Bricker & Eckler LLP
100 South Third Street
Columbus, OH 43215
Office: 614.227.2300
Fax: 614.227.2390

Dylan F. Borchers
Direct Dial: 614.227.4914
dborchers@bricker.com
www.bricker.com
info@bricker.com

March 7, 2022

Via Electronic Filing

Ms. Tanowa Troupe
Administration/Docketing
Ohio Power Siting Board
180 East Broad Street, 11th Floor
Columbus, Ohio 43215-3793

Re: Guernsey Power Station, LLC,
OPSB Case Nos. 16-2443-EL-BGN, 18-0090-EL-BGA, 22-0033-EL-BGA, and 21-0182-EL-BGA

Dear Ms. Troupe:

On behalf of Guernsey Power Station LLC ("GPS"), attached for filing in the above referenced cases is GPS's February 28, 2022 letter that responds to comments provided to the Ohio Environmental Protection Agency letter of February 14, 2022.

If you have any questions please do not hesitate to contact me.

Sincerely,

Dylan F. Borchers

Attachment

cc: Robert Holderbaum (w/Attachment)

HALEY & ALDRICH, INC.
3 Bedford Farms Drive
Bedford, NH 03110
603.391.3325

28 February 2022
File No. 134856-002

Ms. Carol Siegley
Ohio Environmental Protection Agency
Southeast District Office
2195 Front Street
Logan, Ohio 43138-8637

Subject: Response to Application Comments – Water Quality Certification Modification
Guernsey Power Station
Ohio EPA Permit No. DSW 401175544

Dear Ms. Siegley:

On behalf of Guernsey Power Station LLC (GPS), this letter responds to comments provided in the Ohio Environmental Protection Agency (Ohio EPA) letter of 14 February 2022 with regard to the Guernsey Power Station (the Project). Responses are provided below, and – as requested – replacement pages are provided where changes to the application are necessary. Where this is the case, it has been so noted in the response.

ISSUES ASSOCIATED WITH COMMENTS RECEIVED DURING PUBLIC NOTICE PERIOD

Ohio EPA has requested input from GPS on two letters received by Ohio EPA during the public comment period, to which Ohio EPA indicates it will be providing formal responses. Ohio EPA specifically requested input on the following two items:

- Providing an accounting of the wetlands filled; and
- Addressing the comments regarding the laydown yard and private property to the north owned by Brent Ball.

The following information is provided in support of these issues. Comprehensive wetland investigations and permitting to account for all impacts to the Project site have occurred, and authorizations have been granted where appropriate, as further detailed below.

Guernsey Power Station Wetland Resources Formally Delineated

- Formal delineation reports were prepared for the full Project site, including the laydown property owned by Brent Ball. These were reviewed by the U.S. Army Corps of Engineers (USACE) as a part of the individual permit process, and jurisdictional determinations were issued to define the location, extent, and type of wetlands present. See Attachment A for the officially determined wetland locations.

Guernsey Power Station Wetland Avoidance and Minimization

- The Project was sited so that wetland impacts were completely avoided in the generating facility area itself and in the laydown area. Impacts were unavoidable for the electrical switchyard components, so wetlands permitting was necessary in this limited area of the Project.
- Use of the Brent Ball laydown property avoided encroachment into the wetlands, as affirmed by the USACE through the USACE jurisdictional determination. Please see Attachment B, Figure B-1, for an image of a publicly available 2021 aerial photograph on which the relevant wetland boundaries are shown, which illustrates the setback from the wetlands that has been maintained (using silt fencing) for Project work. Attachment B, Figure B-2, provides images taken via drone on February 15, 2022 that illustrate the same careful wetland avoidance.

Robust Individual Permit Review of Comprehensive Guernsey Power Station Wetland Impacts by USACE and Ohio EPA

- An individual permit that addressed all aspects of the Project was submitted to the USACE on July 5, 2017. Jurisdictional determinations were issued on October 23, 2017. The individual permit was issued by the USACE on February 21, 2018 that reflected the permanent discharge of material into approximately 3.07 acres of three wetlands and the temporary discharge of material into approximately 3.46 acres of three wetlands.
- An application for an individual water quality certification was submitted to Ohio EPA on November 17, 2017, following confirmation of the wetland resources at the site and reflecting the same impact information. Based on detailed review, a water quality certification was issued for the project on February 20, 2018. A total of 1.845 acres of wetland conversion was also authorized though this permit.
- A total of 12.1 wetland mitigation credits were purchased as mitigation for this impact from the Ohio Stream and Wetland Foundation.

Additional Review of Potential Guernsey Power Station Issues Associated with Stormwater and Floodplains

- As stormwater management features have been designed for the facility, appropriate filings have been made with Ohio EPA.
- Although projects under the purview of the Ohio Power Siting Board do not require local floodplain approval, GPS voluntarily coordinated with local authorities to obtain a permit for a small portion of incremental encroachment of floodplain within the Brent Ball laydown property from the Guernsey County Floodplain Administrator. Detailed analyses were completed internally for activities south of Wills Creek associated with the electrical equipment. These floodplain analyses and the Brent Ball laydown area approval are provided as Attachment C.

Adjustments in Wetland Impacts Associated with Guernsey Switching Station Electrical Components

- As a result of GPS' coordination with AEP regarding AEP's detailed design and construction requirements, it was determined that adjustments to the areas of wetland impact would be necessary in association with construction of the electrical components of the Project. All of these changes were associated with the electrical components of the Project and not the generating facility or laydown area. On May 20, 2020, requests for permit modifications were

submitted to both the USACE and Ohio EPA to address these changes. Review of these requests resulted in issuance of a USACE Modification on August 17, 2020 and Modification of the Section 401 Water Quality Certification on August 10, 2020 authorizing in total 3.24 acres of permanent fill, 1.85 acres of forested conversion, and 2.86 acres of temporary impact.

- An additional 0.5 wetland credits were obtained from the federally approved Buffalo Fork Mitigation Bank within the Wills Creek watershed.
- As AEP evaluated its safety requirements associated with electric transmission line corridors, the need for additional conversion (but no additional fill) was identified. Because no additional wetland fill was required, the USACE confirmed that no modification of the 404 permit is necessary. Therefore, on September 28, 2021, the Applicant filed for a request for permit modification to reflect 0.8 acres of additional conversion of forested wetland to non-forested wetland.
- A total of 2 mitigation credits will be obtained for this additional impact. At the time the permit application was prepared, GPS could not identify any available credits directly in the Wills Creek watershed. Additional credits in the Wills Creek watershed have subsequently become available. As such, an updated reservation agreement for the purchase of 2 mitigation credits from The Nature Conservancy within the Wills Creek watershed is attached at Attachment D.

All wetland impacts at the site are described above. All impacts have been properly reviewed and permitted where needed by the appropriate jurisdictions, with all associated mitigation implemented. As addressed above and illustrated in the figures provided in Attachment B, all impacts to wetlands in the area of the Brent Ball laydown property have been avoided.

Use of Additional Private Property North of the Brent Ball Laydown Area

The Project's construction contractor, Gemma Power Systems (Gemma), coordinated with Brent Ball (the landowner of the laydown area) separately from the Project, for storage of topsoil for future replacement as well as other uses on Mr. Ball's property located north of the laydown area. Prior to use of this area, Gemma had the Brent Ball private property to the north delineated and has avoided use of any wetland or floodplain areas for their activities. Attachment E provides the wetland delineation, as well as documentation confirming that no wetland permit was required for an in-kind culvert replacement for access.

In addition to this wetland delineation and avoidance, Gemma obtained a Special Flood Hazard Area Development Permit associated with the replacement-in-kind of the culvert associated with the existing access to the Brett Ball private property (also provided in Attachment E). Finally, Attachment E provides a layout drawing further indicating that delineated wetlands and floodplain have been avoided in association with activities in this location.

MITIGATION PLAN

The Natural Conservancy has been contacted and a revised reservation letter is provided in Attachment D that confirms purchase of the mitigation credits from the Wills Creek watershed. The revised pages of the application that reflect this issue are also provided in Attachment D (incorporating the following information in the header: the project name, the Ohio EPA identification number, the revision date, and the revision number).

Do not hesitate to let us know if you have questions with regard to this information. Thank you in advance for your efforts as we work through the permit modification process.

Sincerely yours,

HALEY & ALDRICH, INC.

Lynn Gresock
Principal Consultant

Attachments:

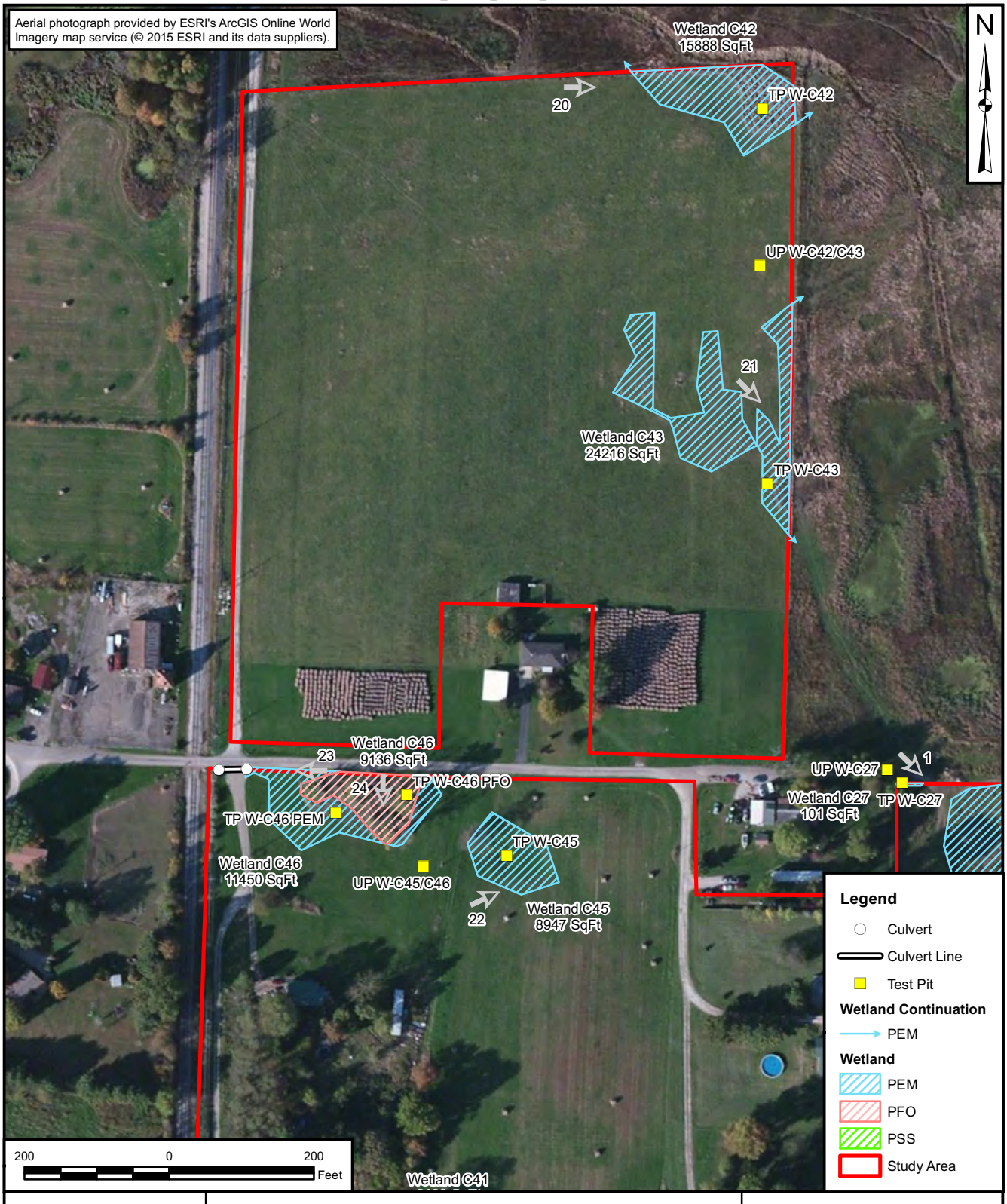
- Attachment A – Guernsey Power Station Formally Delineated Wetlands
- Attachment B – Guernsey Power Station Laydown Area
  - Figure B-1 – GPS Laydown Area, Floodplain, and Delineated Wetlands (2021 Aerial)
  - Figure B-2 – GPS Laydown Area (2022 Drone Photographs)
- Attachment C – Guernsey Power Station Floodplain Documentation
  - Special Flood Hazard Area Development Permit – GPS Laydown Area
  - Floodplain Development Permit Application – GPS Laydown Area
  - Hydrology and Hydraulic Analysis – GPS Switchyard Site
- Attachment D – Updated Wetland Mitigation Credit Reservation Agreement
  - Reservation Agreement
  - Updated Application Pages
- Attachment E – Brent Ball Private Property Documentation
  - Existing Environmental Conditions Map
  - Access Road Culvert Replacement – Nationwide Permit 03 – Maintenance
  - Special Flood Hazard Area Development Permit – Culvert Replacement
  - Gemma Off-Site Fill Placement Plan

cc: GPS; Attn: M. Garber, T. Grace, J. Wanalista, and G. Conboy

Attachment A –
Guernsey Power Station Formally Delineated Wetlands

Enclosure 1

PGH P:\GIS\GUERNSEYPOWERSTATION\MXD\GUERNSEYPOWERSTATION_NORTH_DETAIL_LETTER.MXD 10/06/17 SP



TETRA TECH

DETAIL MAP

GUERNSEY POWER STATION

GUERNSEY POWER STATION, LLC

GUERNSEY COUNTY, OHIO

DRAWN BY: S. PAXTON 10/06/17
CHECKED BY: K. McCLUSKEY 10/06/17
APPROVED BY: P. SMITH 10/06/17

CONTRACT NUMBER: 212IC-CF-00122

FIGURE NUMBER	REV
4-1	0

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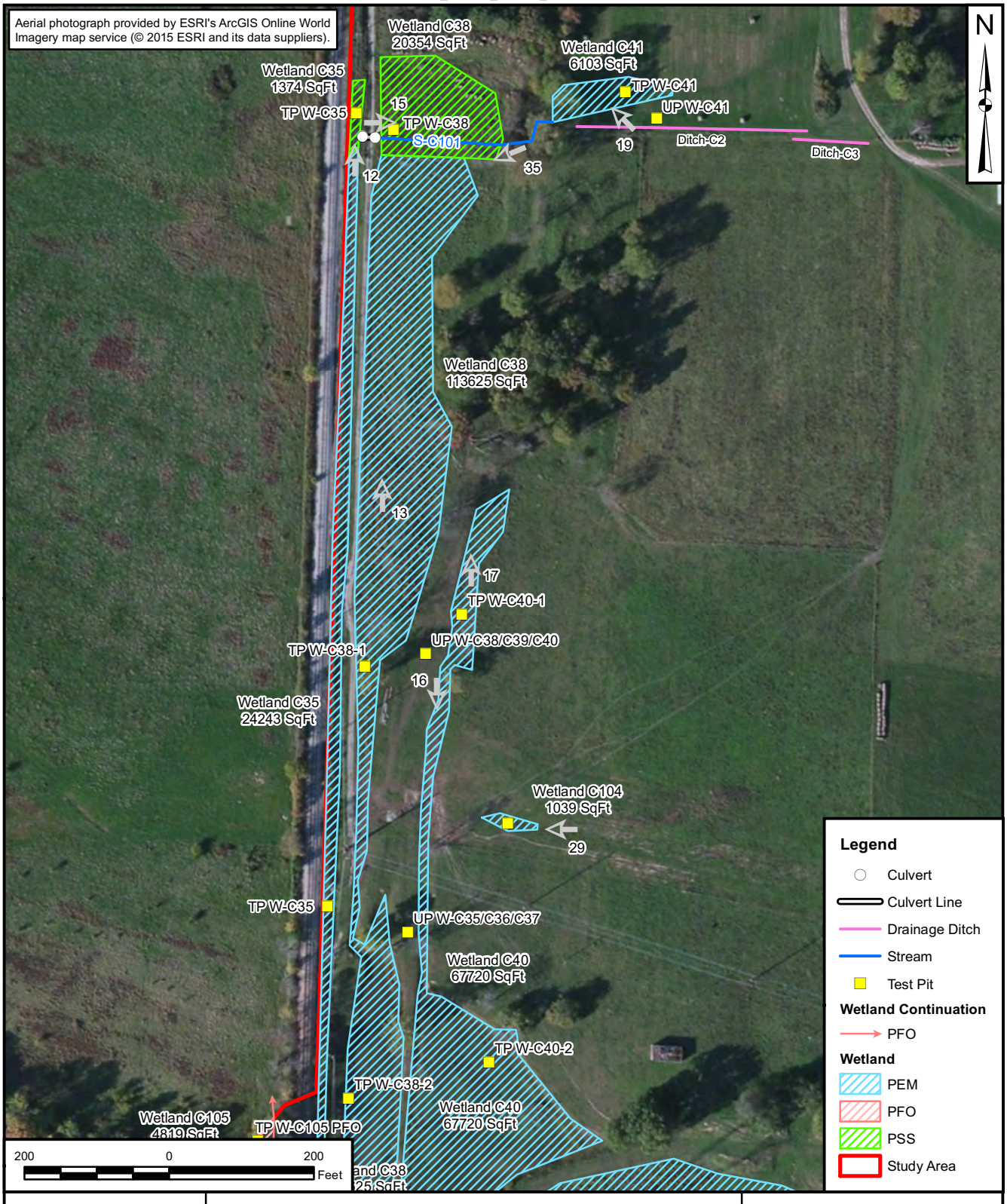

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FIGURE NUMBER	REV
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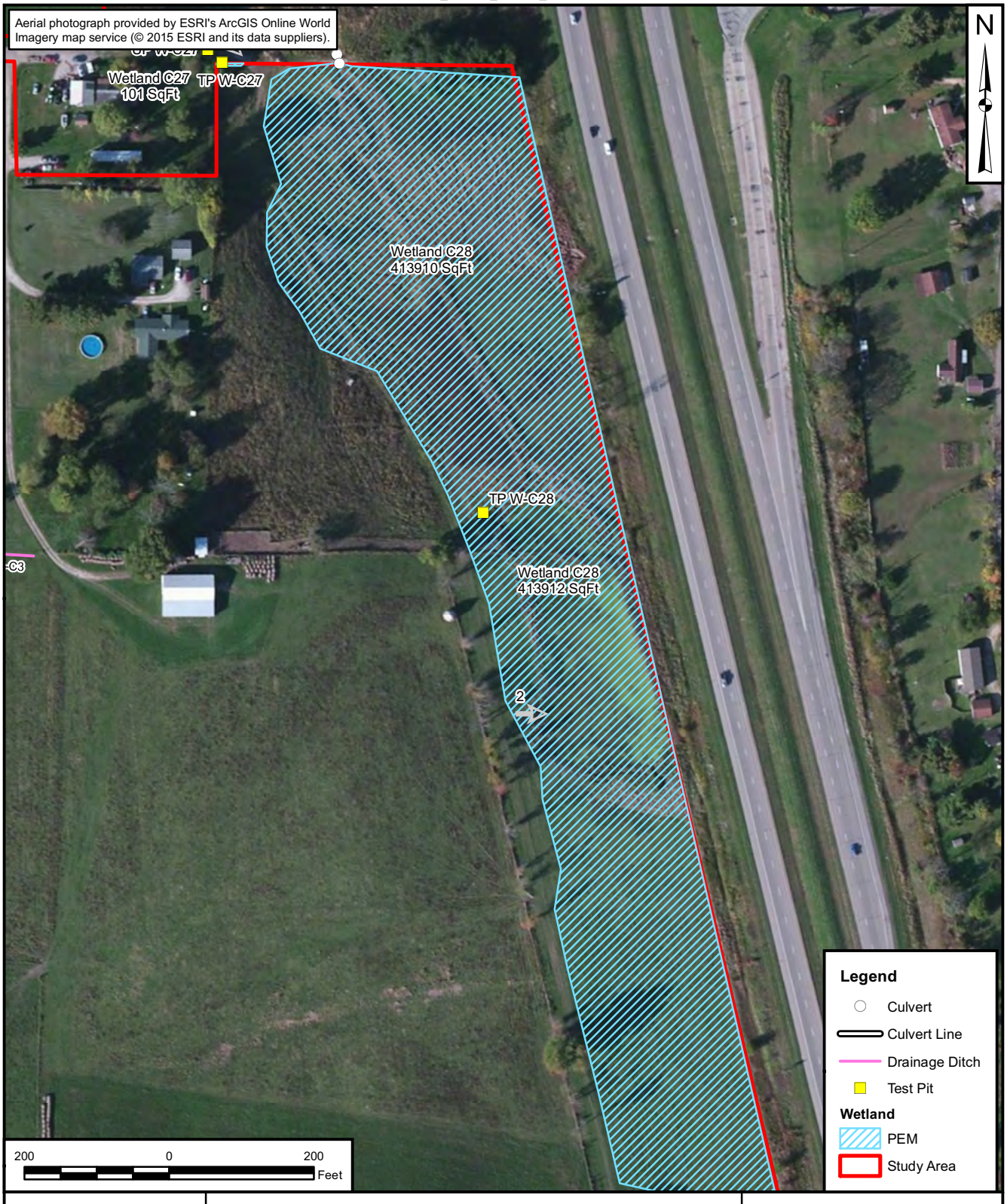

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CONTRACT NUMBER: 212IC-CF-00122

FIGURE NUMBER	REV
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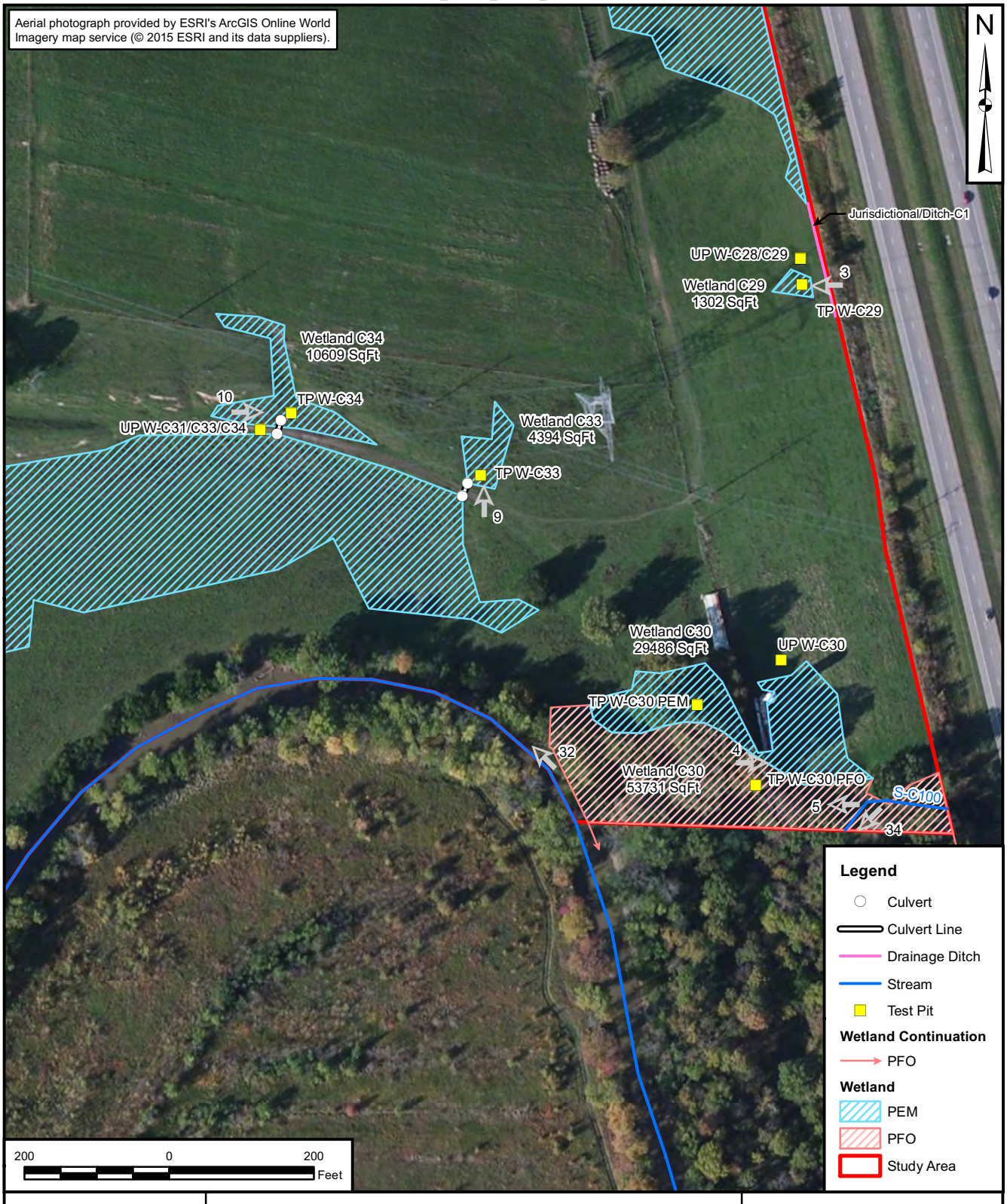

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FIGURE NUMBER	REV
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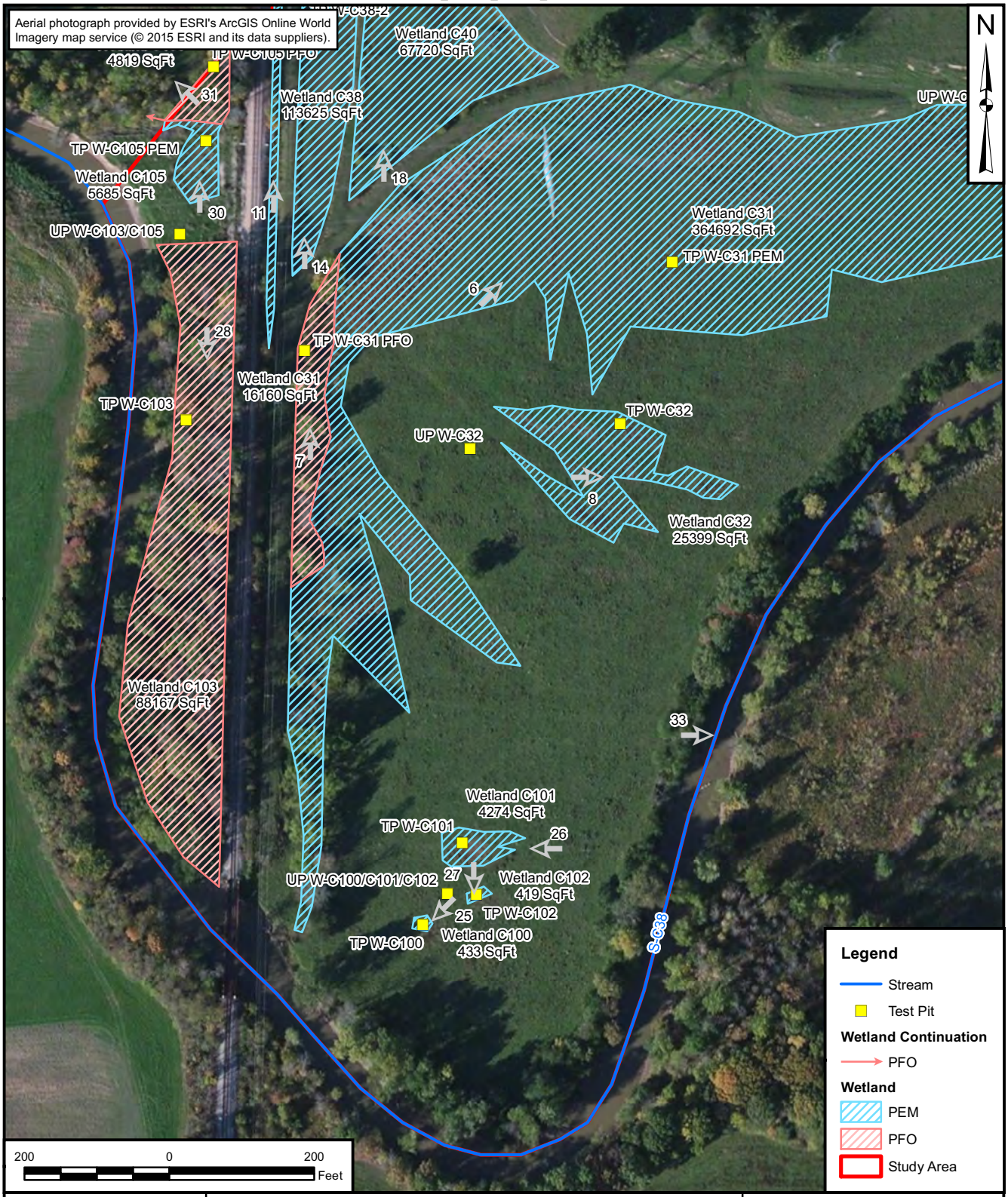

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FIGURE NUMBER	REV
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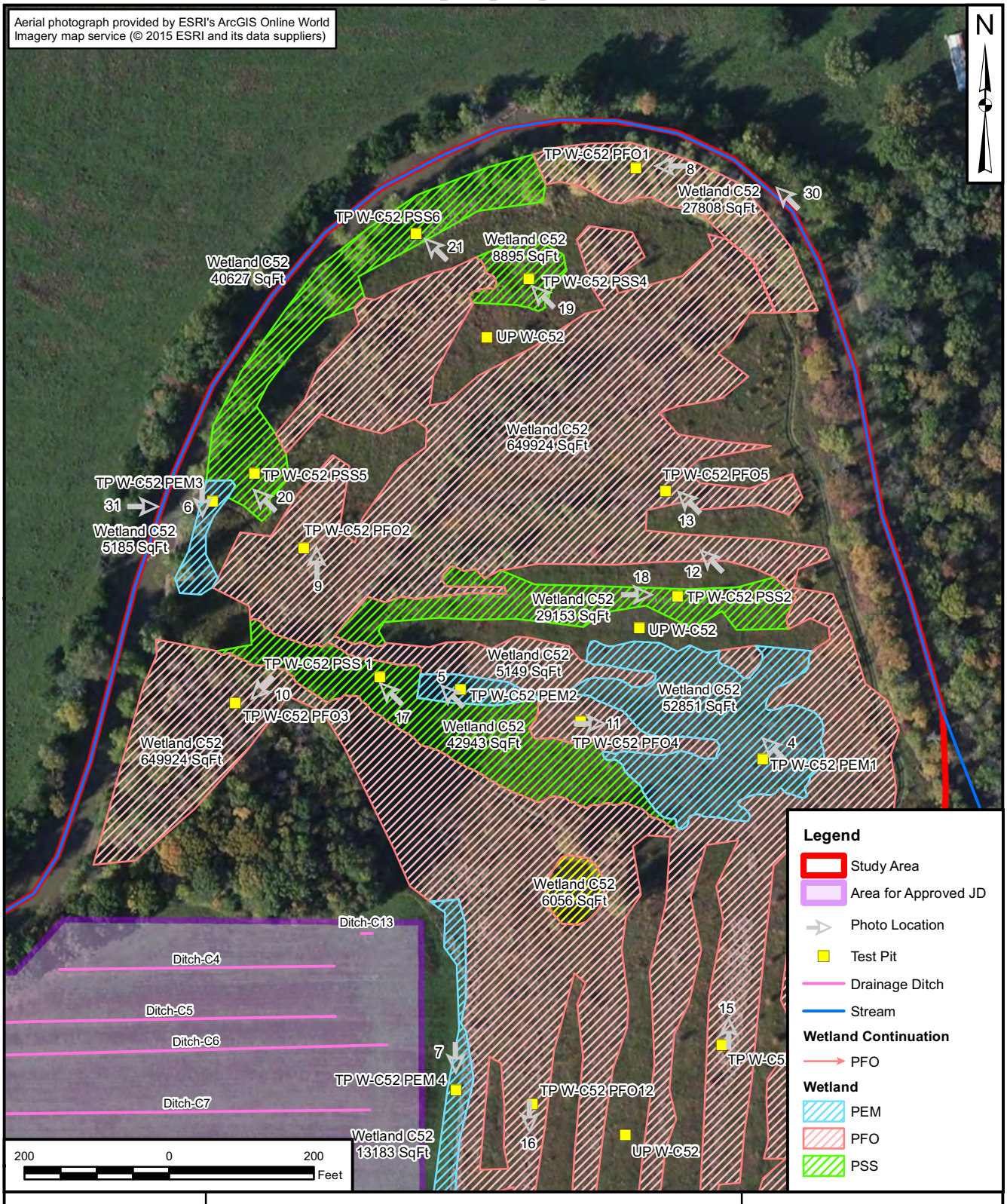

TETRA TECH

DETAIL MAP
GUERNSEY POWER STATION (SOUTH)
INTERCONNECTION PROPERTY
GUERNSEY POWER STATION LLC
GUERNSEY COUNTY, OHIO

DRAWN BY: S. PAXTON 10/06/17
CHECKED BY: K. McCLUSKEY 10/06/17
APPROVED BY: P. SMITH 10/06/17

CONTRACT NUMBER: 212IC-CF-00122

FIGURE NUMBER	REV
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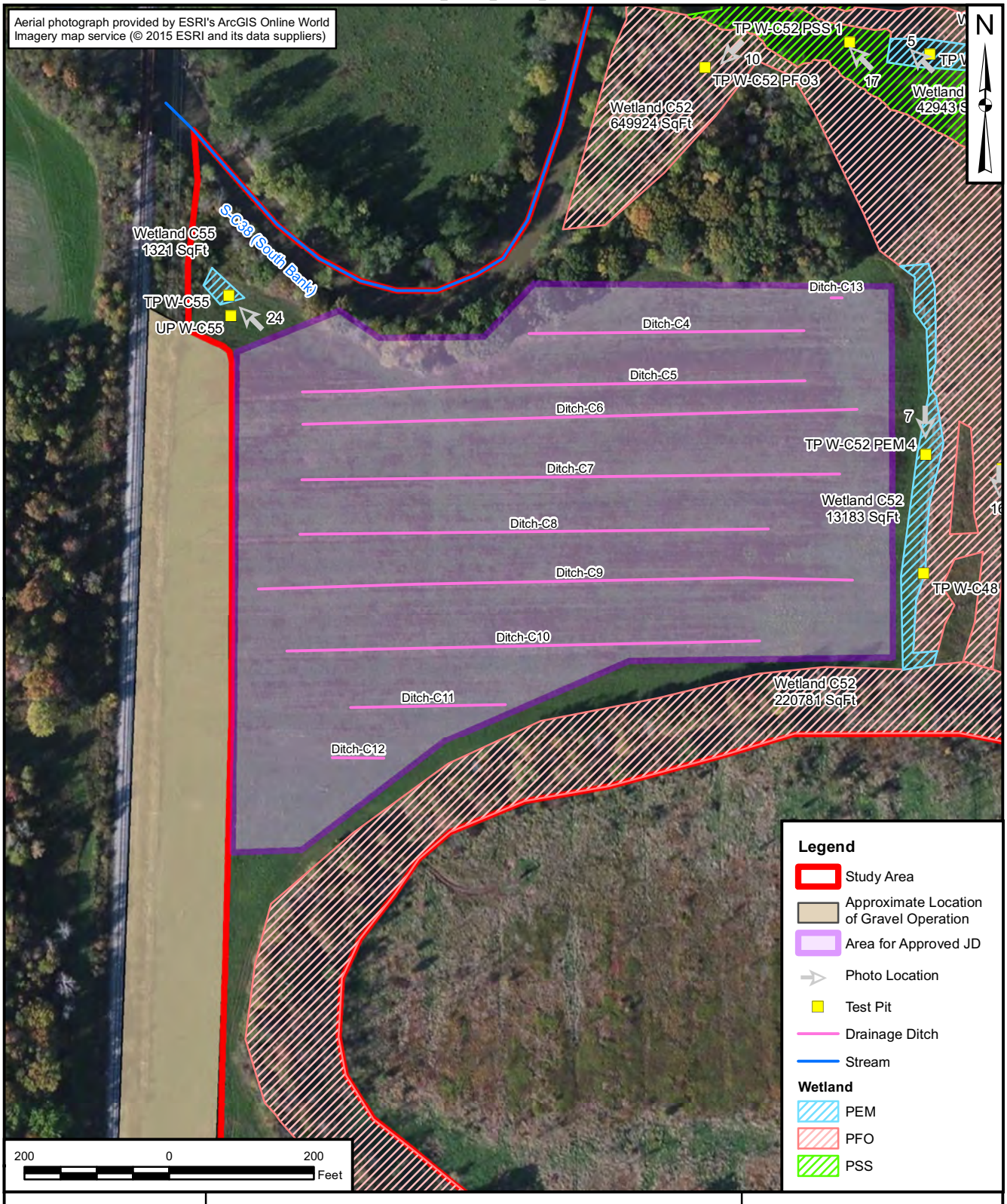

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FIGURE NUMBER	REV
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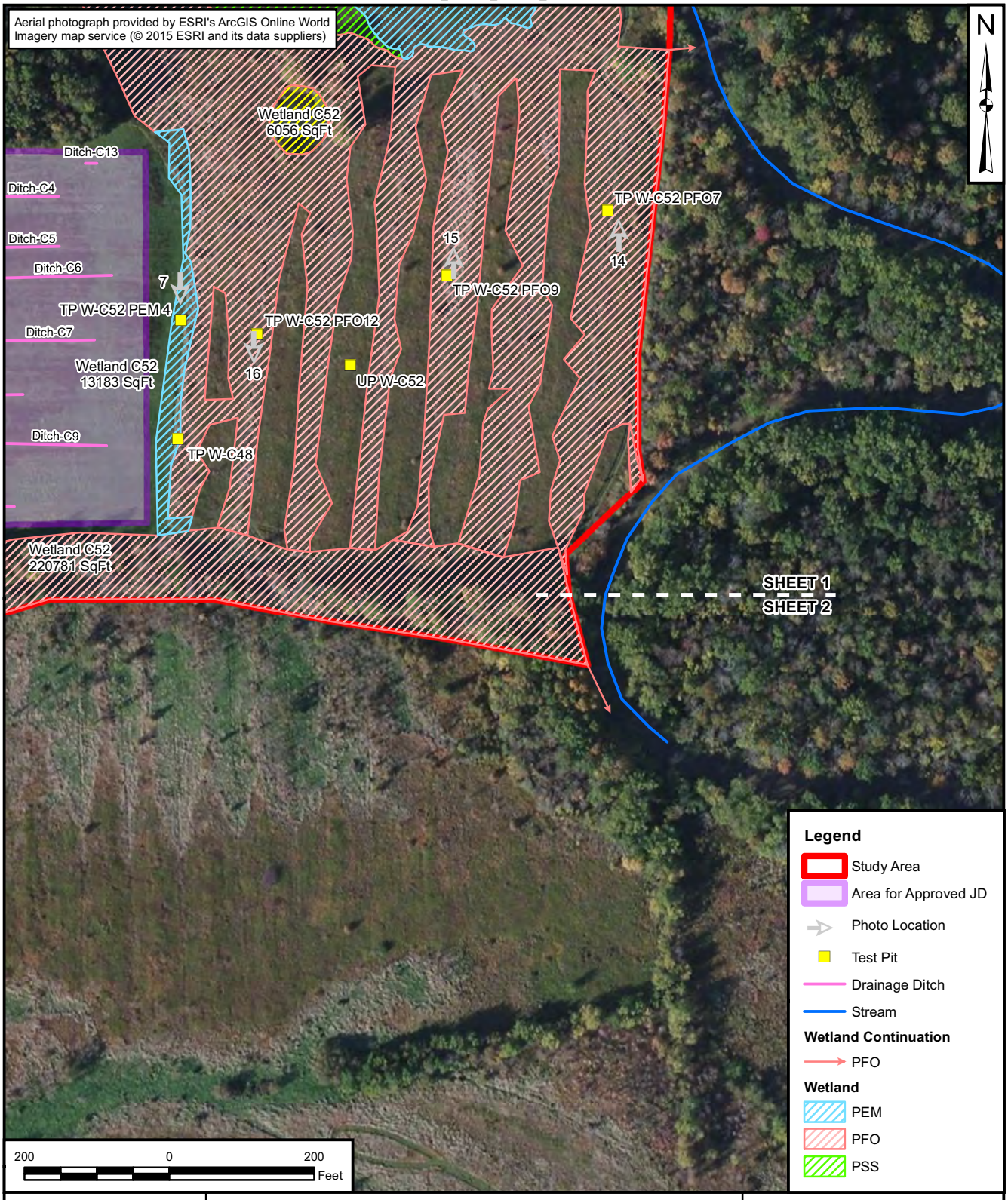

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FIGURE NUMBER	REV
4-3	0

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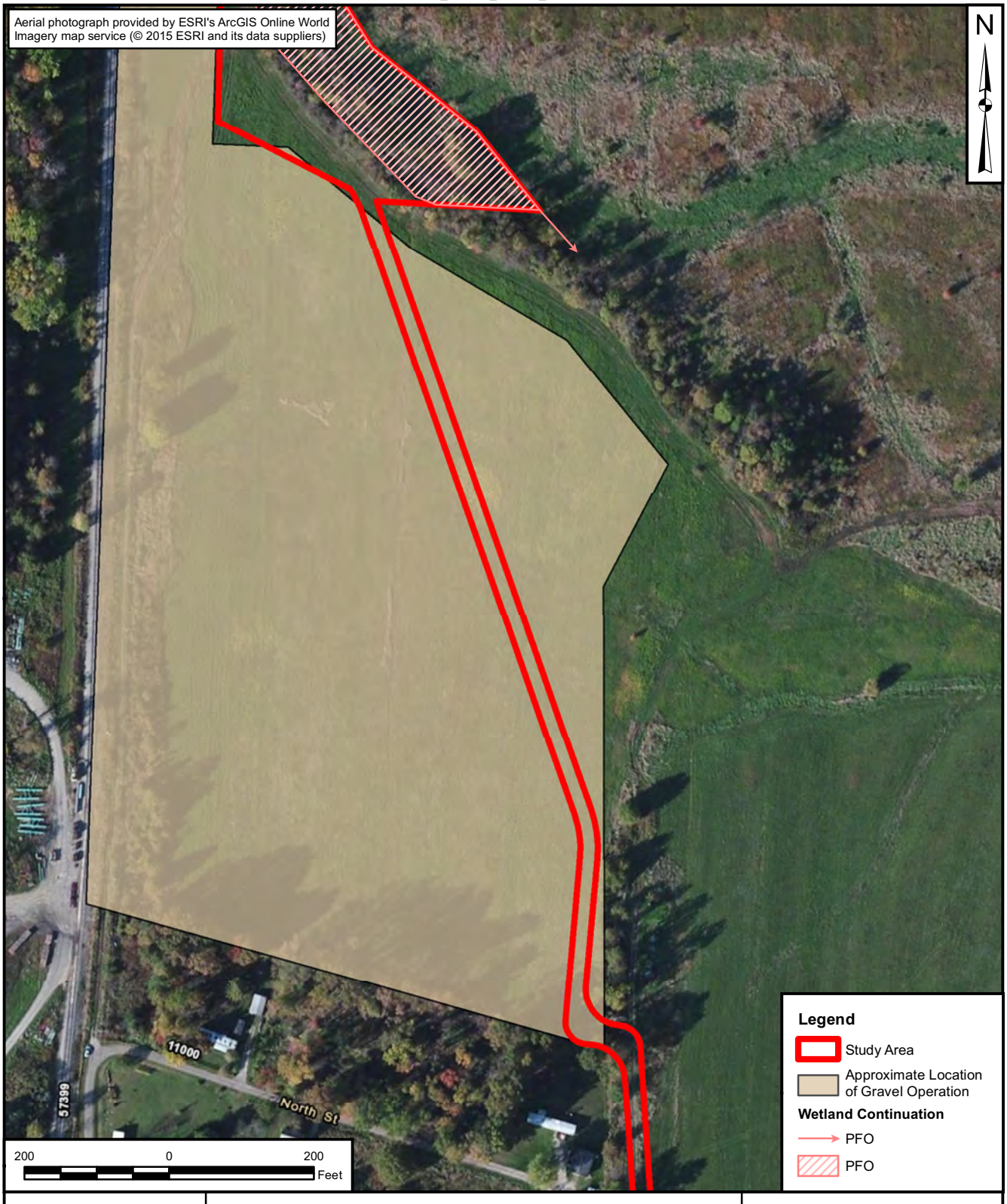

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GUERNSEY COUNTY, OHIO

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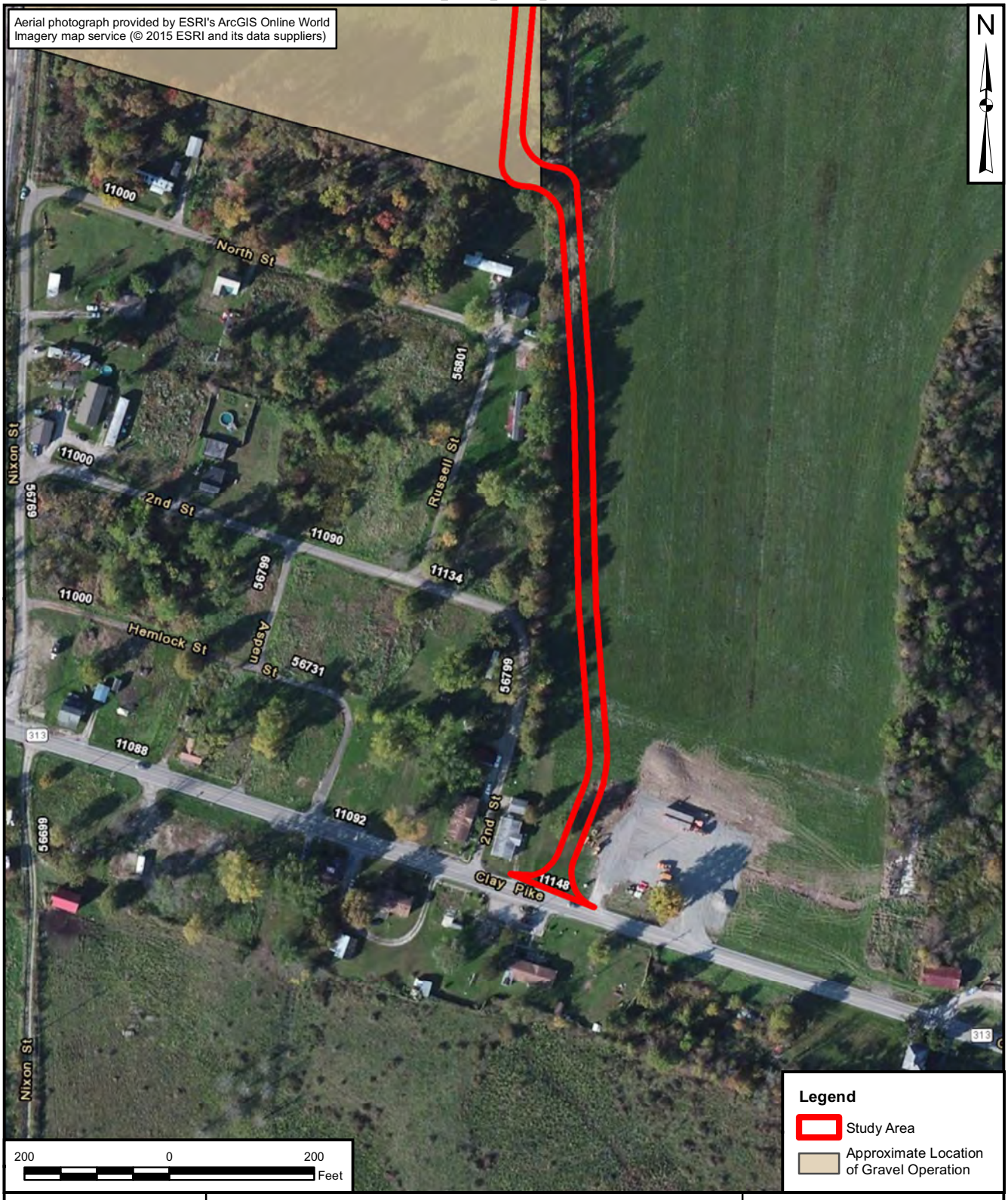

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GUERNSEY POWER STATION LLC
GUERNSEY COUNTY, OHIO

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CHECKED BY: K. McCLUSKEY 10/06/17
APPROVED BY: P. SMITH 10/06/17

CONTRACT NUMBER: 212IC-CF-00122

FIGURE NUMBER	REV
4-5	0

Attachment B –
Guernsey Power Station Laydown Area

- Figure B1 – GPS Laydown Area, Floodplain, and Delineated Wetlands (2021 Aerial)
- Figure B2 – GPS Laydown Area (2022 Drone Photographs)

LEGEND

- Wet Avoidance
- Delineated Wetlands Area
- Guernsey Facility Site
- Laydown Area
- 1% Annual Chance Flood Hazard

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. FLOODPLAIN HAZARD DATA SOURCE: FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) NATIONAL FLOOD HAZARD LAYER (NFHL)
3. AERIAL IMAGERY SOURCE: ESRI

N

0 160 320

SCALE IN FEET

HALEY ALDRICH

GPS LAYDOWN AREA, FLOODPLAIN, AND DELINEATED WETLANDS (2021 AERIAL)

FEBRUARY 2022

FIGURE B-1

GIS: \\haleyaldrich.com\share\CF\Projects\134856\GIS\134856_OPSB_DelWetlands.mxd - awest - 2/25/2022 4:52:52 PM

LEGEND

Laydown Area

NOTES

1. ALL LOCATIONS AND DIMENSION ARE APPROXIMATE

N

0 100 200

SCALE IN FEET

HALEY ALDRICH

GPS LAYDOWN AREA
(2022 DRONE PHOTOGRAPHS)

FEBRUARY 2022

FIGURE B-2

Attachment C –
Guernsey Power Station Floodplain Documentation

- Special Flood Hazard Area Development Permit – GPS Laydown Area
- Floodplain Development Permit Application – GPS Laydown Area
- Hydrology and Hydraulic Analysis – GPS Switchyard Site

Special Flood Hazard Area Development Permit –
GPS Laydown Area

PERMIT # FP-1910

SPECIAL FLOOD HAZARD AREA DEVELOPMENT PERMIT

Guernsey Power Station

APPLICANT

Fill an area of parcel 110003449000 (11152 Seneca Ln., Byesville) to an elevation above the estimated flood elevation as per the attached map. The area will be graded to be used as a parking lot and construction laydown for the Guernsey Power Station. The proposed fill will have a minimal impact of 0.01 ft in the floodplain area.

ACTIVITY DESCRIPTION

1.0 Is the proposed development in:
_____an identified floodway
_____a flood hazard area where base flood elevations exist with no identified floodway
__X__an area within the floodplain fringe
_____an approximate flood hazard area ZONE AO

2.0 The proposed development meets the Standards of Section 4.0 of the regulations.

3.0 Base flood elevation (100-year) at proposed site Zone A: Base flood elevations are not determined. feet m.s.l.
Data source Flood Insurance Rate Map & Flood Insurance Study Guernsey County, Ohio
Map effective date: 8/11/2011 Community Panel No. 39059C0283D.

4.0 Does the structure contain?:
N/A basement N/A enclosed area other than basement below lowest floor

5.0 For structures located in approximate AO zones (no BFE available) the structure's lowest floor is N/a feet above the highest grade adjacent to the structure.

6.0 The proposed development is in compliance with applicable floodplain standards.
PERMIT ISSUED ON 10/17/2019.

7.0 The proposed development is not in compliance with applicable floodplain standards.
PERMIT DENIED ON N/A.
Reason: N/A.

8.0 The proposed development is exempt from the floodplain standards per Section N/A of the Flood Damage Reduction Resolution.

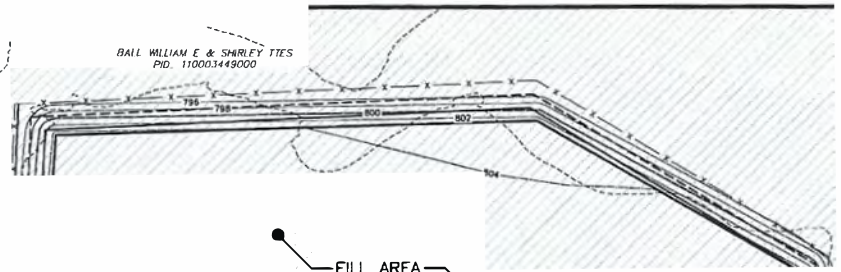
Administrator's Signature: Gerry Beckner Date: 10/17/19
Gerry Beckner, Director of Emergency Management

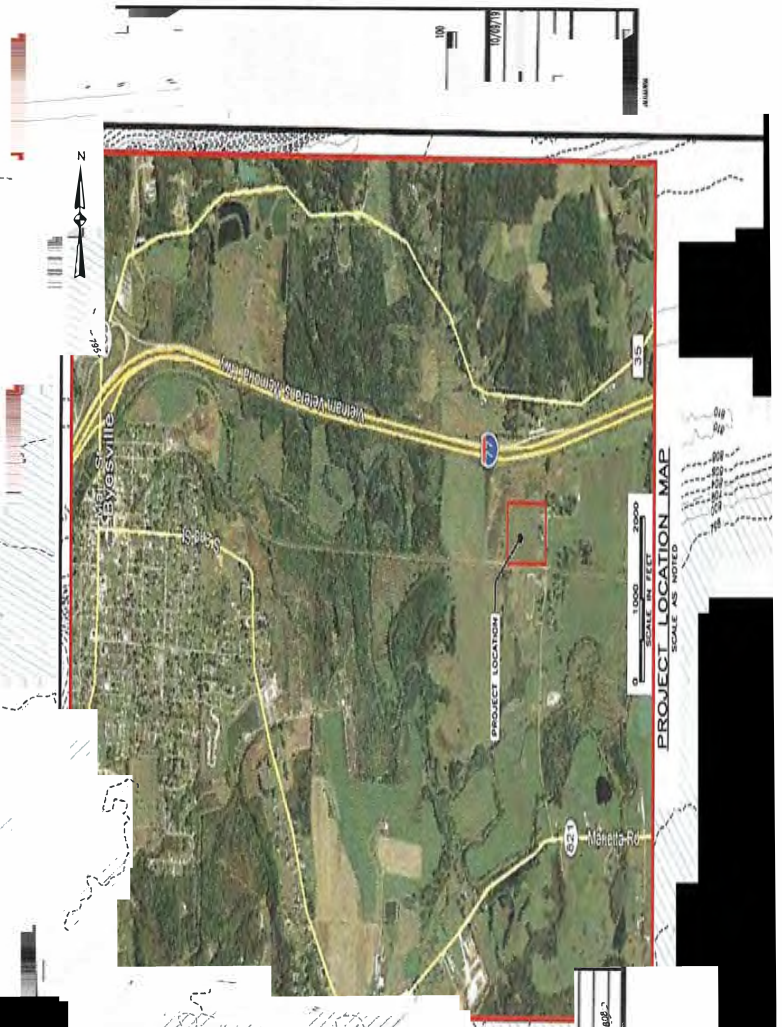
9.0 The certified as-built elevation of the structure's lowest floor is N/A feet above msl.*

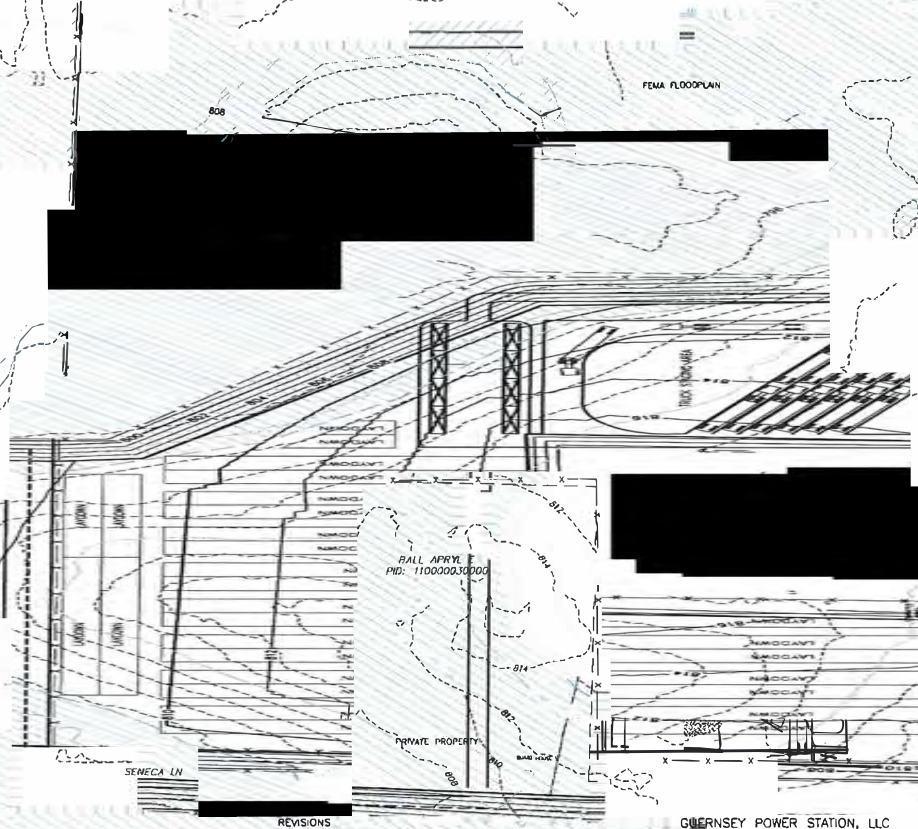
10.0 The certified as-built floodproofed elevation of the structure is N/A feet above msl.*

NOTE *Certification by registered engineer or land surveyor documenting these elevations is necessary if elevations are provided by applicant.

AS BUILT ELEVATIONS SHALL BE PROVIDED AND CERTIFIED BY A REGISTERED SURVEYOR







[redacted]

[redacted]

[redacted]

[redacted]

EARTHWORK SUB-SUMMARY

DESCRIPTION	QUANTITY	UNITS
RAW CUT (EXIST. TO PAD SUBGRADE	965	CY
RAW FILL (EXIST. TO PAD SUBGRADE	104,010	CY
PAD EARTHWORK BALANCE (RAW CUT TO FILL	98,045 (IMPORT)	CY
TOPSOIL STOCKPILED (9" AVG.)		
PLACING STOCKPILED TOPSOIL 4"		
EXCESS TOPSOIL		
NET SITE EARTHWORK = 98,045 CY IMPORT		

NOTE:
ALL INFORMATION USED TO PREPARE THIS SITE PLAN AND EARTH WORK CALCULATIONS IS BASED ON SITE PLAN AND GROSSIN CONTROL PLAN PROVIDED BY GEMMA POWER SYSTEMS, LLC. AND CESO FLOODPLAIN IMPACT ANALYSIS.

LEGEND

- EXISTING 10' CONTOUR
- EXISTING 2' CONTOUR
- PROPOSED 10' CONTOUR
- PROPOSED 2' CONTOUR
- EDGE OF PAVEMENT
- PAD EXTENTS
- FENCE
- EXISTING PROPERTY LINE
- FEMA FLOODPLAIN

50
SCALE IN FEET

Ohio Utilities Protection Service
Call 811 before you dig

TETRA TECH

www.tetratech.com
6715 TIPPECANOE ROAD - SUITE C201
CANFIELD, OH 44406
T (330) 286-3681 F: (330) 286-3573

REVISIONS

REMARKS

GUERNSEY POWER STATION, LLC
JACKSON TOWNSHIP

CAITHNESS GUERNSEY POWER STATION
SITE PLAN

GUERNSEY COUNTY, OH

DATE:
PROJECT NO.: 212IC-CF-00.229
DESIGNED BY: ST
DRAWN BY: JK
CHECKED BY: LD

FIGURE 1

SHEET 1 OF

National Flood Hazard Layer FIRMette

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Area of 1% annual chance flood with average depth less than one foot or with drainag areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN — Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- Cross Sections with 1% Annual Chance
- Water Surface Elevation
- Coastal Transect
- 513 — Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represe an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 10/18/2019 at 8:12:09 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Floodplain Development Permit Application –
GPS Laydown Area

October 16, 2019

Ms. Gerry Beckner
Emergency Management Coordinator
Guernsey County
627 Wheeling Avenue, Suite 302
Cambridge, Ohio 43725

SUBJECT: Floodplain Development Permit Application
Guernsey Power Station Laydown Yard
Valley Township, Guernsey County, Ohio
Tetra Tech Project Number 212-C-CF-00273

Dear Ms. Beckner:

On behalf of Guernsey Power Station, Tetra Tech has prepared this follow-up to your recent correspondence on the issue of the Guernsey Power Station's need to obtain a floodplain permit from your office. Included with this correspondence is the Project's Floodplain Development Application and corresponding documentation.

Specifically, the Guernsey County EMA is requesting a floodplain permit for the Project's laydown yard. By way of background, the Project received a letter dated December 6, 2017 from the Guernsey County Engineer informing the Project that "major utility facilities that require permitting through the Ohio Power Siting Board are exempt from filing a Floodplain Development Permit." As a result, the County Engineer concluded, no permit application is required of the Project.

It is our understanding that the Guernsey County EMA's interpretation that the exemption of "major utility facilities" does not apply to the Project's laydown yard. However, the Project has interpreted the term to be inclusive of the laydown yard. The laydown yard was included as a necessary component of the Project in the application to the Ohio Power Siting Board and was fully evaluated and approved with the other Project's components by the Ohio Power Siting Board. In sum, it is the Project's interpretation that the laydown yard is jurisdictional to the Ohio Power Siting Board and is part and parcel to the meaning of "major utility facility."

Nonetheless, it is the Project's overriding objective to be cooperative and responsive to requests from county and local officials. As such, we respectfully submit the Project's Floodplain Development application. We appreciate the communications thus far on this matter, and please do not hesitate to let us know if you have any follow-up questions about the application.

Note that the proposed work within the floodplain is limited to fill from excess earthwork, with no proposed structures to be constructed. Based on the required Application Requirements, the following is a summary of the required items.

Tetra Tech, Inc.
6715 Tippecanoe Road, Suite C201, Canfield, OH 44406
Tel 330.286.3683 Fax 330.286.3573 www.tetratech.com

Application Form

The completed application form is presented in Attachment A.

Application Items

Item a: Site Plan

The proposed site plan is presented in Attachment B. The shows a scaled map with existing and proposed contours and a summary of the volume of fill material that will be placed in the floodplain. The map also indicates the boundary of the FEMA 100-year Floodplain.

Item b: Elevation of Existing Grade for Proposed Structures

No structures will be built in the floodplain. They will be used for parking and construction laydown.

Item c: Elevation of Structures

No structures will be constructed within the floodplain area.

Item d: Additional Information Requested by Floodplain Administrator

No additional information was requested by the Floodplain Administrator.

Item e: Technical Analysis

A technical analysis was conducted by CESO in April 2019 and included the proposed parking and laydown area. Based on the results of the study conducted by CESO, no significant impacts would result from the filling within the floodplain with a calculated impact of 0.01 feet, well below the 1-foot impact limit. A copy of the analysis is presented in Attachment C.

If you have any questions on the information provided, please feel free to contact me at 330-286-3683 or larry.drane@tetratech.com.

TETRA TECH, INC.

Sincerely,

Lawrence A. Drane, III, P.G.
Canfield Ohio Operations Manager

ATTACHMENT A
APPLICATION FORM

SPECIAL FLOOD HAZARD AREA DEVELOPMENT PERMIT APPLICATION

Application is hereby made for FLOODPLAIN DEVELOPMENT PERMIT as required by the Flood Damage Reduction Resolution of the Guernsey County Commissioners for development in an identified flood hazard area. All activities shall be completed in accordance with the requirements of said Resolution. The development to be performed is described below and in attachments hereto. The applicant understands and agrees that:

- This permit is issued on the conditions and facts described;
- Any permit may be repealed if conditions or facts change;

Brent Ball	Guernsey Power Station
Owner's Name	Applicant
12885 Ridgeview Rd, New Concord, C	565 Fifth Ave., 29th Floor, NY, NY
Address	Address
740-255-1404	770-356-6700
Phone #	Phone #

DESCRIPTION OF WORK:

1. Location of proposed development site address: 11152 Seneca Ln. Byesville, Ohio
   Legal description: Parcel 11000343800

2. Kind of development proposed (check all that apply):

☐ new building	☐ alteration	■ grading
☐ residential	☐ addition	☐ watercourse alteration
■ non residential	☐ accessory bldg.	☐ construction
☐ manufactured home	☐ materials storage	☐ remodeling
☐ existing structure	■ filling	☐ other

Describe activity: The area will be graded and a portion of the 100-year floodplain will be partially filled. The area will be used for parking and construction laydown for the Guernsey Power Station which is being constructed to the south of this area.

If the proposed construction is an alteration, remodeling, or expanding to an existing structure, indicate the cost of proposed construction: $NA. What is the estimated market value of the existing structure? $NA

I AGREE THAT ALL STATEMENTS IN AND ATTACHMENTS TO THIS APPLICATION ARE A TRUE DESCRIPTION OF THE EXISTING PROPERTY AND THE PROPOSED DEVELOPMENT ACTIVITY. I UNDERSTAND THE DEVELOPMENT REQUIREMENTS FOR SPECIAL FLOOD HAZARD AREA ACTIVITIES PER THE APPROPRIATE RESOLUTION AND AGREE TO ABIDE THERETO. I UNDERSTAND IT IS MY RESPONSIBILITY TO OBTAIN ALL APPLICABLE FEDERAL, STATE, AND LOCAL PERMITS.

[signature] for Guernsey Power Station — 10/16/19

Applicant's Signature — Date

FLOODPLAIN DEVELOPMENT PERMIT REQUIREMENTS

- **Floodplain Development Permits**
  It shall be unlawful for any person to begin construction or other development activity including but not limited to filling; grading; construction; alteration, remodeling, or expanding any structure; or alteration of any watercourse wholly within, partially within or in contact with any identified special flood hazard area until a floodplain development permit is obtained from the Floodplain Administrator. Such floodplain development permit shall show that the proposed development activity is in conformity with the provisions of these regulations. No such permit shall be issued by the Floodplain Administrator until the requirements of these regulations have been met.

- **Application Required**
  An application for a floodplain development permit shall be required for all development activities located wholly within, partially within, or in contact with an identified special flood hazard area. Such application shall be made by the owner of the property or his/her authorized agent, herin referred to as the applicant, prior to the actual commencement of such construction. Where it is unclear whether a development site is in a special flood hazard area, the Floodplain Administrator may require an application for a floodplain development permit to determine the development's location. All applications shall include, but not be limited to:
    a. Site plans drawn to scale showing the nature, location, dimensions, and topography of the area in question; the location of existing or proposed structures, fill, storage of materials, drainage facilities, and the location of the foregoing.
    b. Elevation of the existing, natural ground where structures are proposed.
    c. Elevation of the lowest floor, including basement, of all proposed structures.
    d. Such other material and information as may be requested by the Floodplain Administrator to determine conformance with, and provide enforcement of these regulations.
    e. Technical analyses conducted by the appropriate design professional registered in the State of Ohio and submitted with an application for a floodplain development permit when applicable:

       1. Floodproofing certification for non-residential floodproofed structure as required in Section 4.5.
       2. Certification that fully enclosed areas below the lowest floor of a structure not meeting the design requirements of Section 4.4 (E) are designed to automatically equalize hydrostatic flood forces.
       3. Description of any watercourse alteration or relocation that the flood carrying capacity of the watercourse will not be diminished, and maintenance assurances as required in Section 4.9 (C)
       4. A hydrologic and hydraulic analysis demonstrating that the cumulative effect of proposed development, when combined with all other existing and anticipated

development will not increase the water surface elevation of the base flood by more than one foot in special flood hazard areas where the Federal Emergency Management Agency has provided base flood elevations but no floodway as required by Section 4.0 (B)

5. A hydrologic and hydraulic engineering analysis showing impact of any development of flood heights in an identified floodway as required by Section 4.9 (A).
6. Generation of base flood elevation(s) for subdivision and large-scale developments as required by Section 4.3.
7. The Floodplain Administrator shall review all floodplain development permit applications to assure that all necessary permits have been received from those federal, state or local governmental agencies from which prior approval is required. The applicant shall be responsible for obtaining such permits as required including permits issued by the U.S. Army Corps of Engineers under Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act, and the Ohio Environmental Protection Agency under Section 401 of the Clean Water Act.

- **Approval**

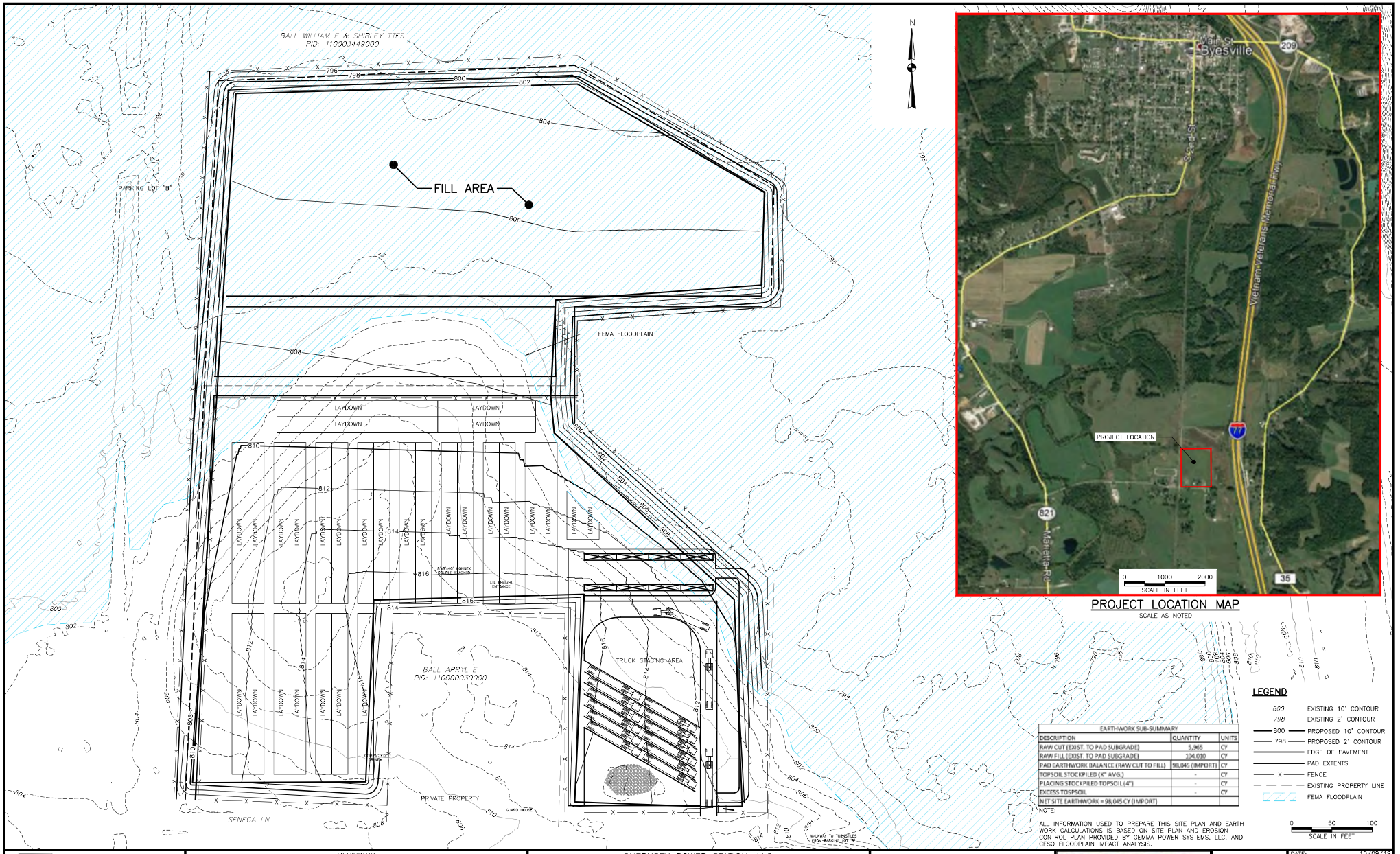
  Within thirty (30) days after the receipt of a complete application, the Floodplain Administrator shall either approve or disapprove the applications. If any application is approved, a floodplain development permit shall be issued. All floodplain development permits shall be conditional upon the commencement of work within one (1) year. A floodplain development permit shall expire on (1) year after issuance unless the permitted activity has been substantially begun and is thereafter pursued to completion.

- **Post-Construction Certifications Required**

  The following as-built certifications are required after a floodplain development permit has been issued:

  a. For new or substantially improved residential structures, or nonresidential structures that have been elevated, the applicant shall have a Federal Emergency Management Agency Elevation Certificate completed by a registered surveyor to record as-built elevation data. For elevated structures in Zone A and Zone AO areas without a base flood elevation, the elevation certificate may be completed by the property owner or owner's representative.
  b. For all development activities subject to the standards of Section 3.10 (A), a Letter of Map Revision.

ATTACHMENT B
SITE PLAN



PROJECT LOCATION MAP
SCALE AS NOTED

EARTHWORK SUB-SUMMARY		
DESCRIPTION	QUANTITY	UNITS
RAW CUT (EXIST. TO PAD SUBGRADE)	5,965	CY
RAW FILL (EXIST. TO PAD SUBGRADE)	104,010	CY
PAD EARTHWORK BALANCE (RAW CUT TO FILL)	98,045 (IMPORT)	CY
TOPSOIL STOCKPILED (X" AVG.)	-	CY
PLACING STOCKPILED TOPSOIL (4")	-	CY
EXCESS TOSPSOIL	-	CY
NET SITE EARTHWORK = 98,045 CY (IMPORT)		

NOTE:

ALL INFORMATION USED TO PREPARE THIS SITE PLAN AND EARTH WORK CALCULATIONS IS BASED ON SITE PLAN AND EROSION CONTROL PLAN PROVIDED BY GEMMA POWER SYSTEMS, LLC. AND CESO FLOODPLAIN IMPACT ANALYSIS.

LEGEND

- 800 EXISTING 10' CONTOUR
- 798 EXISTING 2' CONTOUR
- 800 PROPOSED 10' CONTOUR
- 798 PROPOSED 2' CONTOUR
- EDGE OF PAVEMENT
- PAD EXTENTS
- X FENCE
- EXISTING PROPERTY LINE
- FEMA FLOODPLAIN

0 50 100
SCALE IN FEET

TETRA TECH
www.tetratech.com
6715 TIPPECANOE ROAD - SUITE C201
CANFIELD, OH 44406
T: (330) 286-3683 | F: (330) 286-3573

REVISIONS

NO.	BY	DATE	REMARKS

GUERNSEY POWER STATION, LLC
JACKSON TOWNSHIP

CAITHNESS GUERNSEY POWER STATION
SITE PLAN

GUERNSEY COUNTY, OH

Ohio Utilities Protection Service
Call 811 before you dig

DATE:	10/09/19
PROJECT NO.:	212IC-CF-00229
DESIGNED BY:	ST
DRAWN BY:	JK
CHECKED BY:	LD

FIGURE 1

SHEET 1 OF 1

X:\CADD_Boston\00122 - Guernsey Power Station\Figures\Flood Plain Figure\00229FIG1 - Flood Plain Figure.dwg CAN JAMUSINSKI 10/11/2019 8:40:43 AM

ATTACHMENT C
TECHNICAL ANALYSIS

FLOODPLAIN IMPACT ANALYSIS

Gemma Power Systems, LLC
Guernsey Power Station
Byesville, Ohio
26 April 2019

Table of Contents

FLOODPLAIN IMPACT ANALYSIS

I. Introduction

Gemma Power Systems, LLC is proposing new construction of a natural gas power plant (denoted as 'Project Area'), and associated construction Laydown Yard in Guernsey County, Ohio, south of the City of Byesville. The project is located at the eastern extent of Seneca Lane (Twp Rd 2360), with the primary Project Area being south of Seneca Lane, and the construction Laydown Yard located north of Seneca Lane.

Figure 1- Location Map

The proposed Laydown Yard will be constructed utilizing excess fill from the Project Area. Portions of the Laydown Yard fill area have been determined to be located within the 100-yr Floodplain (Refer to ***Appendix A*** for FEMA FIRM Maps of the area). The purpose of this analysis is to review the current floodplain information for the area, determine the current estimated Base Flood Elevation, and to analyze what impact, if any, the placement of fill for the Laydown Yard will have on the Base Flood Elevation.

II. Area Studied

The flooding source for the project area is Wills Creek, which flows from southeast to northwest in the vicinity of the project. A previous Flood Insurance Study for the area was performed and is on record with FEMA (Study No. 39059CV000A), however there is a gap in the limits of this study that leaves the project area with an undefined Base Flood Elevation. This previous study can be found in ***Appendix B*** of this report.

This impact analysis will study Wills Creek, beginning at the upstream limit of the previous study, which is Wills Creek crossing of the railroad track downstream of Clay Pike Rd, through the Project Area and Laydown Yard Area to the crossing of Seneca Ln; having a total of approximately 1.162 miles.

III. Engineering Approach

This impact analysis utilized information from the previous Flood Insurance Study, such as calculated flows through the area and downstream water surface elevation, and Ohio Geographically Referenced Information Program (OGRIP) statewide terrain model information to establish the current estimated Base Flood Elevation (BFE) for the project area. Calculations and analysis were performed utilizing US Army corps of Engineers Hydrologic Engineering Center's River Analysis System (HEC-RAS). Once the current estimated BFE was established, a second HEC-RAS analysis was ran with terrain models reflected of the proposed Laydown Yard fill placement. These Flood Elevation results was compared to determine what, if any, measurable effects the fill placement had on the BFE in the project vicinity. As a standard, impacts which do not raise the BFE by more than 1-ft are considered to be minor, and a de minimis situation which warrant no additional action.

IV. Results

As noted in ***Section III,*** data and information to create the HEC-RAS model came from multiple sources. The primary information garnered from the previous Flood Insurance Study was the determination of the 100-yr flood event flow rate through the Project Area, and the downstream water surface elevation. In review of the Study, these values were determined to be 10,500.00 cfs and 802.00, respectively. These input parameter when run through the HEC-RAS model were able to produce a consistent floodplain limit and elevation with that reflected on the current FEMA FIRM Maps from the project area.

The proposed terrain model for the Laydown Yard was developed in coordination with Gemma Power based on their proposed lease area and anticipated earthwork export volumes from the primary Project Area. Based on feedback and coordination, the limits and grades for the Laydown Yard were finalized on April 9th. Refer to ***Appendix C*** for the conceptual plan of the proposed Laydown Yard.

The HEC-RAS results from the proposed terrain model with the identical flow and downstream water elevation parameters indicated that the effect of the proposed fill placement was minor, and within the target goal of less than one (1) foot of BFE increase. The below table contains a summary of the elevation changes based on stream cross section. Refer to ***Appendix D*** for detailed HEC-RAS output information.

Table 4.1 HEC-RAS Output Summary

River Sta. (mi.)	Total Flow, Q (cfs)	Exist. Water Surface Elev. (ft)	Prop. Water Surface Elev. (ft)	Elev. Difference (ft)
0.000	10,500	802.00	802.00	**0.00**
0.145	10,500	802.01	802.01	**0.00**
0.299	10,500	802.02	802.02	**0.00**
0.759	10,500	802.06	802.07	**0.01**
1.035	10,500	802.13	802.14	**0.01**
1.162	10,500	802.22	802.22	**0.00**

V. Limitations

The analyses and results reflected in this report are based on the accuracy of the data sources utilized. This information was neither field verified, re-calculated, or re-analyzed to verify their accuracy. Additionally, CESO does not purport that this analysis is the limit of obligation for development within a floodplain, and Gemma Power is solely responsible for any required permits from Federal, State, or Local agencies for their proposed development.

APPENDIX A
FEMA FIRM MAP PANELS

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Ohio State Plane South Zone (FIPS zone 3402). The **horizontal datum** was NAD 83 HARN, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713- 3242**, or visit its website at http://www.ngs.noaa.gov.

Base Map information shown on this FIRM was provided in digital format by ODNR. This information was photogrammetrically compiled at a scale of 1:12000 from aerial photography dated June 2005 or later.

The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

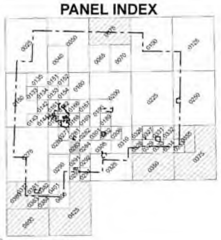
Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables for multiple streams in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.
hgohl
Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have **questions about this map,** how to order products, or the National Flood Insurance Program in general, please call the **FEMA Map Information eXchange (FMIX)** at **1-877-FEMA-MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

PANEL INDEX



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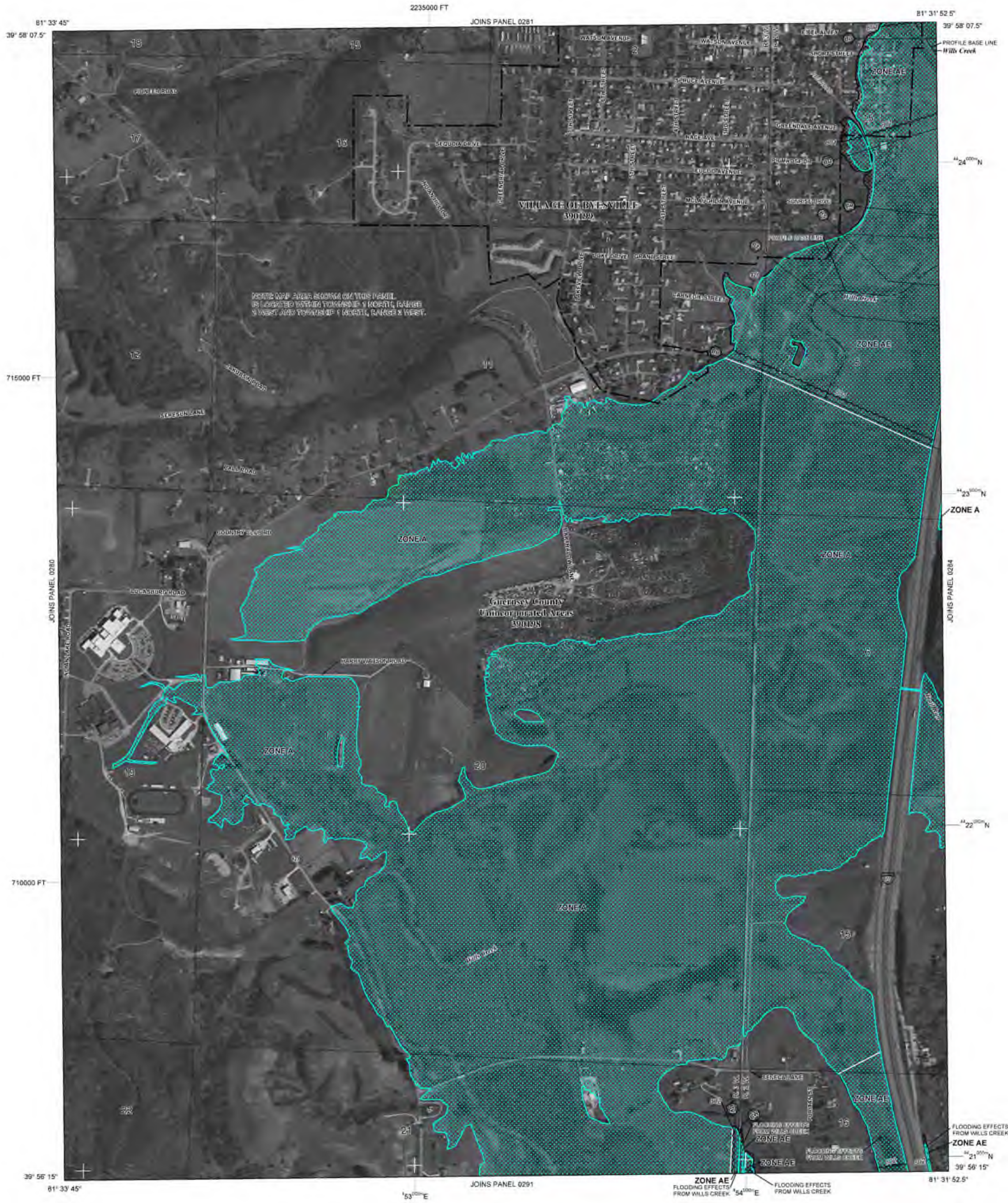

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

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

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% Annual Chance Floodplain Boundary

0.2% Annual Chance Floodplain Boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

A — A	Cross section line
23 - - - 23	Transect line
	Culvert
	Bridge
45° 02' 08", 93° 02' 12"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
3100000 FT	5000-foot ticks: Ohio State Plane South Zone (FIPS Zone 3402), Lambert Conformal Conic projection
4989000m N	1000-meter Universal Transverse Mercator grid values, zone 17N
DX5510 X	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
February 17, 1989

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
August 16, 2011 - to update corporate limits, to add base flood elevations, to add special flood hazard areas, to add Orthophotos, to add road and road names, to update map format and and to update panel layout.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET
150 0 150 300 METERS

NATIONAL FLOOD INSURANCE PROGRAM

NFIP

PANEL 0283D

FIRM

FLOOD INSURANCE RATE MAP

GUERNSEY COUNTY, OHIO AND INCORPORATED AREAS

PANEL 283 OF 425
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BYESVILLE, VILLAGE OF	[illegible]	0283	D
GUERNSEY COUNTY	[illegible]	0283	D

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
39059C0283D

MAP REVISED
AUGUST 16, 2011

Federal Emergency Management Agency

NOTES TO USERS

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NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3262
(301) 713-3242

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Base Map information shown on this FIRM was provided in digital format by ODNR. This information was photogrammetrically compiled at a scale of 1:12000 from aerial photography dated June 2005 or later.

The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

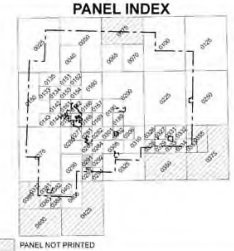
Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables for multiple streams in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.
hgohl
Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have **questions about this map,** how to order products, or the National Flood Insurance Program in general, please call the **FEMA Map Information eXchange (FMIX)** at **1-877-FEMA-MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

PANEL INDEX



PANEL NOT PRINTED

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

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

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% Annual Chance Floodplain Boundary
- 0.2% Annual Chance Floodplain Boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

- A — A — Cross section line
- 23 — 23 — Transect line
- Culvert
- Bridge
- 43° 02' 09", 83° 02' 12" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
- 3100000 FT — 5000-foot ticks: Ohio State Plane South Zone (FIPS Zone 3402), Lambert Conformal Conic projection
- 4190000 FM N — 1000-meter Universal Transverse Mercator grid values, zone 17N
- DN5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
February 17, 1989

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
August 16, 2011 - to update corporate limits, to add base flood elevations, to add special flood hazard areas, to add Orthophotos, to add road and road names, to update map format and and to update panel layout.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0291D

FIRM

FLOOD INSURANCE RATE MAP

GUERNSEY COUNTY, OHIO AND INCORPORATED AREAS

PANEL 291 OF 425
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
GUERNSEY COUNTY	390190	0291	D
PLEASANT CITY, VILLAGE OF	390203	0291	D

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
39059C0291D
MAP REVISED
AUGUST 16, 2011

Federal Emergency Management Agency

APPENDIX B
FEMA FLOOD INSURANCE STUDY 29059CV000A
(AUGUST 16, 2011)

FLOOD INSURANCE STUDY

GUERNSEY COUNTY, OHIO
AND INCORPORATED AREAS

COMMUNITY NAME	COMMUNITY NUMBER
BYESVILLE, VILLAGE OF	390199
CAMBRIDGE, CITY OF	390200
CUMBERLAND, VILLAGE OF	390824
*FAIRVIEW, VILLAGE OF	390922
GUERNSEY COUNTY (UNINCORPORATED AREAS)	390198
LORE CITY, VILLAGE OF	390202
*OLD WASHINGTON, VILLAGE OF	390996
PLEASANT CITY, VILLAGE OF	390203
QUAKER CITY, VILLAGE OF	390853
SALESVILLE, VILLAGE OF	390856
SENECAVILLE, VILLAGE OF	390858

* No Special Flood Hazard Areas

REVISED:
August 16, 2011

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
39059CV000A

INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program (NFIP) have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) report may not contain all data available within the Community Map Repository. It is advisable to contact the Community Map Repository for any additional data.

The Federal Emergency Management Agency (FEMA) may revise and republish part or all of this FIS at any time. In addition, FEMA may revise part of this FIS report by the Letter of Map Revision (LOMR) process, which does not involve republication or redistribution of the FIS report. Therefore, users should consult with community officials and check the Community Map Repository to obtain the most current FIS report components.

Selected Flood Insurance Rate Map panels for this community contain information that was previously shown separately on the corresponding Flood Boundary and Floodway Map panels (e.g., floodways, cross sections). In addition, former flood hazard zone designations have been changed as follows:

Old Zones	New Zone
A1 through A30	AE
B	X
C	X

Initial Countywide FIS Effective Date: February 17, 1989

Revised FIS Report Dates: August 16, 2011

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Exhibit 1 – Flood Profiles

PUBLISHED SEPARATELY

Flood Insurance Rate Map Index
Flood Insurance Rate Maps

FLOOD INSURANCE STUDY

GUERNSEY COUNTY, OHIO AND INCORPORATED AREAS

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study (FIS) revises and supersedes the FIS report and Flood Insurance Rates Maps (FIRMs) in the geographic area of Guernsey County, Ohio, including the Villages of Byesville, Cumberland, Fairview, Lore City, Old Washington, Pleasant City, Quaker City, Salesville and Senecaville, the City of Cambridge, and the unincorporated areas of Guernsey County (referred to collectively herein as Guernsey County), and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. Please note that in the Villages of Fairview and Old Washington, no special flood hazard areas (SFHAs) have been identified. The Village of Fairview is a multi-county community located in Belmont and Guernsey Counties. Please note that only the portion of the Village of Fairview that lies in Guernsey County is included in this FIS report. This study has developed flood-risk data for various areas of the community that will be used to establish actuarial flood insurance rates and to assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the State (or other jurisdictional agency) will be able to explain them.

The Digital Flood Insurance Rate Map (DFIRM) and FIS Report for this countywide study have been produced in digital format. Flood hazard information was converted to meet the Federal Emergency Management Agency (FEMA) DFIRM database specifications and Geographic Information System (GIS) format requirements. The flood hazard information was created and is provided in a digital format so that it can be incorporated into a local GIS and be accessed more easily by the community.

1.2 Authority and Acknowledgments

The sources of authority for this 2009 Countywide FIS are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

Information on the authority and acknowledgments for each of the previously printed FIS reports and FIRMs for communities within Guernsey County was compiled and is shown below.

Previous Analyses

The hydrologic and hydraulic analyses for the previously effective FIS report for Guernsey County and its incorporated areas, dated February 17, 1989, were performed by Woolpert Consultants (the Study Contractor) for the FEMA, under Contract No. EMW 84-C 1616. This study was completed in January 1986 (Reference 1).

Current Analyses

The hydrologic and hydraulic analyses for Clear Fork at the Village of Birmingham, Wills Creek and Buffalo Creek at the Village of Pleasant City, Wills Creek at the Village of Derwent, Wills Creek at Kimbolton and Leatherwood Creek at the Village of Quaker City were performed by the U.S. Geological Survey (USGS) and the Ohio Emergency Management Agency (OEMA) (Reference 2). This work was completed in the Fall of 2008.

Additional approximate hydrologic and hydraulic analyses for this countywide FIS were performed by Stantec Consulting Services, Inc. (Stantec) for FEMA under Contract No. HSFE05-05-D-0026, Task Order No. HSFE05-08-J-0035. This work, which was completed in August 16, 2011, covered unprotected flooding sources affecting Guernsey County.

In addition to incorporating the existing countywide FIS for Guernsey County, this countywide FIS includes new approximate studies, redelineation of all other effective profiles and incorporation of approved Letters of Map Changes (LOMCs). The vertical datum was shifted to North American Vertical Datum of 1988 (NAVD88). The digital floodplain data was merged into a single, updated Digital FIRM. The DFIRM includes 2007 OSIP 1-foot digital orthophotography, five-foot contours, 1:24,000 political boundaries, road centerlines with street names, railroads with names, airports, rivers, lakes, streams, bridges and other hydraulic structures and elevation reference marks. All digital information is in projection NAD 1983 HARN State Plane Ohio South FIPS 3402 (feet).

1.3 Coordination

The purpose of an initial Consultation Coordination Officer's (CCO's) meeting is to discuss the scope of the FIS. A final CCO meeting is held to review the results of the study. The dates of the initial and final CCO meeting held for the previous FIS for Guernsey County and the incorporated communities within its boundaries are shown in Table 1 (Reference 1).

Table 1 — Guernsey County CCO Meetings

Community Name	Initial CCO Date	Final CCO Date
Guernsey County, OH and Incorporated Areas	April 5, 1984	February 16, 1988

The initial CCO meeting for this 2009 countywide FIS was held on June 13, 2007 and was attended by representatives of FEMA, the Ohio Department of Natural Resources (ODNR), the study contractor and other local participants.

The results of the study were reviewed at the final CCO meeting held on November 9, 2009, and attended by representatives of Guernsey County, and Incorporated Areas, ODNR, FEMA, and the study contractor. All problems raised at that meeting have been addressed.

2.0 AREA STUDIED

2.1 Scope of Study

This countywide FIS covers the geographic area of Guernsey County, Ohio, including the incorporated communities listed in Section 1.1 and unincorporated areas.

For this countywide FIS, no new detailed studies were performed. Flood data obtained from detailed studies performed by the USGS and OEMA in 2008 on portions of Clear Fork, Wills Creek, Buffalo Creek, and Leatherwood Creek were incorporated into this study as Zone AE floodplains, Table 2.

Table 2 – Limits of USGS/OEMA Incorporated Detailed Studies

Flooding Source	Limits of Previous Detailed Study
Clear Fork	From a point approximately 180 feet downstream of Sligo Road to a point approximately 190 feet downstream of Birmingham Road (Birmingham/Guernsey County).
Wills Creek	From a point approximately 90 feet downstream of SR 541 to a point approximately 425 feet downstream of Main Street (Kimbolton/Guernsey County). From a point approximately 260 feet upstream of SR 313 to a point approximately 1.2 miles upstream of Seneca Lane (Derwent/Guernsey County).
Wills Creek/Buffalo Creek	From a point approximately 0.5 miles upstream of SR 146 to a point approximately 0.5 miles downstream of SR 146 (Pleasant City/Guernsey County).
Leatherwood Creek	From a point approximately 70 feet upstream of Eldon Road to a point approximately 1mile downstream of Eldon Road (Village of Quaker City and Guernsey County).

Detailed studies in the February 17, 1989 countywide FIS for Guernsey County were redelineated for this countywide FIS. The flooding sources studied previously by detailed methods are shown in Table 3. The limits of the detailed studies are described from upstream to downstream (References 1).

Table 3 — Limits of Previous Detailed Studies

Flooding Source	Limits of Previous Detailed Study
Buffalo Fork - Collins Fork	From a point approximately 865 feet upstream of State Road 83 to a point approximately 3,237 feet downstream of Perry's Den Road (Village of Cumberland and Guernsey County).
Crooked Creek	From a point approximately 1,050 feet downstream of State Road 723 to confluence with Wills Creek (City of Cambridge and Guernsey County).
Hospital Tributary	From a point approximately 280 feet downstream of I-77 to confluence with Wills Creek (Guernsey County).
Leatherwood Creek	From a point approximately 1 mile downstream of Eldon Road to a point approximately 233 feet downstream of Iron Horse Road (Village of Quaker City and Guernsey County). From the upstream corporate limit of the Village of Lore City to a point approximately 1.12 miles downstream of State Road 285 (Village of Lore City and Guernsey County). From a point approximately 2,361 feet upstream of Corduroy Road to confluence with Wills Creek (City of Cambridge and Guernsey County).
Smith Creek	From a point approximately 70 feet downstream of Francis Lane to confluence with Leatherwood Creek (Village of Quaker City)
Wills Creek	From a point approximately 1.1miles upstream of State Road 209 to a point approximately 3,686 feet downstream of Wills Creek Valley Drive (City of Cambridge and Guernsey County).

Approximate analyses are usually used to study areas having a low development potential or minimal flood hazards. Streams previously studied by approximate analyses are listed in Table 4.

Table 4 ─ Streams Studied by Approximate Methods

Atkinson Creek
Beeham Run
Beeham Run Tributary 1
Birds Run
Birds Run Tributary 1
Birds Run Tributary 6
Birds Run Tributary 13
Birds Run Tributary 15
Bobs Run
Brush Run
Brushy Fork
Brushy Fork Tributary 12
Brushy Fork Tributary 18
Brushy Fork Tributary 20
Buffalo Creek
Buffalo Creek Tributary 3.4
Buffalo Fork
Buffalo Fork Tributary 1
Buffalo Fork Tributary 4
Chapman Run
Chapman Run Tributary 1
Chapman Run Tributary 3.1
Chapman Run Tributary 4
Chapman Run Tributary 9
Chapman Run Tributary 12
Christian Creek
Clear Fork
Clear Fork Tributary 3
Collins Fork
Craborchard Creek
Crane Run
Crooked Creek
Crooked Creek Tributary 1
Crooked Creek Tributary 7
Crooked Creek Tributary 10
Crooked Creek Tributary 19
Crooked Creek Tributary 19.2
Crooked Creek Tributary 19.2.2
Dare Run
Dry Run
Flat Run
Hawkins Run
Hospital Tributary Tributary 4
Mud Run
North Crooked Creek
North Crooked Creek Tributary 3
North Crooked Creek Tributary 3.2
Opossum Run
Peters Creek
Peters Creek Tributary 2
Rannells Creek
Rocky Fork
Rocky Fork Tributary 3
Rocky Fork Tributary 6
Salt Fork
Salt Fork Tributary 7
Salt Fork Tributary 11.3
Salt Fork Tributary 25
Salt Fork Tributary 26
Salt Fork Tributary 29
Salt Fork Tributary 32
Salt Fork Tributary 34
Salt Fork Tributary 38
Salt Fork Tributary 38.1
Salt Fork Tributary 38.2
Salt Fork Tributary 40
Salt Fork Tributary 48
Salt Fork Tributary 49
Salt Fork Tributary 51
Salt Fork Tributary 51.4
Sarchet Run
Seneca Fork Wills Creek
Seneca Fork Wills Creek Tributary 3.1
Seneca Fork Wills Creek Tributary 11
Seneca Fork Wills Creek Tributary 12
Seneca Fork Wills Creek Tributary 12.2
Seneca Fork Wills Creek Tributary 12.3
Shannon Run
Skull Fork
Skull Fork Tributary 1
Skull Fork Tributary 2
Skull Fork Tributary 4
Skull Fork Tributary 4.1
Skull Fork Tributary 4.2
Skull Fork Tributary 7
Skull Fork Tributary 8

Table 4 – Streams Studied by Approximate Methods (*continued)*

Indian Camp Run	Smith Creek
Indian Camp Run Tributary 18	Sugartree Fork
Jackson Run	Sugartree Fork Tributary 9
Johnson Fork	Trail Run
Leatherwood Creek	Turkey Run
Leatherwood Creek Tributary 7	West Fork Duck Creek Tributary 10
Leatherwood Creek Tributary 13	Wills Creek
Leatherwood Creek Tributary 13.6	Wills Creek Tributary 1
Leatherwood Creek Tributary 13.7	Wills Creek Tributary 1.3
Leatherwood Creek Tributary 27	Wills Creek Tributary 1.4
Leatherwood Creek Tributary 29	Wills Creek Tributary 4
Leatherwood Creek Tributary 30	Wills Creek Tributary 6
Leatherwood Creek Tributary 31	Wills Creek Tributary 17
Leatherwood Creek Tributary 34	Wills Creek Tributary 21
Leatherwood Creek Tributary 35	Wills Creek Tributary 27
Leatherwood Creek Tributary 36	Wills Creek Tributary 39
Leatherwood Creek Tributary 41	Wills Creek Tributary 41
Mannon Run	Wills Creek Tributary 43
Mays Fork	Wills Creek Tributary 45
Miller Creek	Wolf Run
Millers Fork	Yoker Creek
Millers Fork Tributary 3	

Lakes previously studied by approximate analyses are Piedmont Lake, Salt Fork Lake, Senecaville Lake, and Wills Creek Dam. These approximate streams were restudied as part of this FIS.

This countywide FIS also incorporates the determination of letters issued by the FEMA resulting in map revisions [Letter of Map Revision (LOMR)] and map amendments [Letter of Map Amendment (LOMA)], as shown in Table 5.

Table 5 – Incorporated Letters of Map Change

Community	Case No.	Flood Source(s)	Date Issued	Type
Guernsey County & City of Cambridge	06-05-BT86P	Wills Creek	Feb. 5, 2007	LOMR
Guernsey County & City of Cambridge	00-05-249P	Leatherwood Creek	Jul. 27, 2001	LOMR
Guernsey County & City of Cambridge	98-05-397P	Wills Creek	Apr. 23, 1999	LOMR

Letters of Map Amendment (LOMAs) incorporated in this study are summarized in the Summary of Map Actions (SOMA) included in the Technical Support Data Notebook (TSDN) associated with this FIS update. Copies of the SOMA may be obtained from the Community Map Repository. Copies of the TSDN may be obtained from FEMA.

2.2 Community Description

Guernsey County is in east-central Ohio and is bordered on the west by Muskingum County, on the northwest by Coshocton County, on the north by Tuscarawas County, on the northeast by Harrison County, on the east by Belmont County, and on the south by Noble County. Guernsey County is approximately 74 miles east of Columbus and 100 miles south of Cleveland, the major metropolitan areas in this area of Ohio. The largest community in Guernsey County is the City of Cambridge, the county seat. Guernsey County is served by U.S. Routes 22 and 40, and Interstates 70 and 77. The 2008 population of Guernsey County was reported to be 40,177, a 3.0 percent increase from the 1990 population of 39,024. Approximately one-third of the population lives within the City of Cambridge (Reference 3).

The terrain of the area ranges from nearly level in the stream floodplains to sloping and very steep in the uplands. The soils are somewhat poorly drained in the floodplains and well-drained to moderately well-drained in the uplands. These soils are underlain mostly by shale and sandstone with thin layers of limestone bedrock (Reference 4).

The land within Guernsey County is used mainly for forestry, mining, and agriculture. The area has deposits of coal, pottery clay, oil, and natural gas. Industries include strip-mining, manufacture of plastic, pottery, glass and glassware, furniture, wood articles, kitchen utensils, spark plugs, small motors, and metal alloys. The agricultural region produces corn, wheat, and oats (Reference 5).

The climate of Guernsey County is typical of the Central Temperate Zone, with frequent and rapid changes in weather due to alternate invasions of continental polar and maritime tropical air masses. Monthly mean temperatures range from a low of 29 degrees Fahrenheit (^{o}F) in January, to a high of 75 ^{o}F in July; the average annual precipitation is 39 inches (Reference 6).

All streams studied in this study are within the Muskingum River Basin. Wills Creek, which has a total drainage area of 853 square miles, flows in a northwesterly direction through the City of Cambridge to the Muskingum River and drains the major portion of Guernsey County. The average fall of the stream north of Cambridge is 0.8 foot per mile (Reference 5). Leatherwood Creek, a major tributary to Wills Creek with its confluence in Cambridge, flows in a westerly direction and drains the southeastern portion of Guernsey County. All other streams studied are tributaries to Wills Creek.

The Village of Byesville is located along Wills Creek in south-central Guernsey County. According to the US Census Bureau, the village has a total area of approximately 1.0 square mile and a 2008 population estimate of 2,515 (Reference 3).

The City of Cambridge is the county seat and is located around Wills Creek in central Guernsey County. According to the US Census Bureau, the city has a total area of approximately 5.0 square miles and a 2008 population estimate of 11,192 (Reference 3).

The Village of Cumberland is located along Buffalo Fork in southern Guernsey County. According to the US Census Bureau, the village has a total area of approximately 0.5 square miles and a 2008 population estimate of 389 (Reference 3).

The Village of Fairview is located in eastern Guernsey County and is a multi-county community and shares land area with Belmont County. According to the US Census Bureau, the village has a total area of approximately 0.4 square miles and a 2008 population estimate of 80 (Reference 3).

The Village of Lore City is located along Leatherwood Creek in south-central Guernsey County. According to the US Census Bureau, the village has a total area of approximately 0.3 square miles and a 2008 population estimate of 295 (Reference 3).

The Village of Old Washington is located at the head waters of Hawkins Run in central Guernsey County. According to the US Census Bureau, the village has a total area of approximately 1.0 square mile and a 2008 population estimate of 258 (Reference 3).

The Village of Pleasant City is located along Wills Creek in southern Guernsey County. According to the US Census Bureau, the village has a total area of approximately 0.2 square miles and a 2008 population estimate of 425 (Reference 3).

The Village of Quaker City is located along Leatherwood Creek in south-eastern Guernsey County. According to the US Census Bureau, the village has a total area of approximately 1.0 square mile and a 2008 population estimate of 546 (Reference 3).

The Village of Salesville is located along Leatherwood Creek in south-eastern Guernsey County. According to the US Census Bureau, the village has a total area of approximately 0.1 square miles and a 2008 population estimate of 149 (Reference 3).

The Village of Senecaville is located along Seneca Fork Wills Creek in south-central Guernsey County. According to the US Census Bureau, the village has a total area of approximately 0.5 square miles and a 2008 population estimate of 439 (Reference 3).

2.3 Principal Flood Problems

The principal flooding problems in Guernsey County is the periodic overflow of Wills Creek, Crooked Creek, Leatherwood Creek, Buffalo Creek, Collins Creek, and Smith Creek.

The history of flooding along the streams in the county indicates that flooding could occur during any season of the year. The majority of the major floods have occurred during January to March and have usually been the result of spring rains and/or rapid snowmelt. Major flooding events are noted in previous FISs to have occurred in 1907, 1913, 1935, 1945, 1963, 1964, and 1980. Of these, the Wills Creek flood of August 8, 1935, produced the highest stage and caused the most damage. According to the data obtained from the USGS gage at Cambridge, this flood had a peak discharge of 11,800 cubic feet per second (cfs) and an elevation of 797 feet North American Vertical Datum of 1988 (NAVD) (Reference 5).

In August 1980, a damaging flood occurred that affected four Ohio counties and resulted in a Presidential Disaster Declaration. While all of Guernsey County was affected, the areas hardest hit were Byesville, Cambridge, Lore City, and Quaker City. Based on high-water marks obtained by the USGS (Reference 7), the flood was estimated to have a

frequency approximating a 50-year event. However, areas of Cambridge experienced elevations that approximated a 100-year flood because of constriction caused by several bridges within the city. The most recent significant flooding events occurred in 1998, 2004, and 2005 on Wills Creek and Leatherwood Creek. See TABLE 6 for the Maximum Floods of Record.

TABLE 6 – Maximum Floods of Record

Flooding Source & Location	Date	Flow (cfs)
Wills Creek		
at Cambridge, Ohio	1935	11,800
(USGS gage no. 03142000)	1945	7,860
	1963	8,500
	1964	8,370
	1980	7,860
	1998	11,400
	2004	9,110
	2005	6,440
Leatherwood Creek		
near Kipling, Ohio	2004	10,100
(USGS gage no. 03141870)	2005	4,050

2.4 Flood Protection Measures

Flood flows on Seneca Fork are regulated by a dam operated and maintained by the USACE. Senecaville Lake, which is formed by the dam, controls a drainage area of 118 square miles and is used for flood control, recreation, and fish and wildlife enhancement. The dam closure was completed in September 1936 and the reservoir design peak flow is 9,100 cfs (Reference 8).

Flood flows on Salt Fork are regulated by a dam operated and maintained by the Ohio Department of Natural Resources (ODNR). Salt Fork Lake, which is formed by the dam, controls a drainage area of 160 square miles and is used for flood control, recreation, and fish and wildlife enhancement. The reservoir design peak flow is 28,903 cfs (Reference 9).

There were no other structural flood protection works that affect Guernsey County at the time of the 1989 FIS. Additional structural flood protection works have been utilized to prevent or reduce potential flooding damages subsequent to the 1989 FIS.

On Wills Creek and Leatherwood Creek, some levee construction has taken place, but areas not protected by a levee still see significant flooding during major floods. Nonstructural measures for flood protection are of state directives which require that all agencies comply with floodplain management criteria established by the Flood Disaster of 1973 (Reference 1).

3.0 ENGINEERING METHODS

For the flooding sources studied by detailed methods in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded once on the average during any 10-, 50-, 100- or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100- and 500-year floods, have a 10-, 2-, 1- and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term, average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than one year are considered. For example, the risk of having a flood that equals or exceeds the 1-percent-annual-chance (100-year) flood in any 50-year period is approximately 40 percent (4 in 10); for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each riverine flooding source studied in detail affecting the community.

This countywide FIS report includes information from previously published FIS reports where stream were studied in detail. It also includes new information for streams studied by approximate methods and information from a 2008 USGS/OEMA study which was incorporated as part of this countywide study. Unless indicated otherwise, the information provided in this section was obtained from the previously published FIS reports for Guernsey County.

Detailed Studies

Peak discharges for Wills Creek and Leatherwood Creek (to river mile 5.5) are based on USACE gage records and reflect flow regulation by Senecaville Lake. Peak discharges for Wills Creek were computed by the USACE based on guidelines in Bulletin No. 17A (Reference 9).

Crooked Creek, Hospital Tributary, Collins Fork, Buffalo Fork and Leatherwood Creek (above river mile 20.6), all ungaged streams, were evaluated by the regression methods recommended for this region of Ohio by the ODNR (Reference 10). The mathematical model is based on data received from 46 gaging stations in the Ohio River drainage basin. Principal parameters include drainage areas, stream slopes, and mean annual precipitation.

Hydrologic analyses were carried out to establish peak discharge-frequency relationships for each flooding source studied by detailed methods affecting the community. Peak discharges for the 10-, 2-, 1- and 0.2-percent-annual-chance flooding events and the drainage area for each of the streams studied in detail are shown in Table 7.

Table 7 – Summary of Peak Discharges

Flooding Source and Location	Drainage Area (Sq. Miles)	Peak Discharges (cfs) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Buffalo Creek					
At mouth	50[1]	3,930	5,740	6,540	8,410
Buffalo Fork					
At Cambridge Street	28.7	3,060	5,230	6,340	9,300
Clear Fork					
At Birmingham Road	6.9[1]	1,210	1,880	2,180	2,880
Collins Fork					
At Mouth	22.6	2,520	4,280	5,180	7,600
Crooked Creek					
At Mouth	61.8	3,680	5,610	6,550	8,800
Hospital Tributary					
At Mouth	2.7	582	1,040	1,270	1,960
Leatherwood Creek					
At Mouth	91.8	5,200	7,800	8,900	11,900
At Wintergreen Lane	60	3,990	6,260	7,380	10,000
Just downstream of confluence of Smith Creek	24.8	3,613	5,896	6,900	9,098
Upstream of confluence of Smith Creek	21.7	3,252	5,194	6,060	7,909
Below Eldon Road (above Unnamed Tributary)	17.8[1]	2,660	4,250	4,960	6,470
Smith Creek					
At Mouth	3.1	742	978	1,103	1,419
Wills Creek					
At Kimbolton Main Street	666[1]	14,900	19,700	21,700	26,400
At Campbell Avenue	406	6,800	9,800	11,100	14,500
Just upstream of confluence of Leatherwood Creek	314	6,400	9,400	10,600	14,050
Below Seneca Fork	275[1]	7,140	9,790	10,950	13,750
Below confluence of Buffalo Creek and Buffalo Fork	121[1]	6,260	8,880	10,000	12,700

Notes
[1]Drainage area and corresponding discharges taken from 2008 report Floods of December 2004 and January 2005 in Ohio: FEMA Disaster Declaration 1580 (Reference 2).

Approximate Studies

Peak discharges for the 1-percent-annual-chance (100-year) storm event were determined at various locations throughout each of the approximate study reaches in Guernsey County. Hydrologic calculations were performed using regression equations presented in SIR 2006-5312 (Reference 11). The regression equations were developed using generalized least-squares (GLS) regression analyses on data from 305 gaging stations.

The equations were developed to estimate flood discharges on unregulated streams based on the total-contributing drainage area, channel slope determined from the 10-85 method, percentage of drainage area as open water and wetlands, and hydrologic regional factors. Additional information about the model development is contained in Techniques for Estimating Flood Peak Discharges of Rural, Unregulated Streams in Ohio by G.F. Koltun, 2003, United States Geological Survey (USGS) Water Resources Investigations Report (WRIR) 03-4164 (Reference 12).

Peak discharges were adjusted when needed to account for the influence of existing stream gages and dams on the approximate study reach.

Approximate methods were used to determine the 1-percent-annual-chance flood boundaries for Piedmont Lake, Salt Fork Lake, Senecaville Lake, and Wills Creek Dam. Flood information supplied by the ODNR and the USACE, Huntington District was used to confirm these flood boundaries.

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals. Users should be aware that flood elevations shown on the FIRM represent rounded whole-foot elevations and may not exactly reflect the elevations shown on the Flood Profiles or in the Floodway Data Tables in the FIS report. Flood elevations shown on the FIRM are primarily intended for flood insurance rating purposes. For construction and/or floodplain management purposes, users are cautioned to use the flood elevation data presented in this FIS report in conjunction with the data shown on the FIRM.

This countywide FIS report includes information from previously published FIS reports as well as new information and hydraulic information from a 2008 USGS/OEMA study (Reference 2) which was incorporated as part of this countywide study. Unless indicated otherwise, the information provided in this section was obtained from the previously published FIS reports for Guernsey County.

Detailed Studies

Cross-sections for the backwater analyses were obtained from aerial photographs taken in April 1984 at a scale of 1:9600 (Reference 13). Additional floodplain cross-sections, below-water sections, and bridge data were obtained from field surveys. In addition, cross-sections were taken from field surveys obtained by the SCS.

Locations of selected cross-sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross-section locations are also shown on the FIRM.

Detail-studied streams that were not restudied as part of this map update may include a "profile base line" on the maps. This "profile base line" provides a link to the flood profiles included in the FIS report. The detail-studied stream centerline may have been digitized or redelineated as part of this revision. The "profile base lines" for these streams were based on the best available data at the time of their study and are depicted as they were on the previous FIRMs. In some cases where improved topographic data was used

to redelineate floodplain boundaries, the "profile base line" may deviate significantly from the channel centerline or may be outside the SFHA.

Profiles for Wills Creek and the downstream portion of Leatherwood Creek were obtained from the SCS WSP-2 computer program (Reference 14).

Roughness coefficients (Manning's "n") were used to compute the hydraulic conveyance of each cross-section and to compute friction losses between adjacent sections. Roughness factors were chosen by engineering judgment and were based on field observations of streams and floodplains. Separate overbank and channel roughness values were selected for each stream reach. Roughness coefficients (Manning's "n") for water-surface computations of Leatherwood Creek were determined using computer modeling of the backwater curves to match the high-water marks of the September 1980 flood in Quaker City (Reference 7).

Table 8 shows the channel and overbank "n" values typical for early summer conditions for the flooding sources studied by detailed methods (Reference 1).

Table 8 – Manning's "n" Values

Flooding Source	Channel "n" Values	Overbank "n" Values
Buffalo Creek[1]	0.035 – 0.090	0.05 – 0.090
Buffalo Fork	0.075	0.100
Clear Fork[1]	0.040 – 0.046	0.040 – 0.064
Collins Fork	0.075	0.100
Crooked Creek	0.060 – 0.075	0.080 – 0.120
Hospital Tributary	0.045 – 0.090	0.045 – 0.055
Leatherwood Creek[1]	0.040 – 0.075	0.036 – 0.120
Smith Creek	0.050	0.060
Wills Creek[1]	0.035 – 0.090	0.050 – 0.090

Notes

[1]Range includes Manning's n values taken from 2008 report Floods of December 2004 and January 2005 in Ohio: FEMA Disaster Declaration 1580 (Reference 2).

Water-surface elevations for the floods of the selected recurrence intervals were computed using the HEC-2 step-backwater computer program (Reference 15). Starting water-surface elevations for the streams were based on slope area method.

Flood profiles were drawn showing the computed water-surface elevations to an accuracy of 0.5 foot for floods of the selected recurrence intervals. In cases where two or more profiles are close together, due to limitations of the profile scale, only the higher profile has been shown.

Approximate Studies

Approximate hydraulic analyses were performed using the USACE's Hydraulic Engineering Center River Analysis System (HEC-RAS) computer program (Version 4.0.0). A simplified HEC-RAS hydraulic model was created for each stream system. These models contain unsurveyed cross-sections with an average spacing of 1,800 feet apart. No structures (i.e. bridges or culverts) were included in the modeling.
Cross-section geometry data was created using a 2007 5-foot contour data derived from Light Detection and Ranging (LiDAR) dataset provided by the Ohio Geographically Referenced Information Program Ohio Statewide Imagery Program. The data is in HARN State Plane NAD83, Ohio South Zone 3402, with a vertical datum of NAVD88.

Overbank Manning's 'n' values were estimated from a 2001 National Land Cover Dataset (NLCD) of Ohio prepared by USGS. A field reconnaissance was not performed. Channel 'n' values were assumed to be 0.035. The overbank 'n' values were extracted to RAS directly from GIS using HECGeoRAS 4.1. Table 9 shows the Overbank Manning's 'n' values used for each corresponding landuse. These values were taken from Chow (1959) and McCuen (1998).

Table 9– Overbank Manning's 'n' Values

Landuse	Manning's 'n'
Developed-Open Space	0.04
Cultivated Crops	0.04
Grassland	0.05
Forest	0.10
Pasture/Hay	0.05
Developed-Low Intensity	0.05
Developed-Medium Intensity	0.06
Developed-High Intensity	0.08
Herbaceous Wetlands	0.08
Shrub/Scrub	0.05
Woody Wetlands	0.06
Barren land	0.03

The 1-percent-annual-chance flood discharges determined using the previously described hydrologic methods were used in the HEC-RAS models. Reach boundary conditions were selected in accordance with Guidelines and Specifications for Flood Hazard Mapping Partners, and were either known water surface elevations or normal depth measured from the downstream end of each stream.

The hydraulic analyses for this study are based only on the effects of unobstructed flow. The flood elevations as shown on the profiles (Exhibit 1) are, therefore, considered valid only if hydraulic structures remain unobstructed, operate properly and do not fail, and if channel and overbank conditions remain essentially the same as ascertained during this study.

All elevations are referenced from North American Vertical Datum of 1988 (NAVD88); elevation reference marks used in the study are shown on the maps.

3.3 Vertical Datum

All FIS reports and FIRMs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground and structure elevations can be referenced and compared. Until recently, the standard vertical datum in use for newly created or revised FIS reports and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD29). With the finalization of the NAVD88, many FIS reports and FIRMs are being prepared using NAVD88 as the referenced vertical datum.

Effective information for this countywide FIS report was converted from NGVD29 to NAVD88 based on data presented in Table 10. The average conversion of -0.7 foot (NGVD29 – 0.7 = NAVD88) was applied to convert all effective Base Flood Elevations (BFEs). Structure and ground elevations in the community must therefore be referenced to NAVD88. It is important to note that adjacent communities in other counties not presented in this countywide FIS may be referenced to NGVD29. This may result in differences in BFEs across the corporate limits between communities.

Table 10 – Datum Conversion Calculation

Point ID	Quadrangle Name	Quadrangle Corner	Latitude	Longitude	Difference
1	New Concord	SE	39.875	-81.625	-0.633 ft
2	Antrim	SE	40.000	-81.250	-0.633 ft
3	Old Washington	SE	40.000	-81.375	-0.663 ft
4	Cambridge	SE	40.000	-81.500	-0.692 ft
5	Bloomfield	SE	40.000	-81.625	-0.715 ft
6	Freeport	SE	40.125	-81.250	-0.627 ft
7	Birmingham	SE	40.125	-81.375	-0.666 ft
8	Kimbolton	SE	40.125	-81.500	-0.702 ft
9	Plainfield	SE	40.125	-81.625	-0.712 ft
10	Byesville	SE	39.875	-81.500	-0.620 ft
11	Otsego	SE	40.000	-81.750	-0.728 ft
12	Wills Creek	SE	40.125	-81.750	-0.715 ft
13	Newcomerstown	SE	40.250	-81.500	-0.682 ft
14	Fresno	SE	40.250	-81.625	-0.696 ft
				Average Conversion:	-0.677 ft
				Range:	-0.728ft - 0.620ft
				Max Offset:	0.057ft

For more information on NAVD88, see the FEMA publication entitled *Converting the National Flood Insurance Program to the North American Vertical Datum of 1988*, or contact the Vertical Network Branch, National Geodetic Survey, Coast and Geodetic Survey, National Oceanic and Atmospheric Administration, Silver Spring, Maryland 20910 (http://www.ngs.noaa.gov).

Temporary vertical monuments are often established during the preparation of a flood hazard analysis for the purpose of establishing local vertical control. Although these monuments are not shown on the FIRM, they may be found in the TSDN associated with

this FIS report and FIRM for this community. Interested individuals may contact FEMA to access these data.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. Therefore, each FIS provides l-percent-annual-chance (100-year) flood elevations and delineations of the 1- and 0.2-percent-annual-chance (500-year) floodplain boundaries and l-percent-annual-chance floodway to assist communities in developing floodplain management measures. This information is presented on the FIRM and in many components of this FIS report, including Flood Profiles Floodway Data Tables. Users should reference the data presented in this FIS report as well as additional information that may be available at the local map repository before making flood elevation and/or floodplain boundary determinations.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent-annual-chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent-annual-chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each stream studied by detailed methods, the 1- and 0.2-percent-annual-chance floodplain boundaries have been delineated using the flood elevations determined at each cross-section. Between cross-sections, the boundaries were interpolated using topographic maps with a contour interval of five feet.

The 1- and 0.2-percent-annual-chance floodplain boundaries are shown on the FIRM. On this map, the 1-percent-annual-chance floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A and AE) and the 0.2-percent-annual-chance floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 1- and 0.2-percent-annual-chance floodplain boundaries are close together, only the 1-percent-annual-chance floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by approximate methods, only the l-percent-annual-chance floodplain boundary is shown on the FIRM. The approximate 1-percent-annual-chance floodplain boundaries have been delineated using a contour interval of five feet.

These five foot contours were created in May 2007 from digital elevation models (DEMs) which were produced using LIDAR data. Accuracy of this data meets the National Map Accuracy Standards for five foot contour intervals (Reference 16).

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the NFIP, a floodway is used as a tool to assist local

communities in this aspect of floodplain management. Under this concept, the area of the l-percent-annual-chance floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the l-percent-annual-chance flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodway presented in this 2009 FIS report and on the FIRM were directly obtained from the floodway data contained in the 1989 countywide FIS report they were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross-sections. Between cross-sections, the floodway boundaries were interpolated. The results of the floodway computations have been tabulated for selected cross-sections and can be seen in Table 11. In cases where the floodway and l-percent-annual-chance floodplain boundaries are either closing together or collinear, only the floodway boundary has been shown.

A floodway has not been computed for the upper portion of Wills Creek which is consistent with previously published FIS reports. In areas where USGS/OEMA leverage data was incorporated, floodways also have not been computed (Reference 2). Along streams where floodways have not been computed, the community must ensure that the cumulative effect of development in the floodplain will not cause more than a 1.0-foot increase in the base flood elevations at any point within the community.

Because the floodway was not recalculated, there were areas where the previous floodway did not fit within the boundaries of the 1-percent-annual-chance floodplain. Therefore, in these areas, the floodway was reduced. Table 11 lists the water surface elevations with and without a floodway, the mean velocity in the floodway, and the location and area at each surveyed cross-section as determined by hydraulic methods. The width of the floodway depicted by the FIRM panels and the amount of reduction to fit the floodway inside the 1-percent-annual-chance floodplain, if necessary, is also listed.

Encroachment into areas subject to inundation by floodwaters having hazardous velocities aggravates the risk of flood damage and heightens potential flood hazards by further increasing velocities. A listing of stream velocities at selected cross-sections is provided in Table 11 “Floodway Data”. In order to reduce the risk of property damage in areas where the stream velocities are high, the community may wish to restrict development in areas outside of the floodway.

The floodways in this report are recommended to local agencies as minimum standards that can be adopted or used as a basis for additional studies.

The area between the floodway and l-percent-annual-chance floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the l-percent-annual-chance flood more than 1.0 foot at any point. Typical

relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 1.

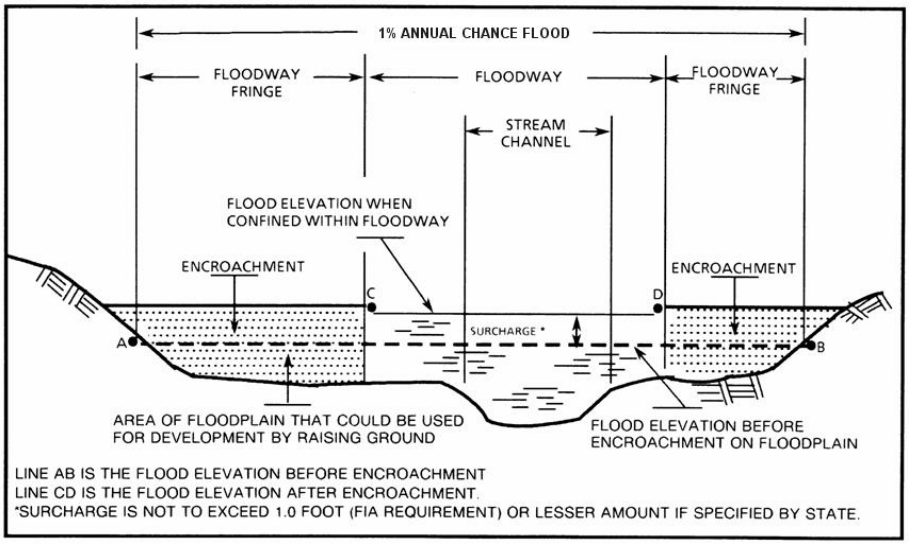

Figure 1 – Floodway Schematic

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Buffalo Fork									
A	37103	1114	4062	1.6		826.3	826.3	827.3	1.0
B	38301	957	3472	1.9		827.7	827.7	828.7	1.0
C	39954	979	4392	1.5		829.3	829.3	830.3	1.0
D	40461	708	3355	1.9		830.1	830.1	831.0	0.9
E	41691	992	3855	1.6		831.8	831.8	832.8	1.0
F	42129	1441	6987	0.9		833.3	833.3	834.3	1.0
Collins Fork									
G	42979	1329	5960	1.1		833.6	833.6	834.6	1.0
H	43945	686	4349	1.2		835.2	835.2	836.2	1.0
I	44706	628	3507	1.5		835.8	835.8	836.7	0.9

[1]Feet above mouth

TABLE 11

FEDERAL EMERGENCY MANAGEMENT AGENCY

GUERNSEY COUNTY, OH
AND INCORPORATED AREAS

FLOODWAY DATA

BUFFALO FORK - COLLINS FORK

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Clear Fork									
A	24	NA[2]	NA[2]	NA[2]		830.2	830.2	NA[2]	NA[2]
B	262	NA[2]	NA[2]	NA[2]		831.9	831.9	NA[2]	NA[2]
C	734	NA[2]	NA[2]	NA[2]		833.1	833.1	NA[2]	NA[2]
D	1107	NA[2]	NA[2]	NA[2]		833.9	833.9	NA[2]	NA[2]
E	1512	NA[2]	NA[2]	NA[2]		835.3	835.3	NA[2]	NA[2]
F	2060	NA[2]	NA[2]	NA[2]		836.4	836.4	NA[2]	NA[2]
G	2615	NA[2]	NA[2]	NA[2]		837.2	837.2	NA[2]	NA[2]

[1]Feet from a point approximately 182 feet downstream of Birmingham Road
[2]No data available

TABLE 11

FEDERAL EMERGENCY MANAGEMENT AGENCY

GUERNSEY COUNTY, OH
AND INCORPORATED AREAS

FLOODWAY DATA

CLEAR FORK

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Crooked Creek									
A	2200	290	3,634	1.8		794.8	790.4[2]	791.4	1.0
B	6730	383	5322	1.2		794.8	791.4[2]	792.4	1.0
C	8980	226	2907	2.3		794.8	792.0[2]	793.0	1.0
D	11510	224	3200	2.0		794.8	792.9[2]	793.9	1.0
E	14228	264	3907	1.7		795.1	792.9[2]	793.9	1.0
F	18438	349	4378	1.5		795.1	795.1	796.0	0.9
G	30031	300	4211	1.6		800.1	800.1	800.4	0.4
H	34858	313	4435	1.5		802.1	802.1	803.1	1.0
Hospital Tributary									
A	2240	119	362	3.5		786.0	777.4[2]	778.1	0.7
B	3665	42	256	5.0		786.0	779.9[2]	780.7	0.8
C	4955	95	532	2.4		786.0	785.2[2]	785.6	0.4
D	5585	200	806	1.6		786.0	785.5[2]	786.0	0.5
E	6485	51	254	5.0		786.0	785.8[2]	786.5	0.7
F	7085	46	209	6.1		788.4	788.4	789.0	0.6
G	7355	54	265	4.8		789.4	789.4	790.3	0.9
H	8395	54	327	3.9		792.9	792.9	793.7	0.8
I	8885	127	430	3.0		793.9	793.9	794.8	0.9
J	9345	113	521	2.4		794.6	794.6	795.5	0.9
K	9895	109	201	6.3		795.9	795.9	796.7	0.8

[1]Feet above mouth

[2]Elevations without considering backwater effect from Wills Creek

TABLE 11

FEDERAL EMERGENCY MANAGEMENT AGENCY

GUERNSEY COUNTY, OH
AND INCORPORATED AREAS

FLOODWAY DATA

CROOKED CREEK - HOSPITAL TRIBUTARY

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Leatherwood Creek									
A	634	200	3974	2.2		799.1	798.7[2]	799.9	0.8
B	2059	945	12850	0.7		799.1	798.9[2]	799.9	0.8
C	2904	475	7068	1.3		799.1	798.9[2]	799.9	0.8
D	3907	147	2748	3.2		799.1	798.9[2]	799.9	0.8
E	5174	500	8955	1.6		799.6	799.6	800.5	0.9
F	6178	534	9321	1.4		799.7	799.7	800.5	0.8
G	6970	475	5077	3.2		799.7	799.7	800.6	0.9
H	8026	541	9400	1.7		799.7	799.7	800.7	1.0
I	9926	1240	20837	0.8		799.8	799.8	800.8	1.0
J	12197	1143	18030	0.9		799.8	799.8	800.8	1.0
K	13939	1055	16757	0.5		800.5	800.5	801.4	0.9
L	19948	1879	27919	0.3		800.9	800.9	801.9	1.0
M	22250	1738	24692	0.4		800.9	800.9	801.9	1.0
N	23602	1619	20202	0.4		800.9	800.9	801.9	1.0
O	24895	1194	14369	0.6		801.0	801.0	802.0	1.0
P	26083	1805	19251	0.5		801.0	801.0	802.0	1.0
Q	56813	974	2829	2.6		812.7	812.7	813.7	1.0
R	57341	59	655	11.3		813.8	813.8	814.7	0.9
S	58714	188	1683	4.4		819.0	819.0	819.6	0.6
T	60403	1216	8347	0.8		819.5	819.5	820.1	0.6
U	61406	1354	8655	0.9		819.5	819.5	820.2	0.7
V	62299	1254	7771	0.9		819.6	819.6	820.4	0.8
W	62726	1111	1875	1.5		819.8	819.8	820.6	0.8
X	108889	511	3076	2.3		860.8	860.8	861.8	1.0
Y	109465	455	3430	2.1		861.7	861.7	862.4	0.7

[1]Feet above mouth

[2]Elevations without considering backwater effect from Wills Creek

TABLE 11

FEDERAL EMERGENCY MANAGEMENT AGENCY

GUERNSEY COUNTY, OH
AND INCORPORATED AREAS

FLOODWAY DATA

LEATHERWOOD CREEK

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Leatherwood Creek (continued)									
Z	111503	637	4747	1.4		863.0	863.0	863.8	0.8
AA	112754	290	1971	3.2		863.9	863.9	864.7	0.8
AB	113087	180	1331	4.8		866.3	866.3	866.6	0.3
AC	113568	222	2063	3.1		866.9	866.9	867.4	0.5
AD	114159	421	3442	2.0		867.0	867.0	867.9	0.9
AE	114618	518	4181	1.7		867.1	867.1	868.1	1.0
AF	115389	660	5312	1.3		867.3	867.3	868.3	1.0
AG	116118	885	4787	1.4		867.5	867.5	868.4	0.9
AH	116493	702	3717	1.9		868.3	868.3	869.3	1.0
AI	117306	355	2950	2.1		872.1	872.1	873.1	1.0
AJ	118589	915	6296	1.0		873.2	873.2	873.9	0.7
AK	119729	544	4477	1.4	23[3]	873.8	873.8	874.4	0.6
AL	119993	NA[2]	NA[2]	NA[2]		879.1	879.1	NA[2]	NA[2]
AM	120843	NA[2]	NA[2]	NA[2]		879.2	879.2	NA[2]	NA[2]
AN	122237	NA[2]	NA[2]	NA[2]		879.8	879.8	NA[2]	NA[2]
AO	124296	NA[2]	NA[2]	NA[2]		880.4	880.4	NA[2]	NA[2]
AP	125257	NA[2]	NA[2]	NA[2]		880.6	880.6	NA[2]	NA[2]
AQ	125347	NA[2]	NA[2]	NA[2]		880.6	880.6	NA[2]	NA[2]

[1]Feet above mouth
[2]No data available
[3]See explanation in Section 4.2

TABLE 11

FEDERAL EMERGENCY MANAGEMENT AGENCY

GUERNSEY COUNTY, OH
AND INCORPORATED AREAS

FLOODWAY DATA

LEATHERWOOD CREEK

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Smith Creek									
A	568	93	483	2.3		868.8	865.6[2]	865.7	0.8
B	1018	35	190	5.8		869.3	866.2[2]	866.8	0.6
C	1333	32	153	7.2		869.3	867.7[2]	868.8	0.9
D	1633	25	200	5.5		869.3	869.7[2]	870.7	1.0
E	1847	265	870	1.3		870.3	870.3	871.8	0.8
F	2387	44	206	5.3		870.5	870.5	871.9	0.7
G	2827	111	373	3.0		871.8	871.8	873.5	1.0
H	3417	80	286	3.9		873.2	873.2	874.9	1.0

[1]Feet above mouth

[2]Elevations without considering overflow effect from Leatherwood Creek

TABLE 11

FEDERAL EMERGENCY MANAGEMENT AGENCY

GUERNSEY COUNTY, OH
AND INCORPORATED AREAS

FLOODWAY DATA

SMITH CREEK

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Wills Creek at Kimbolton									
A	111	NA[2]	NA[2]	NA[2]		775.9	775.9	NA[2]	NA[2]
B	410	NA[2]	NA[2]	NA[2]		775.9	775.9	NA[2]	NA[2]
C	1181	NA[2]	NA[2]	NA[2]		776.5	776.5	NA[2]	NA[2]
D	1932	NA[2]	NA[2]	NA[2]		776.5	776.5	NA[2]	NA[2]
E	3150	NA[2]	NA[2]	NA[2]		776.7	776.7	NA[2]	NA[2]
F	4693	NA[2]	NA[2]	NA[2]		777.2	777.2	NA[2]	NA[2]

[1]Feet from a point approximately 460 feet downstream of Plum Street (Main Street)
[2]No data available

TABLE 11

FEDERAL EMERGENCY MANAGEMENT AGENCY

GUERNSEY COUNTY, OH
AND INCORPORATED AREAS

FLOODWAY DATA

WILLS CREEK AT KIMBOLTON

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Wills Creek									
A	100	582	12103	1.0		793.7	793.7	794.7	1.0
B	998	923	15727	0.8		793.8	793.8	794.8	1.0
C	3573	600	11561	1.0		793.9	793.9	794.9	1.0
D	4852	755	12870	0.9		794.0	794.0	795.0	1.0
E	5961	1272	18696	0.6		794.0	794.0	795.0	1.0
F	6964	988	14377	0.8		794.0	794.0	795.0	1.0
G	8020	511	7686	1.6		794.0	794.0	795.0	1.0
H	9023	300	5662	2.1		794.1	794.1	795.1	1.0
I	9868	120	3596	3.3		794.1	794.1	795.1	1.0
J	10924	1086	16064	0.1		794.5	794.5	795.5	1.0
K	11822	1516	21516	0.6		794.5	794.5	795.5	1.0
L	12878	600	10188	1.2		794.5	794.5	795.5	1.0
M	14514	670	9896	1.2		794.7	794.7	795.7	1.0
N	16732	793	11863	1.0		794.8	794.8	795.8	1.0
O	18633	706	10772	1.0		794.9	794.9	795.9	1.0
P	21431	679	8120	1.4		795.1	795.1	796.1	1.0
Q	22435	882	10762	1.0		795.2	795.2	796.2	1.0
R	23174	875	10528	1.0		795.2	795.2	796.2	1.0
S	24652	413	6033	1.8		795.3	795.3	796.3	1.0
T	26553	294	5356	2.1		795.4	795.4	796.4	1.0
U	27873	276	5711	1.9		795.5	795.5	796.5	1.0
V	28982	516	7741	1.4		795.6	795.6	796.6	1.0
W	30038	347	6442	1.7		795.7	795.7	796.7	1.0
X	31041	245	4575	2.4		795.9	795.9	796.9	1.0
Y	31516	323	6638	1.7		796.4	796.4	797.4	1.0

[1]Feet from a point approximately 3575 feet downstream from Wills Creek Valley Road

TABLE 11

FEDERAL EMERGENCY MANAGEMENT AGENCY

GUERNSEY COUNTY, OH
AND INCORPORATED AREAS

FLOODWAY DATA

WILLS CREEK

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Wills Creek (continued)									
Z	32519	437	7145	1.6		797.2	797.2	798.2	1.0
AA	33602	216	5482	2.0		797.2	797.2	798.2	1.0
AB	33738	154	4170	2.7		797.3	797.3	798.3	1.0
AC	34869	360	7990	1.4		797.3	797.3	798.3	1.0
AD	35687	272	6283	1.8		797.5	797.5	798.5	1.0
AE	35832	193	4618	2.4		797.5	797.5	798.5	1.0
AF	36770	230	5032	2.2		797.6	797.6	798.6	1.0
AG	37720	297	5813	1.9		797.7	797.7	798.7	1.0
AH	37862	191	5004	2.2		797.7	797.7	798.7	1.0
AI	38492	197	4700	2.4		797.7	797.7	798.7	1.0
AJ	38993	130	3352	3.3		797.8	797.8	798.8	1.0
AK	39125	119	3037	3.7		798.3	798.3	799.3	1.0
AL	39653	248	5274	2.1		798.4	798.4	799.4	1.0
AM	42716	113	4006	2.8		798.7	798.7	799.7	1.0
AN	42857	185	5397	2.1		799.0	799.0	800.0	1.0
AO	43460	125	3325	3.3		799.1	799.1	800.0	0.9
AP	43575	105	2951	3.8		799.1	799.1	800.1	1.0
AQ	44675	1030	15643	0.7		799.1	799.1	800.1	1.0
AR	45361	1870	33864	0.3		799.1	799.1	800.1	1.0
AS	46470	2276	38701	0.3		799.1	799.1	800.1	1.0
AT	49268	780	11029	1.0		799.1	799.1	800.1	1.0
AU	50351	1026	17575	0.6		799.2	799.2	800.2	1.0
AV	51512	1478	21944	0.5		799.2	799.2	800.2	1.0
AW	52647	2333	33091	0.3		799.2	799.2	800.2	1.0
AX	53968	2415	32856	0.3		799.2	799.2	800.2	1.0

[1]Feet from a point approximately 3575 feet downstream from Wills Creek Valley Road

TABLE 11

FEDERAL EMERGENCY MANAGEMENT AGENCY

GUERNSEY COUNTY, OH
AND INCORPORATED AREAS

FLOODWAY DATA

WILLS CREEK

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Wills Creek (continued)									
AY	56429	NA[2]	NA[2]	NA[2]		799.2	799.2	NA[2]	NA[2]
AZ	57055	NA[2]	NA[2]	NA[2]		799.2	799.2	NA[2]	NA[2]
BA	57772	NA[2]	NA[2]	NA[2]		799.2	799.2	NA[2]	NA[2]
BB	59013	NA[2]	NA[2]	NA[2]		799.3	799.3	NA[2]	NA[2]
BC	60366	NA[2]	NA[2]	NA[2]		799.3	799.3	NA[2]	NA[2]
BD	61226	NA[2]	NA[2]	NA[2]		799.3	799.3	NA[2]	NA[2]
BE	62277	NA[2]	NA[2]	NA[2]		799.3	799.3	NA[2]	NA[2]
BF	62782	NA[2]	NA[2]	NA[2]		799.3	799.3	NA[2]	NA[2]
BG	63379	NA[2]	NA[2]	NA[2]		799.4	799.4	NA[2]	NA[2]
BH	64472	NA[2]	NA[2]	NA[2]		799.4	799.4	NA[2]	NA[2]
BI	65870	NA[2]	NA[2]	NA[2]		799.4	799.4	NA[2]	NA[2]
BJ	67630	NA[2]	NA[2]	NA[2]		799.6	799.6	NA[2]	NA[2]
BK	68268	NA[2]	NA[2]	NA[2]		799.7	799.7	NA[2]	NA[2]
BL	69586	NA[2]	NA[2]	NA[2]		799.7	799.7	NA[2]	NA[2]
BM	71214	NA[2]	NA[2]	NA[2]		800.5	800.5	NA[2]	NA[2]
BN	72190	NA[2]	NA[2]	NA[2]		800.6	800.6	NA[2]	NA[2]
BO	73083	NA[2]	NA[2]	NA[2]		800.7	800.7	NA[2]	NA[2]
BP	74979	NA[2]	NA[2]	NA[2]		800.9	800.9	NA[2]	NA[2]
BQ	75872	NA[2]	NA[2]	NA[2]		801.0	801.0	NA[2]	NA[2]
BR	76903	NA[2]	NA[2]	NA[2]		801.1	801.1	NA[2]	NA[2]
BS	77779	NA[2]	NA[2]	NA[2]		801.2	801.2	NA[2]	NA[2]
BT	78791	NA[2]	NA[2]	NA[2]		801.3	801.3	NA[2]	NA[2]
BU	80000	NA[2]	NA[2]	NA[2]		801.4	801.4	NA[2]	NA[2]

[1]Feet from a point approximately 3575 feet downstream from Wills Creek Valley Road

[2]No data available

TABLE 11

FEDERAL EMERGENCY MANAGEMENT AGENCY

GUERNSEY COUNTY, OH
AND INCORPORATED AREAS

FLOODWAY DATA

WILLS CREEK

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Wills Creek (continued)									
BV	100290	NA[2]	NA[2]	NA[2]		802.9	802.9	NA[2]	NA[2]
BW	100394	NA[2]	NA[2]	NA[2]		802.8	802.8	NA[2]	NA[2]
BX	104158	NA[2]	NA[2]	NA[2]		802.7	802.7	NA[2]	NA[2]
BY	109731	NA[2]	NA[2]	NA[2]		802.6	802.6	NA[2]	NA[2]
BZ	110042	NA[2]	NA[2]	NA[2]		802.5	802.5	NA[2]	NA[2]
CA	121703	NA[2]	NA[2]	NA[2]		803.3	803.3	NA[2]	NA[2]
CB	122549	NA[2]	NA[2]	NA[2]		803.4	803.4	NA[2]	NA[2]
CC	124020	NA[2]	NA[2]	NA[2]		803.7	803.7	NA[2]	NA[2]
Buffalo Creek									
CD	124413	NA[2]	NA[2]	NA[2]		804.2	804.2	NA[2]	NA[2]
CE	124610	NA[2]	NA[2]	NA[2]		804.6	804.6	NA[2]	NA[2]
CF	125671	NA[2]	NA[2]	NA[2]		805.2	805.2	NA[2]	NA[2]
CG	125991	NA[2]	NA[2]	NA[2]		805.6	805.6	NA[2]	NA[2]
CH	127160	NA[2]	NA[2]	NA[2]		805.9	805.9	NA[2]	NA[2]

[1]Feet from a point approximately 3575 feet downstream from Wills Creek Valley Road

[2]No data available

TABLE 11

FEDERAL EMERGENCY MANAGEMENT AGENCY

GUERNSEY COUNTY, OH
AND INCORPORATED AREAS

FLOODWAY DATA

WILLS CREEK - BUFFALO CREEK

5.0 INSURANCE APPLICATIONS

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance risk zone that corresponds to the 1-percent-annual-chance floodplains that are determined in the FIS by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no BFEs or base flood depths are shown within this zone.

Zone AE

Zone AE is the flood insurance risk zone that corresponds to the 1-percent-annual-chance floodplains that are determined in the FIS by detailed methods. In most instances, whole-foot BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance risk zone that corresponds to areas outside the 0.2-percent-annual-chance floodplain, areas within the 0.2-percent-annual-chance floodplain, areas of 1-percent-annual-chance flooding where average depths are less than 1 foot, areas of 1-percent-annual-chance flooding where the contributing drainage area is less that 1 square mile, and areas protected from the 1-percent-annual-chance flood by levees. No BFEs or base flood depths are shown within this zone.

6.0 FLOOD INSURANCE RATE MAP

The FIRM is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance risk zones described in Section 5.0 and, in the 1-percent-annual-chance floodplains that were studied by detailed methods, shows selected whole-foot BFEs or average depths. Insurance agents use the zones and BFEs in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens and symbols, the 1- and 0.2-percent-annual-chance floodplains, floodways and the locations of selected cross-sections used in the hydraulic analyses and floodway computations.

The current FIRM presents flooding information for the entire geographic area of Guernsey County. Previously, separate FIRMs were prepared for each identified flood-prone incorporated community and the unincorporated areas of the county with identified special flood hazard areas. Historical data relating to the maps prepared for each community are presented in Table 11.

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISION DATE(S)	FIRM EFFECTIVE DATE	FIRM REVISION DATE(S)
Byesville, Village of	March 29, 1974	May 21, 1976	February 17, 1989	August 16, 2011
Cambridge, City of	May 31, 1974	November 21, 1975	March 18, 1986	August 16, 2011
Cumberland, Village of	September 15, 1978	None	February 17, 1989	August 16, 2011
* Fairview, Village of	N/A	None	N/A	None
Guernsey County (Unincorporated Areas)	March 21, 1975	December 16, 1977	February 17, 1989	August 16, 2011
Lore City, Village of	August 30, 1974	July 2, 1976	February 17, 1989	August 16, 2011
* Old Washington, Village of	N/A	None	N/A	None
Pleasant City, Village of	August 23, 1974	July 30, 1976	January 5, 1979	August 16, 2011
Quaker City, Village of	September 29, 1978	None	February 17, 1989	August 16, 2011
Salesville, Village of	February 17, 1989	None	February 17, 1989	August 16, 2011
Senecaville, Village of	October 6, 1978	None	February 17, 1989	August 16, 2011

*No Special Flood Hazard Areas Identified

TABLE 12

FEDERAL EMERGENCY MANAGEMENT AGENCY

GUERNSEY COUNTY, OHIO
AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

7.0 OTHER STUDIES

This FIS incorporates all previously published FISs and FIRMs for the areas within Guernsey County.

This FIS report supersedes all previous studies published on streams studied in this report and should be considered authoritative for purposes of the National Flood Insurance Program.

Countywide FIS reports and FIRMS are in progress or complete for Belmont County, Coshocton County, Harrison County, Muskingum County, Noble County, and Tuscarawas County. The results presented in this FIS report and on the FIRM for Guernsey County will be in agreement with the results of these studies.

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Flood Insurance and Mitigation Division, Federal Emergency Management Agency, 536 South Clark Street, Sixth Floor, Chicago, Illinois 60605.

Future revisions may be made that do not result in the republishing of the FIS report. To ensure that any user is aware of all revisions, it is advisable to contact the map repository of flood hazard data located in the community.

9.0 BIBLIOGRAPHY AND REFERENCES

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32. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Insurance Rate Map, Village of Pleasant City, Guernsey County, Ohio, January 1979.

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34. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, Village of Senecaville, Guernsey County, Ohio, October 1978.

FEDERAL EMERGENCY MANAGEMENT AGENCY
GUERNSEY COUNTY, OH
AND INCORPORATED AREAS
01P
FLOOD PROFILES
BUFFALO FORK
ELEVATION IN FEET (NAVD)
STREAM DISTANCE IN FEET ABOVE MOUTH
LEGEND
0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
2% ANNUAL CHANCE FLOOD
10% ANNUAL CHANCE FLOOD
STREAM BED
CROSS SECTION LOCATION
LIMIT OF DETAILED STUDY
PERRY'S DEN ROAD
VILLAGE OF CUMBERLAND
A
B
C
D
E
I

FEDERAL EMERGENCY MANAGEMENT AGENCY

GUERNSEY COUNTY, OH

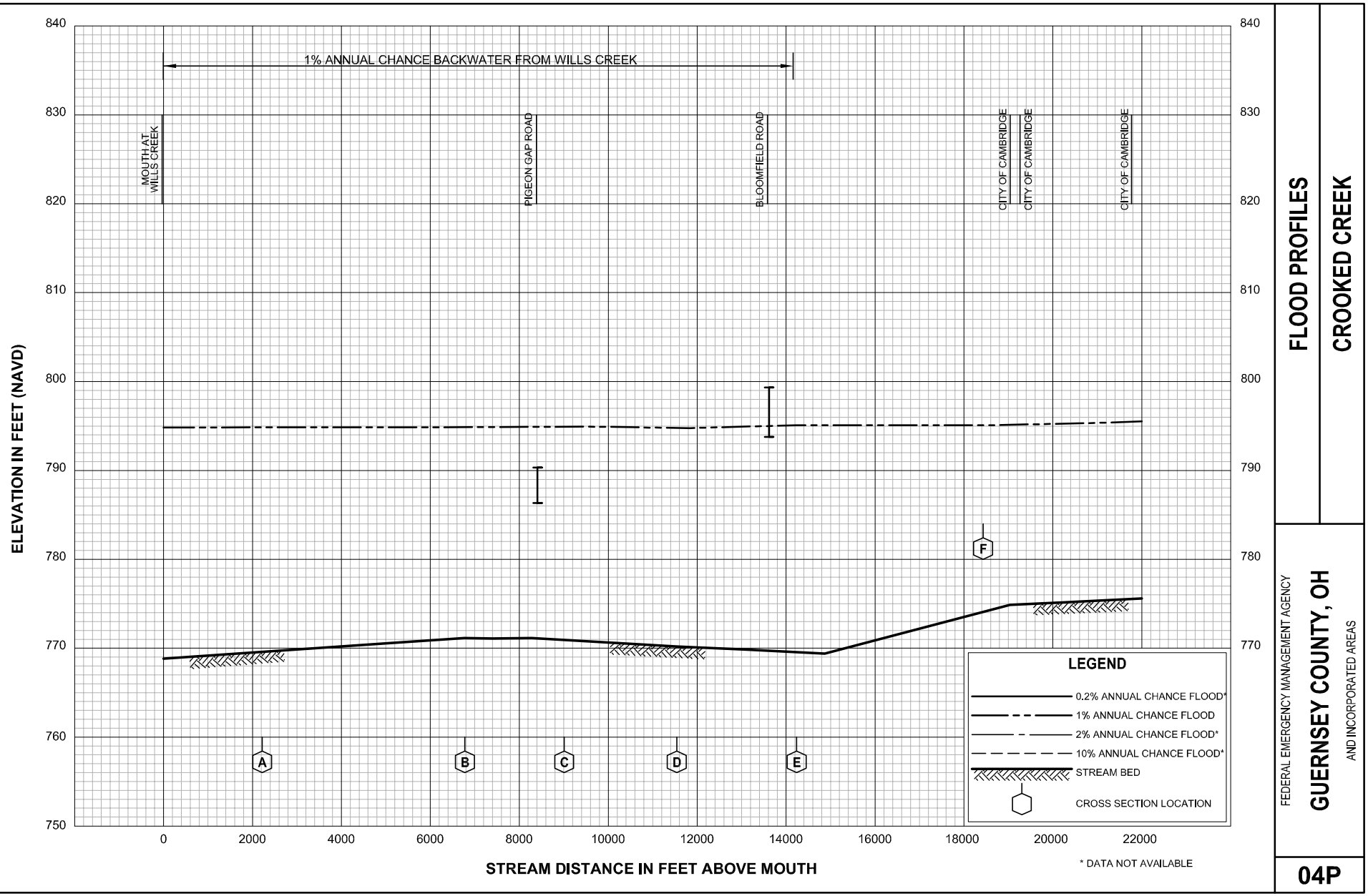
AND INCORPORATED AREAS

02P

FLOOD PROFILES

BUFFALO FORK - COLLINS FORK

FEDERAL EMERGENCY MANAGEMENT AGENCY
GUERNSEY COUNTY, OH
AND INCORPORATED AREAS
03P
FLOOD PROFILES
CLEAR FORK
ELEVATION IN FEET (NAVD)
848
844
840
836
832
828
824
820
816
812
LEGEND
0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
2% ANNUAL CHANCE FLOOD
10% ANNUAL CHANCE FLOOD
STREAM BED
CROSS SECTION LOCATION
A
B
C
D
E
F
G
LIMIT OF DETAILED STUDY
BIRMINGHAM ROAD
LIMIT OF DETAILED STUDY
0
400
800
1200
1600
2000
2400
2800
STREAM DISTANCE IN FEET FROM A POINT APPROXIMATELY
182 FEET DOWNSTREAM OF BIRMINGHAM ROAD



FLOOD PROFILES
CROOKED CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

GUERNSEY COUNTY, OH

AND INCORPORATED AREAS

04P

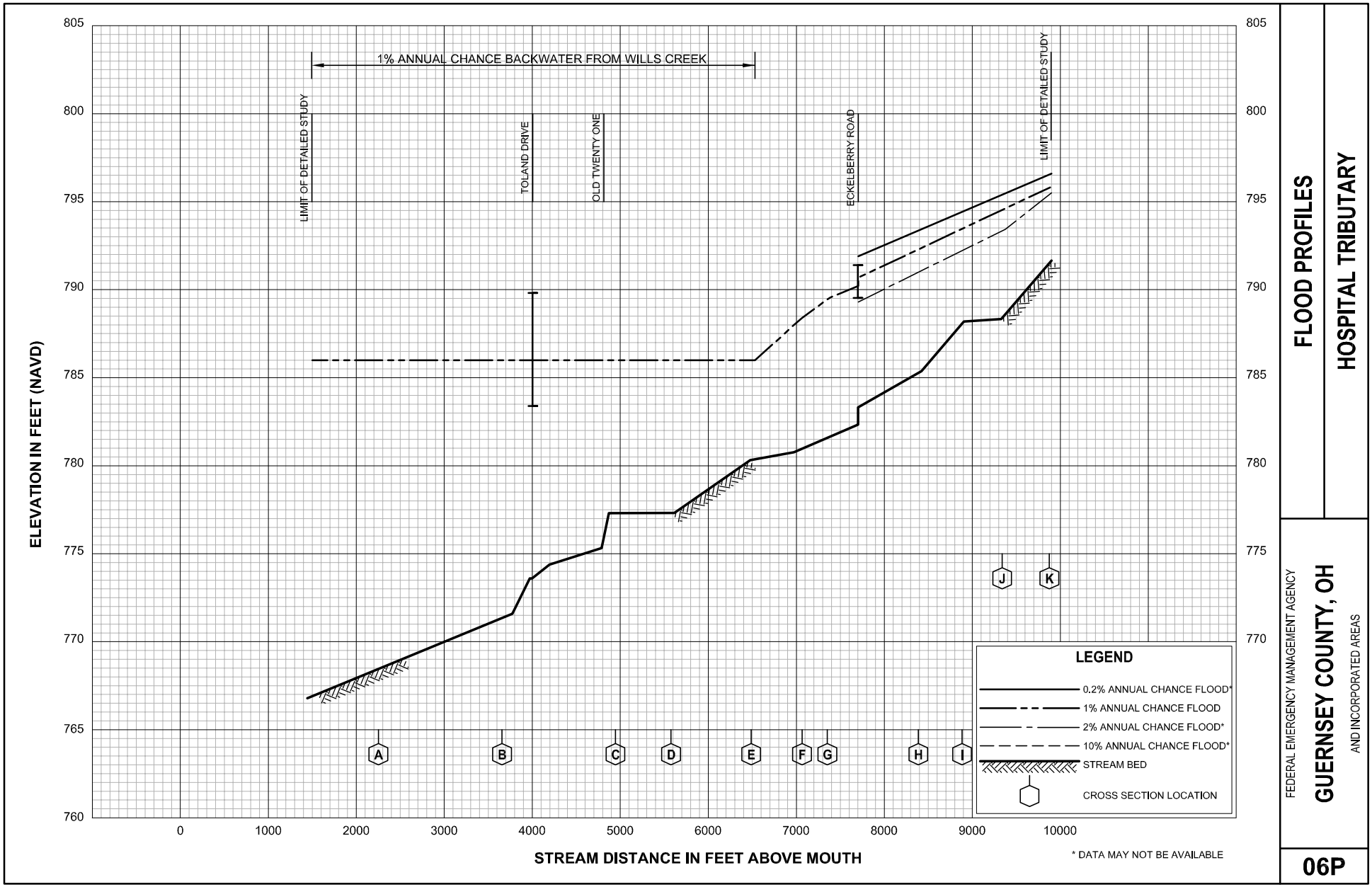
FEDERAL EMERGENCY MANAGEMENT AGENCY

GUERNSEY COUNTY, OH

AND INCORPORATED AREAS

FLOOD PROFILES

CROOKED CREEK



FLOOD PROFILES

HOSPITAL TRIBUTARY

FEDERAL EMERGENCY MANAGEMENT AGENCY

GUERNSEY COUNTY, OH

AND INCORPORATED AREAS

06P

FEDERAL EMERGENCY MANAGEMENT AGENCY

GUERNSEY COUNTY, OH

AND INCORPORATED AREAS

07P

FLOOD PROFILES

LEATHERWOOD CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

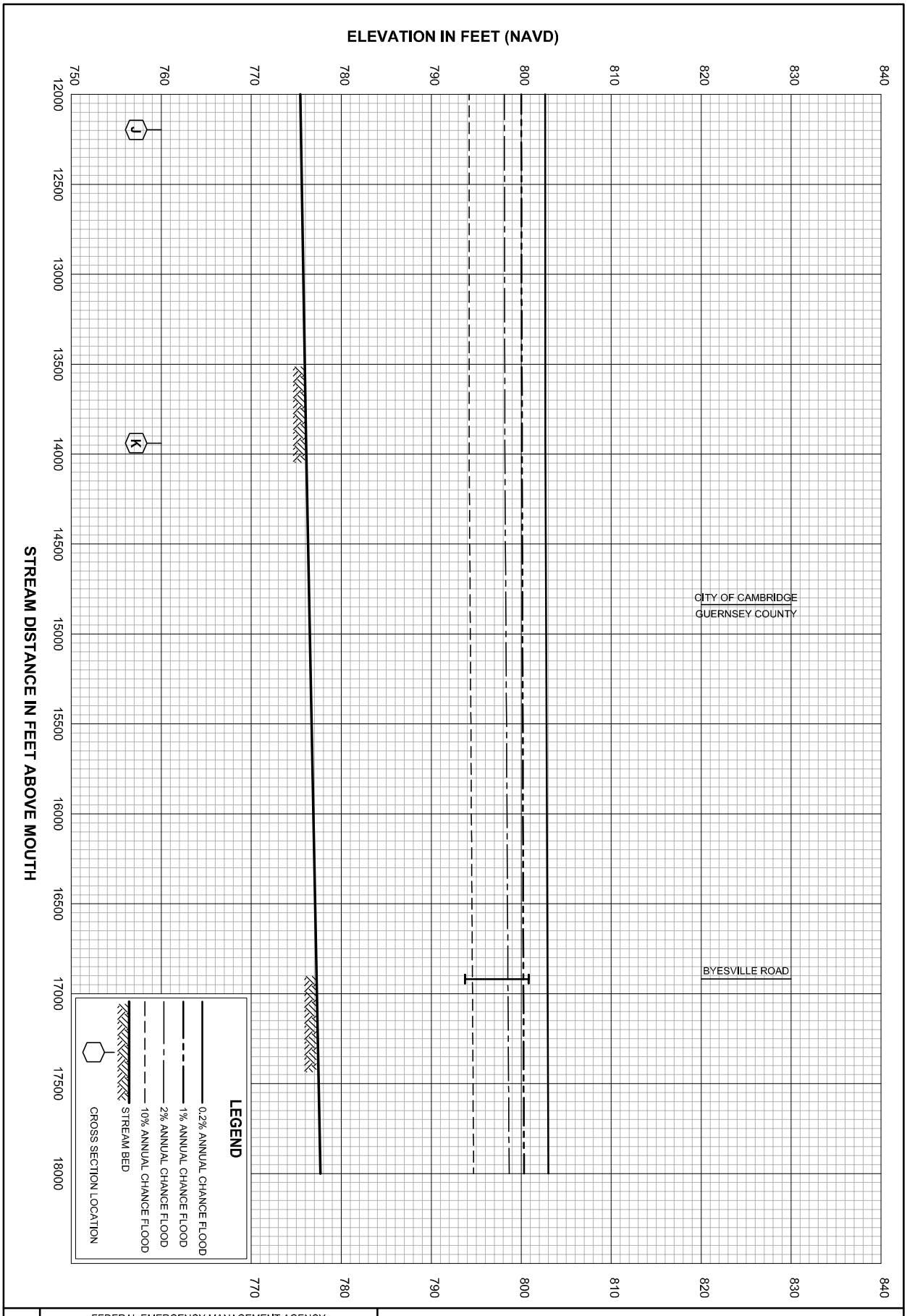
GUERNSEY COUNTY, OH

AND INCORPORATED AREAS

08P

FLOOD PROFILES

LEATHERWOOD CREEK



FEDERAL EMERGENCY MANAGEMENT AGENCY

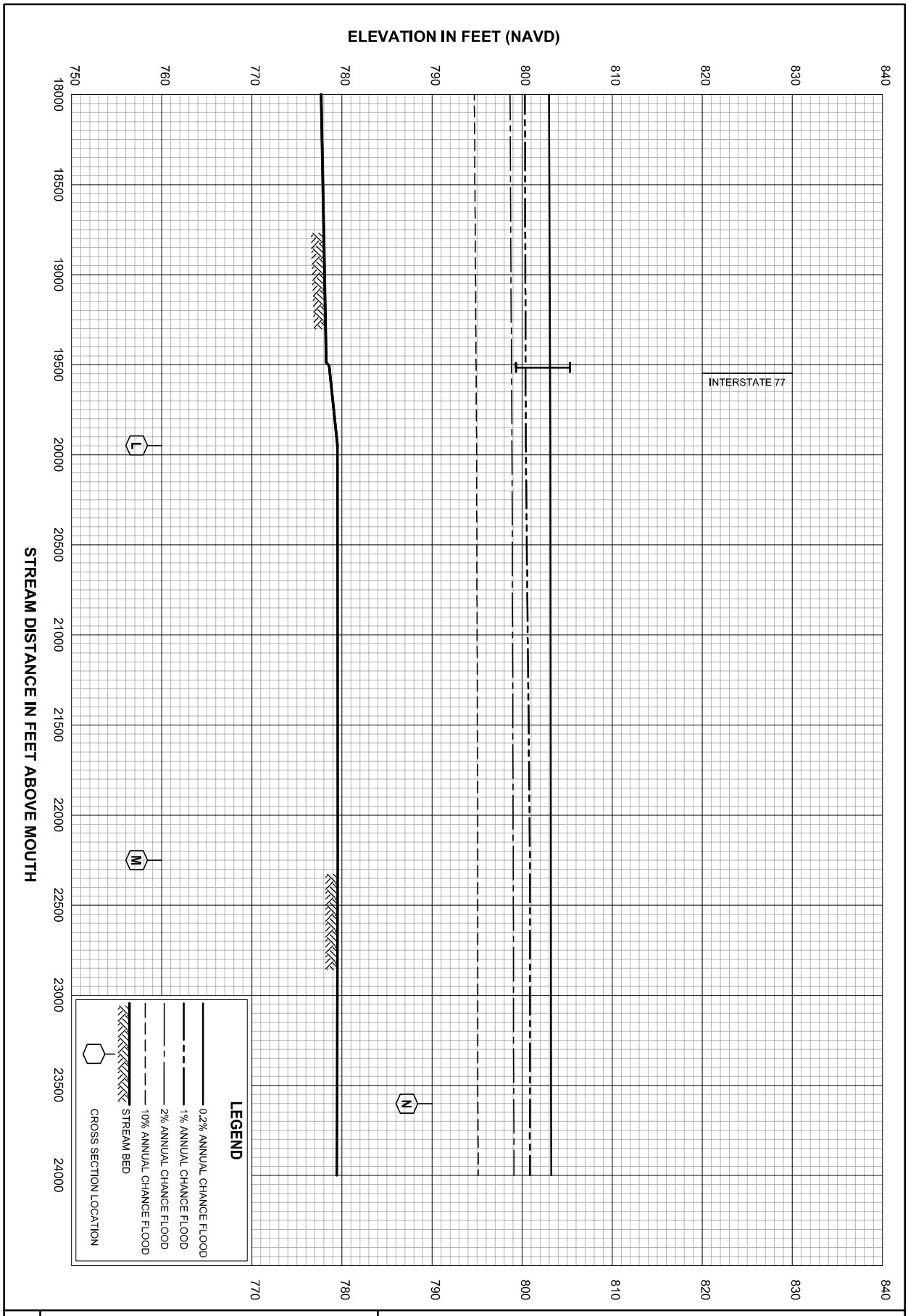
GUERNSEY COUNTY, OH

AND INCORPORATED AREAS

FLOOD PROFILES

LEATHERWOOD CREEK

09P



10P

FEDERAL EMERGENCY MANAGEMENT AGENCY

GUERNSEY COUNTY, OH

AND INCORPORATED AREAS

FLOOD PROFILES

LEATHERWOOD CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

GUERNSEY COUNTY, OH

AND INCORPORATED AREAS

FLOOD PROFILES

LEATHERWOOD CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY
GUERNSEY COUNTY, OH
AND INCORPORATED AREAS
12P
FLOOD PROFILES
LEATHERWOOD CREEK
ELEVATION IN FEET (NAVD)
STREAM DISTANCE IN FEET ABOVE MOUTH
LEGEND
0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
2% ANNUAL CHANCE FLOOD
10% ANNUAL CHANCE FLOOD
STREAM BED
CROSS SECTION LOCATION
LIMIT OF STUDY
RAILROAD
VILLAGE OF LORE CITY
CONFLUENCE WITH INFIRMARY RUN

FLOOD PROFILES
LEATHERWOOD CREEK

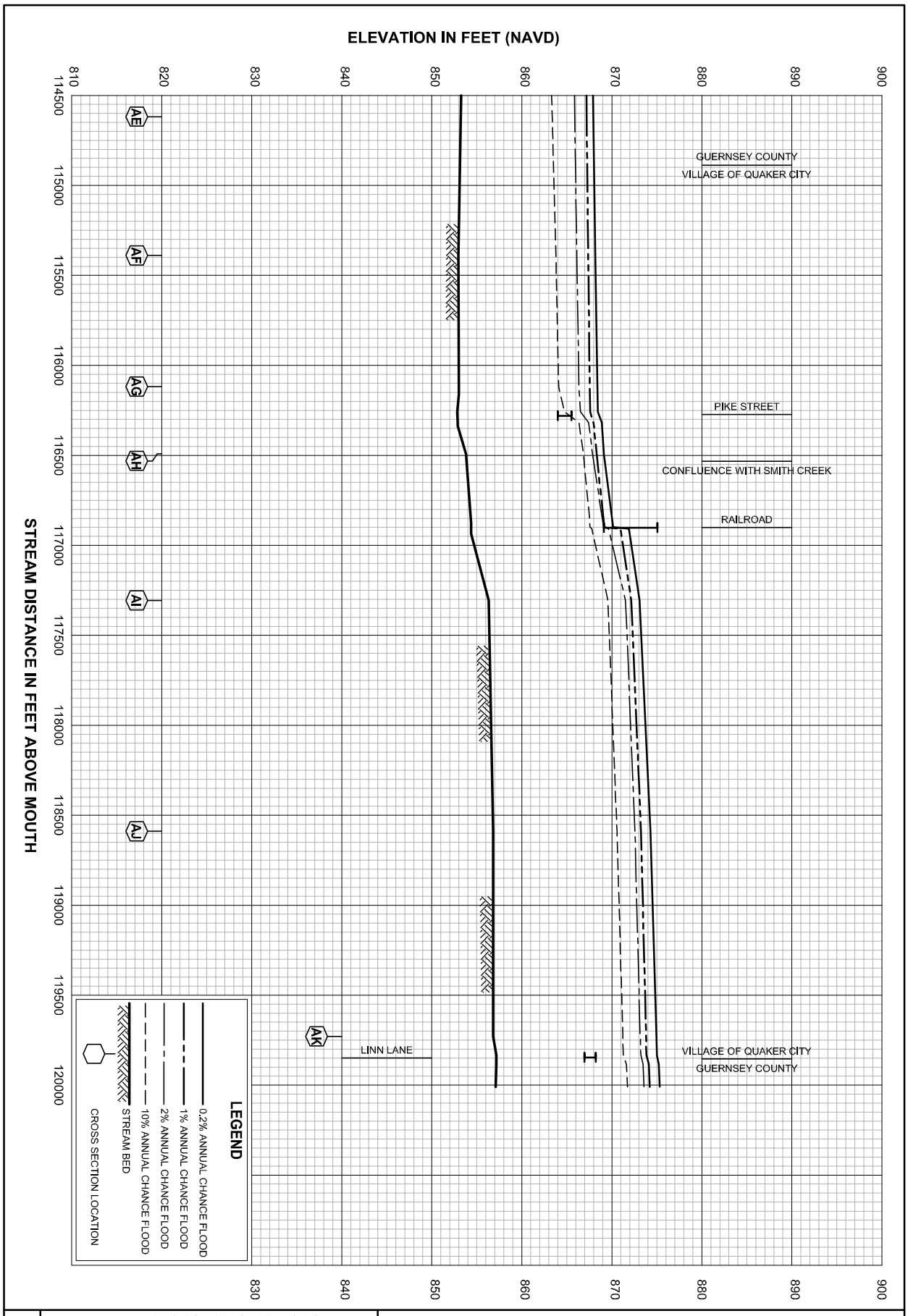
FEDERAL EMERGENCY MANAGEMENT AGENCY

GUERNSEY COUNTY, OH

AND INCORPORATED AREAS

FLOOD PROFILES

LEATHERWOOD CREEK



FEDERAL EMERGENCY MANAGEMENT AGENCY

GUERNSEY COUNTY, OH

AND INCORPORATED AREAS

FLOOD PROFILES

LEATHERWOOD CREEK

15P

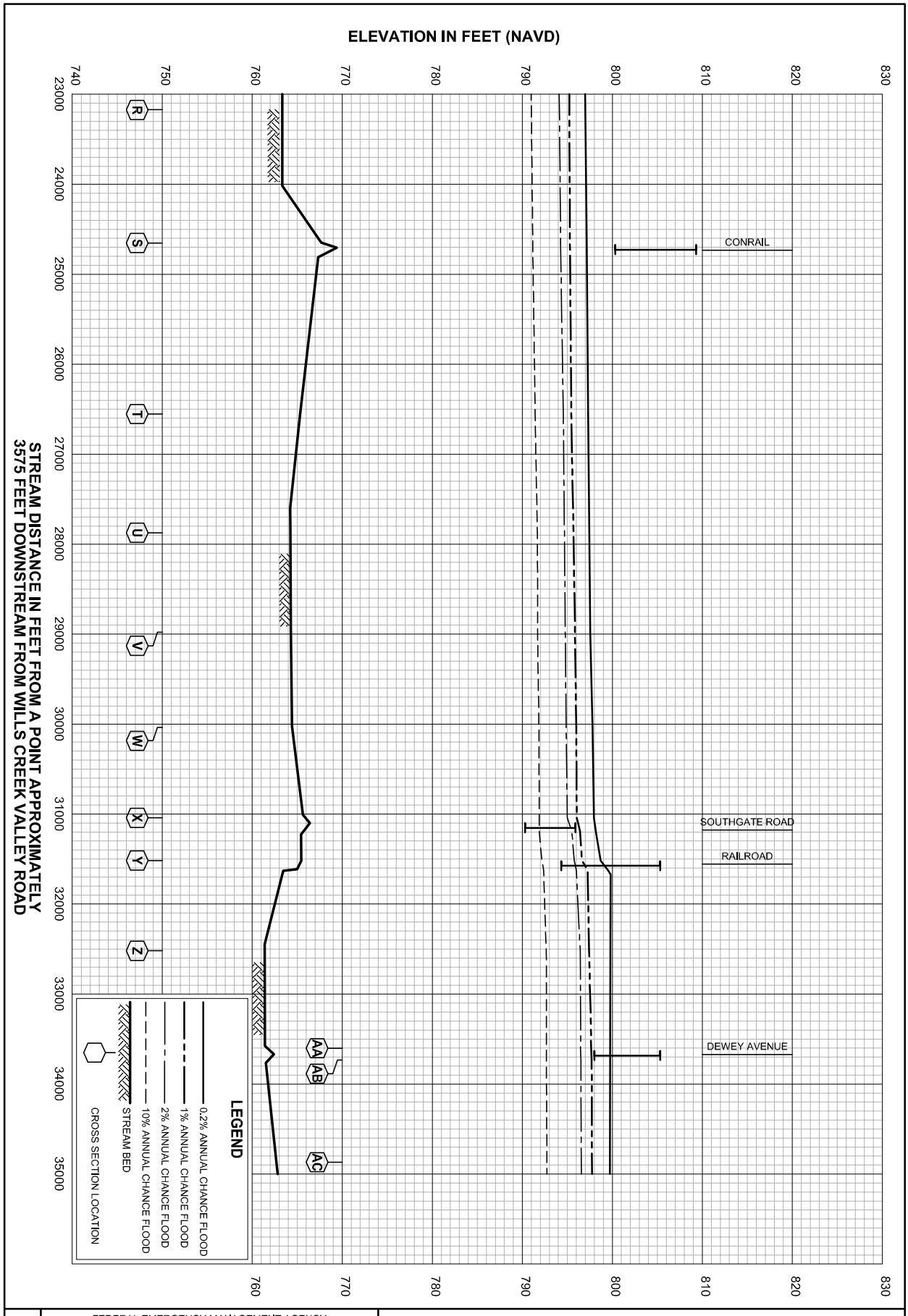
FEDERAL EMERGENCY MANAGEMENT AGENCY
GUERNSEY COUNTY, OH
AND INCORPORATED AREAS
16P
FLOOD PROFILES
LEATHERWOOD CREEK
ELEVATION IN FEET (NAVD)
STREAM DISTANCE IN FEET ABOVE MOUTH
LEGEND
0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
2% ANNUAL CHANCE FLOOD
10% ANNUAL CHANCE FLOOD
STREAM BED
CROSS SECTION LOCATION
ELDON ROAD
LIMIT OF DETAILED STUDY
AL
AM
AN
AO
AP
AQ

FEDERAL EMERGENCY MANAGEMENT AGENCY
GUERNSEY COUNTY, OH
AND INCORPORATED AREAS
17P
FLOOD PROFILES
SMITH CREEK
ELEVATION IN FEET (NAVD)
STREAM DISTANCE IN FEET ABOVE MOUTH
LEGEND
0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
2% ANNUAL CHANCE FLOOD*
10% ANNUAL CHANCE FLOOD
STREAM BED
CROSS SECTION LOCATION
* DATA NOT AVAILABLE
MOUTH AT LEATHERWOOD CREEK
SOUTH STREET
BARNESVILLE STREET
CRAWFORD LANE
LIMIT OF DETAILED STUDY
1% ANNUAL CHANCE FLOOD FROM LEATHERWOOD CREEK OVERFLOW
A
B
C
D
E
F
G
H

FEDERAL EMERGENCY MANAGEMENT AGENCY
GUERNSEY COUNTY, OH
AND INCORPORATED AREAS
18P
FLOOD PROFILES
WILLS CREEK AT KIMBOLTON
ELEVATION IN FEET (NAVD)
820
810
800
790
780
770
760
750
740
730
0
1000
2000
3000
4000
5000
STREAM DISTANCE IN FEET FROM A POINT
APPROXIMATELY 460 FEET DOWNSTREAM OF PLUM STREET (MAIN STREET)
LEGEND
0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
2% ANNUAL CHANCE FLOOD
10% ANNUAL CHANCE FLOOD
STREAM BED
CROSS SECTION LOCATION
A
B
C
D
E
F
LIMIT OF DETAILED STUDY
MAIN STREET
LIMIT OF STUDY
NOTE: INFORMATION BETWEEN CROSS-SECTIONS F
AND A (STATIONS 4693 AND 100) IS ZONE A FLOODPLAIN

FEDERAL EMERGENCY MANAGEMENT AGENCY
GUERNSEY COUNTY, OH
AND INCORPORATED AREAS
19P
FLOOD PROFILES
WILLS CREEK
ELEVATION IN FEET (NAVD)
STREAM DISTANCE IN FEET FROM A POINT APPROXIMATELY 3575 FEET DOWNSTREAM FROM WILLS CREEK VALLEY ROAD
LEGEND
0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
2% ANNUAL CHANCE FLOOD
10% ANNUAL CHANCE FLOOD
STREAM BED
CROSS SECTION LOCATION
GUERNSEY COUNTY
CITY OF CAMBRIDGE
LIMIT OF STUDY
WILLS CREEK
VALLEY ROAD
CITY OF CAMBRIDGE
CITY OF CAMBRIDGE
CITY OF CAMBRIDGE
EIGHTH STREET
CITY OF CAMBRIDGE

FEDERAL EMERGENCY MANAGEMENT AGENCY
GUERNSEY COUNTY, OH
AND INCORPORATED AREAS
20P
FLOOD PROFILES
WILLS CREEK
ELEVATION IN FEET (NAVD)
STREAM DISTANCE IN FEET FROM A POINT APPROXIMATELY
3575 FEET DOWNSTREAM FROM WILLS CREEK VALLEY ROAD
LEGEND
0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
2% ANNUAL CHANCE FLOOD
10% ANNUAL CHANCE FLOOD
STREAM BED
CROSS SECTION LOCATION
CITY OF CAMBRIDGE
CONRAIL
CONFLUENCE WITH CROOKED CREEK
CONRAIL
K
L
M
N
O
P
Q



FEDERAL EMERGENCY MANAGEMENT AGENCY

GUERNSEY COUNTY, OH

AND INCORPORATED AREAS

FLOOD PROFILES

WILLS CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

GUERNSEY COUNTY, OH

AND INCORPORATED AREAS

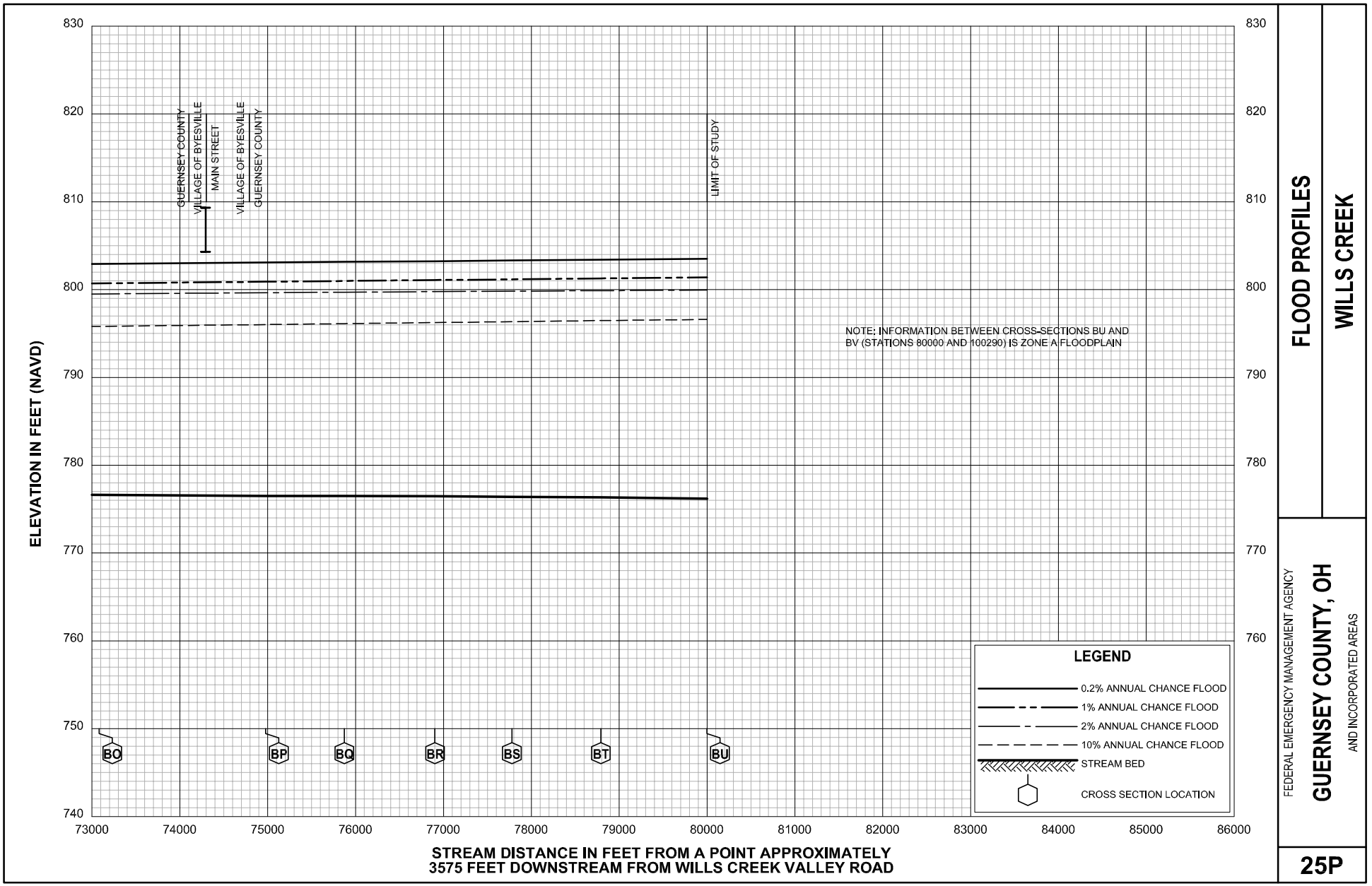
FLOOD PROFILES

WILLS CREEK

22P

23P
FEDERAL EMERGENCY MANAGEMENT AGENCY
GUERNSEY COUNTY, OH
AND INCORPORATED AREAS
FLOOD PROFILES
WILLS CREEK
ELEVATION IN FEET (NAVD)
STREAM DISTANCE IN FEET FROM A POINT APPROXIMATELY
3575 FEET DOWNSTREAM FROM WILLS CREEK VALLEY ROAD
LEGEND
0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
2% ANNUAL CHANCE FLOOD
10% ANNUAL CHANCE FLOOD
STREAM BED
CROSS SECTION LOCATION
OAKWOOD ROAD
CONFLUENCE WITH CHAPMAN RUN
INTERSTATE 70
CITY OF CAMBRIDGE
GUERNSEY COUNTY
BC
BB
BA
AZ
AY
AX
AW
AV
AU
AT

24P
FEDERAL EMERGENCY MANAGEMENT AGENCY
GUERNSEY COUNTY, OH
AND INCORPORATED AREAS
FLOOD PROFILES
WILLS CREEK
ELEVATION IN FEET (NAVD)
STREAM DISTANCE IN FEET FROM A POINT APPROXIMATELY
3575 FEET DOWNSTREAM FROM WILLS CREEK VALLEY ROAD
LEGEND
0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
2% ANNUAL CHANCE FLOOD
10% ANNUAL CHANCE FLOOD
STREAM BED
CROSS SECTION LOCATION
IDEAL ROAD (10TH STREET)
BD
BE
BF
BG
BH
BI
BJ
BK
BL
BM
BN
830
820
810
800
790
780
770
760
750
740
61000
62000
63000
64000
65000
66000
67000
68000
69000
70000
71000
72000
73000



FLOOD PROFILES

WILLS CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

GUERNSEY COUNTY, OH

AND INCORPORATED AREAS

25P

FEDERAL EMERGENCY MANAGEMENT AGENCY

GUERNSEY COUNTY, OH

AND INCORPORATED AREAS

FLOOD PROFILES

WILLS CREEK

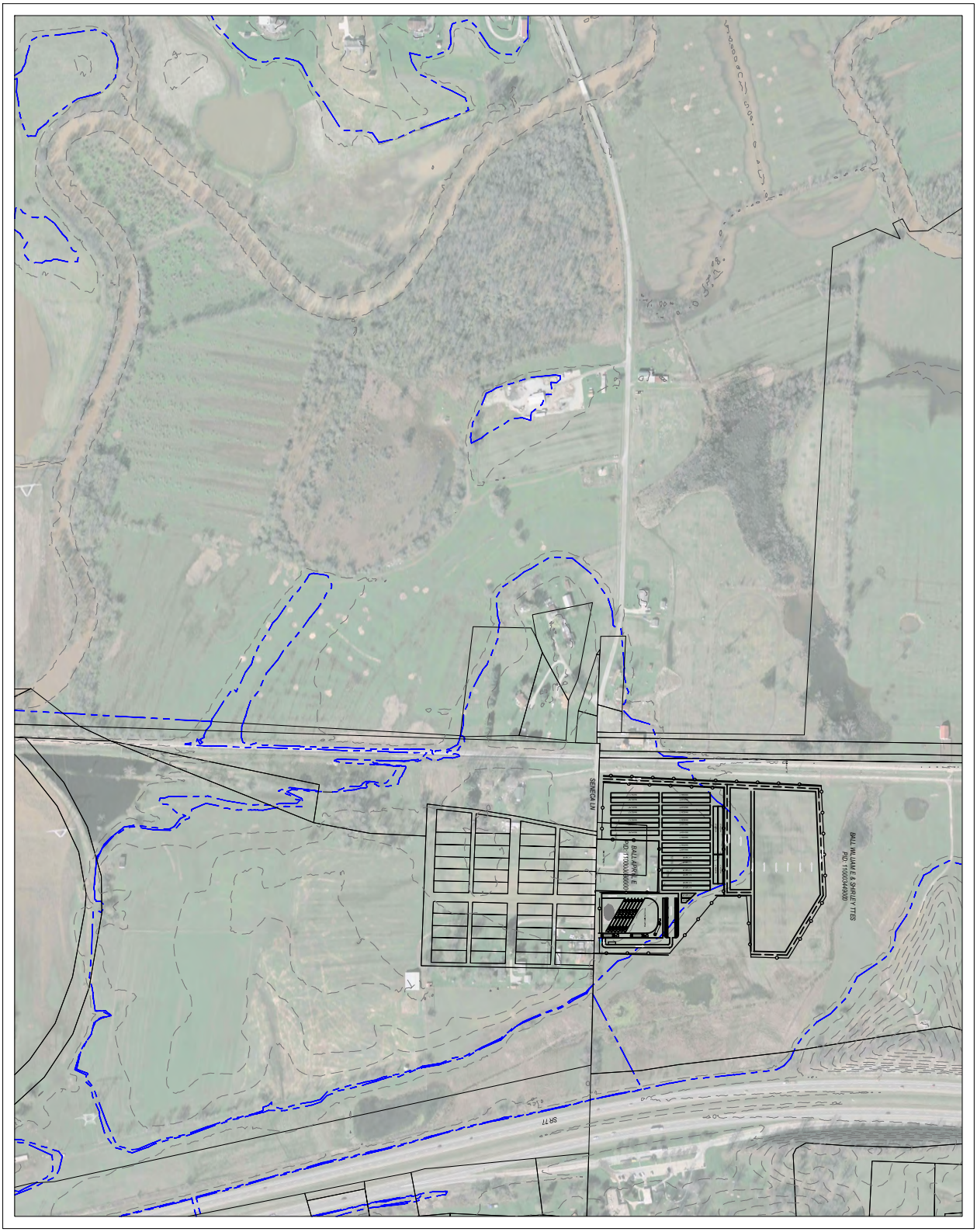
26P

27P
FEDERAL EMERGENCY MANAGEMENT AGENCY
GUERNSEY COUNTY, OH
AND INCORPORATED AREAS
FLOOD PROFILES
WILLS CREEK - BUFFALO CREEK
ELEVATION IN FEET (NAVD)
STREAM DISTANCE IN FEET FROM A POINT APPROXIMATELY
3575 FEET DOWNSTREAM FROM WILLS CREEK VALLEY ROAD
LEGEND
0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
2% ANNUAL CHANCE FLOOD
10% ANNUAL CHANCE FLOOD
STREAM BED
CROSS SECTION LOCATION
LIMIT OF DETAILED STUDY
LIMIT OF STUDY
STATE ROUTE 146
VILLAGE OF PLEASANT CITY
GUERNSEY COUNTY
HEADWATER OF WILLS CREEK
MOUTH OF BUFFALO FORK
MOUTH OF BUFFALO CREEK
WILLS CREEK
BUFFALO CREEK
CA
CB
CC
CD
CE
CF
CG
CH

APPENDIX C
PROPOSED LAYDOWN YARD PLAN

SITE PLAN

N.T.S.



OHIO Utilities Protection Service
811 or 1-800-362-2764
Call Before You Dig

ISSUE	CONCEPT PLAN
	04/08/2019
JOB NO.:	756827
DESIGN:	JRM
DRAWN:	JMR
CHECKED:	JRM
SHEET NO.	A1

OVERALL PLAN

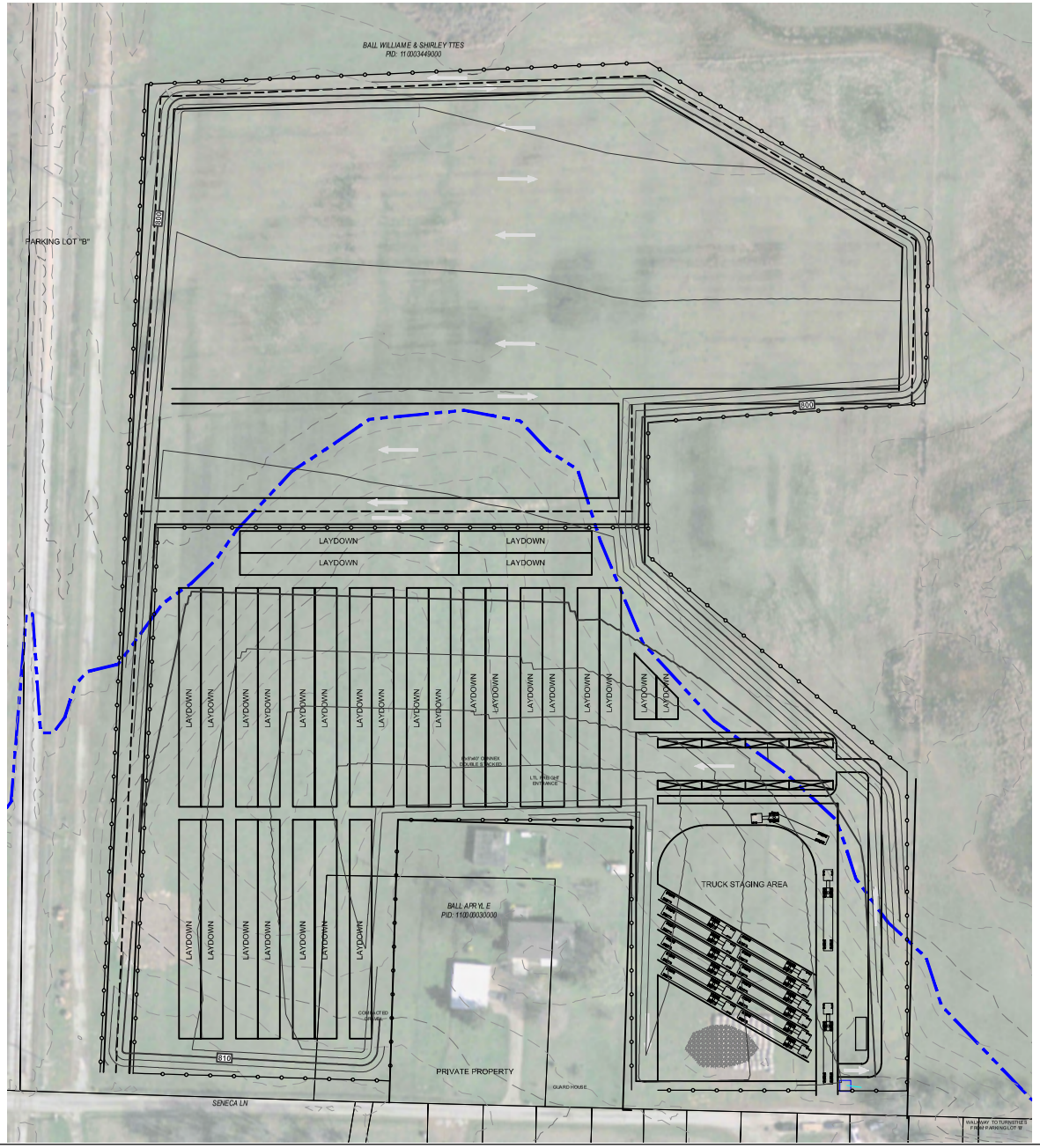
GEMMA POWER
BYESVILLE, OH

VALLEY TOWNSHIP, GUERNSEY COUNTY, OHIO

NO.	DATE	REVISION DESCRIPTION

CESO
www.ceso-inc.com

W:\PROJECTS\GEMMA POWER\756827 GUERNSEY POWER STATION\03-CIVIL\PLAN\CONCEPT\756827_CONCEPT_A.DWG - 4/9/2019 3:47 PM



LEGEND

EXISTING

- R/W — RIGHT OF WAY
- ESMT — EASEMENT
- PL — PROPERTY LINE
- MAJOR CONTOUR
- MINOR CONTOUR
- 100-YEAR FLOOD PLAIN LIMITS

PROPOSED

- 1200 — MAJOR CONTOUR
- 1202 — MINOR CONTOUR
- PAVEMENT
- CENTER LINE
- STM — STORM SEWER
- UD — UNDERDRAIN
- GRADE BREAK
- CLEARING LIMITS
- TEMPORARY FENCE

N

50 0 50 100

GRAPHIC SCALE (IN FEET)
1 inch = 50 ft.

EARTHWORK SUB-SUMMARY

DESCRIPTION	QUANTITY	UNITS
RAW CUT (EXIST. TO PAD SUBGRADE)	5,965	CY
RAW FILL (EXIST. TO PAD SUBGRADE)	104,010	CY
PAD EARTHWORK BALANCE (RAW CUT TO FILL)	**98,045 [IMPORT]**	**CY**
TOPSOIL STOCKPILED (X" AVG.)	---	CY
PLACING STOCKPILED TOPSOIL (4")	---	CY
EXCESS TOPSOIL	---	CY
NET SITE EARTHWORK = 98,045 CY [IMPORT]		

CESO
www.cesoinc.com

NO.	DATE	REVISION DESCRIPTION

GEMMA POWER
BYESVILLE, OH

VALLEY TOWNSHIP, GUERNSEY COUNTY, OHIO

SITE PLAN

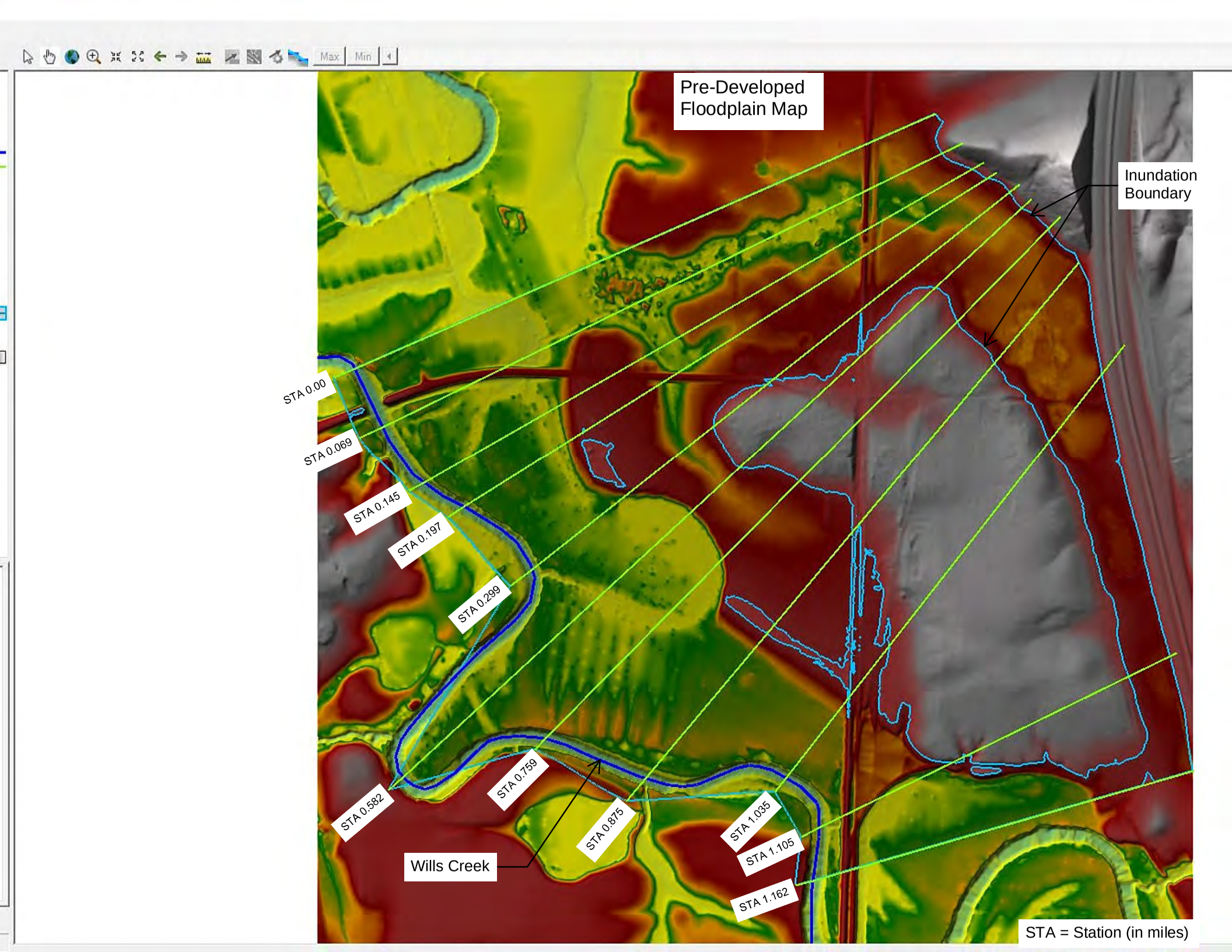
ISSUE:
CONCEPT PLAN
DATE:
04.09.2019

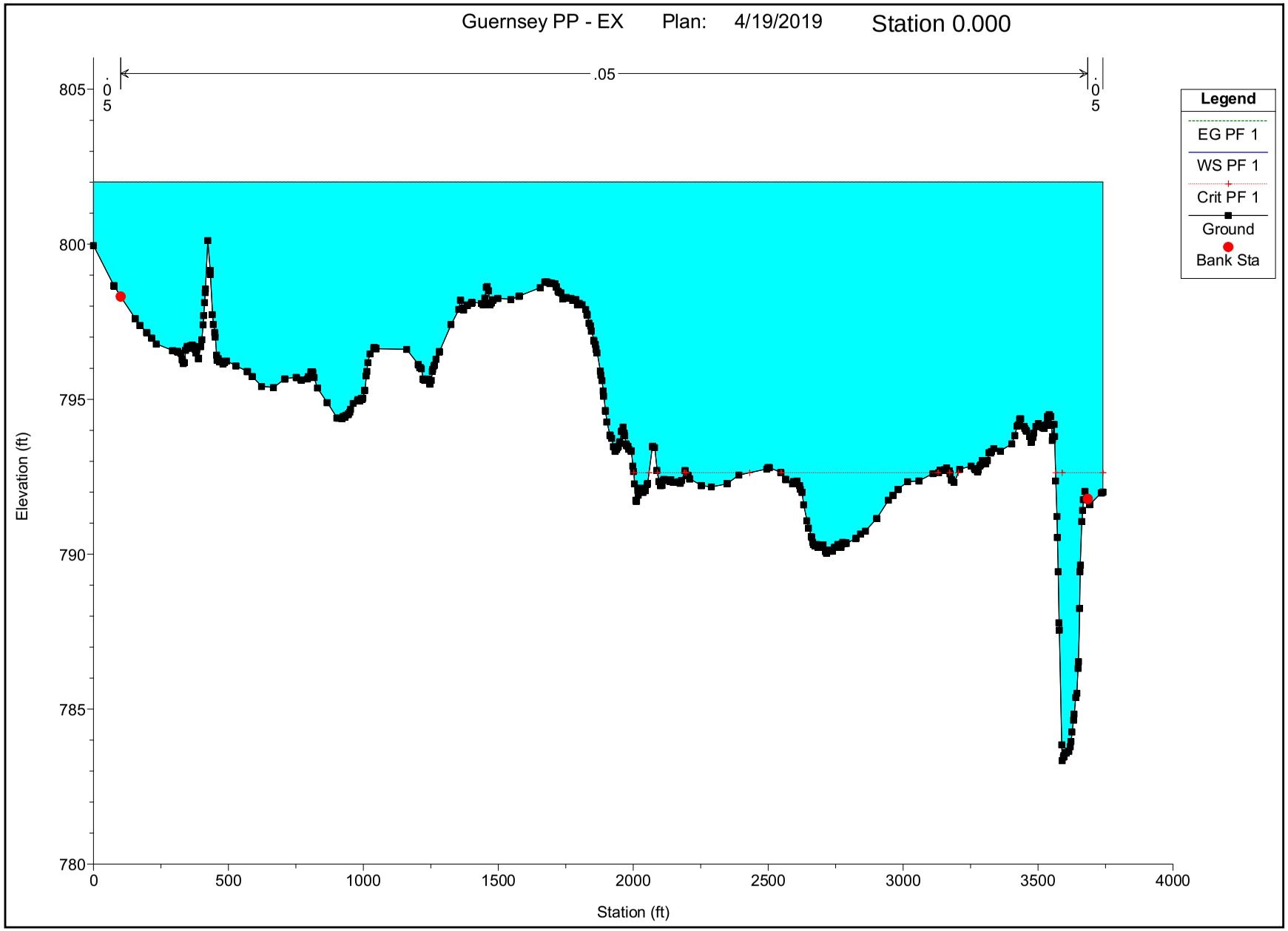
JOB NO.:	756527
DESIGN:	JRM
DRAWN:	JMR
CHECKED:	JRM

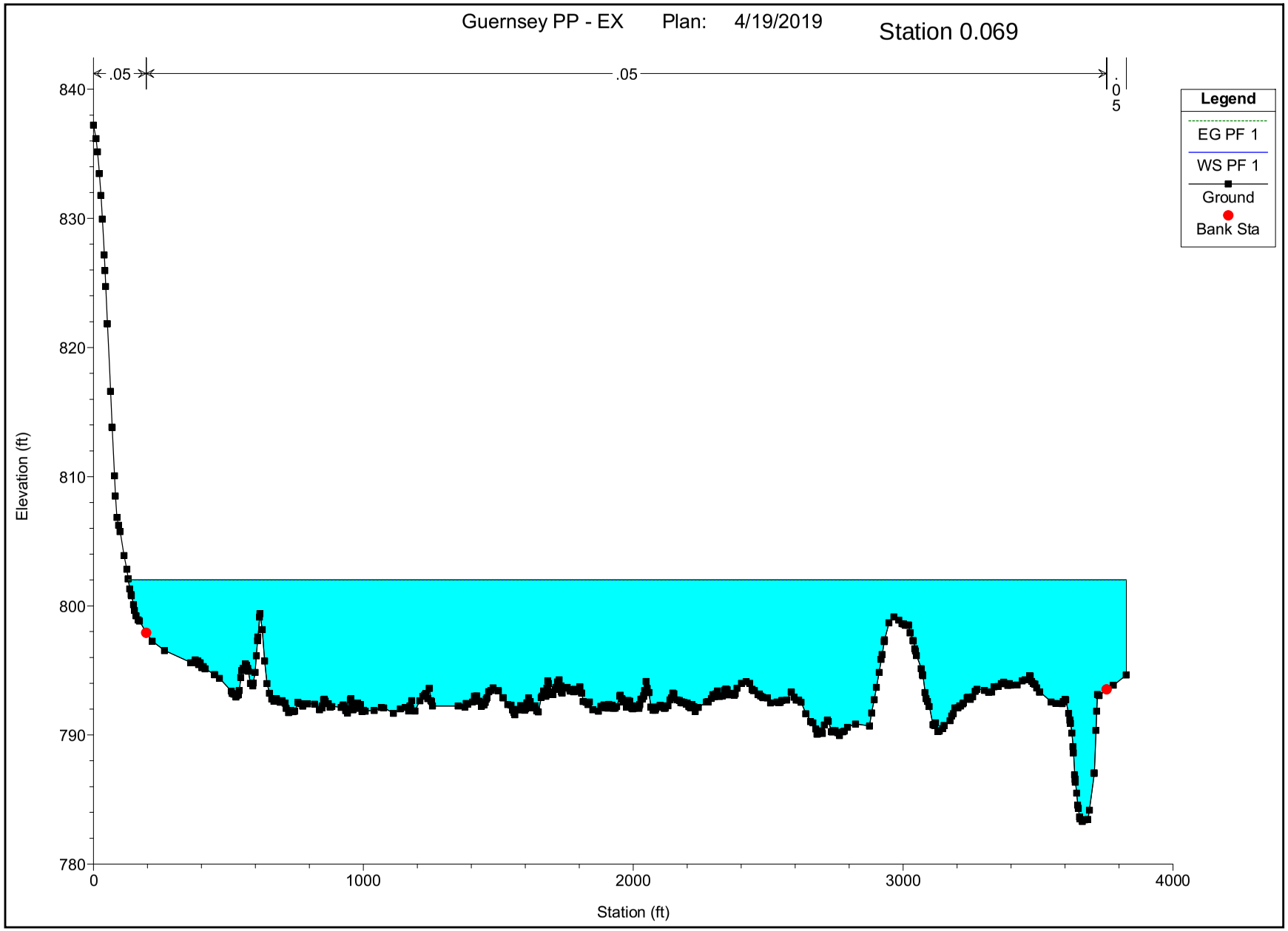
SHEET NO.
A2

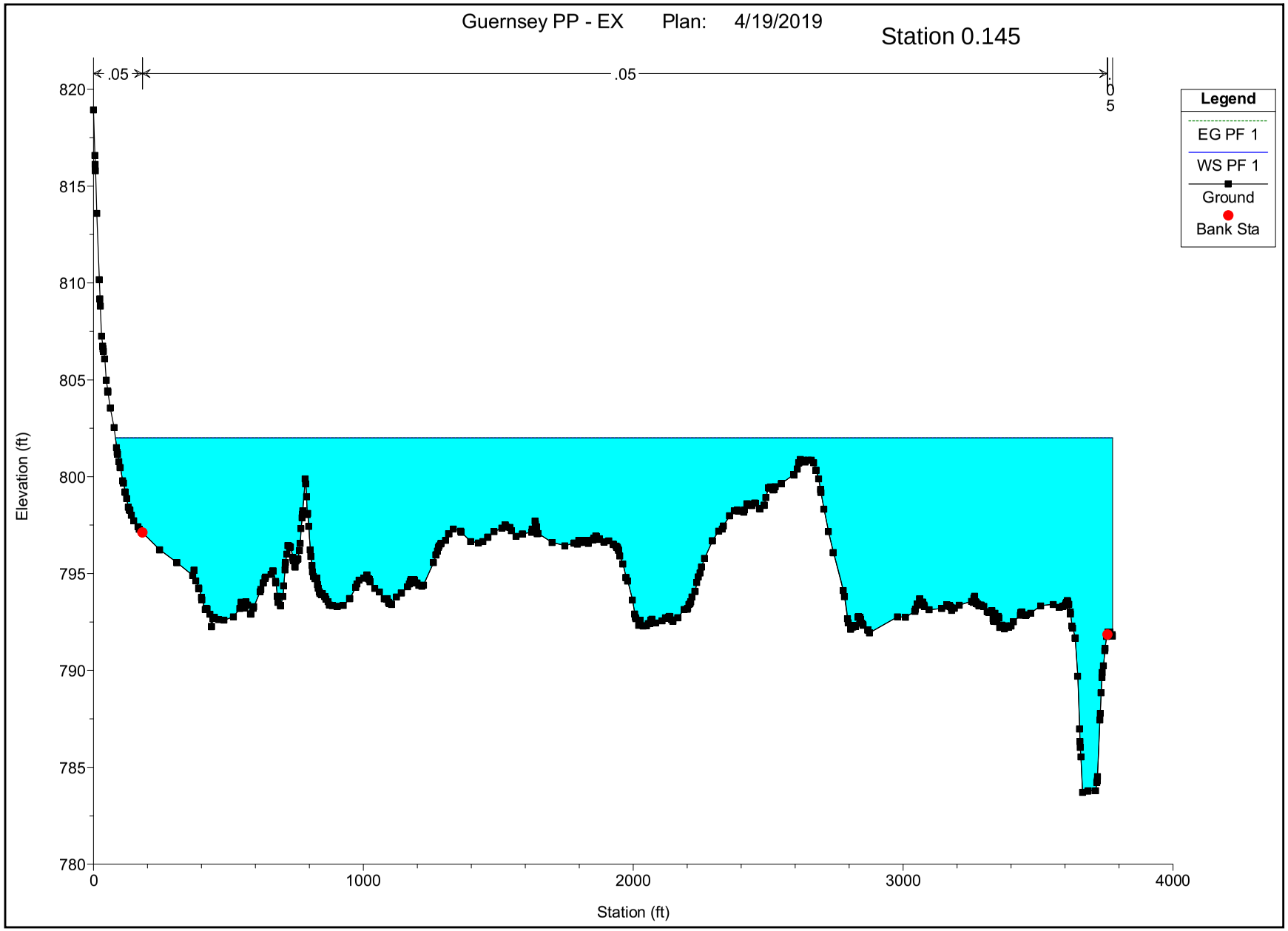
OHIO Utilities Protection SERVICE
811 or 1-800-362-2764 Call Before You Dig

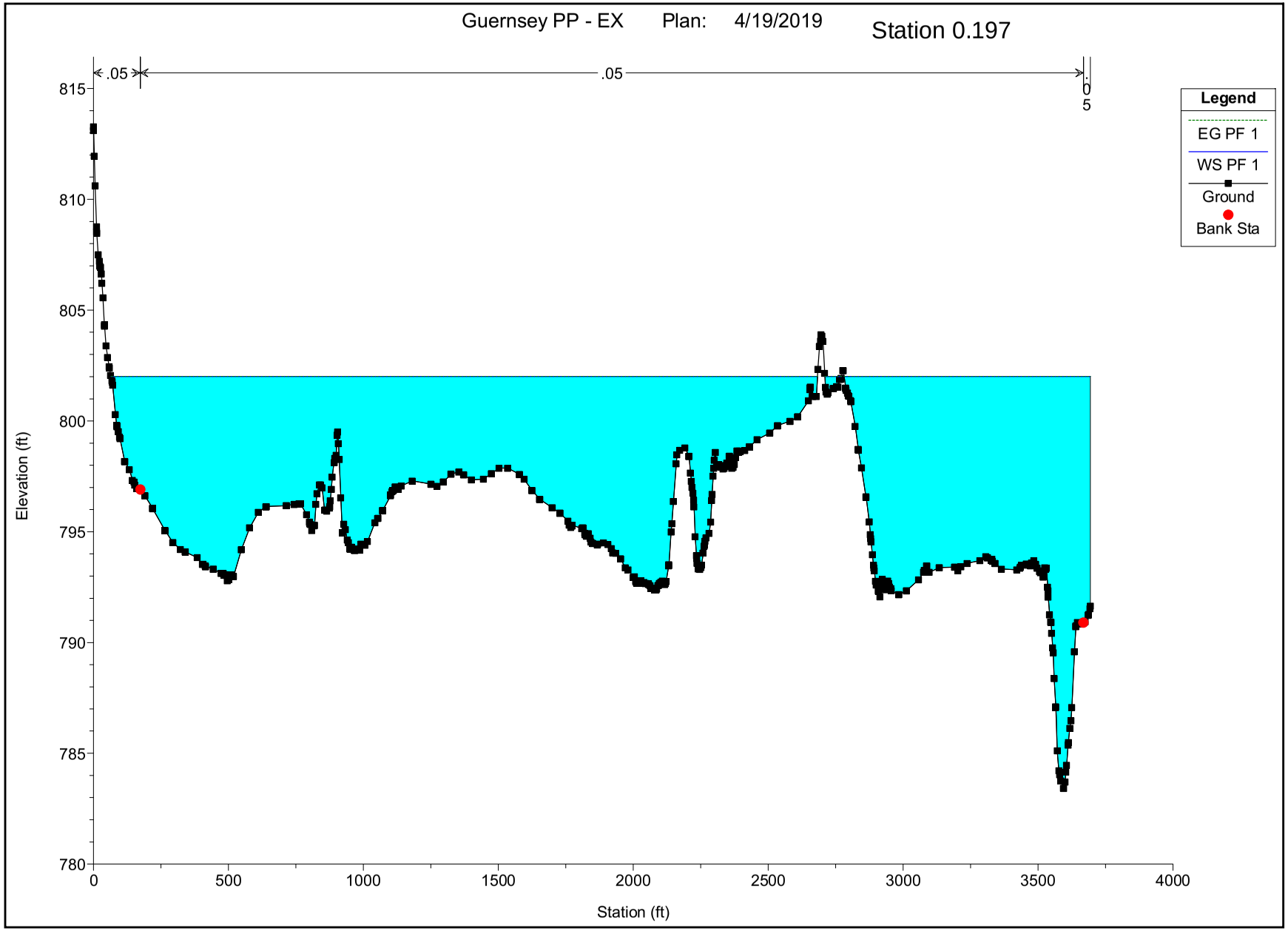
APPENDIX D
HEC-RAS OUTPUT


Pre-Developed
Floodplain Map
Inundation
Boundary
STA 0.00
STA 0.069
STA 0.145
STA 0.197
STA 0.299
STA 0.582
STA 0.759
STA 0.875
STA 1.035
STA 1.105
STA 1.162
Wills Creek
STA = Station (in miles)


Guernsey PP - EX
Plan: 4/19/2019
Station 0.000
.05
.05
.05
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
805
800
795
790
785
780
0
500
1000
1500
2000
2500
3000
3500
4000


Guernsey PP - EX
Plan: 4/19/2019
Station 0.069
.05
.05
.05
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
840
830
820
810
800
790
780
0
1000
2000
3000
4000
Station (ft)


Guernsey PP - EX
Plan: 4/19/2019
Station 0.145
.05
.05
0
5
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
820
815
810
805
800
795
790
785
780
0
1000
2000
3000
4000
Station (ft)


Guernsey PP - EX
Plan: 4/19/2019
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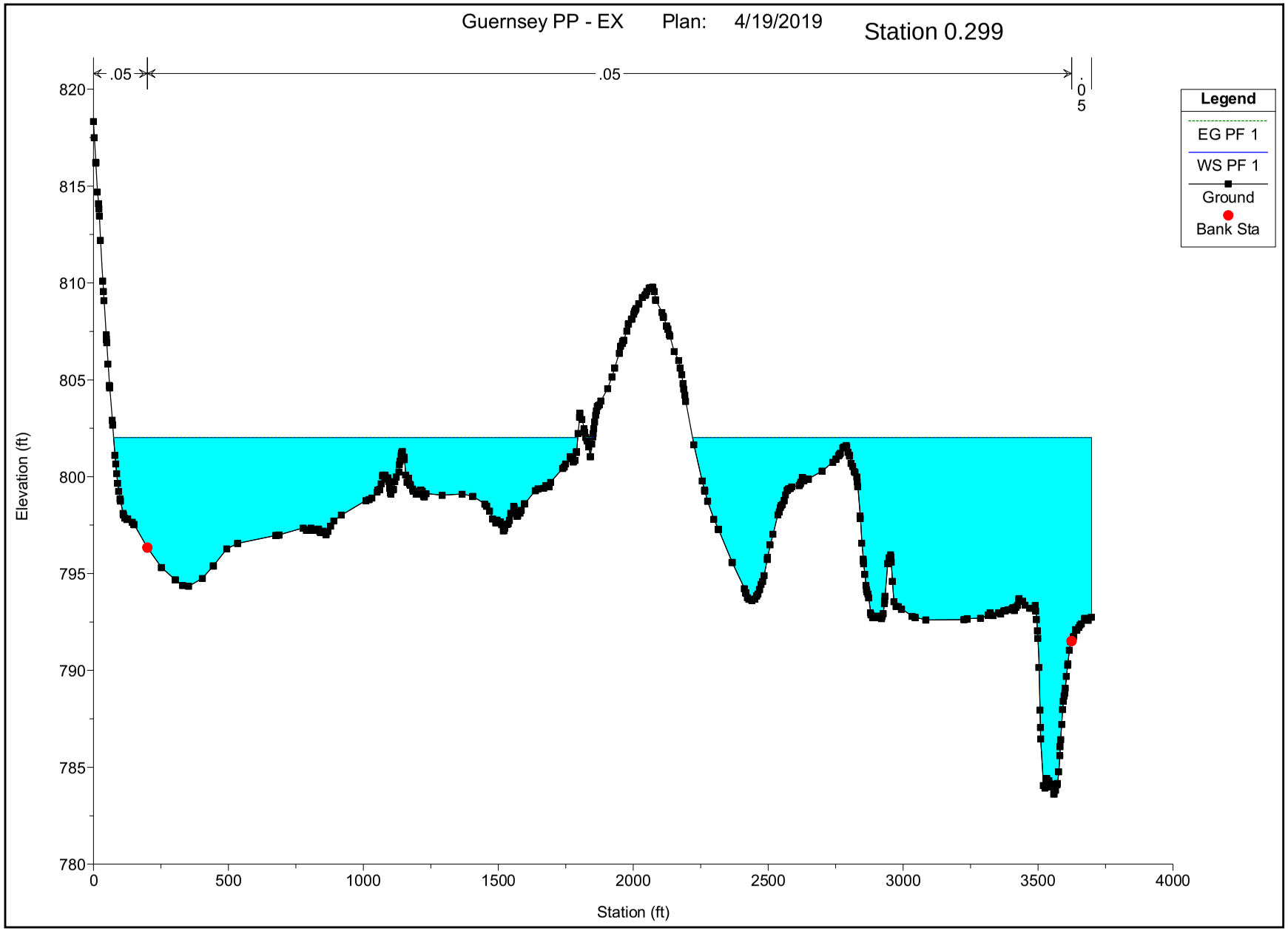
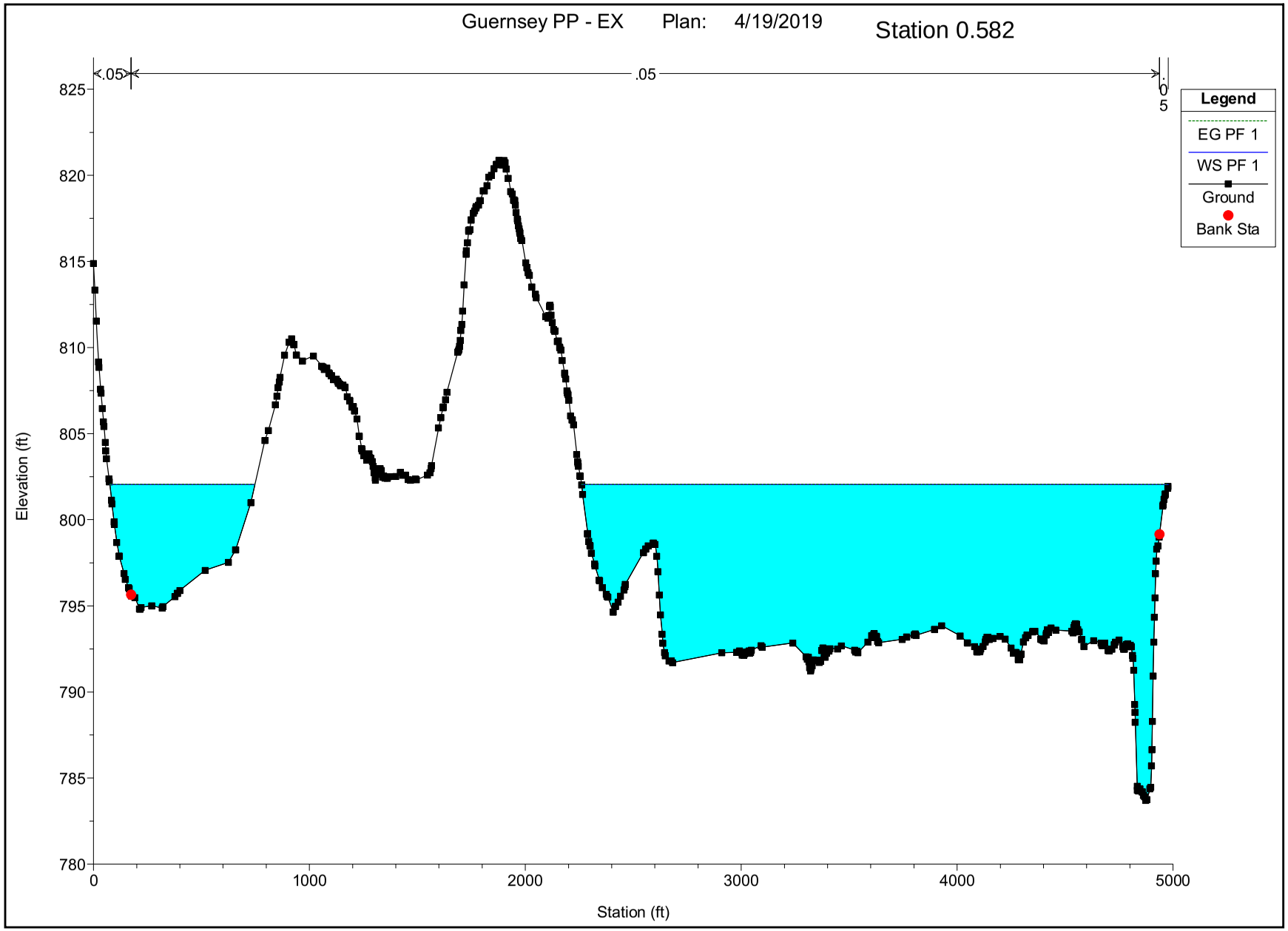
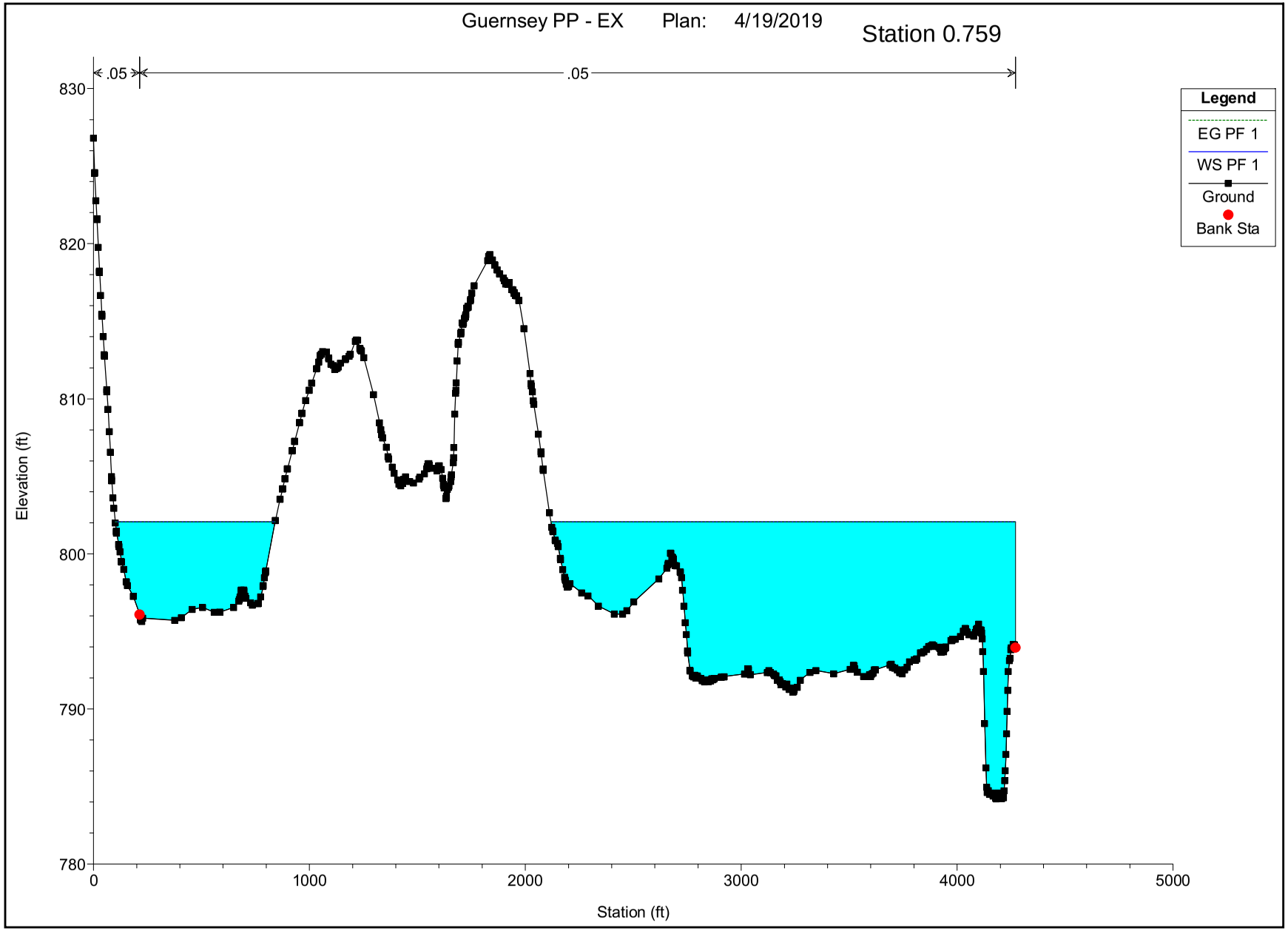
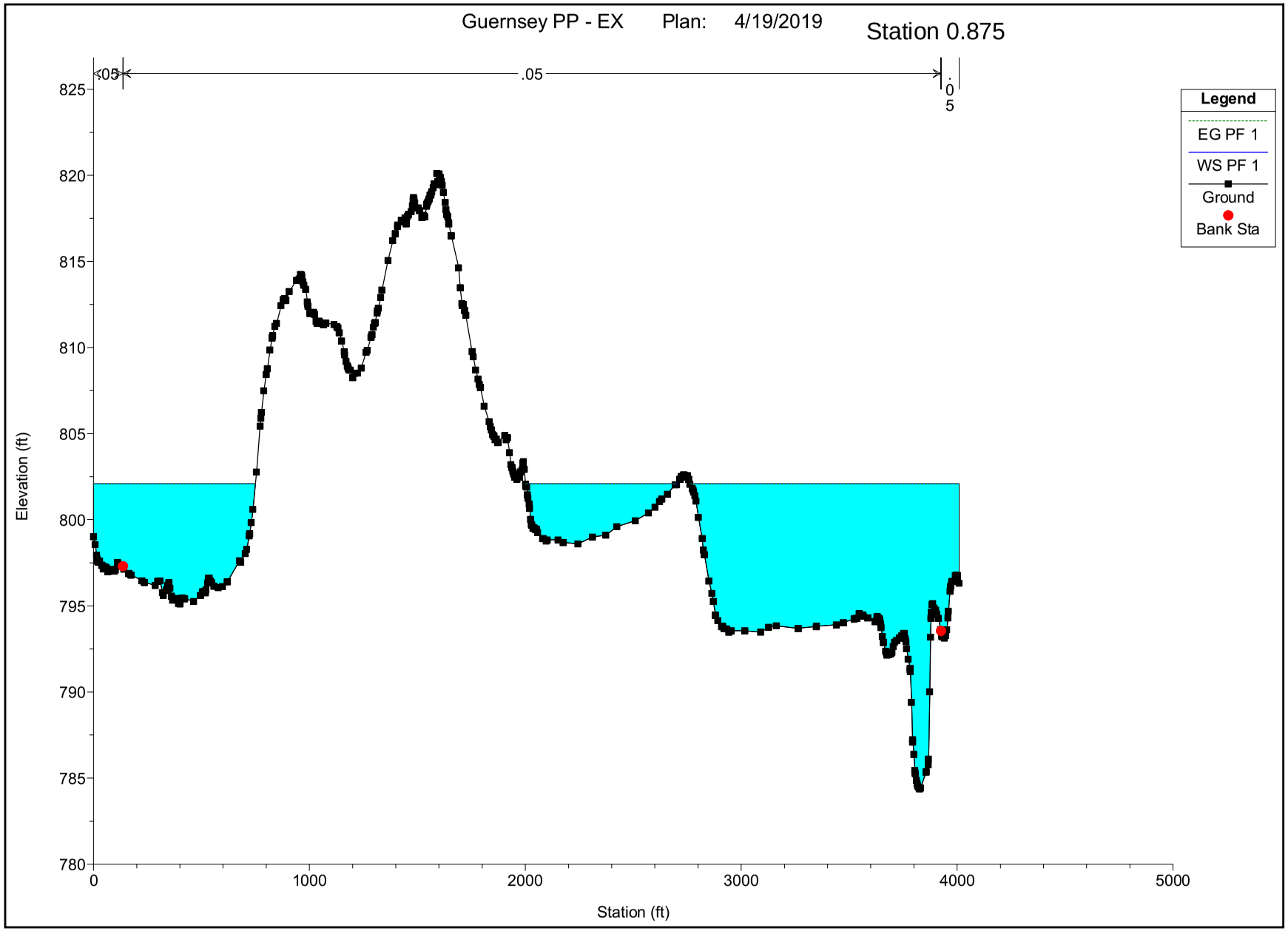
.05
.05
.05
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
815
810
805
800
795
790
785
780
0
500
1000
1500
2000
2500
3000
3500
4000


Guernsey PP - EX
Plan: 4/19/2019
Station 0.299
.05
.05
.05
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
820
815
810
805
800
795
790
785
780
0
500
1000
1500
2000
2500
3000
3500
4000
Station (ft)


Guernsey PP - EX
Plan: 4/19/2019
Station 0.582
.05
.05
.05
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
825
820
815
810
805
800
795
790
785
780
0
1000
2000
3000
4000
5000
Station (ft)


Guernsey PP - EX
Plan: 4/19/2019
Station 0.759
.05
.05
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
830
820
810
800
790
780
0
1000
2000
3000
4000
5000
Station (ft)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.05
Legend
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WS PF 1
Ground
Bank Sta
Elevation (ft)
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815
810
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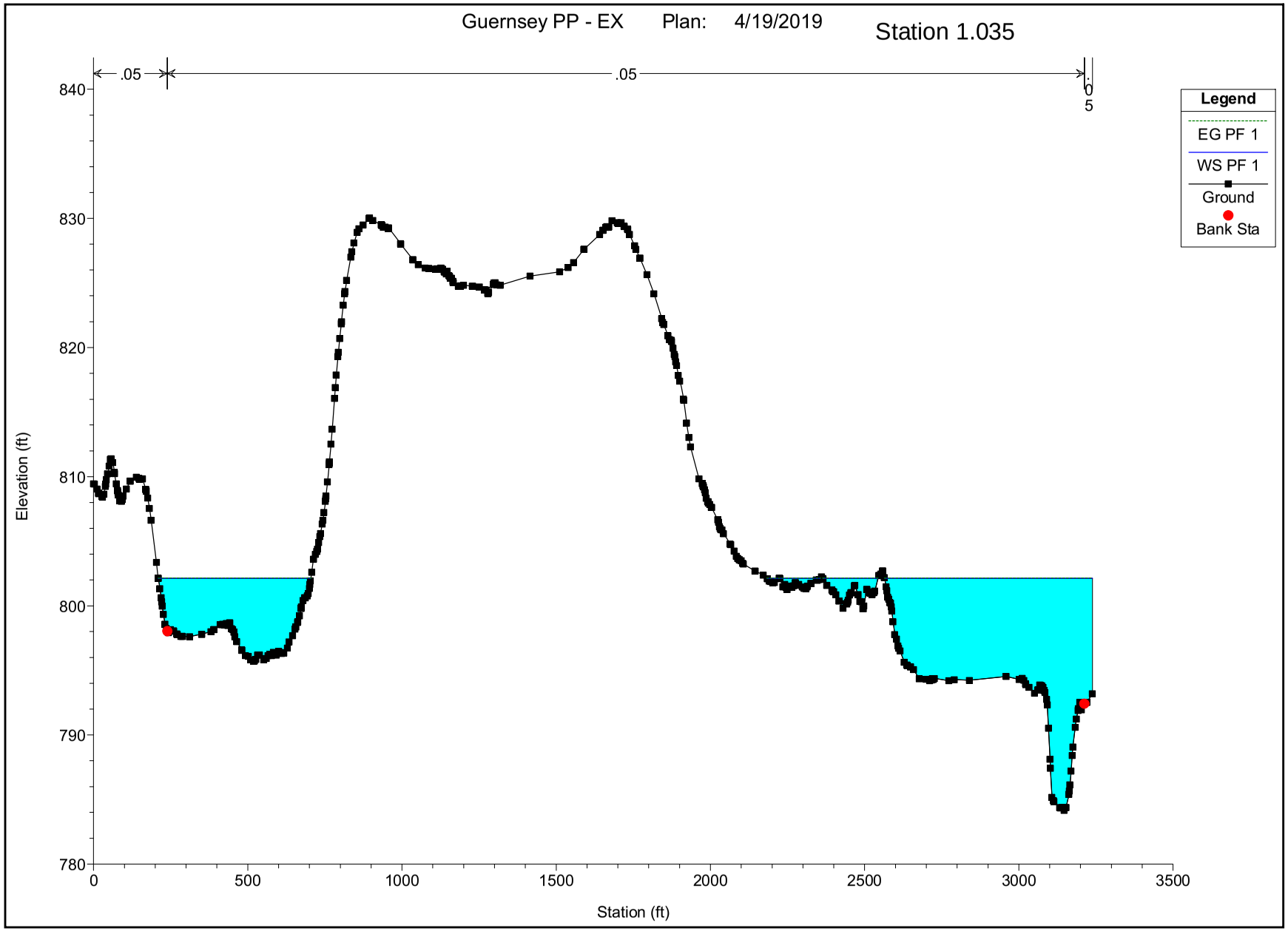
Station (ft)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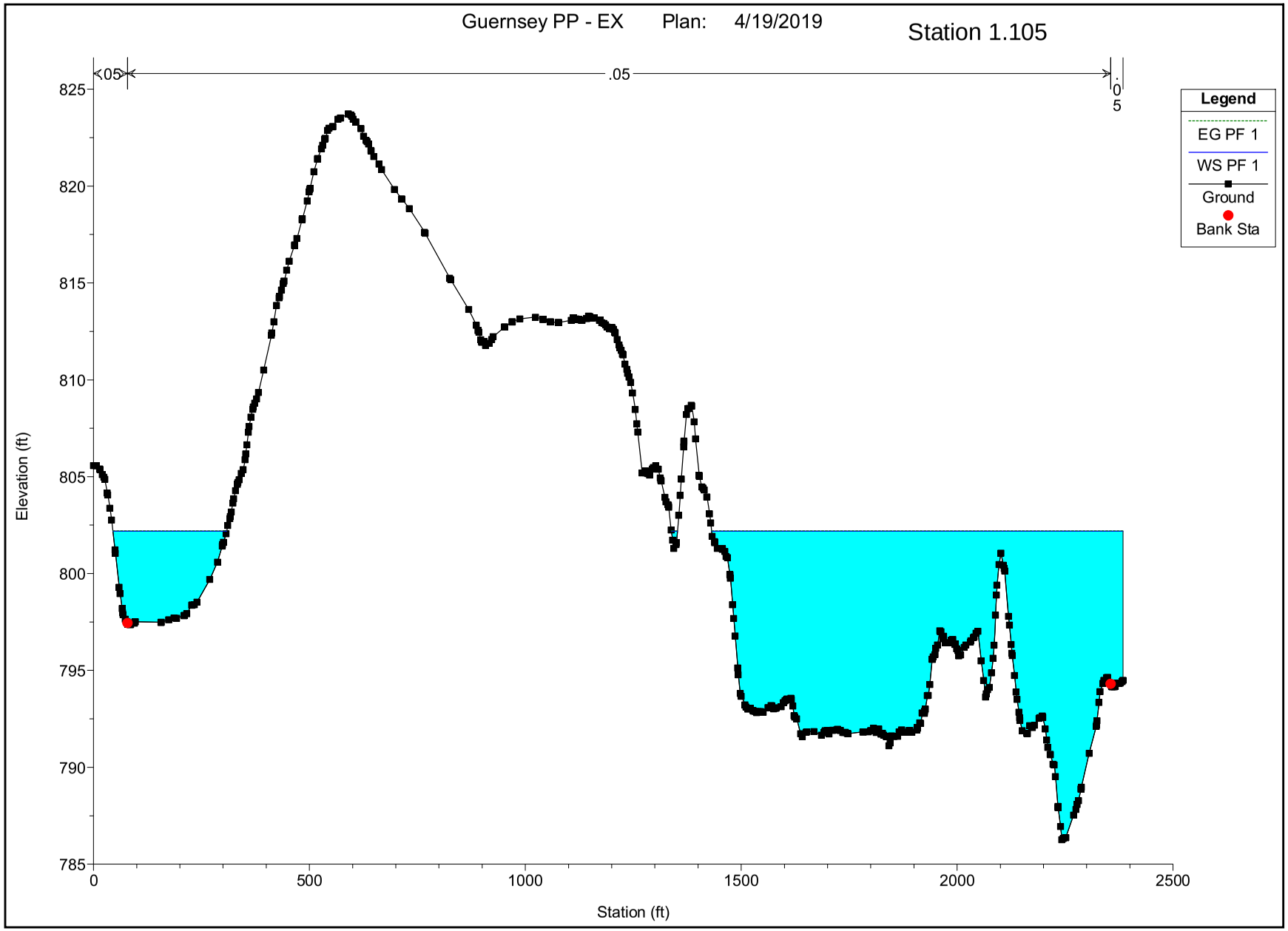
Station (ft)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Ground
Bank Sta
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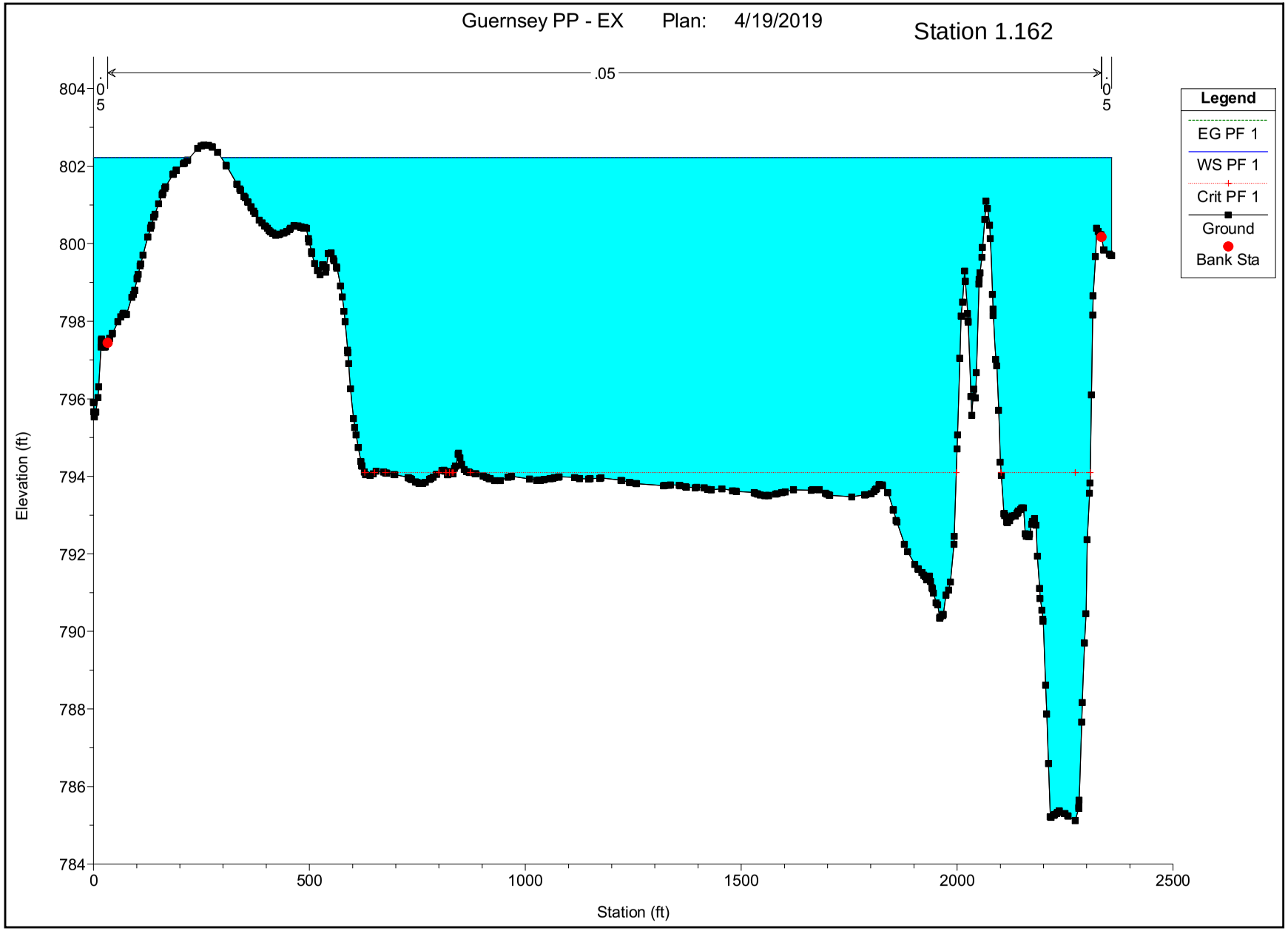
790
785
0
500
1000
1500
2000
2500
Station (ft)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Legend
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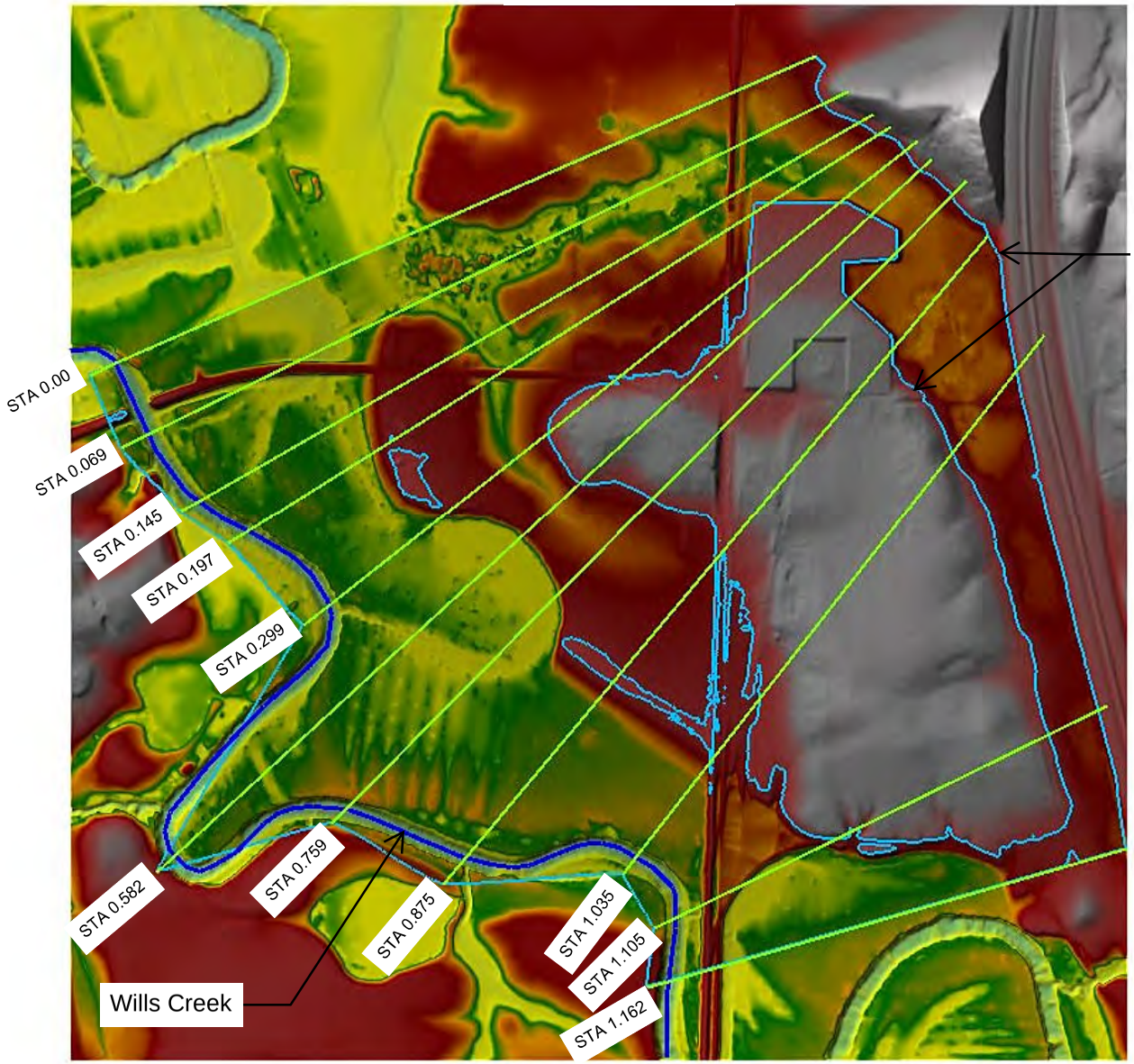
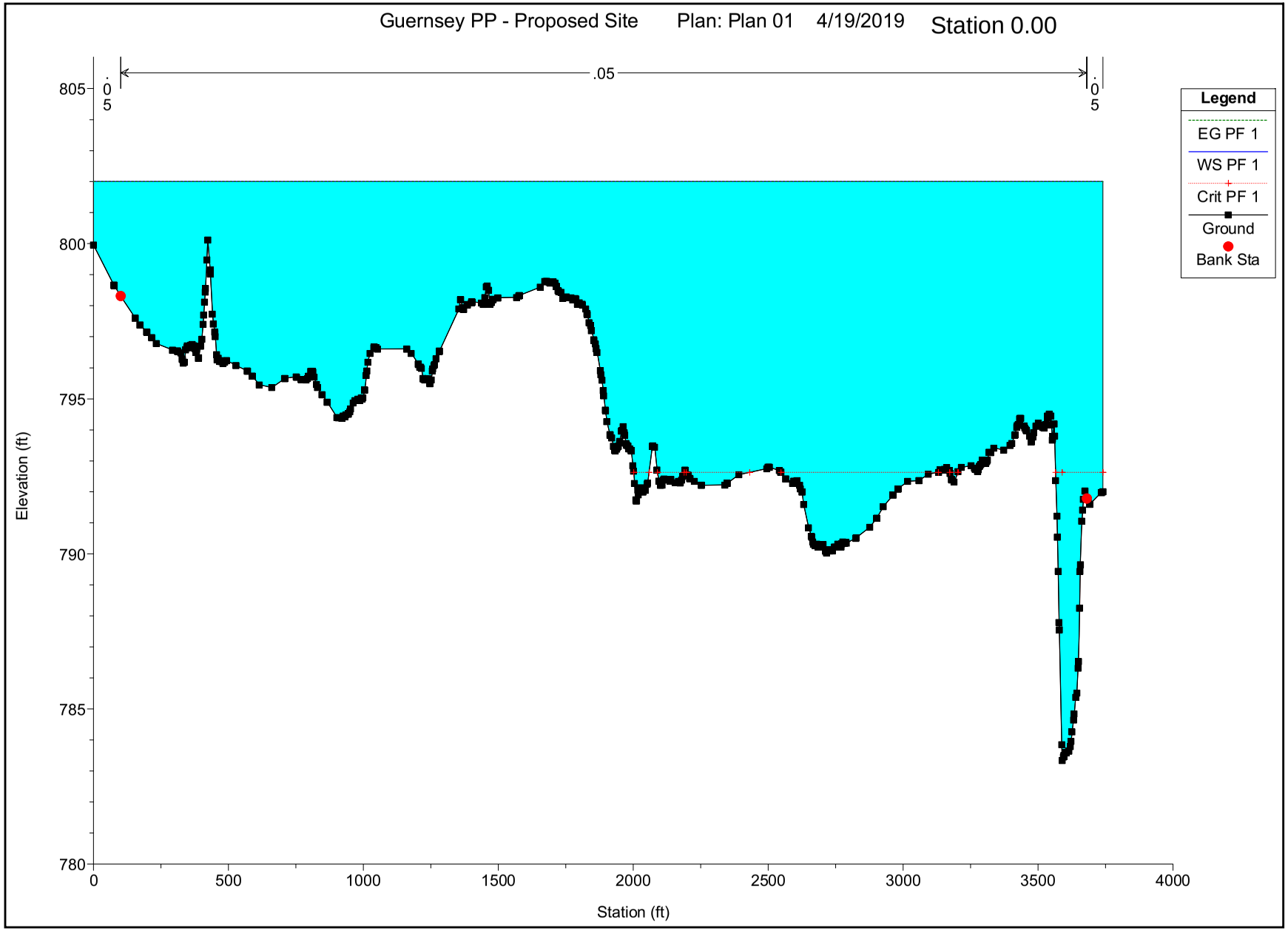
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
804
802
800
798
796
794
792
790
788
786
784
0
500
1000
1500
2000
2500
Station (ft)

Post-Developed
Floodplain Map



STA = Station (in miles)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Plan: Plan 01
4/19/2019
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Crit PF 1
Ground
Bank Sta
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Station (ft)
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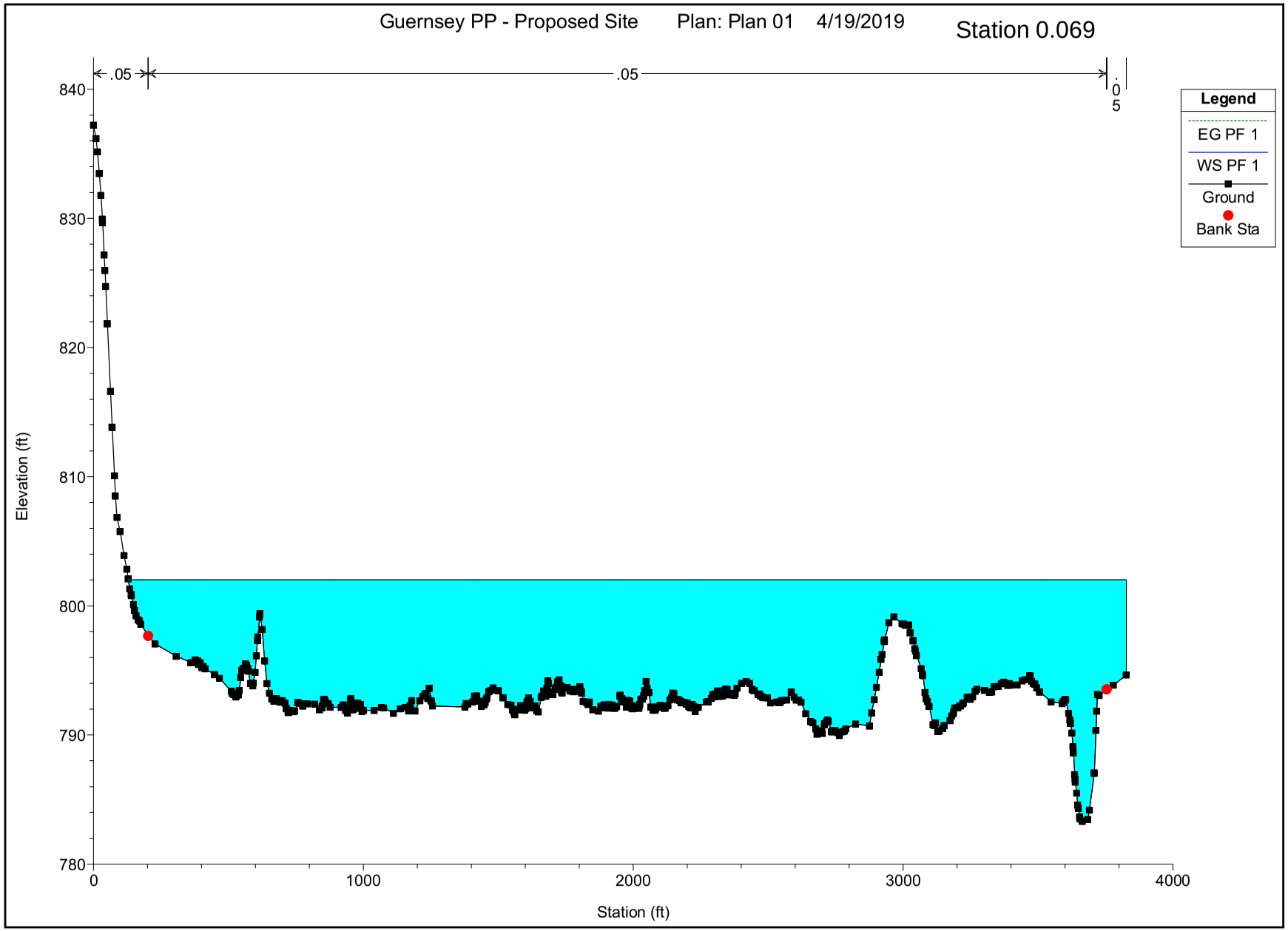
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Ground
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790
780
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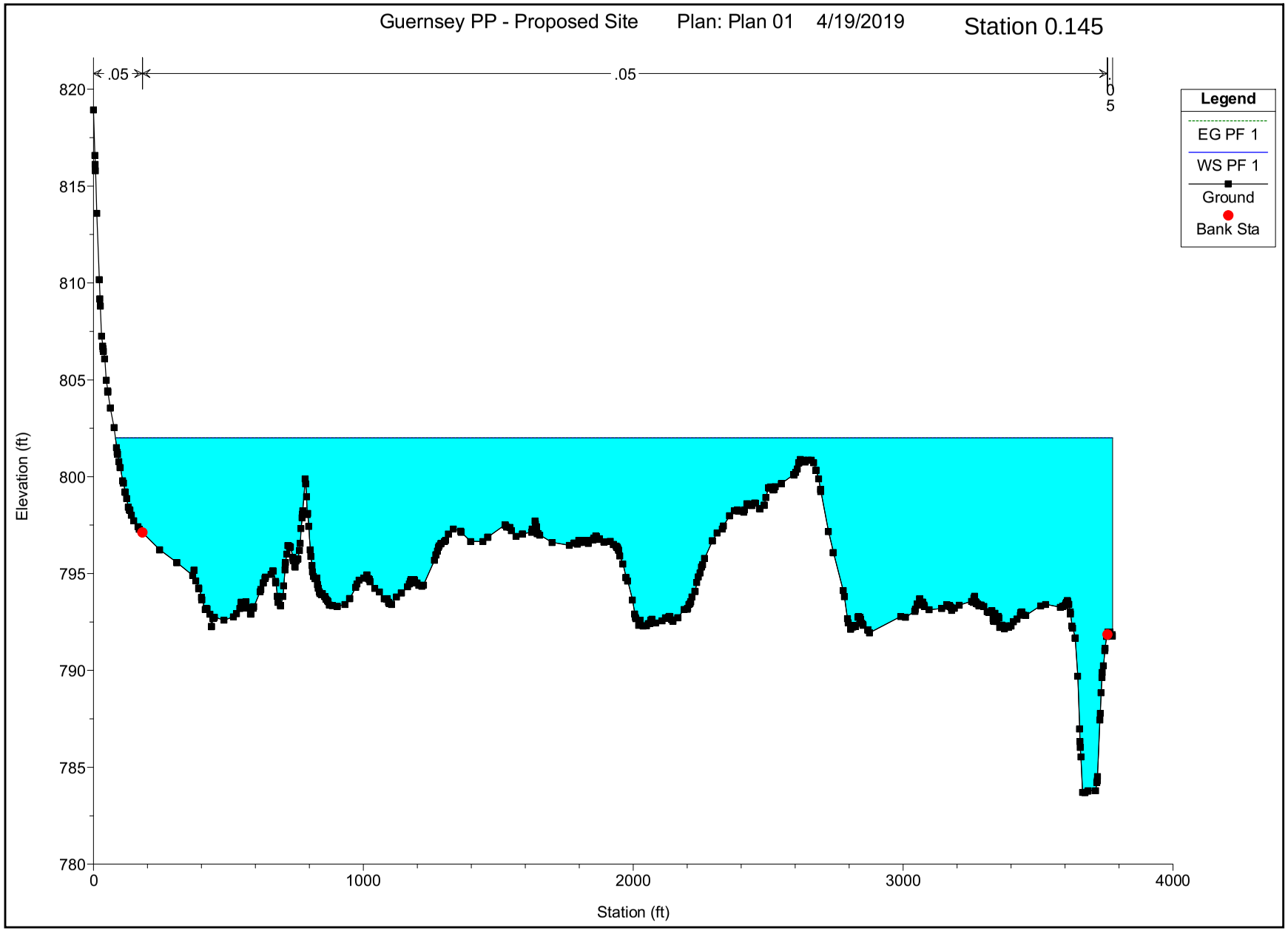
2000
3000
4000
Station (ft)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Ground
Bank Sta
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Elevation (ft)
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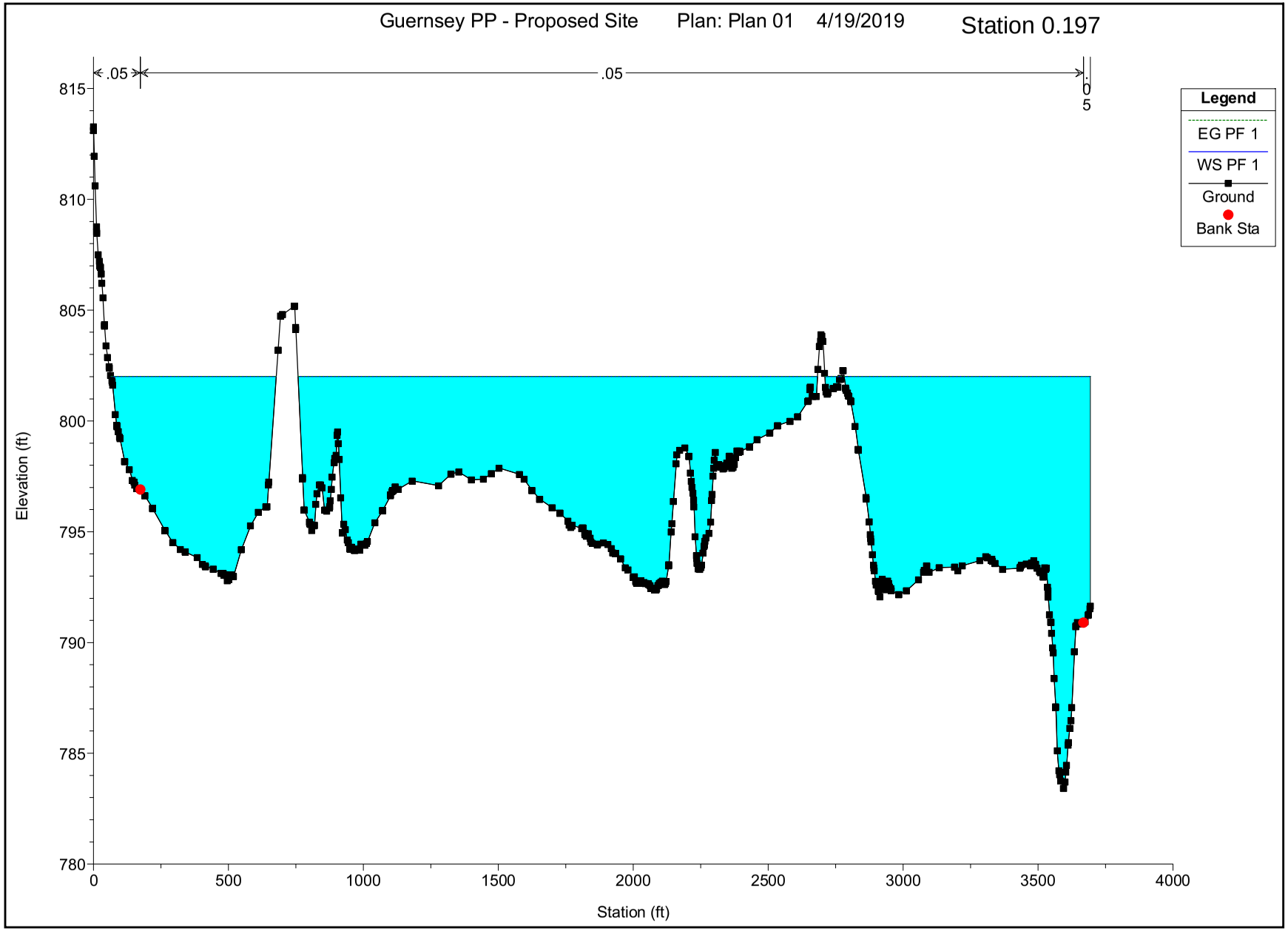
Station (ft)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Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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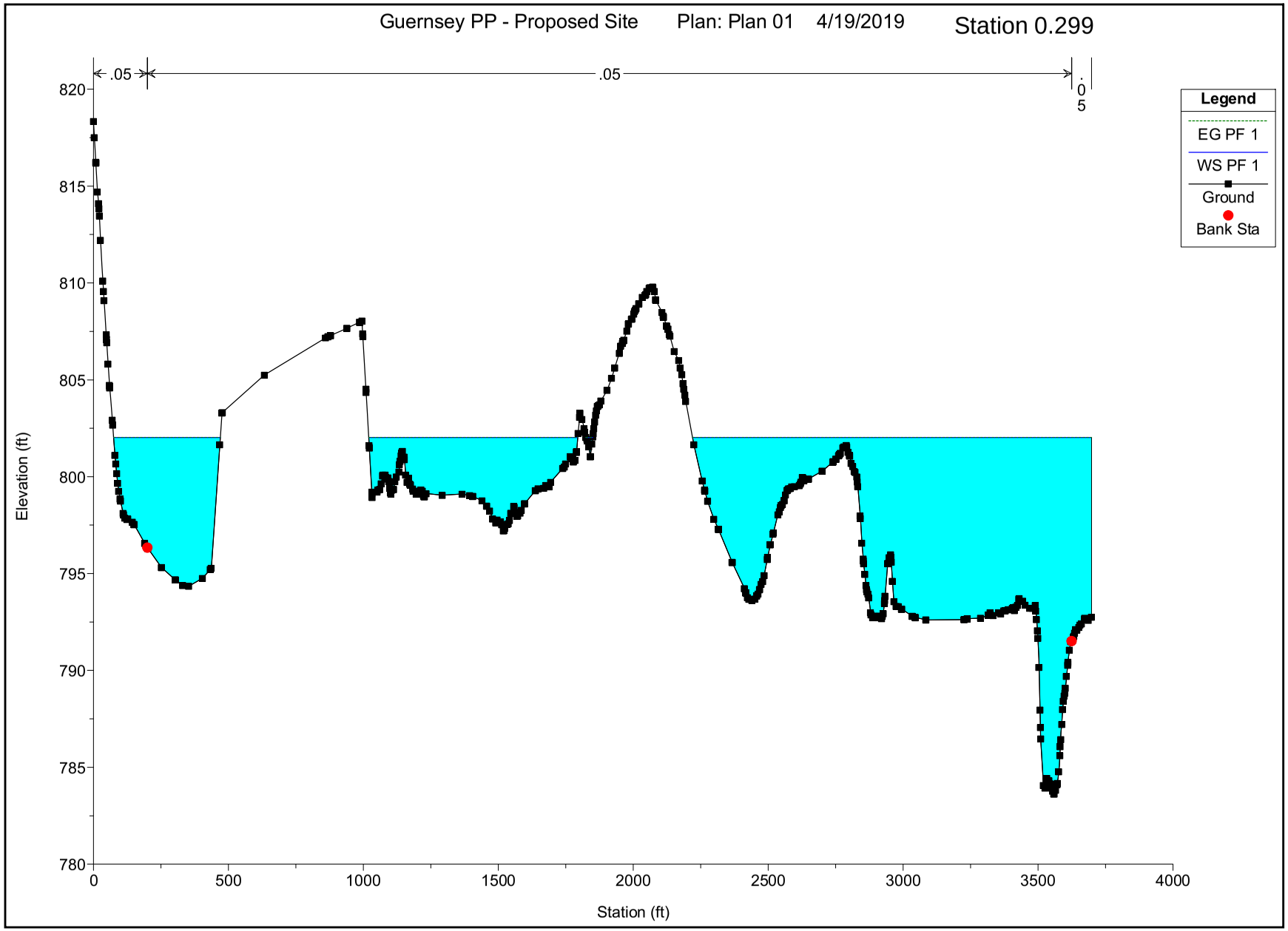
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EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
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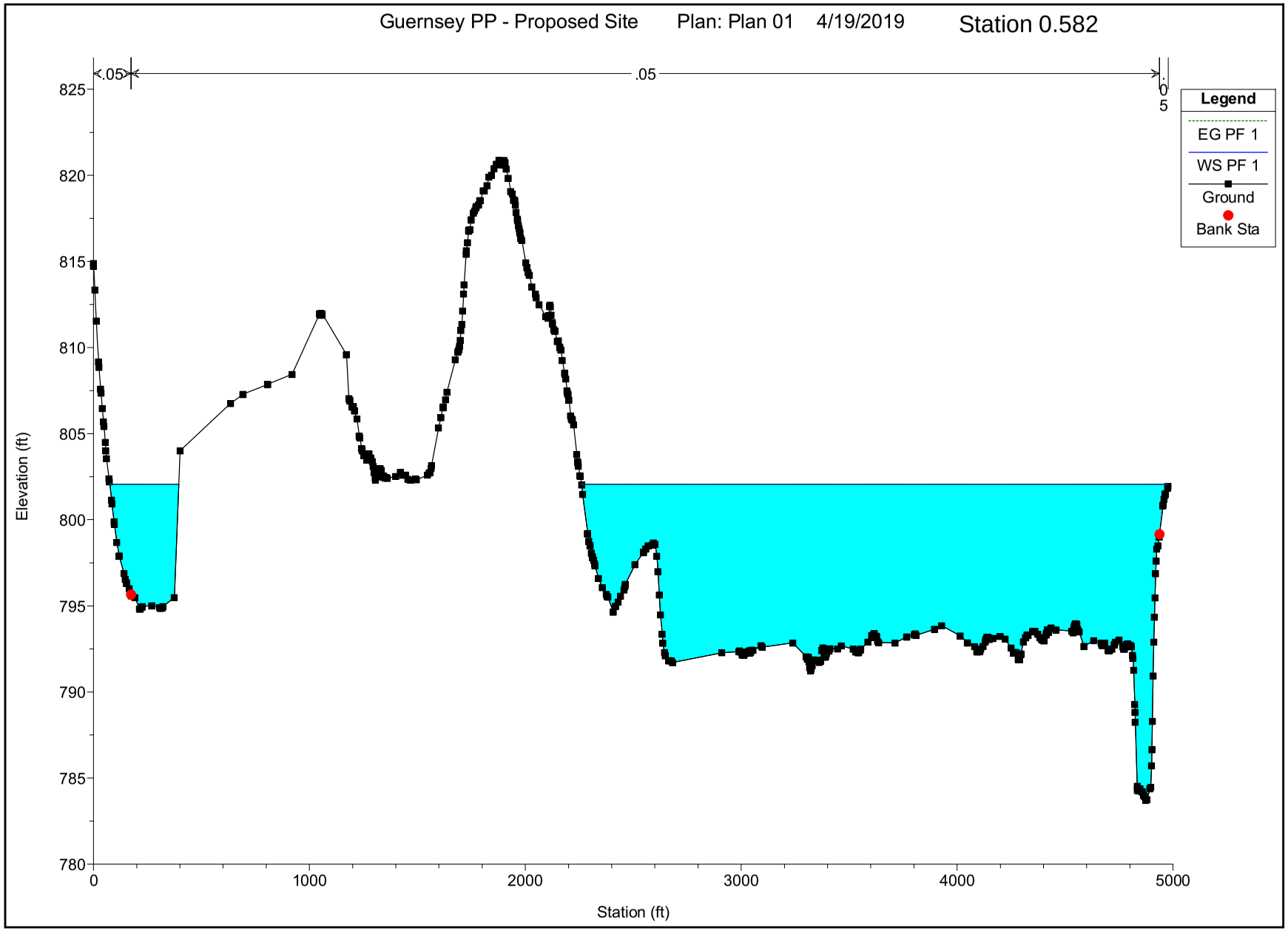
Station (ft)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Ground
Bank Sta
Elevation (ft)
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4000
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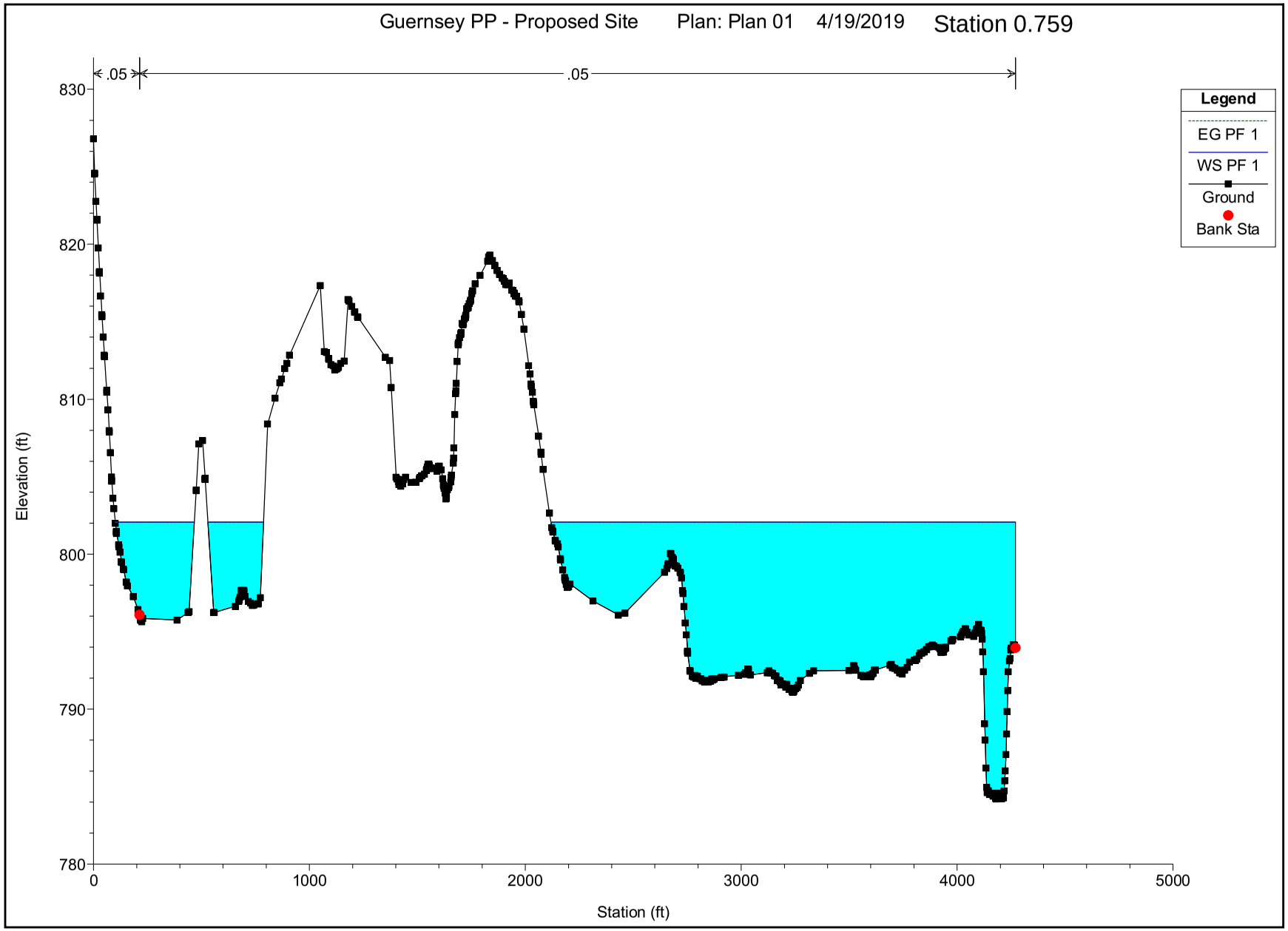
Station (ft)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Bank Sta
Elevation (ft)
830
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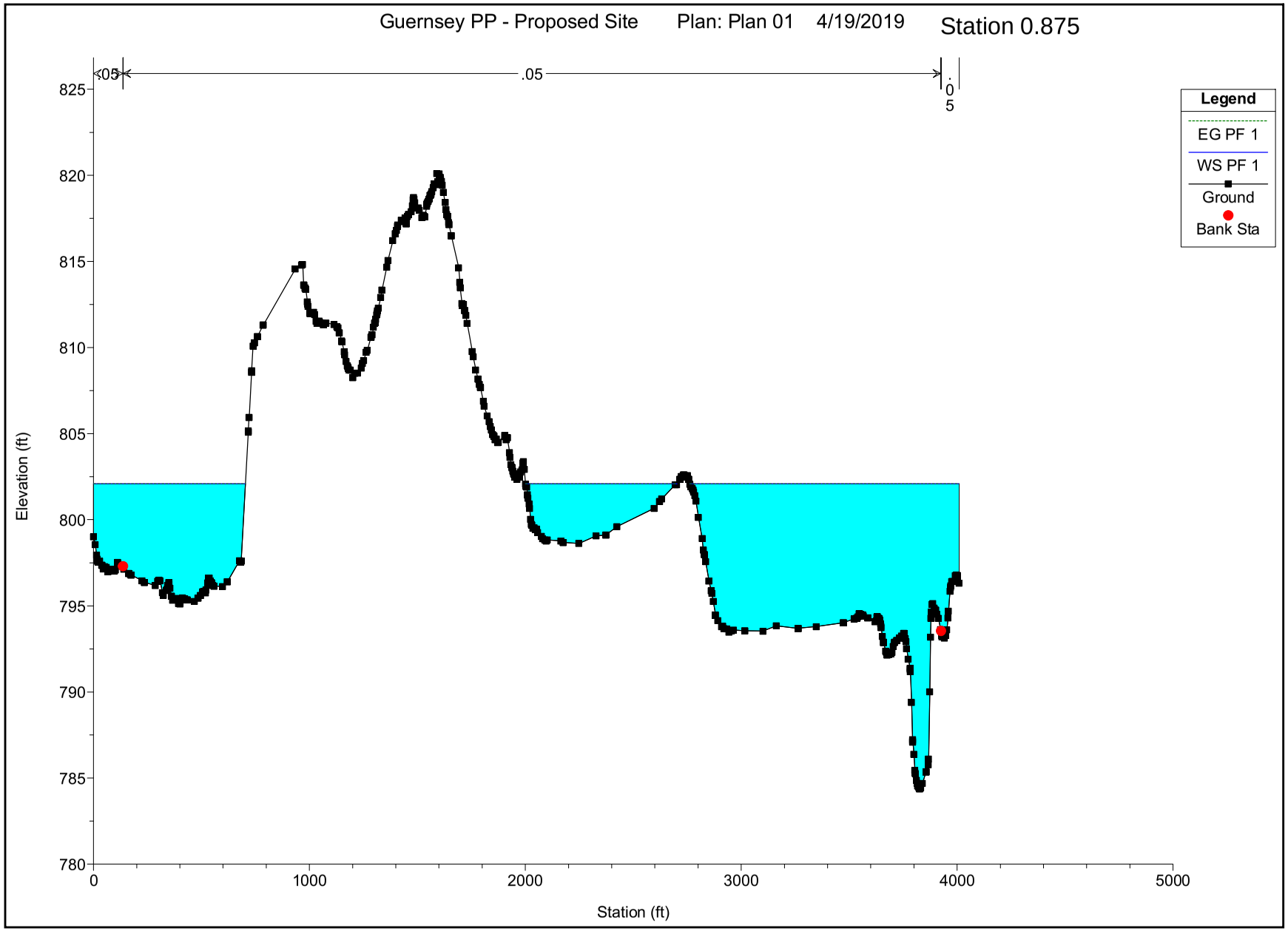
Station (ft)


Guernsey PP - Proposed Site
Plan: Plan 01
4/19/2019
Station 0.875
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Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
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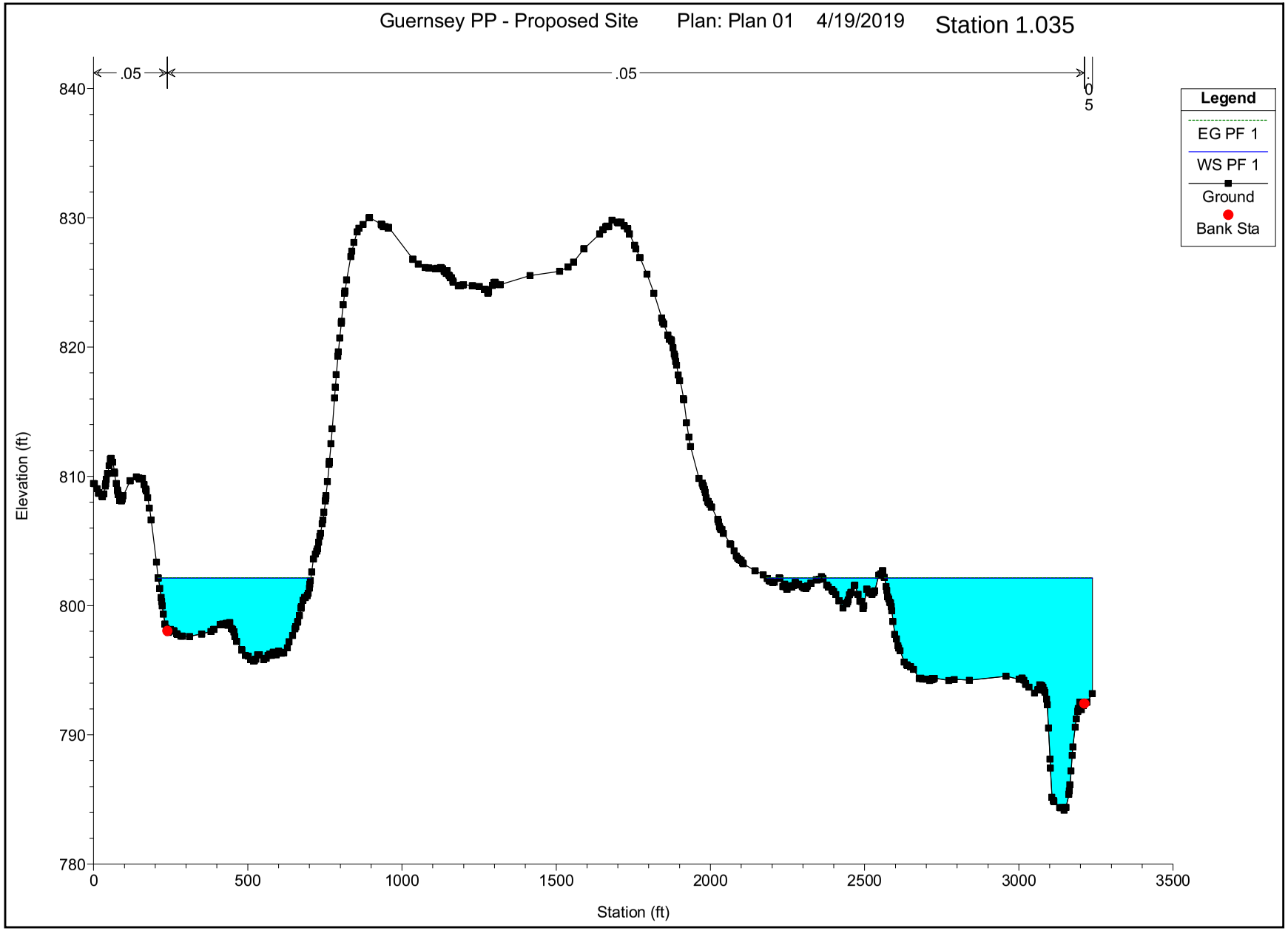
Station (ft)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4/19/2019
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EG PF 1
WS PF 1
Ground
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Elevation (ft)
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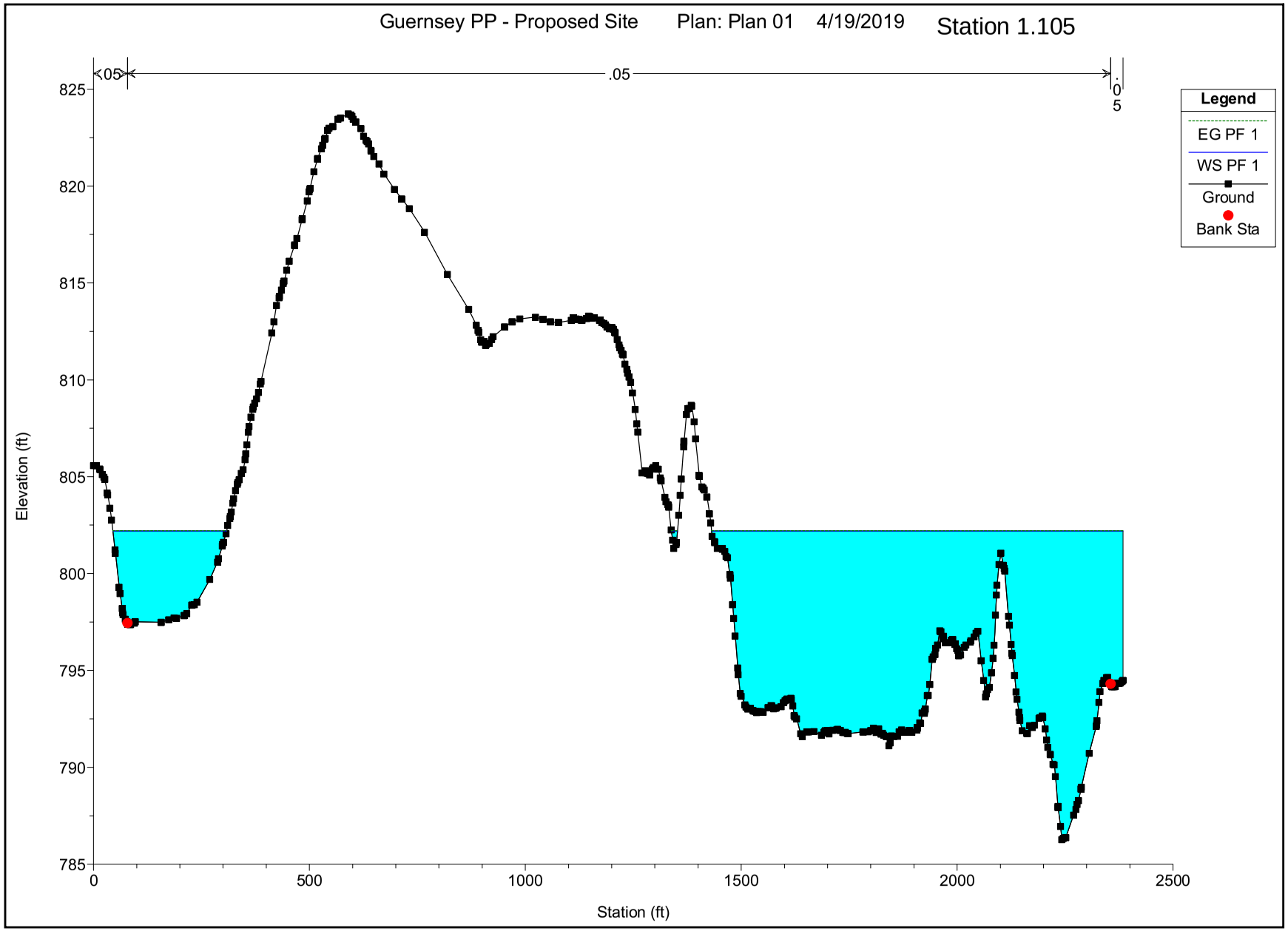
Station (ft)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Ground
Bank Sta
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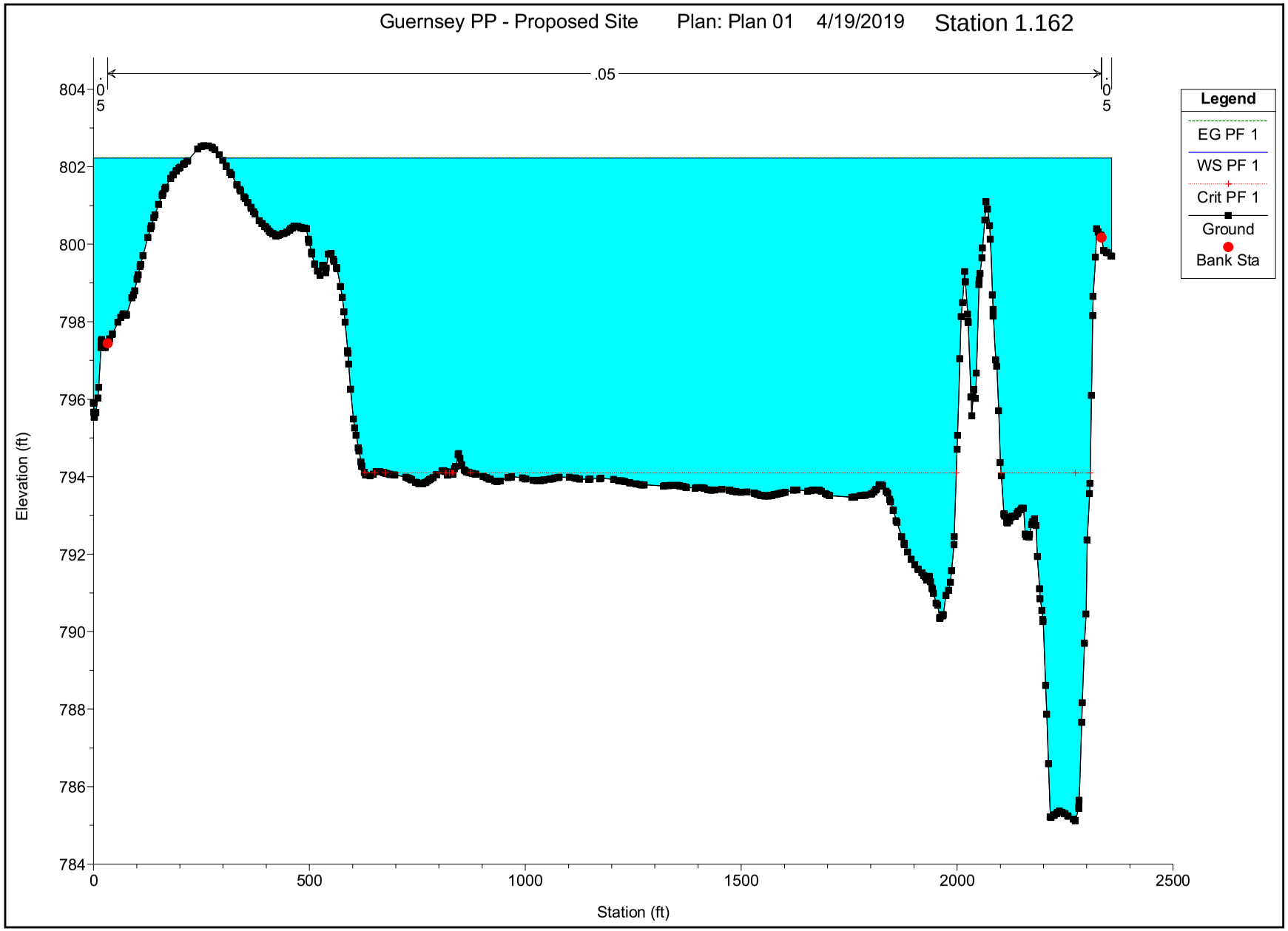
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Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
804
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0
500
1000
1500
2000
2500
Station (ft)

HEC-RAS Plan: planex River: Wills Reach: HEC-RAS Profile: PF 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
HEC-RAS	1.162	PF 1	10500.00	785.12	802.22	794.10	802.22	0.000033	0.64	16450.10	2284.59	0.04
HEC-RAS	1.105	PF 1	10500.00	786.27	802.19		802.21	0.000096	1.13	9352.57	1230.20	0.07
HEC-RAS	1.035	PF 1	10500.00	784.16	802.13		802.16	0.000185	1.26	8348.70	1518.31	0.09
HEC-RAS	0.875	PF 1	10500.00	784.37	802.08		802.08	0.000044	0.65	16195.93	2697.75	0.05
HEC-RAS	0.759	PF 1	10500.00	784.20	802.06		802.07	0.000018	0.49	21521.77	2892.03	0.03
HEC-RAS	0.582	PF 1	10500.00	783.70	802.05		802.05	0.000010	0.39	27339.27	3389.32	0.02
HEC-RAS	0.299	PF 1	10500.00	783.62	802.02		802.03	0.000038	0.58	18078.04	3223.29	0.04
HEC-RAS	0.197	PF 1	10500.00	783.41	802.01		802.01	0.000019	0.45	23248.27	3592.58	0.03
HEC-RAS	0.145	PF 1	10500.00	783.71	802.01		802.01	0.000013	0.40	26366.44	3694.88	0.03
HEC-RAS	0.069	PF 1	10500.00	783.31	802.00		802.01	0.000006	0.32	33088.75	3697.51	0.02
HEC-RAS	0.000	PF 1	10500.00	783.34	802.00	792.63	802.00	0.000011	0.38	28030.63	3740.37	0.02

HEC-RAS Plan: Plan 01 River: Wills Reach: HEC-RAS Profile: PF 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
HEC-RAS	1.162	PF 1	10500.00	785.12	802.22	794.10	802.23	0.000033	0.64	16466.26	2285.00	0.04
HEC-RAS	1.105	PF 1	10500.00	786.27	802.19		802.21	0.000095	1.13	9362.26	1230.43	0.07
HEC-RAS	1.035	PF 1	10500.00	784.16	802.14		802.16	0.000184	1.25	8361.21	1520.10	0.09
HEC-RAS	0.875	PF 1	10500.00	784.37	802.09		802.09	0.000044	0.66	16042.47	2652.51	0.05
HEC-RAS	0.759	PF 1	10500.00	784.20	802.07		802.07	0.000019	0.51	20882.57	2776.04	0.03
HEC-RAS	0.582	PF 1	10500.00	783.70	802.06		802.06	0.000011	0.41	25777.37	3036.74	0.02
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HEC-RAS	0.197	PF 1	10500.00	783.41	802.01		802.01	0.000020	0.47	22621.20	3512.19	0.03
HEC-RAS	0.145	PF 1	10500.00	783.70	802.01		802.01	0.000013	0.40	26368.03	3694.88	0.03
HEC-RAS	0.069	PF 1	10500.00	783.31	802.00		802.01	0.000006	0.32	33091.19	3697.51	0.02
HEC-RAS	0.000	PF 1	10500.00	783.34	802.00	792.63	802.00	0.000011	0.38	28028.94	3740.37	0.02

Hydrology and Hydraulic Analysis –
GPS Switchyard Site

Hydrology and Hydraulic Analysis

Guernsey Power Station LLC
Guernsey 765KV Switchyard
Hydrology & Hydraulic Studies

Issue Date: December 05, 2018
Issue Purpose: Client Use

55 East Monroe Street
Chicago, IL 60603-5780 USA

Project No.: 13607-005

Calculation No.: GUE-WR-HH-001
Rev. 0B

Client	Guernsey Power Station LLC	Prepared by	M. Salehi	Date	12/052018
Project	Guernsey 765KV Switchyard	Reviewed by	N. Patel	Date	12/05/2018
Project No.	13607-005	Approved by	M. Salehi	Date	12/05/2018

LEGAL NOTICE

This calculation ("Deliverable") was prepared by Sargent & Lundy, L.L.C. ("S&L"), expressly for the sole use of Guernsey Power Station LLC ("Client") in accordance with the agreement between S&L and Client. This Deliverable was prepared using the degree of skill and care ordinarily exercised by engineers practicing under similar circumstances. Client acknowledges: (1) S&L prepared this Deliverable subject to the particular scope limitations, budgetary and time constraints, and business objectives of the Client; (2) information and data provided by others may not have been independently verified by S&L; and (3) the information and data contained in this Deliverable are time sensitive and changes in the data, applicable codes, standards, and acceptable engineering practices may invalidate the findings of this Deliverable. Any use or reliance upon this Deliverable by third parties shall be at their sole risk.

Sargent & Lundy LLC

ISSUE SUMMARY
Form SOP-0402-07, Revision 12

DESIGN CONTROL SUMMARY

CLIENT:	Guernsey Power Station LLC	UNIT NO.:	N/A	PAGE NO.:	3
PROJECT NAME:	**Guernsey 765KV Switchyard - Hydrology & Hydraulic Studies**				
PROJECT NO.:	13607-005	S&L NUCLEAR QA PROGRAM			
CALC. NO..:	GUE-WR-HH-001	APPLICABLE ☐ YES ☒ NO			
TITLE:	Hydrology and Hydraulic Analysis				
EQUIPMENT NO.:	N/A				

IDENTIFICATION OF PAGES ADDED/REVISED/SUPERSEDED/VOIDED & REVIEW METHOD

Total Pages of 64

INPUTS/ ASSUMPTIONS
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PREPARER:	M. Salehi	DATE:	5 DEC 2018
REVIEWER:	N. Patel	DATE:	5 DEC 2018
APPROVER:		DATE:	

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APPROVER:		DATE:	

NOTE: PRINT AND SIGN IN THE SIGNATURE AREAS

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1 PURPOSE AND SCOPE

Guernsey Power Station LLC (Client) is in the process of developing a 765KV switchyard (Project) in approximately 8 miles south of Cambridge, OH. The Project site is located in Guernsey County, Ohio and is subject to the permit requirements of the County Office of Floodplain Administration. In order to obtain a construction permit, it shall be proved that the Project construction will not cause significant rise to the 100-year FEMA flood elevations from the existing condition. The purpose of this summary report is to present the results of the analysis performed to support the maximum 1-foot rise condition for the 100-year flood elevations. Client has requested Sargent & Lundy L.L.C. (S&L) prepare the no-rise evaluation on their behalf.

Effective FEMA hydraulic models are used as per county guideline (Reference 6.1). The scopes of this evaluation are limited to modifying the existing effective FEMA model through adding Project details to account for the existing conditions. This summary report aids Guernsey County in understanding the approach that has been taken by S&L to document and demonstrate insignificant rise based on the addition of the Project.

2 STUDY INPUTS

2.1 PROJECT LOCATION

The area of this study is shown on regional and local scales in Figure 1 and Figure 2, respectively. Guernsey switchyard will be built on the west floodplain of the Wills Creek in an approximate straight line distance of 8 miles south of Cambridge, OH and 1 mile north of Buffalo, OH. Project site falls inside the Guernsey County, OH. The principal source of flooding in this county is the periodic overflow of several creeks including the Wills Creek (Reference 6.2).

2.2 WILLS CREEK

Analyses of the hydraulic characteristics of flooding from this creek were carried out by the Federal Emergency Management Agency (FEMA) to provide estimates of the elevations of floods of the selected recurrence intervals. Figure 3 (Reference 6.3) shows the extent of the 100-year flooding for the Wills Creek near the Project site. As presented in the figure, proposed switchyard will be located entirely inside the creek's floodplain, *but not the floodway*. Therefore, to protect the site against flooding, it is raised above the flood elevations and surrounded with a sheet pile type wall that acts as a retaining wall to keep the soil in place. Project site is located within segment of the Wills Creek that is identified as Cross Sections BZ, BY, BX, BW, and BV in Reference 6.2. The 100-year flood elevation at the Project site varies from is 802.9 feet based on North American Vertical Datum of 1988 (NAVD88) at BZ to 802.5 ft NAVD88 at BV (see Page 33 of Reference 6.2, Attachment 7.1).

2.3 DATUM

FEMA flood maps and drawings are in North American Vertical Datum of 1988 (NAVD88). The FEMA effective model files are in National Geodetic Vertical Datum of 1929 (NGVD29). The conversion between the two datum is shown as extracted from National Oceanic and Atmospheric Administration (NOAA) VERTCON tool (Attachment 7.2).

- Datum shift (NAVD 88 minus NGVD 29): - 0.673 feet

2.4 PLANT DRAWINGS

Sargent & Lundy Civil Drawings (Reference 6.4, Attachment 7.4) were used as a basis for the relevant site elevations including the following.

- Top of the sheet pile wall: 806 ft NAVD88 (Reference 6.4, GUE-E17026, Page 3 of Attachment 7.4)

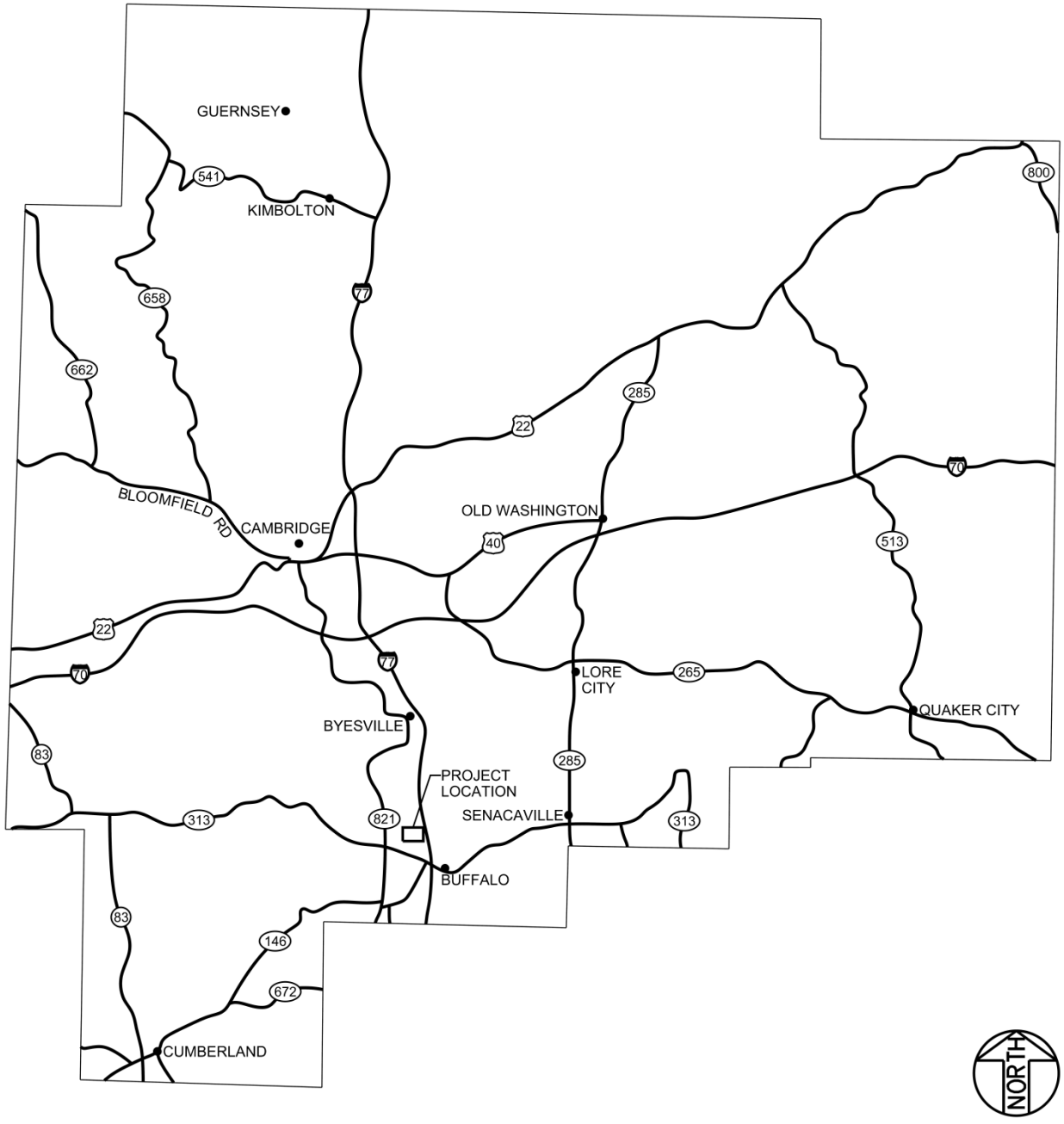

Figure 1: *Location of the Study Area in Regional Scale*

Client	Guernsey Power Station LLC	Prepared by	M. Salehi	Date	12/052018
Project	Guernsey 765KV Switchyard	Reviewed by	N. Patel	Date	12/05/2018
Project No.	13607-005	Approved by	M. Salehi	Date	12/05/2018

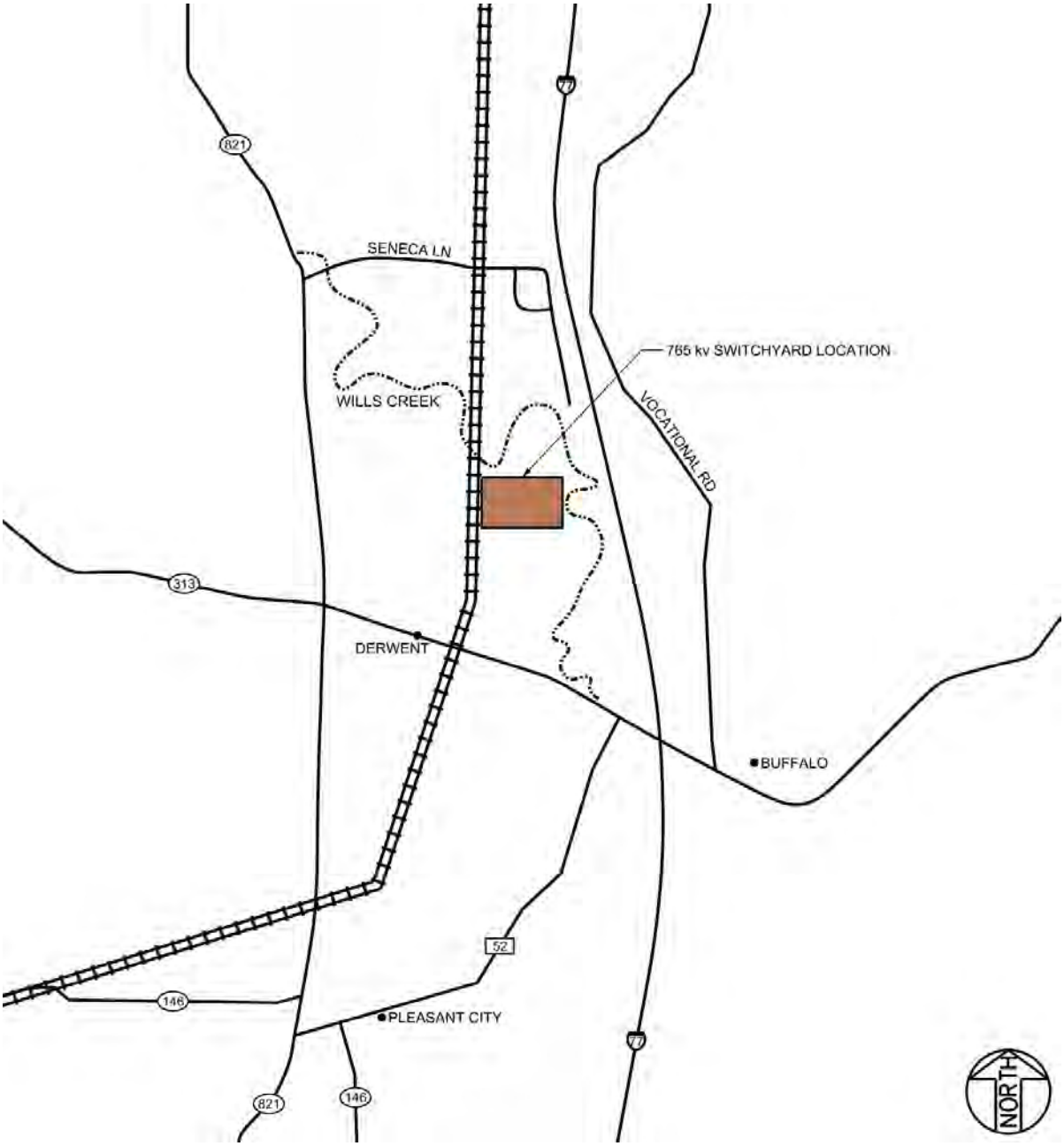

Figure 2: *Location of the Study Area in Local Scale*

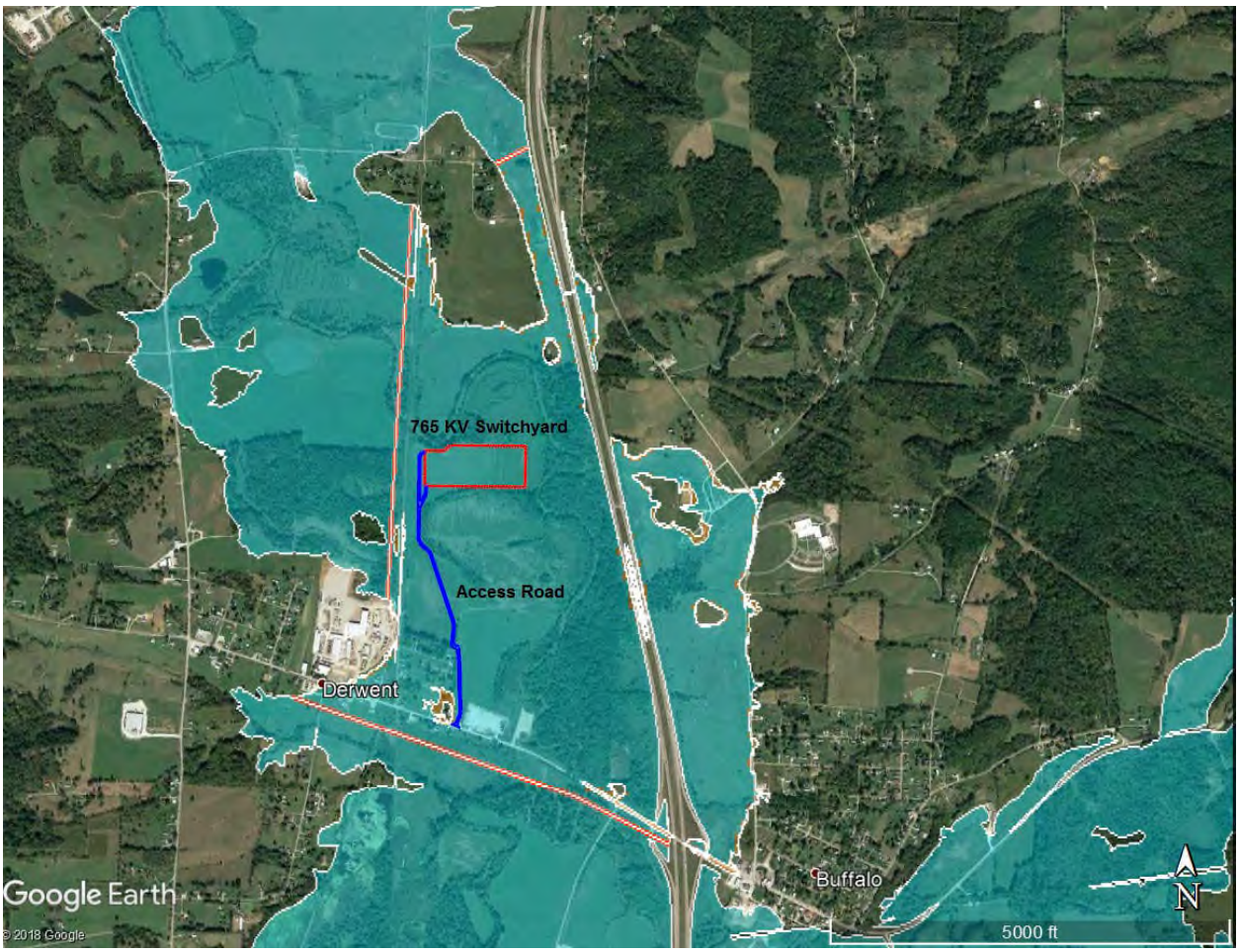

Figure 3: *Wills Creek Flooding Extent (Blue Color) and Project Site (Red Rectangle)*

2.5 FEMA EFFECTIVE FLOOD HYDRAULIC FILES

S&L has received the following information from the FEMA Engineering Library (transmittal email is presented in Attachment 7.3):

1. 1985 Study
    a. HEC2 pdf covering cross sections A-O
    b. WSP2 pdf covering cross sections P-BU
2. Study 07-06-4849S – covering cross sections BV-CC
    a. HEC-RAS
    b. Hydrology

3. LOMR 98-05-397P – cross section AX
4. LOMR 06-05-BT86P – cross section AK-AP
    a. I am still working to locate the digital modeling for this LOMR. However the modeling is printed within the pdf here.
5. Topo maps

Digital files were comprised of many models with various labels. Investigation showed that the files located in the folder shown below covers the Plant area and S&L's model results match the effective FEMA flood maps. A complete list of electronic files received from FEMA Engineering Library is provided in Attachment 7.3. Figure 4 shows the overlay of FEMA flood model cross sections, project site, and aerial image of the study area.

\07-05-4849S_XS_BV_CC\Hydraulic Models\Guernsey_County_Approximate\Supplemental Information\Leverage_Studies\Guernsey_County\HEC-RAS\Derwent.

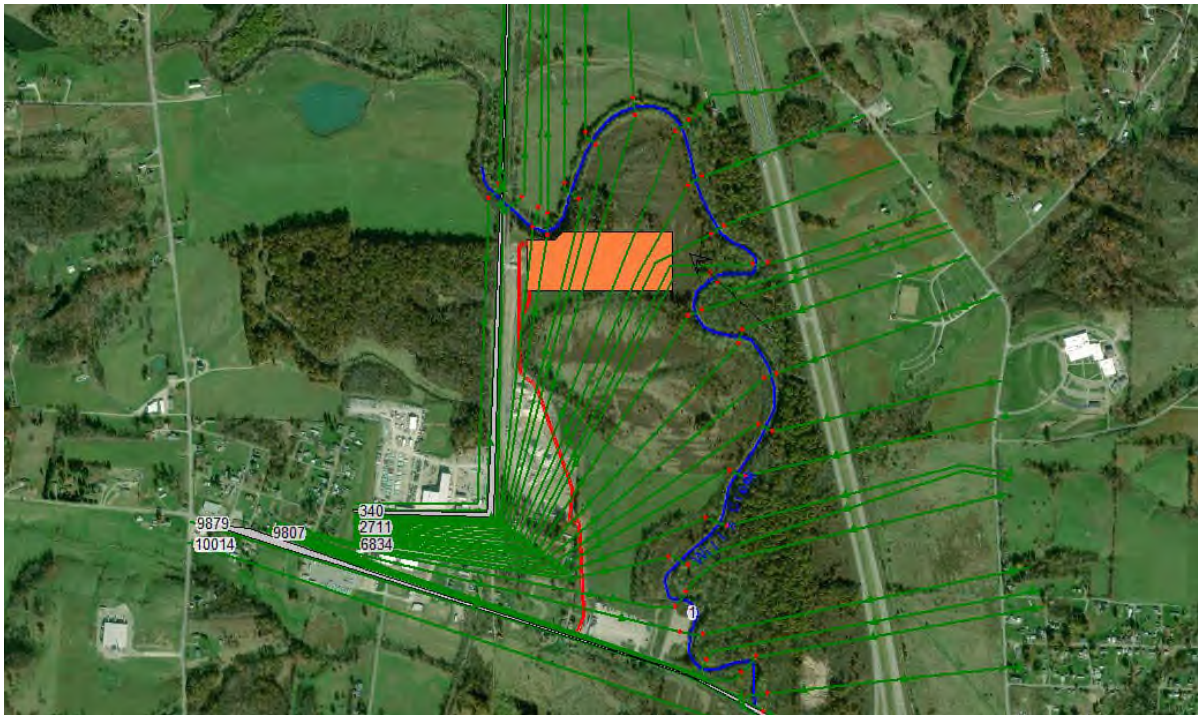

Figure 4: *HEC-RAS Cross Sections Covering Project Site*

3 ASSUMPTIONS

It is assumed that the models received from FEMA Engineering Library are the effective models. As necessary, other assumptions are made and justified throughout this document.

4 METHODOLOGY AND ACCEPTANCE CRITERIA

The hydraulics of the Wills Creek at a reach covering Project site is analyzed using HEC-RAS version 4.1.0 computer software (S&L validated and verified software no. 03.7.710-4.1) on computer #ZL10888. S&L employed the following methodology and steps to support a minimal impact determination of the 100-year flood level:

1) Requesting and receiving effective FEMA hydraulic model files from FEMA Engineering Library.

2) Identifying the portion of the models that cover Project site.

3) Running HEC-RAS Hydraulic models to compare the results with those provided in Reference 6.2. This step is essential to make sure that the models are matching the current effective FEMA flood elevations.

4) Inserting one additional cross sections into the model to cover the Plant eastern portion. This step is necessary to be able to model existing as well as proposed conditions. Implementing this additional cross section started with identifying the immediate cross section downstream of the Plant. This was done by investigating the FEMA reports and overlaying the existing FEMA model cross sections on top of the site aerial image (see Figure 4). Then the distances between existing and inserted cross section is measured in Google

Earth and then the HEC-RAS interpolation feature is used to add the cross section. Added cross section is modified as described in Section 4.2.

5) Running model and comparing the existing versus proposed condition.

4.1 EFFECTIVE FEMA HYDRAULIC MODEL

As noted earlier, Cross Sections BZ (identified as 10014 in FEMA Model) and BV (identified as 263 in FEMA Model) are located upstream and downstream of the Project site, respectively.

4.2 HYDRAULIC MODEL SCENARIOS

The goal in this study is to demonstrate that adding the proposed Project to the floodplain will not change the existing 100-year FEMA flood elevations by more than 1 foot as requested by County (Reference 6.1). Therefore, evaluating the net difference between the existing (current) and proposed conditions is the primary focus of this analysis. The following two scenarios are evaluated:

1) Effective FEMA hydraulic models with no change

2) Modified FEMA hydraulic model with the proposed raised Project site and road: the Plant area is modeled as a complete obstruction by raising the entire plant area to an elevation higher than 100-year effective flood levels. The access road is modeled by raising the cross sections that intersect the road to elevation 803.673 ft NGVD29 (after converting from NAVD88) as shown in Drawing GUE-E17032 (Reference 6.4).

3) All other parameters remained unchanged from those received from FEMA.

4.3 ACCEPTANCE CRITERIA

The difference between the existing and proposed condition less than 1 foot is considered as acceptance criteria in this study.

5 CALCULATION AND RESULTS

The two model scenarios were run, considering the design inputs and the methodology presented in Section 2 and Section 4, respectively. Model results for each scenario are included in Attachment 7.5 and Attachment 7.6, and a summary of the model results for the cross sections upstream and downstream of the Plant are presented in Table 1. The results indicate that there is only 0.03 feet rise in 100-year flood elevations between the FEMA model for the existing (current) condition and modified FEMA model that includes the proposed raise site. Therefore, constructing the proposed Project will not cause any noticeable 100-year flood level rise beyond existing (current) condition.

Table 1: Hydraulic Model Result Summary

HEC-RAS Cross Section (FEMA Flood Maps)	HEC-RAS Cross Section	FEMA Model [Current Effective Condition] Elev (ft NAVD88) [1]	Modified FEMA Model [Proposed Wall] Elev (ft NAVD88) [2]	Difference (ft)
BZ	10014	802.90	802.90	0.0
BY	9704	802.80	802.80	0.0
BX	4131	802.70	802.72	0.02
BW	367	802.60	802.63	0.03
BV	263	802.50	802.52	0.02

Note:

1) It should be noted that the FEMA hydraulic model showed 0.01 to 0.03 feet higher than those presented in Reference 6.2. This change considered insignificant.

2) Elevations are converted from NGVD29 (model) to NAVD88 using conversion shown in Section 2.3 (i.e. subtracting 0.673 from the model results).

6 REFERENCES

6.1 Guernsey County Commissioners, Special Purpose Flood Damage Reduction Resolution, Guernsey County, Ohio.

6.2 Flood Insurance Study, Guernsey County, Ohio and Incorporated Areas. Federal Emergency Management Agency, Flood Insurance Study Number 39059CV000A, August 16, 2011.

6.3 Flood Insurance Map, Guernsey County, Ohio and Incorporated Areas. Map Numbers 39059C0291D and 39059C0292D

6.4 Sargent & Lundy Civil Drawings. Guernsey 765KV Switchyard Site Work. Drawing Numbers GUE-E17010 to GUE-E17018; GUE-E17020 to GUE-E17022; GUE-E17025 to GUE-E17027; and GUE-E17030 to GUE-E17032.

7 ATTACHMENTS

Attachment 7.1 1% Annual Chance Flood Water Surface Elevations at Project Site

FLOOD INSURANCE STUDY

GUERNSEY COUNTY, OHIO

AND INCORPORATED AREAS

COMMUNITY NAME	COMMUNITY NUMBER
BYESVILLE, VILLAGE OF	390199
CAMBRIDGE, CITY OF	390200
CUMBERLAND, VILLAGE OF	390824
*FAIRVIEW, VILLAGE OF	390922
GUERNSEY COUNTY (UNINCORPORATED AREAS)	390198
LORE CITY, VILLAGE OF	390202
*OLD WASHINGTON, VILLAGE OF	390996
PLEASANT CITY, VILLAGE OF	390203
QUAKER CITY, VILLAGE OF	390853
SALESVILLE, VILLAGE OF	390856
SENECAVILLE, VILLAGE OF	390858

* No Special Flood Hazard Areas

REVISED:
August 16, 2011

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
39059CV000A

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Wills Creek (continued)									
BV	100290	NA[2]	NA[2]	NA[2]		802.9	802.9	NA[2]	NA[2]
BW	100394	NA[2]	NA[2]	NA[2]		802.8	802.8	NA[2]	NA[2]
BX	104158	NA[2]	NA[2]	NA[2]		802.7	802.7	NA[2]	NA[2]
BY	109731	NA[2]	NA[2]	NA[2]		802.6	802.6	NA[2]	NA[2]
BZ	110042	NA[2]	NA[2]	NA[2]		802.5	802.5	NA[2]	NA[2]
CA	121703	NA[2]	NA[2]	NA[2]		803.3	803.3	NA[2]	NA[2]
CB	122549	NA[2]	NA[2]	NA[2]		803.4	803.4	NA[2]	NA[2]
CC	124020	NA[2]	NA[2]	NA[2]		803.7	803.7	NA[2]	NA[2]
Buffalo Creek									
CD	124413	NA[2]	NA[2]	NA[2]		804.2	804.2	NA[2]	NA[2]
CE	124610	NA[2]	NA[2]	NA[2]		804.6	804.6	NA[2]	NA[2]
CF	125671	NA[2]	NA[2]	NA[2]		805.2	805.2	NA[2]	NA[2]
CG	125991	NA[2]	NA[2]	NA[2]		805.6	805.6	NA[2]	NA[2]
CH	127160	NA[2]	NA[2]	NA[2]		805.9	805.9	NA[2]	NA[2]

[1]Feet from a point approximately 3575 feet downstream from Wills Creek Valley Road
[2]No data available

TABLE 11

FEDERAL EMERGENCY MANAGEMENT AGENCY

GUERNSEY COUNTY, OH
AND INCORPORATED AREAS

FLOODWAY DATA

WILLS CREEK - BUFFALO CREEK

LEGEND
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
GUERNSEY COUNTY, OHIO
AND INCORPORATED AREAS
PANEL 291 OF 425
MAP NUMBER
39059C0291D
MAP REVISED
AUGUST 16, 2011
VILLAGE OF PLEASANT CITY
390283
NOTES TO USERS
PANEL INDEX

Attachment 7.2 Datum Conversion

Questions concerning the VERTCON process may be mailed to NGS

Latitude: 39.929

Longitude: 081.536

NGVD 29 height: 802.00 ft

Datum shift(NAVD 88 minus NGVD 29): -0.673 feet

Converted to NAVD 88 height: 801.327 feet

Website: https://www.ngs.noaa.gov/cgi-bin/VERTCON/vert_con.prl

Attachment 7.3 FEMA Engineering Library Correspondence

SALEHI, MEHRDAD

From: Hoover, Carrie <Carrie.Hoover@mbakerintl.com>
Sent: Friday, November 02, 2018 12:28 PM
To: SALEHI, MEHRDAD
Cc: SRONCE, ROBERT M
Subject: RE: EXTERNAL: FW: FEMA Data Request

Mehrdad,

Through the link at the bottom of the email chain you can download the data I have located for Wills Creek in Guernsey County, OH. The 2011 FIS indicates that your stream was last studied in detail in 1985 and 2007 with 2 revising LOMRs. The zip includes the following:

1. 1985 Study
    a. HEC2 pdf covering cross sections A-O
    b. WSP2 pdf covering cross sections P-BU
2. Study 07-06-4849S – covering cross sections BV-CC
    a. HEC-RAS
    b. Hydrology
3. LOMR 98-05-397P – cross section AX
4. LOMR 06-05-BT86P – cross section AK-AP
    a. I am still working to locate the digital modeling for this LOMR. However the modeling is printed within the pdf here.
5. Topo maps

We are moving offices this week and it has slowed the search for that LOMR modeling but I hope to have an answer soon. But the modeling is also there in the pdf.

Please let me know if you need anything further.

Carrie Hoover
FEMA Engineering Library
3601 Eisenhower Ave.
Suite 600
Alexandria VA 22304
571-357-6046

To retrieve the attachments referenced in this email, click on the secure link below.
https://eftp.mbakerintl.com/message/SmXfs1Xy0fSiuUQsqkotrK

Filename	Size
B1905002_WillsCrk_OH.zip	182 MB

This email or download link can be forwarded to anyone.

The attachments are available until: **Tuesday, 1 January.**

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 Volume Serial Number is AE76-A7CF

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10/26/2018  11:28 AM               108 zone100.shx
10/26/2018  11:28 AM               209 zone50.dbf
10/26/2018  11:28 AM             4,480 zone50.shp
10/26/2018  11:28 AM               108 zone50.shx
10/26/2018  11:28 AM               119 zone500.dbf
10/26/2018  11:28 AM             3,772 zone500.shp
10/26/2018  11:28 AM               108 zone500.shx
              21 File(s)         27,688 bytes

 Directory of D:\0t1483\Technical Info\Guernsey\6.0 FEMA Model
Files\07-05-4849S_XS_BV_CC\Hydraulic Models\Guernsey_County_Approximate\Supplemental
Information\Leverage_Studies\Guernsey_County\GIS\Quaker City

11/05/2018  07:46 AM    <DIR>          .
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10/26/2018  11:28 AM               389 stream.dbf
10/26/2018  11:28 AM             1,020 stream.shp
10/26/2018  11:28 AM               108 stream.shx
10/26/2018  11:28 AM           222,055 topo.dbf
10/26/2018  11:28 AM         5,543,852 topo.shp
10/26/2018  11:28 AM            15,516 topo.shx
10/26/2018  11:28 AM             2,018 xscutlines.dbf
10/26/2018  11:28 AM             1,940 xscutlines.shp
10/26/2018  11:28 AM               228 xscutlines.shx
10/26/2018  11:28 AM               140 zone10.dbf
10/26/2018  11:28 AM             5,576 zone10.shp
10/26/2018  11:28 AM               116 zone10.shx
10/26/2018  11:28 AM               119 zone100.dbf
10/26/2018  11:28 AM             6,332 zone100.shp
10/26/2018  11:28 AM               108 zone100.shx
10/26/2018  11:28 AM               119 zone50.dbf
10/26/2018  11:28 AM             6,444 zone50.shp
10/26/2018  11:28 AM               108 zone50.shx
10/26/2018  11:28 AM               119 zone500.dbf
10/26/2018  11:28 AM             5,756 zone500.shp
10/26/2018  11:28 AM               108 zone500.shx
              21 File(s)      5,812,171 bytes

 Directory of D:\0t1483\Technical Info\Guernsey\6.0 FEMA Model
Files\07-05-4849S_XS_BV_CC\Hydraulic Models\Guernsey_County_Approximate\Supplemental
Information\Leverage_Studies\Guernsey_County\HEC-RAS

11/05/2018  07:46 AM    <DIR>          .
11/05/2018  07:46 AM    <DIR>          ..
11/05/2018  07:46 AM    <DIR>          Derwent
11/05/2018  07:46 AM    <DIR>          Kimbolton
11/05/2018  07:46 AM    <DIR>          Pleasant City
               0 File(s)              0 bytes

 Directory of D:\0t1483\Technical Info\Guernsey\6.0 FEMA Model
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Files\07-05-4849S_XS_BV_CC\Hydraulic Models\Guernsey_County_Approximate\Supplemental
Information\Leverage_Studies\Guernsey_County\HEC-RAS\Derwent

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11/05/2018  07:46 AM             1,277 wills.p01
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11/05/2018  07:46 AM            36,177 wills.r01
               6 File(s)        220,628 bytes

 Directory of D:\0t1483\Technical Info\Guernsey\6.0 FEMA Model
Files\07-05-4849S_XS_BV_CC\Hydraulic Models\Guernsey_County_Approximate\Supplemental
Information\Leverage_Studies\Guernsey_County\HEC-RAS\Kimbolton

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11/05/2018  07:46 AM    <DIR>          ..
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10/26/2018  11:28 AM            64,000 Kimbolton.o01
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10/26/2018  11:28 AM               124 Kimbolton.p01.comp_msgs.txt
11/05/2018  07:46 AM               631 Kimbolton.prj
11/05/2018  07:46 AM            25,085 Kimbolton.r01
               7 File(s)        116,338 bytes

 Directory of D:\0t1483\Technical Info\Guernsey\6.0 FEMA Model
Files\07-05-4849S_XS_BV_CC\Hydraulic Models\Guernsey_County_Approximate\Supplemental
Information\Leverage_Studies\Guernsey_County\HEC-RAS\Pleasant City

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11/05/2018  07:46 AM             1,142 WillsBuffalo.f01
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 Directory of D:\0t1483\Technical Info\Guernsey\6.0 FEMA Model
Files\07-05-4849S_XS_BV_CC\Hydrology

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11/05/2018  07:46 AM    <DIR>          General
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 Directory of D:\0t1483\Technical Info\Guernsey\6.0 FEMA Model
Files\07-05-4849S_XS_BV_CC\Hydrology\General

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08/03/2011  09:53 AM            97,169 39059C_HYDRO_ITR.pdf
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08/03/2011  09:53 AM           510,379 Certification of Work_stamped.pdf
                                       Page 6
```

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Files\07-05-4849S_XS_BV_CC\Hydrology\Hydrology Data

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 Directory of D:\0t1483\Technical Info\Guernsey\6.0 FEMA Model
Files\07-05-4849S_XS_BV_CC\Hydrology\Hydrology Data\PeakFQ

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11/05/2018  07:46 AM            16,381 03141870.PRT
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08/03/2011  09:54 AM               987 03142200.txt
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08/03/2011  09:54 AM               308 SS_Flowpaths.sbx
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08/03/2011  09:54 AM             1,740 SS_Points.sbn
08/03/2011  09:54 AM               252 SS_Points.sbx
08/03/2011  09:54 AM            10,020 SS_Points.shp
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08/03/2011  09:54 AM             1,340 SS_Points.shx
08/03/2011  09:54 AM           122,893 SS_Subbasins.dbf
08/03/2011  09:54 AM               424 SS_Subbasins.prj
08/03/2011  09:54 AM             1,796 SS_Subbasins.sbn
08/03/2011  09:54 AM               308 SS_Subbasins.sbx
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08/03/2011  09:54 AM            15,979 SS_Subbasins.shp.xml
08/03/2011  09:54 AM             1,340 SS_Subbasins.shx
              21 File(s)      9,535,833 bytes

 Directory of D:\0t1483\Technical Info\Guernsey\6.0 FEMA Model
Files\07-05-4849S_XS_BV_CC\Hydrology\Hydrology Databases
                                    Page 7
```

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11/05/2018  07:46 AM    <DIR>          .
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 Directory of D:\0t1483\Technical Info\Guernsey\6.0 FEMA Model
Files\07-05-4849S_XS_BV_CC\Hydrology\Hydrology Models

11/05/2018  07:46 AM    <DIR>          .
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Files\07-05-4849S_XS_BV_CC\Hydrology\Hydrology Models\39059C

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10/24/2018  12:54 PM           227,788 READ-ME.pdf
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06-05-BT86P_XS_AK-AP

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10/26/2018  09:04 AM         1,477,020 06-05-BT86P-390198.pdf
10/26/2018  10:09 AM         5,008,117 06-05-BT86P.PDF
10/26/2018  10:05 AM            31,853 Disk from 06-05-BT86P.pdf
               3 File(s)      6,516,990 bytes

 Directory of D:\0t1483\Technical Info\Guernsey\6.0 FEMA Model Files\LOMR
98-05-397P_XS_AX

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98-05-397P_XS_AX\ENG

11/05/2018  01:44 PM    <DIR>          .
                                       Page 8
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 Directory of D:\0t1483\Technical Info\Guernsey\6.0 FEMA Model Files\LOMR
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10/24/2018  01:18 PM           697,181 WILLS CREEK-D0005.pdf
10/24/2018  01:18 PM           917,837 WILLS CREEK-E0006.pdf
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10/24/2018  01:18 PM           808,341 WILLS CREEK-G0008.pdf
10/24/2018  01:18 PM           705,333 WILLS CREEK-H0009.pdf
10/24/2018  01:18 PM           660,776 WILLS CREEK-I0010.pdf
10/24/2018  01:18 PM           741,866 WILLS CREEK-J0011.pdf
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10/24/2018  01:18 PM           646,701 WILLS CREEK-Q0018.pdf
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10/24/2018  01:18 PM           602,340 WILLS CREEK-S0020.pdf
10/24/2018  01:18 PM           686,221 WILLS CREEK-T0021.pdf
10/24/2018  01:18 PM         1,078,642 WILLS CREEK-U0022.pdf
10/24/2018  01:18 PM           666,221 WILLS CREEK-V0023.pdf
10/24/2018  01:18 PM           616,308 WILLS CREEK-W0024.pdf
10/24/2018  01:18 PM           762,053 WILLS CREEK-X0025.pdf
10/24/2018  01:18 PM           545,439 WILLS CREEK-Y0026.pdf
10/24/2018  01:18 PM           837,603 WILLS CREEK-Z0027.pdf
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 Directory of D:\0t1483\Technical Info\Guernsey\6.0 FEMA Model
Files\WILLS_CREEK_1985_HEC2_XS_A-O

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10/24/2018  01:17 PM         2,595,531 wills creek A-P.pdf
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 Directory of D:\0t1483\Technical Info\Guernsey\6.0 FEMA Model
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Files\WILLS_CREEK_1985_WSP2_XS_P-BU

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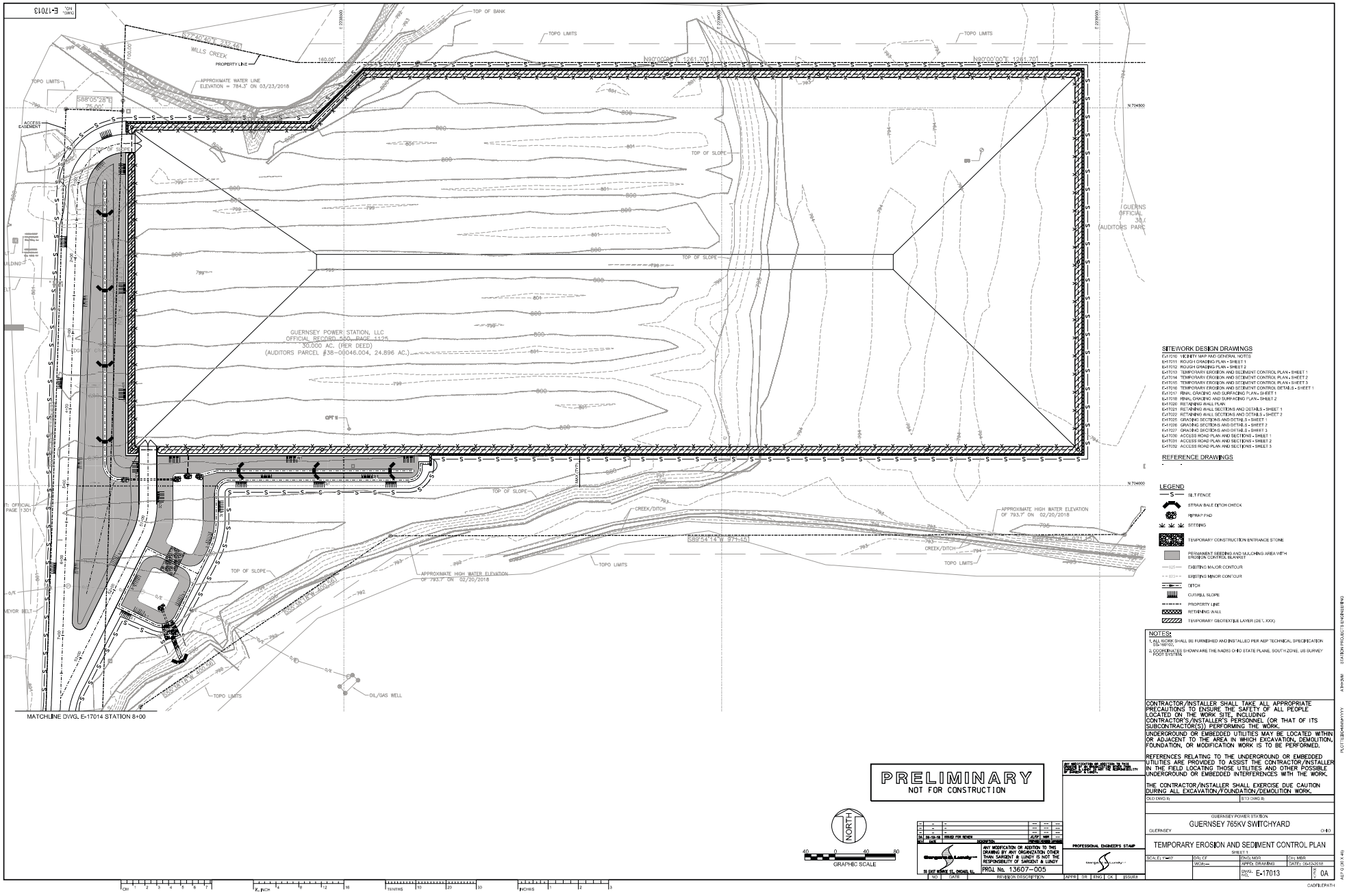
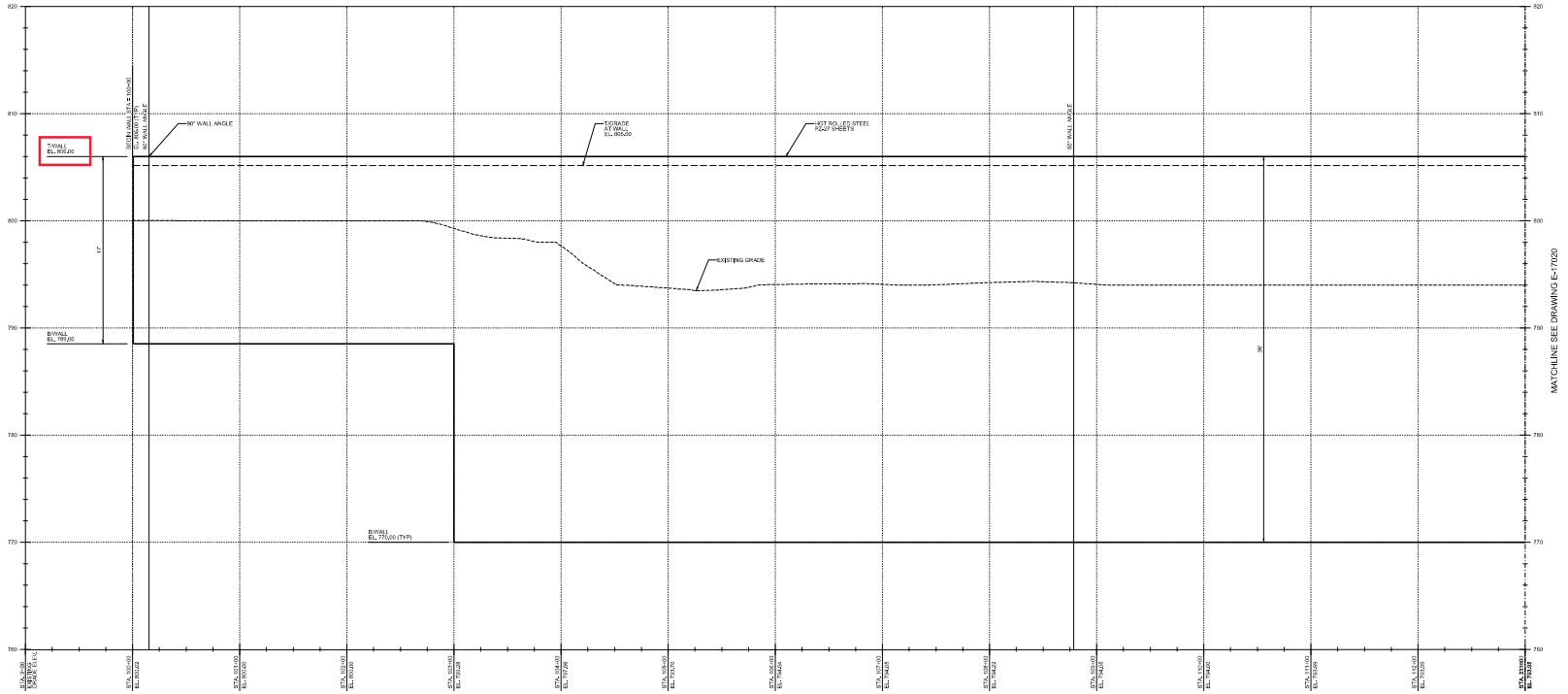
Attachment 7.4 Relevant Project Civil Drawings


DWG. NO. E-17013
TOP OF BANK
TOPO LIMITS
WILLS CREEK
PROPERTY LINE
APPROXIMATE WATER LINE ELEVATION = 784.3' ON 03/23/2018
ACCESS EASEMENT
TOP OF SLOPE
GUERNSEY POWER STATION, LLC
OFFICIAL RECORD 580, PAGE 1125
30.000 AC. (PER DEED)
(AUDITORS PARCEL #38-09046.004, 24.896 AC.)
CREEK/DITCH
APPROXIMATE HIGH WATER ELEVATION OF 793.7' ON 02/20/2018
TEMPORARY CONSTRUCTION ENTRANCE
OIL/GAS WELL
MATCHLINE DWG. E-17014 STATION 8+00
SITEWORK DESIGN DRAWINGS
E-17010 VICINITY MAP AND GENERAL NOTES
E-17011 ROUGH GRADING PLAN - SHEET 1
E-17012 ROUGH GRADING PLAN - SHEET 2
E-17013 TEMPORARY EROSION AND SEDIMENT CONTROL PLAN - SHEET 1
E-17014 TEMPORARY EROSION AND SEDIMENT CONTROL PLAN - SHEET 2
E-17015 TEMPORARY EROSION AND SEDIMENT CONTROL PLAN - SHEET 3
E-17016 TEMPORARY EROSION AND SEDIMENT CONTROL DETAILS - SHEET 1
E-17017 FINAL GRADING AND SURFACING PLAN - SHEET 1
E-17018 FINAL GRADING AND SURFACING PLAN - SHEET 2
E-17020 RETAINING WALL PLAN
E-17021 RETAINING WALL SECTIONS AND DETAILS - SHEET 1
E-17022 RETAINING WALL SECTIONS AND DETAILS - SHEET 2
E-17025 GRADING SECTIONS AND DETAILS - SHEET 1
E-17026 GRADING SECTIONS AND DETAILS - SHEET 2
E-17027 GRADING SECTIONS AND DETAILS - SHEET 3
E-17030 ACCESS ROAD PLAN AND SECTIONS - SHEET 1
E-17031 ACCESS ROAD PLAN AND SECTIONS - SHEET 2
E-17032 ACCESS ROAD PLAN AND SECTIONS - SHEET 3
REFERENCE DRAWINGS
LEGEND
SILT FENCE
STRAW BALE DITCH CHECK
RIPRAP PAD
SEEDING
TEMPORARY CONSTRUCTION ENTRANCE STONE
PERMANENT SEEDING AND MULCHING AREA WITH EROSION CONTROL BLANKET
EXISTING MAJOR CONTOUR
EXISTING MINOR CONTOUR
DITCH
CUT/FILL SLOPE
PROPERTY LINE
RETAINING WALL
TEMPORARY GEOTEXTILE LAYER (DET. XXX)
NOTES:
1. ALL WORK SHALL BE FURNISHED AND INSTALLED PER AEP TECHNICAL SPECIFICATION SS-190102.
2. COORDINATES SHOWN ARE THE NAD83 OHIO STATE PLANE, SOUTH ZONE, US SURVEY FOOT SYSTEM.
CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUBCONTRACTOR(S)) PERFORMING THE WORK.
UNDERGROUND OR EMBEDDED UTILITIES MAY BE LOCATED WITHIN OR ADJACENT TO THE AREA IN WHICH EXCAVATION, DEMOLITION, FOUNDATION, OR MODIFICATION WORK IS TO BE PERFORMED.
REFERENCES RELATING TO THE UNDERGROUND OR EMBEDDED UTILITIES ARE PROVIDED TO ASSIST THE CONTRACTOR/INSTALLER IN THE FIELD LOCATING THOSE UTILITIES AND OTHER POSSIBLE UNDERGROUND OR EMBEDDED INTERFERENCES WITH THE WORK.
THE CONTRACTOR/INSTALLER SHALL EXERCISE DUE CAUTION DURING ALL EXCAVATION/FOUNDATION/DEMOLITION WORK.
PRELIMINARY
NOT FOR CONSTRUCTION
NORTH
GRAPHIC SCALE
ANY MODIFICATION OR ADDITION TO THIS DRAWING BY ANY ORGANIZATION OTHER THAN SARGENT & LUNDY IS NOT THE RESPONSIBILITY OF SARGENT & LUNDY
PROJ No. 13607-005
PROFESSIONAL ENGINEER'S STAMP
GUERNSEY POWER STATION
GUERNSEY 765KV SWITCHYARD
GUERNSEY OHIO
TEMPORARY EROSION AND SEDIMENT CONTROL PLAN
SHEET 1
SCALE: 1"=40'
DR: CF
ENG MGR: CH: MBR
APPD: DRAWING
DATE: 06-13-2018
DWG. NO. E-17013
REV. 0A
CADFILEPATH

DWG. NO.: E-17021



SITEWORK DESIGN DRAWINGS

E-17010 VICINITY MAP AND GENERAL NOTES
E-17011 ROUGH GRADING PLAN - SHEET 1
E-17012 ROUGH GRADING PLAN - SHEET 2
E-17013 TEMPORARY EROSION AND SEDIMENT CONTROL PLAN - SHEET 1
E-17014 TEMPORARY EROSION AND SEDIMENT CONTROL PLAN - SHEET 2
E-17015 TEMPORARY EROSION AND SEDIMENT CONTROL PLAN - SHEET 3
E-17016 TEMPORARY EROSION AND SEDIMENT CONTROL DETAILS - SHEET 1
E-17017 FINAL GRADING AND SURFACING PLAN - SHEET 1
E-17018 FINAL GRADING AND SURFACING PLAN - SHEET 2
E-17020 RETAINING WALL PLAN
E-17021 RETAINING WALL SECTIONS AND DETAILS - SHEET 1
E-17022 RETAINING WALL SECTIONS AND DETAILS - SHEET 2
E-17025 GRADING SECTIONS AND DETAILS - SHEET 1
E-17026 GRADING SECTIONS AND DETAILS - SHEET 2
E-17027 GRADING SECTIONS AND DETAILS - SHEET 3
E-17030 ACCESS ROAD PLAN AND SECTIONS - SHEET 1
E-17031 ACCESS ROAD PLAN AND SECTIONS - SHEET 2
E-17032 ACCESS ROAD PLAN AND SECTIONS - SHEET 3

REFERENCE DRAWINGS

- -

NOTES:

1. ALL WORK SHALL BE FURNISHED AND INSTALLED PER AEP TECHNICAL SPECIFICATION 88-166102.

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUBCONTRACTOR(S)) PERFORMING THE WORK.

UNDERGROUND OR EMBEDDED UTILITIES MAY BE LOCATED WITHIN OR ADJACENT TO THE AREA IN WHICH EXCAVATION, DEMOLITION, FOUNDATION, OR MODIFICATION WORK IS TO BE PERFORMED.

REFERENCES RELATING TO THE UNDERGROUND OR EMBEDDED UTILITIES ARE PROVIDED TO ASSIST THE CONTRACTOR/INSTALLER IN THE FIELD LOCATING THOSE UTILITIES AND OTHER POSSIBLE UNDERGROUND OR EMBEDDED INTERFERENCES WITH THE WORK.

THE CONTRACTOR/INSTALLER SHALL EXERCISE DUE CAUTION DURING ALL EXCAVATION/FOUNDATION/DEMOLITION WORK.

OLD DWG #: STD DWG #:

PRELIMINARY
NOT FOR CONSTRUCTION

HORIZONTAL SCALE
VERTICAL SCALE

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PROJ No. 13607-005

PROFESSIONAL ENGINEER'S STAMP

GUERNSEY POWER STATION
GUERNSEY POWER STATION
GUERNSEY OHIO

RETAINING WALL SECTIONS AND DETAILS

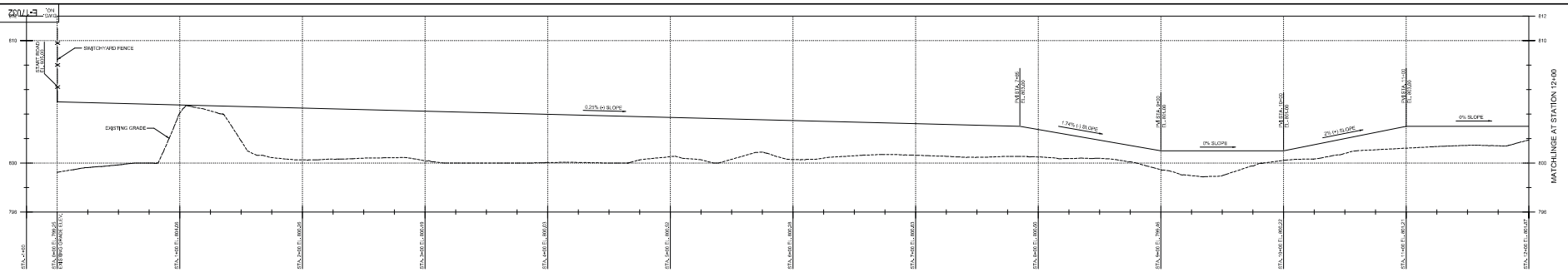
SCALE: 1"=40' | DR: CF | ENG: MBR | CH: MBR | WOR:— | APP'D. DRAWING | DATE: 05-23-2018

DWG. NO. E-17021 | REV. 0A

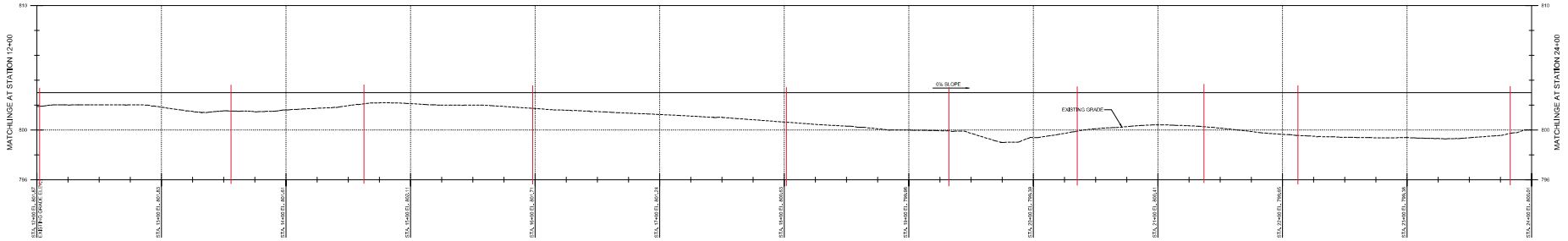
AEP 10.00 X 40

CADTLEPATH

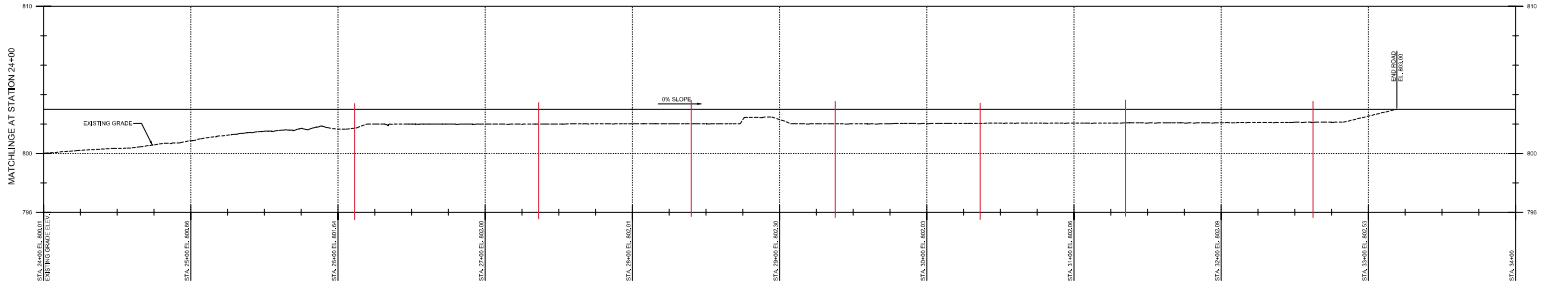
PLOTTED:08-MAY-YYYY ATHOOM STATION PROJECTS ENGINEERING



ROAD SECTION VIEW 1



ROAD SECTION VIEW 2



ROAD SECTION VIEW 3

SITEWORK DESIGN DRAWINGS

E-17010	VICINITY MAP AND GENERAL NOTES
E-17011	ROUGH GRADING PLAN - SHEET 1
E-17012	ROUGH GRADING PLAN - SHEET 2
E-17013	TEMPORARY EROSION AND SEDIMENT CONTROL PLAN - SHEET 1
E-17014	TEMPORARY EROSION AND SEDIMENT CONTROL PLAN - SHEET 2
E-17015	TEMPORARY EROSION AND SEDIMENT CONTROL PLAN - SHEET 3
E-17016	TEMPORARY EROSION AND SEDIMENT CONTROL DETAILS - SHEET 1
E-17017	FINAL GRADING AND SURFACING PLAN - SHEET 1
E-17018	FINAL GRADING AND SURFACING PLAN - SHEET 2
E-17029	RETAINING WALL PLAN
E-17021	RETAINING WALL SECTIONS AND DETAILS - SHEET 1
E-17022	RETAINING WALL SECTIONS AND DETAILS - SHEET 2
E-17025	GRADING SECTIONS AND DETAILS - SHEET 1
E-17026	GRADING SECTIONS AND DETAILS - SHEET 2
E-17027	GRADING SECTIONS AND DETAILS - SHEET 3
E-17030	ACCESS ROAD PLAN AND SECTIONS - SHEET 1
E-17031	ACCESS ROAD PLAN AND SECTIONS - SHEET 2
E-17032	ACCESS ROAD PLAN AND SECTIONS - SHEET 3

REFERENCE DRAWINGS

-

NOTES:
1. ALL WORK SHALL BE FURNISHED AND INSTALLED PER AEP TECHNICAL SPECIFICATION SS-1921100.
2. COORDINATES SHOWN ARE THE NAD83 OHIO STATE PLANE, SOUTH ZONE, US SURVEY FOOT SYSTEM.

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUBCONTRACTOR(S)) PERFORMING THE WORK.

UNDERGROUND OR EMBEDDED UTILITIES MAY BE LOCATED WITHIN OR ADJACENT TO THE AREA IN WHICH EXCAVATION, DEMOLITION, FOUNDATION, OR MODIFICATION WORK IS TO BE PERFORMED.

REFERENCES RELATING TO THE UNDERGROUND OR EMBEDDED UTILITIES ARE PROVIDED TO ASSIST THE CONTRACTOR/INSTALLER IN THE FIELD LOCATING THOSE UTILITIES AND OTHER POSSIBLE UNDERGROUND OR EMBEDDED INTERFERENCES WITH THE WORK.

THE CONTRACTOR/INSTALLER SHALL EXERCISE DUE CAUTION DURING ALL EXCAVATION/FOUNDATION/DEMOLITION WORK.

PRELIMINARY
NOT FOR CONSTRUCTION

HORIZONTAL SCALE
VERTICAL SCALE

NO	DATE	REVISION DESCRIPTION	APPR	DR	ENG	CK	ISSUE
1	06-15-18	ISSUED FOR REVIEW	ALAP	MBR			

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PROJ No. 13607-005

PROFESSIONAL ENGINEER'S STAMP

OLD DWG #: | STD DWG #:

GUERNSEY POWER STATION
GUERNSEY 765KV SWITCHYARD
GUERNSEY OHIO

ACCESS ROAD PROFILE
SHEET 3

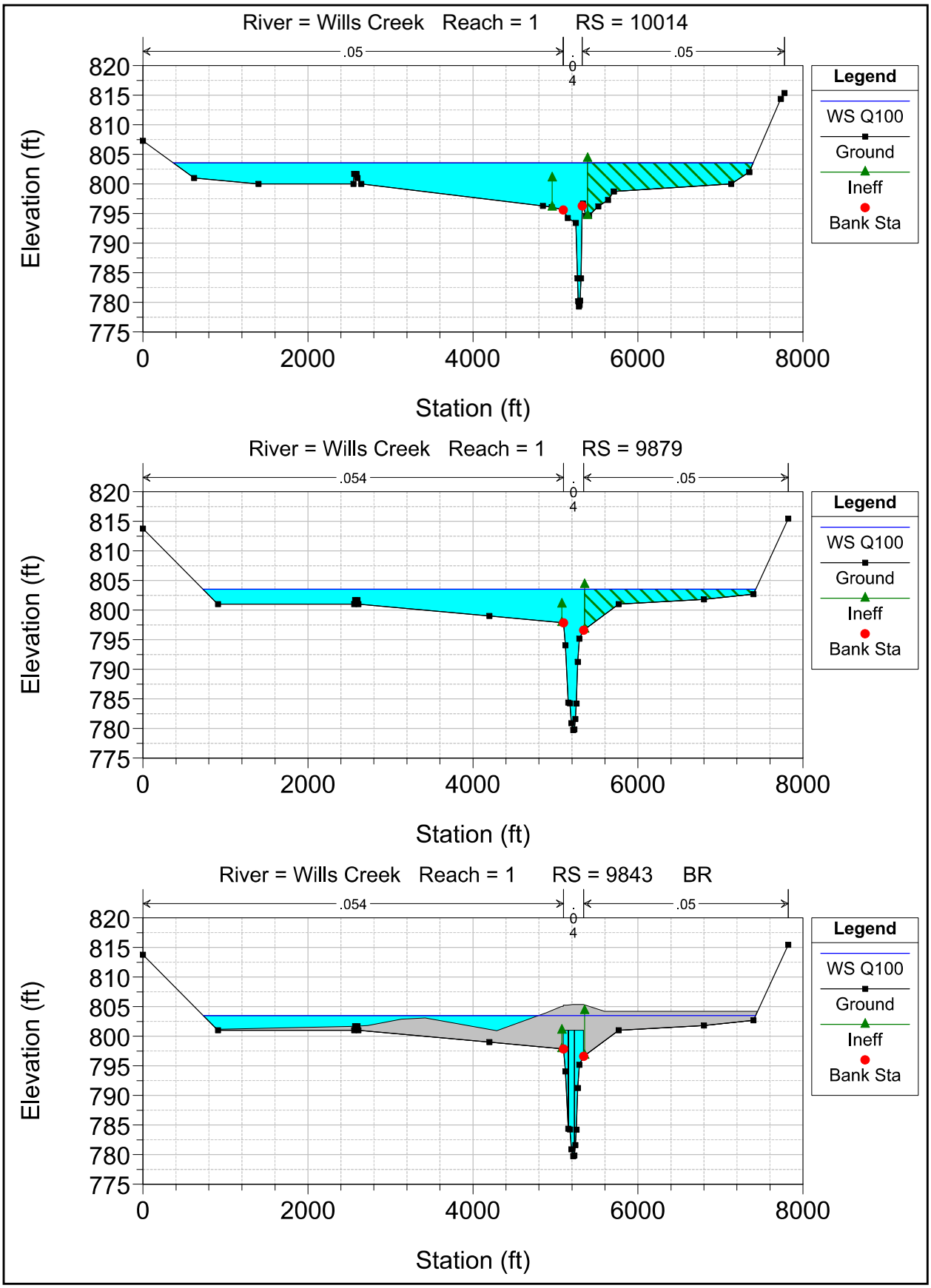
SCALE: 1"=30'	DR: CF	ENG: MBR	CK: MBR
	WOR:—	APPR: DRAWING	DATE: 06-15-2018
		DWG. NO. E-17032	REV. 0A

PLOTTED:06-MAY-YYYY A.THOM STATION PROJECTS ENGINEERING
ASP 12.00 X 48
CADTLEPATH

Attachment 7.5 FEMA Model Results for Existing Condition

HEC-RAS Plan: P01 River: Wills Creek Reach: 1 Profile: Q100

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	10014	Q100	10950.00	779.28	803.56	792.91	803.56	0.000021	0.90	24251.57	7029.74	0.04
1	9879	Q100	10950.00	779.73	803.54	789.04	803.55	0.000037	1.37	18496.05	6700.17	0.06
1	9843		Bridge									
1	9807	Q100	10950.00	779.73	803.46	789.06	803.48	0.000055	1.61	15222.16	6319.50	0.07
1	9704	Q100	10950.00	780.17	803.46	792.83	803.48	0.000060	1.55	15462.15	6098.69	0.08
1	9416	Q100	10950.00	780.10	803.45	792.76	803.46	0.000038	1.22	19571.30	6145.28	0.06
1	8977	Q100	10950.00	780.00	803.45	792.66	803.46	0.000028	1.04	21645.30	6065.69	0.05
1	8634	Q100	10950.00	779.90	803.44	792.55	803.45	0.000029	1.07	20634.07	5801.30	0.05
1	8236	Q100	10950.00	779.78	803.43	792.32	803.44	0.000024	1.04	21898.45	5582.98	0.05
1	7764	Q100	10950.00	779.71	803.42	792.36	803.43	0.000028	1.07	20108.78	5442.06	0.05
1	7295	Q100	10950.00	779.61	803.41	792.27	803.42	0.000031	1.13	19350.51	5411.00	0.06
1	6834	Q100	10950.00	779.50	803.40	792.06	803.41	0.000020	0.97	23050.41	5437.10	0.04
1	6357	Q100	10950.00	779.40	803.40	791.96	803.40	0.000020	1.02	22909.34	5476.00	0.05
1	5884	Q100	10950.00	779.30	803.39	791.59	803.40	0.000016	0.96	24892.47	5361.06	0.04
1	5423	Q100	10950.00	779.20	803.39	791.50	803.39	0.000015	0.92	26148.17	4993.46	0.04
1	4946	Q100	10950.00	779.10	803.38	791.39	803.39	0.000015	0.91	26807.12	5016.56	0.04
1	4549	Q100	10950.00	779.01	803.38	791.31	803.38	0.000013	0.91	29157.36	5243.21	0.04
1	4131	Q100	10950.00	778.91	803.38	791.22	803.38	0.000012	0.83	28726.65	5042.10	0.04
1	3663	Q100	10950.00	779.12	803.37	791.41	803.38	0.000014	0.89	27355.66	4931.36	0.04
1	3189	Q100	10950.00	779.34	803.37	791.65	803.37	0.000016	0.91	27299.08	5235.76	0.04
1	2711	Q100	10950.00	779.55	803.37	790.18	803.37	0.000009	0.71	32807.27	5870.35	0.03
1	2229	Q100	10950.00	779.77	803.37	790.40	803.37	0.000009	0.72	32657.69	5418.78	0.03
1	1738	Q100	10950.00	780.00	803.36	790.64	803.37	0.000013	0.86	27847.87	5415.81	0.04
1	1257	Q100	10950.00	780.21	803.36	790.84	803.36	0.000022	1.05	23259.54	5337.42	0.05
1	845	Q100	10950.00	780.40	803.34	791.05	803.35	0.000036	1.33	19612.60	5270.60	0.06
1	444	Q100	10950.00	780.59	803.33	791.23	803.34	0.000041	1.38	19337.68	5506.12	0.06
1	367	Q100	10950.00	780.00	803.30	788.94	803.33	0.000082	1.84	15678.93	5655.24	0.08
1	362		Bridge									
1	340	Q100	10950.00	780.00	803.22	790.54	803.24	0.000092	1.54	16705.74	5574.09	0.07
1	263	Q100	10950.00	779.46	803.19	789.01	803.22	0.000080	2.03	15120.88	5500.41	0.09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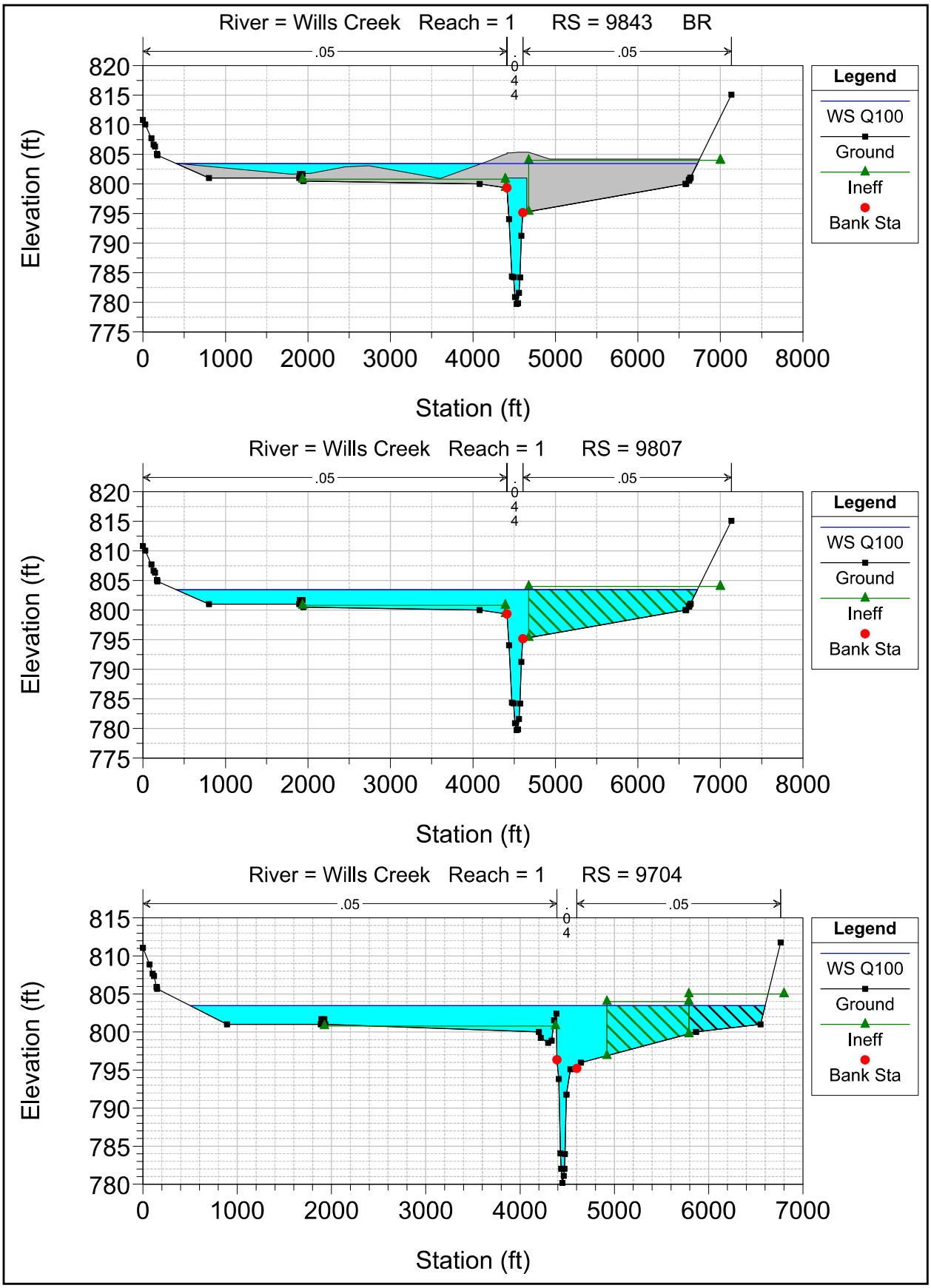
.05
.04
.05
Elevation (ft)
820
815
810
805
800
795
790
785
780
775
0
2000
4000
6000
8000
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta
River = Wills Creek Reach = 1 RS = 9879
.054
.04
.05
Elevation (ft)
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta
River = Wills Creek Reach = 1 RS = 9843 BR
.054
.04
.05
Elevation (ft)
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta


River = Wills Creek Reach = 1 RS = 9843 BR
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.044
.05
Elevation (ft)
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810
805
800
795
790
785
780
775
0
1000
2000
3000
4000
5000
6000
7000
8000
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta
River = Wills Creek Reach = 1 RS = 9807
.05
.044
.05
Elevation (ft)
820
815
810
805
800
795
790
785
780
775
0
1000
2000
3000
4000
5000
6000
7000
8000
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta
River = Wills Creek Reach = 1 RS = 9704
.05
.04
.05
Elevation (ft)
815
810
805
800
795
790
785
780
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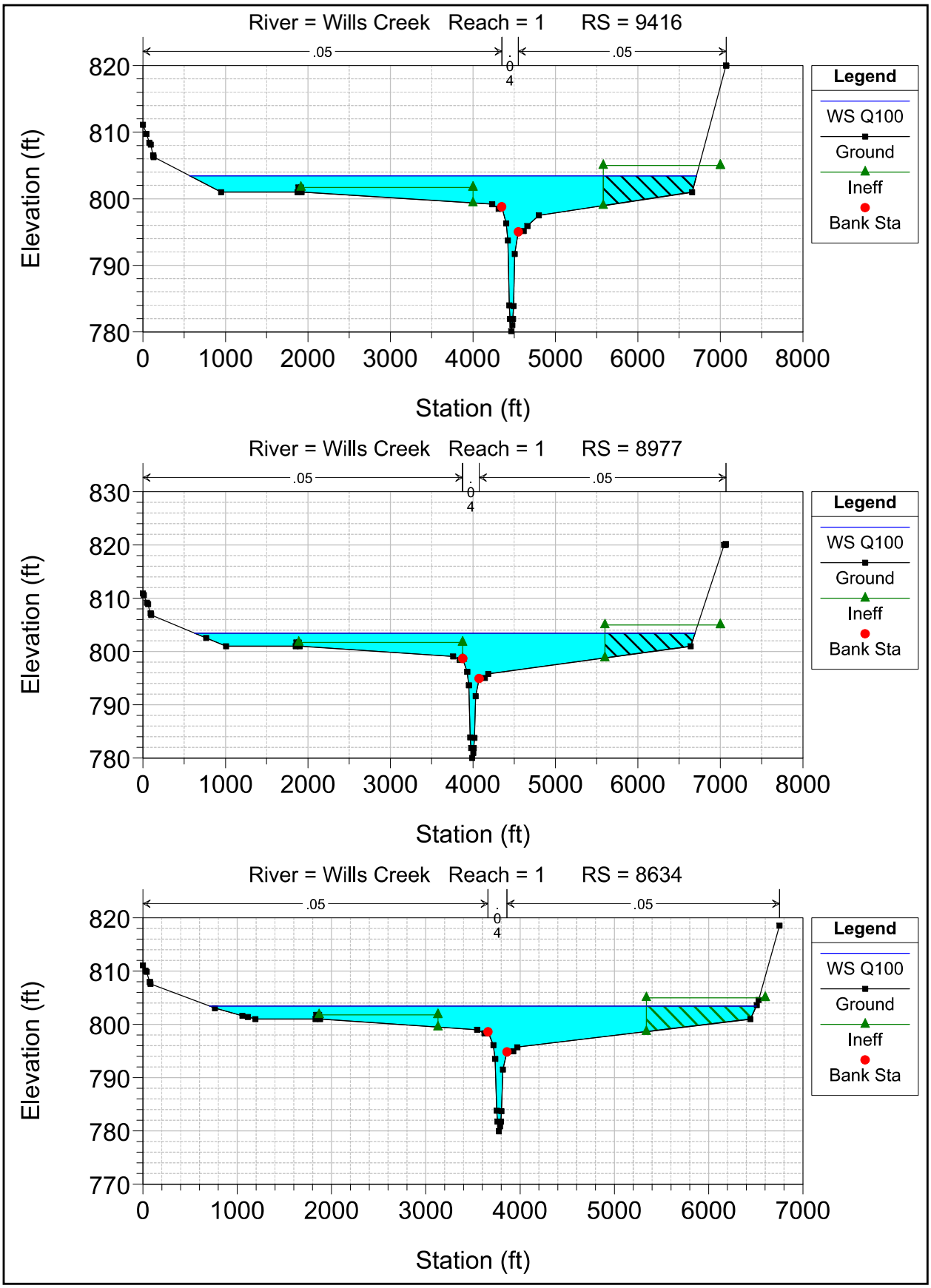
1000
2000
3000
4000
5000
6000
7000
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta


River = Wills Creek Reach = 1 RS = 9416
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.04
.05
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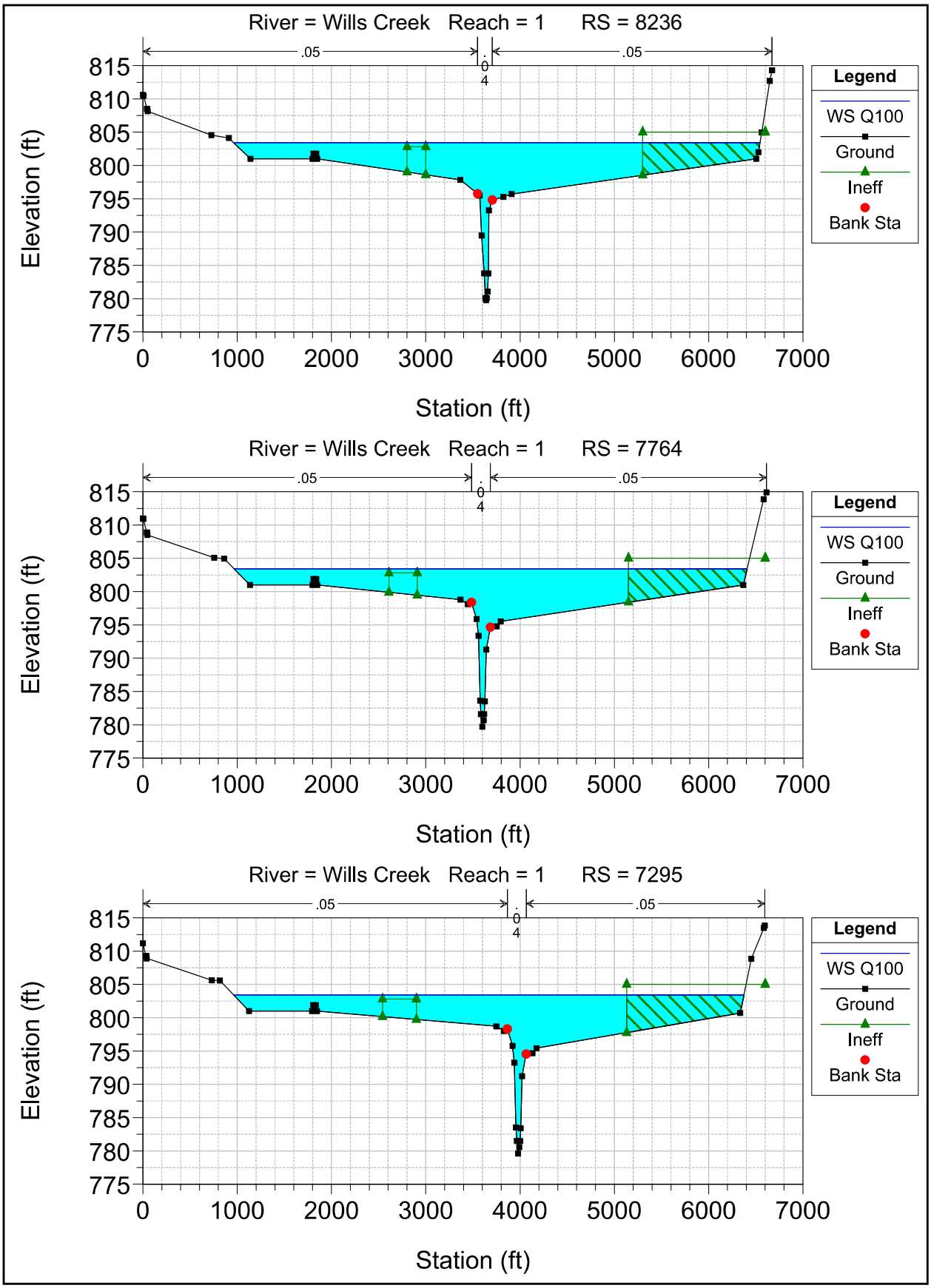
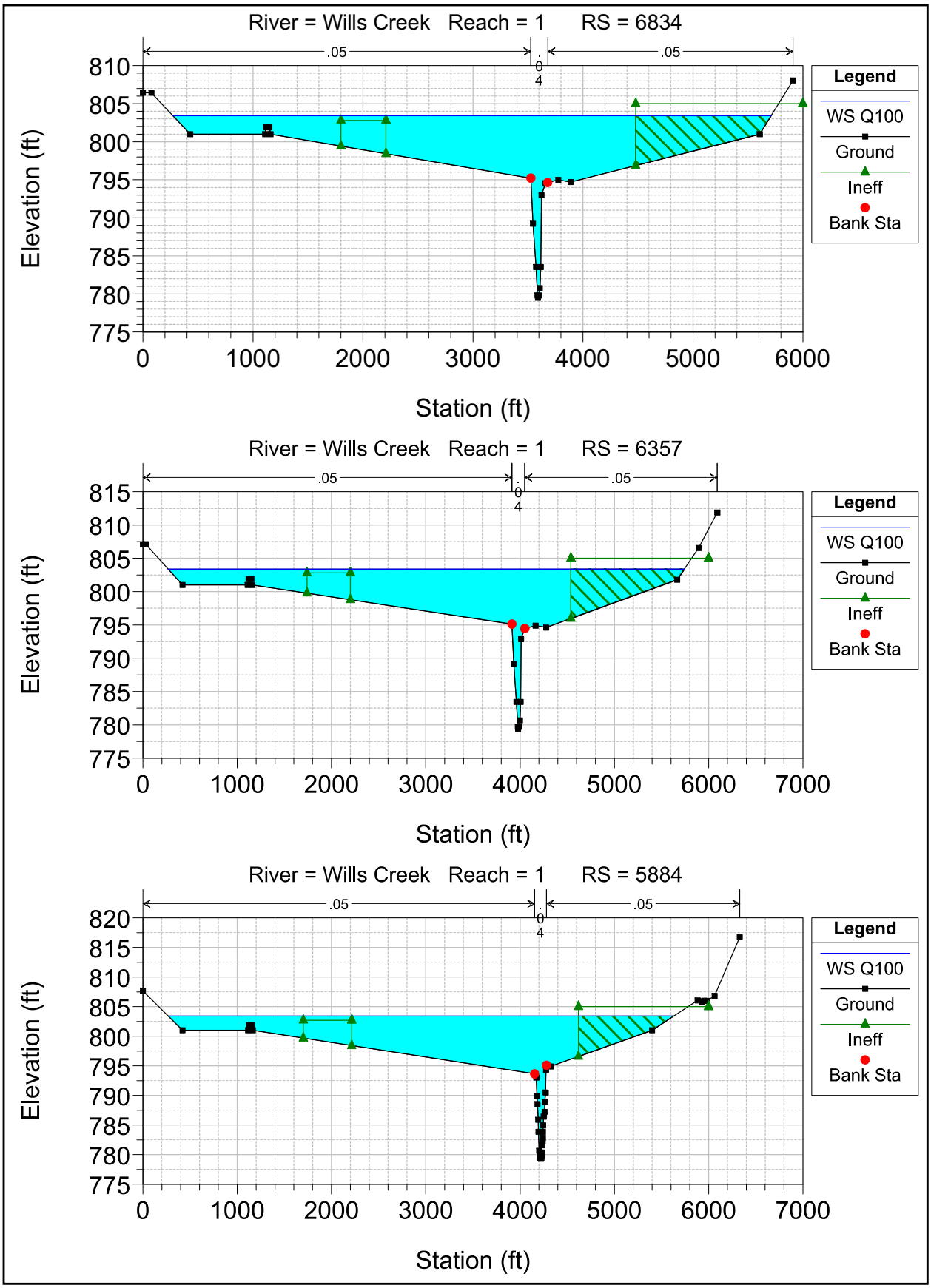
800
790
780
0
1000
2000
3000
4000
5000
6000
7000
8000
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta
River = Wills Creek Reach = 1 RS = 8977
.05
.04
.05
Elevation (ft)
830
820
810
800
790
780
0
1000
2000
3000
4000
5000
6000
7000
8000
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta
River = Wills Creek Reach = 1 RS = 8634
.05
.04
.05
Elevation (ft)
820
810
800
790
780
770
0
1000
2000
3000
4000
5000
6000
7000
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta


River = Wills Creek Reach = 1 RS = 8236
.05
.04
.05
Legend
WS Q100
Ground
Ineff
Bank Sta
Elevation (ft)
815
810
805
800
795
790
785
780
775
0
1000
2000
3000
4000
5000
6000
7000
Station (ft)
River = Wills Creek Reach = 1 RS = 7764
.05
.04
.05
Legend
WS Q100
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
River = Wills Creek Reach = 1 RS = 7295
.05
.04
.05
Legend
WS Q100
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


River = Wills Creek Reach = 1 RS = 6834
.05
.04
.05
Elevation (ft)
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta
River = Wills Creek Reach = 1 RS = 6357
.05
.04
.05
Elevation (ft)
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta
River = Wills Creek Reach = 1 RS = 5884
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.04
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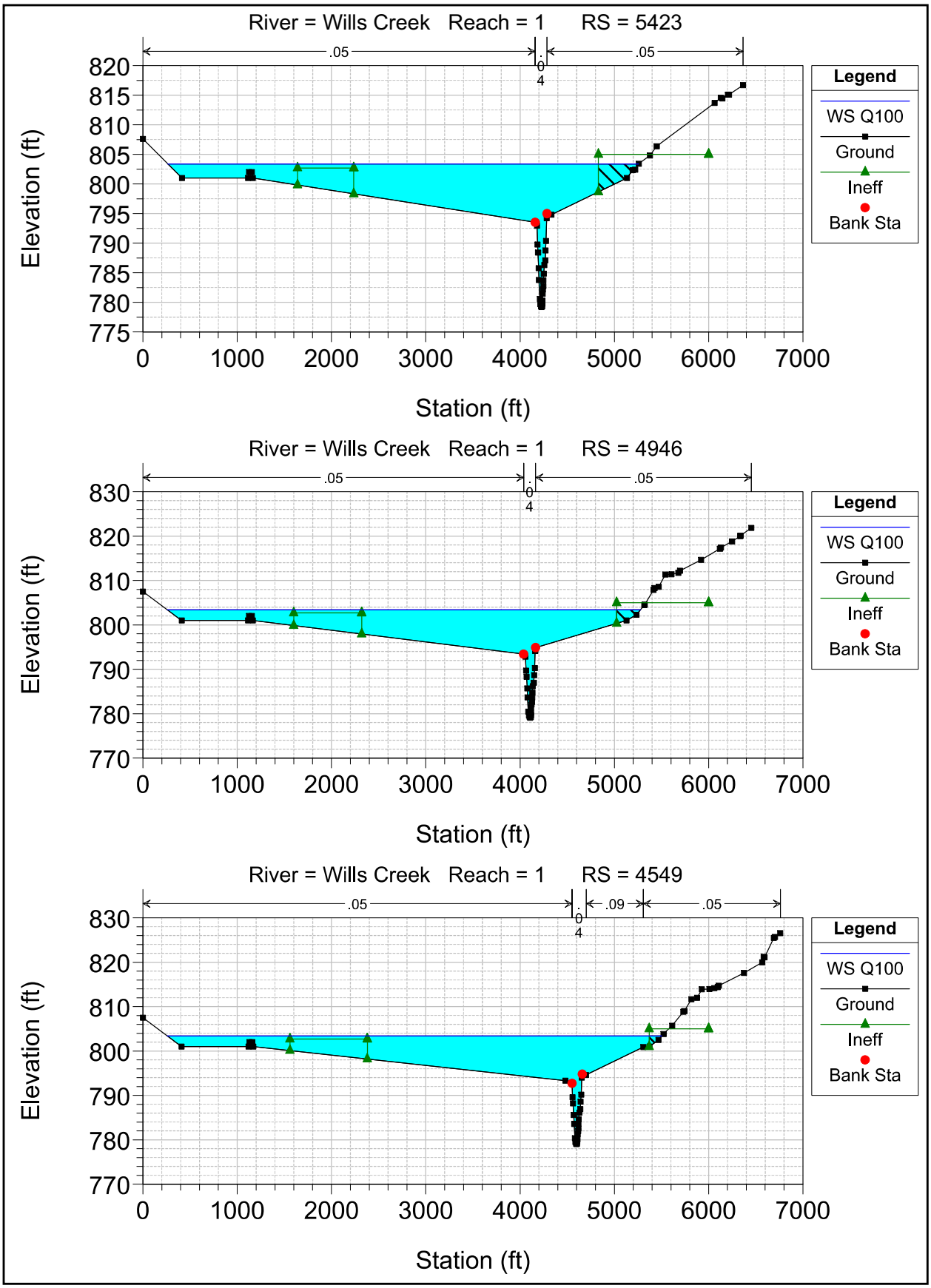
Elevation (ft)
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta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Elevation (ft)
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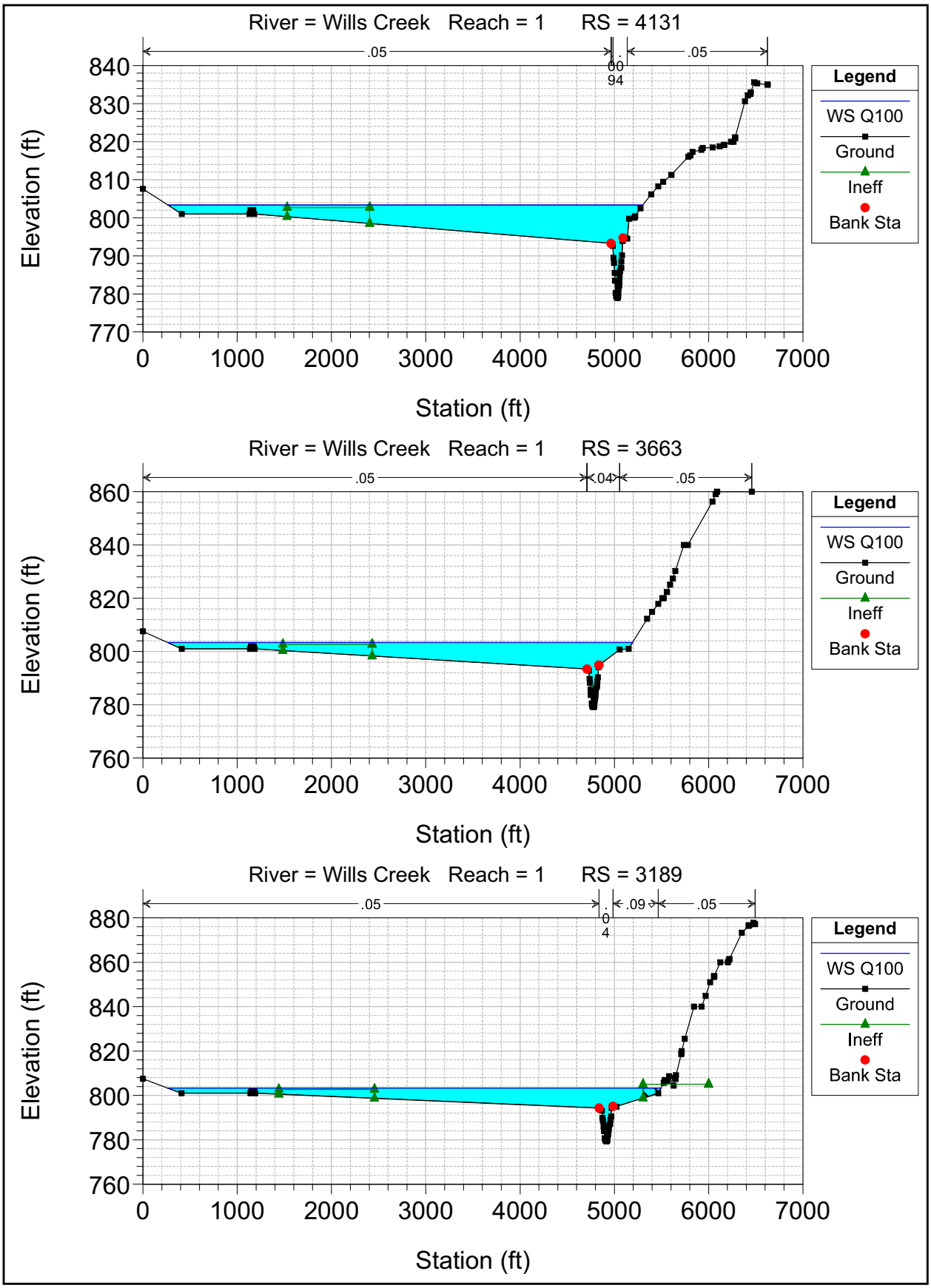
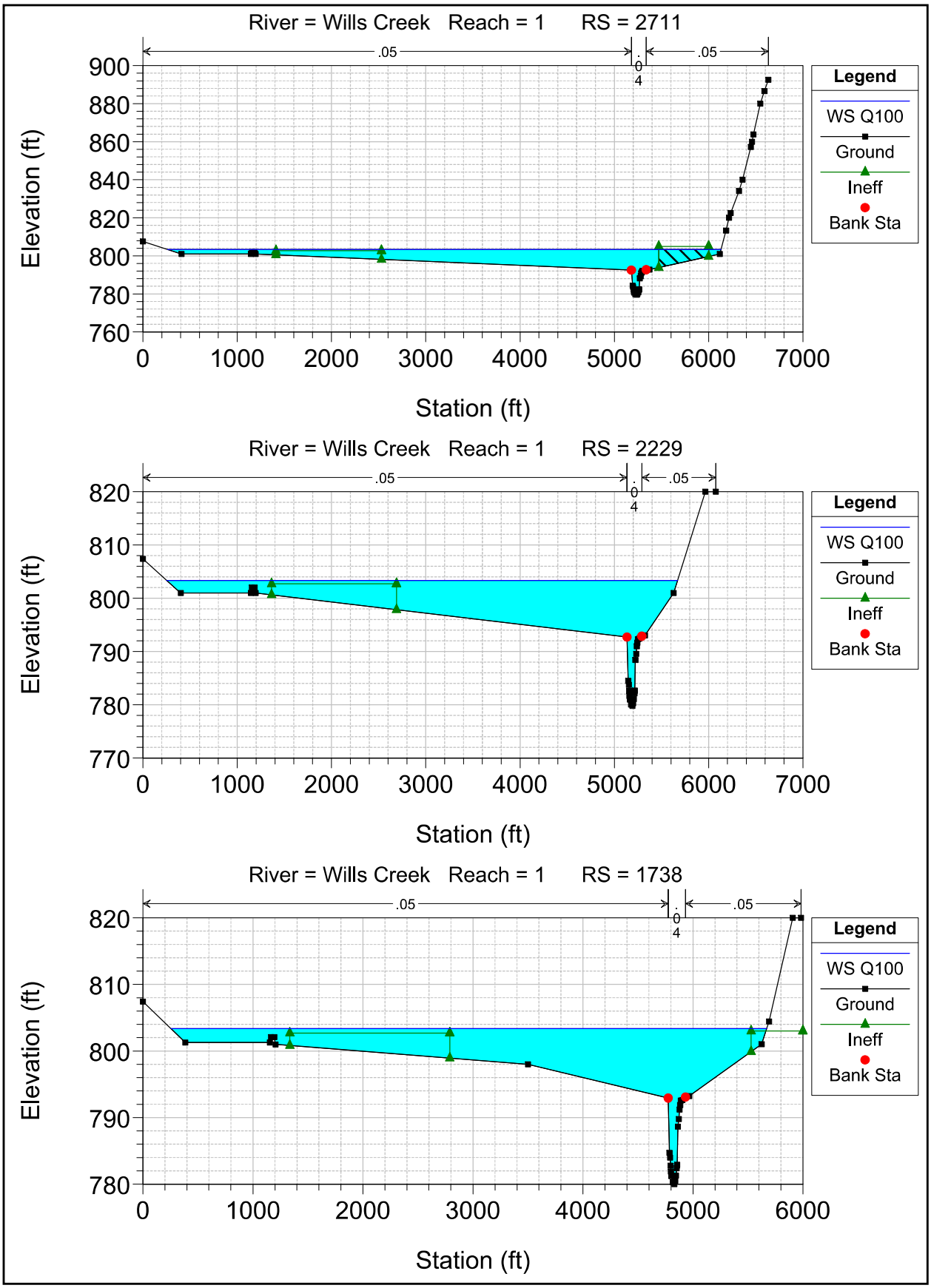
790
785
780
775
0
1000
2000
3000
4000
5000
6000
7000
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta
River = Wills Creek Reach = 1 RS = 4946
.05
.04
.05
Elevation (ft)
830
820
810
800
790
780
770
0
1000
2000
3000
4000
5000
6000
7000
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta
River = Wills Creek Reach = 1 RS = 4549
.05
.04
.09
.05
Elevation (ft)
830
820
810
800
790
780
770
0
1000
2000
3000
4000
5000
6000
7000
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta


River = Wills Creek Reach = 1 RS = 4131
.05
.00
94
.05
Elevation (ft)
840
830
820
810
800
790
780
770
0
1000
2000
3000
4000
5000
6000
7000
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta
River = Wills Creek Reach = 1 RS = 3663
.05
.04
.05
Elevation (ft)
860
840
820
800
780
760
0
1000
2000
3000
4000
5000
6000
7000
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta
River = Wills Creek Reach = 1 RS = 3189
.05
.0
4
.09
.05
Elevation (ft)
880
860
840
820
800
780
760
0
1000
2000
3000
4000
5000
6000
7000
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta


River = Wills Creek Reach = 1 RS = 2711
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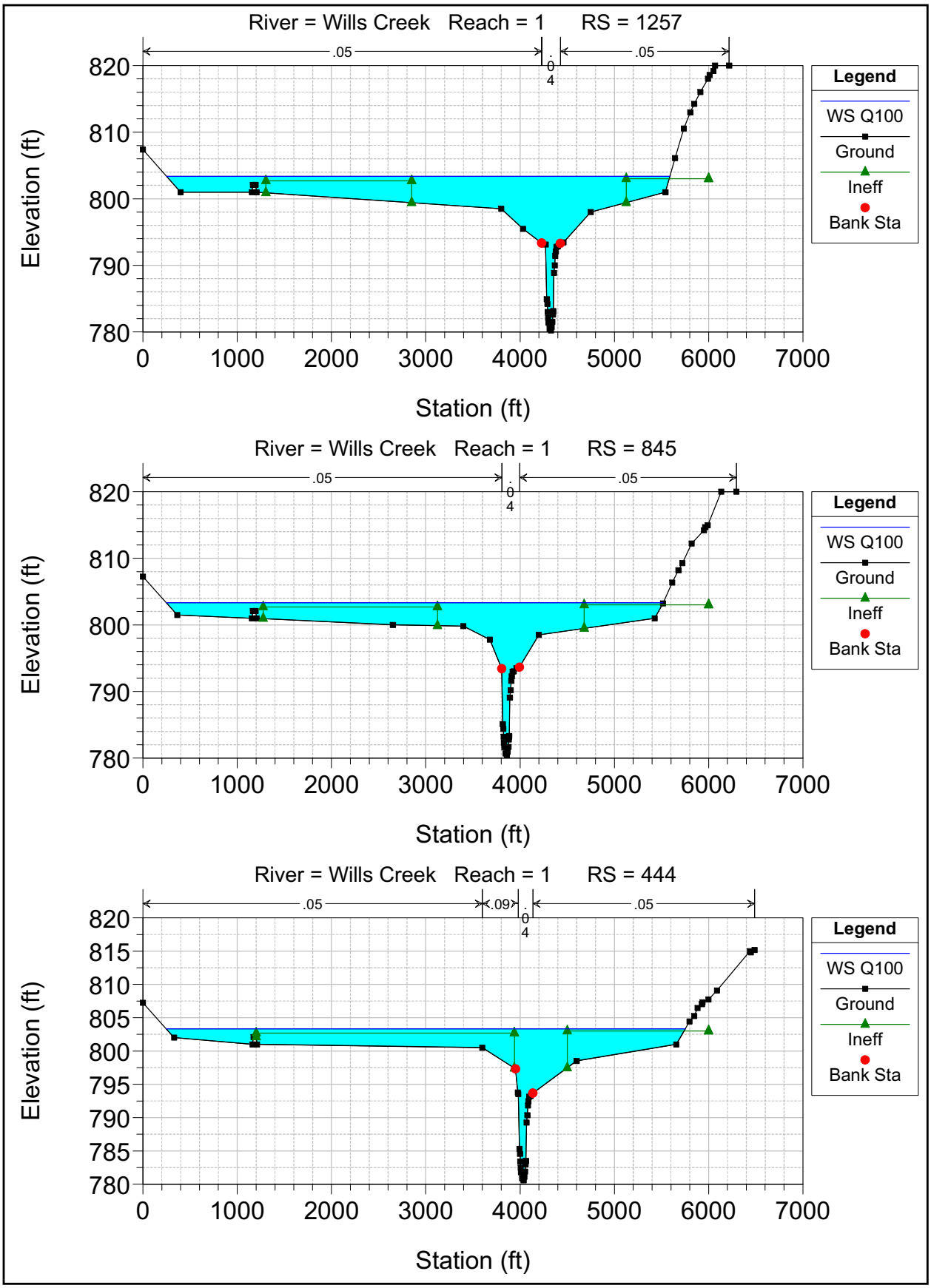
.05
.04
Elevation (ft)
900
880
860
840
820
800
780
760
0
1000
2000
3000
4000
5000
6000
7000
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta
River = Wills Creek Reach = 1 RS = 2229
.05
.05
.04
Elevation (ft)
820
810
800
790
780
770
0
1000
2000
3000
4000
5000
6000
7000
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta
River = Wills Creek Reach = 1 RS = 1738
.05
.05
.04
Elevation (ft)
820
810
800
790
780
0
1000
2000
3000
4000
5000
6000
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta


River = Wills Creek Reach = 1 RS = 1257
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.04
.05
Elevation (ft)
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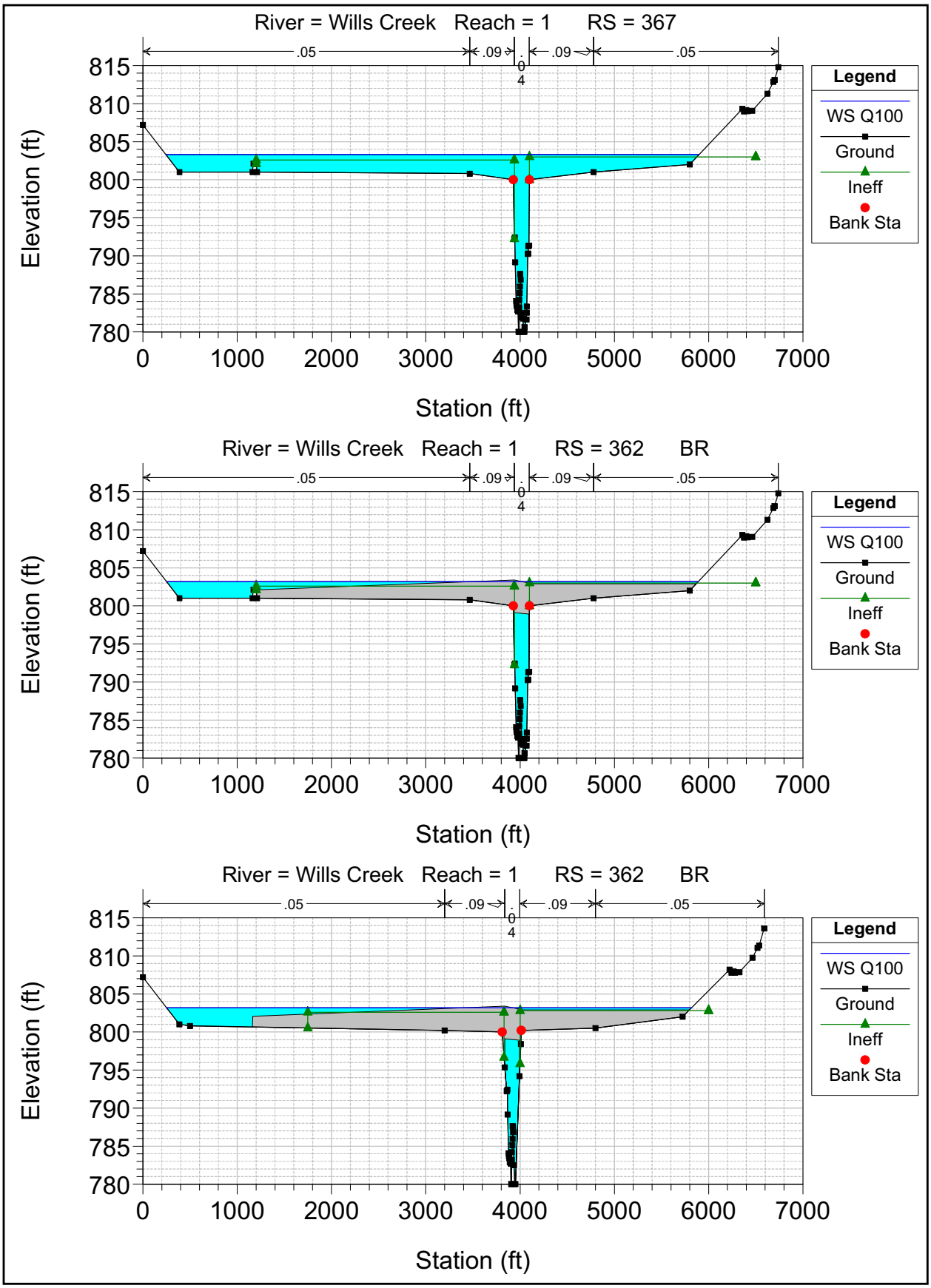
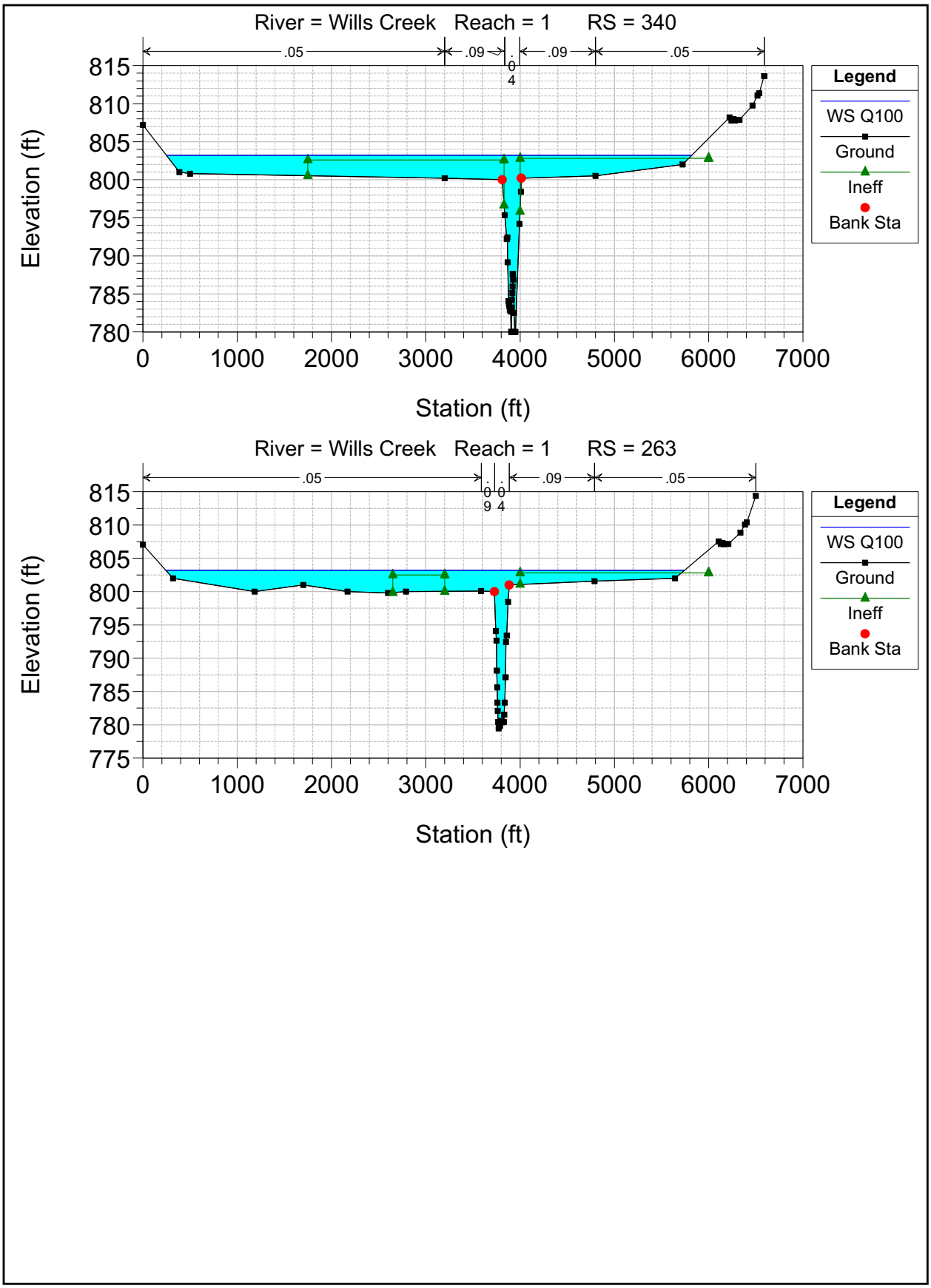
810
800
790
780
0
1000
2000
3000
4000
5000
6000
7000
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta
River = Wills Creek Reach = 1 RS = 845
.05
.04
.05
Elevation (ft)
820
810
800
790
780
0
1000
2000
3000
4000
5000
6000
7000
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta
River = Wills Creek Reach = 1 RS = 444
.05
.09
.04
.05
Elevation (ft)
820
815
810
805
800
795
790
785
780
0
1000
2000
3000
4000
5000
6000
7000
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta


River = Wills Creek Reach = 1 RS = 367
.05
.09
.04
.09
.05
Elevation (ft)
815
810
805
800
795
790
785
780
0
1000
2000
3000
4000
5000
6000
7000
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta
River = Wills Creek Reach = 1 RS = 362 BR
.05
.09
.04
.09
.05
Elevation (ft)
815
810
805
800
795
790
785
780
0
1000
2000
3000
4000
5000
6000
7000
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta
River = Wills Creek Reach = 1 RS = 362 BR
.05
.09
.04
.09
.05
Elevation (ft)
815
810
805
800
795
790
785
780
0
1000
2000
3000
4000
5000
6000
7000
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta


River = Wills Creek Reach = 1 RS = 340
.05
.09
.04
.09
.05
Elevation (ft)
815
810
805
800
795
790
785
780
0
1000
2000
3000
4000
5000
6000
7000
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta
River = Wills Creek Reach = 1 RS = 263
.05
.09
.04
.09
.05
Elevation (ft)
815
810
805
800
795
790
785
780
775
0
1000
2000
3000
4000
5000
6000
7000
Station (ft)
Legend
WS Q100
Ground
Ineff
Bank Sta

Attachment 7.6 FEMA Model Results for Proposed Condition

HEC-RAS Plan: P02 River: Wills Creek Reach: 1 Profile: Q100

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	10014	Q100	10950.00	779.28	803.57	792.91	803.58	0.000021	0.89	24316.55	7031.41	0.04
1	9879	Q100	10950.00	779.73	803.55	789.04	803.57	0.000037	1.37	18556.77	6701.53	0.06
1	9843		Bridge									
1	9807	Q100	10950.00	779.73	803.48	789.06	803.50	0.000054	1.61	15282.68	6322.29	0.07
1	9704	Q100	10950.00	780.17	803.47	792.83	803.49	0.000059	1.54	15524.74	6101.21	0.08
1	9416	Q100	10950.00	780.10	803.47	792.76	803.48	0.000038	1.21	19642.64	6147.81	0.06
1	8977	Q100	10950.00	780.00	803.46	792.66	803.47	0.000029	1.07	20981.84	6042.94	0.05
1	8634	Q100	10950.00	779.90	803.46	792.55	803.46	0.000031	1.10	19947.78	5778.47	0.05
1	8236	Q100	10950.00	779.78	803.45	792.32	803.45	0.000023	1.04	21842.21	5559.00	0.05
1	7764	Q100	10950.00	779.71	803.44	792.36	803.44	0.000028	1.07	20066.80	5418.08	0.05
1	7295	Q100	10950.00	779.61	803.43	792.27	803.44	0.000031	1.12	19318.77	5386.95	0.05
1	6834	Q100	10950.00	779.50	803.42	792.06	803.42	0.000021	1.01	21932.45	5413.30	0.05
1	6357	Q100	10950.00	779.40	803.41	791.96	803.42	0.000023	1.08	21616.04	5452.11	0.05
1	5884	Q100	10950.00	779.30	803.40	791.59	803.41	0.000015	0.93	24826.07	5337.82	0.04
1	5423	Q100	10950.00	779.20	803.40	791.50	803.40	0.000014	0.90	26079.54	4969.55	0.04
1	4946	Q100	10950.00	779.10	803.39	791.39	803.40	0.000014	0.89	26733.58	4992.70	0.04
1	4549	Q100	10950.00	779.01	803.39	791.31	803.39	0.000014	0.93	27621.11	5061.33	0.04
1	4131	Q100	10950.00	778.91	803.39	791.22	803.39	0.000014	0.87	26380.56	4747.48	0.04
1	3663	Q100	10950.00	779.12	803.38	791.41	803.39	0.000020	1.07	22279.71	4338.16	0.05
1	3189	Q100	10950.00	779.34	803.38	791.65	803.38	0.000022	1.07	22745.82	4627.03	0.05
1	2711	Q100	10950.00	779.55	803.38	790.18	803.38	0.000011	0.79	28141.23	5291.53	0.03
1	2229	Q100	10950.00	779.77	803.37	790.40	803.38	0.000011	0.78	28340.24	4857.06	0.03
1	1738	Q100	10950.00	780.00	803.37	790.64	803.37	0.000017	0.96	24453.45	4859.33	0.04
1	1257	Q100	10950.00	780.21	803.36	790.84	803.37	0.000028	1.18	20259.59	4734.37	0.05
1	845	Q100	10950.00	780.40	803.34	791.05	803.36	0.000046	1.50	17123.28	4796.01	0.07
1	700	Q100	10950.00	780.46	803.34		803.35	0.000049	1.53	16300.39	4757.86	0.07
1	444	Q100	10950.00	780.59	803.33	791.23	803.34	0.000041	1.38	19338.01	5506.13	0.06
1	367	Q100	10950.00	780.00	803.30	788.94	803.33	0.000082	1.84	15679.27	5655.25	0.08
1	362		Bridge									
1	340	Q100	10950.00	780.00	803.22	790.54	803.24	0.000092	1.54	16706.08	5574.10	0.07
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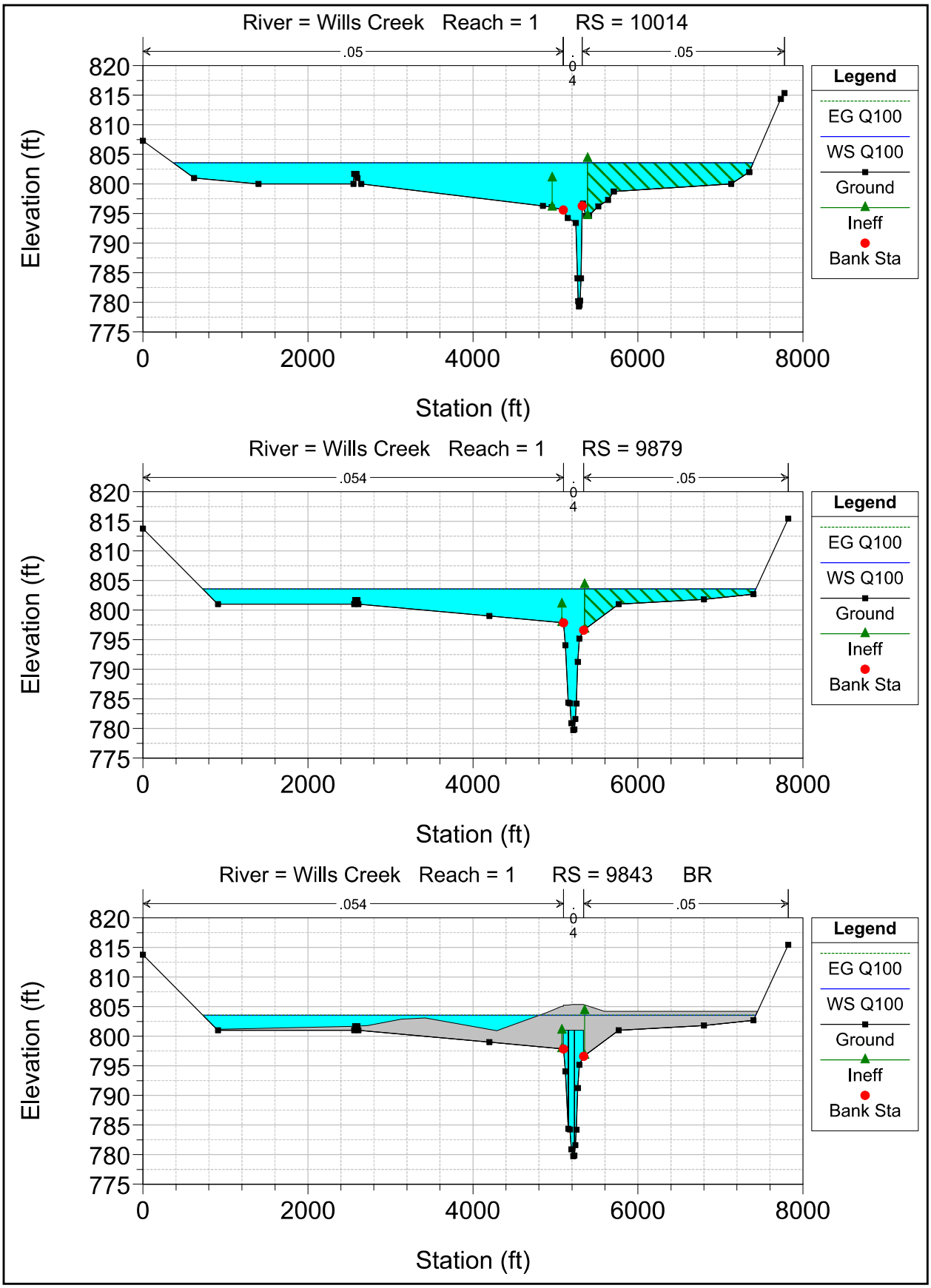
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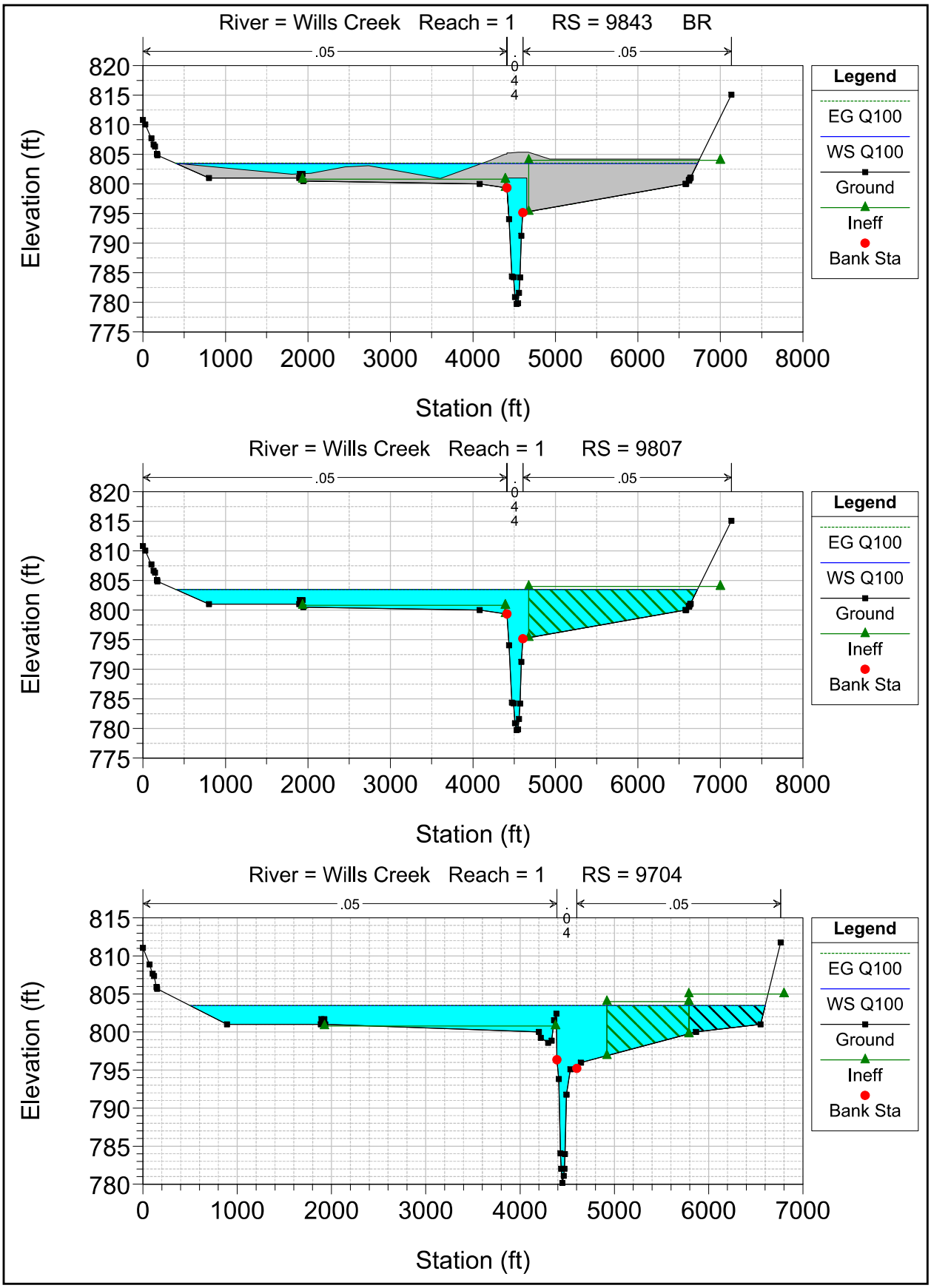
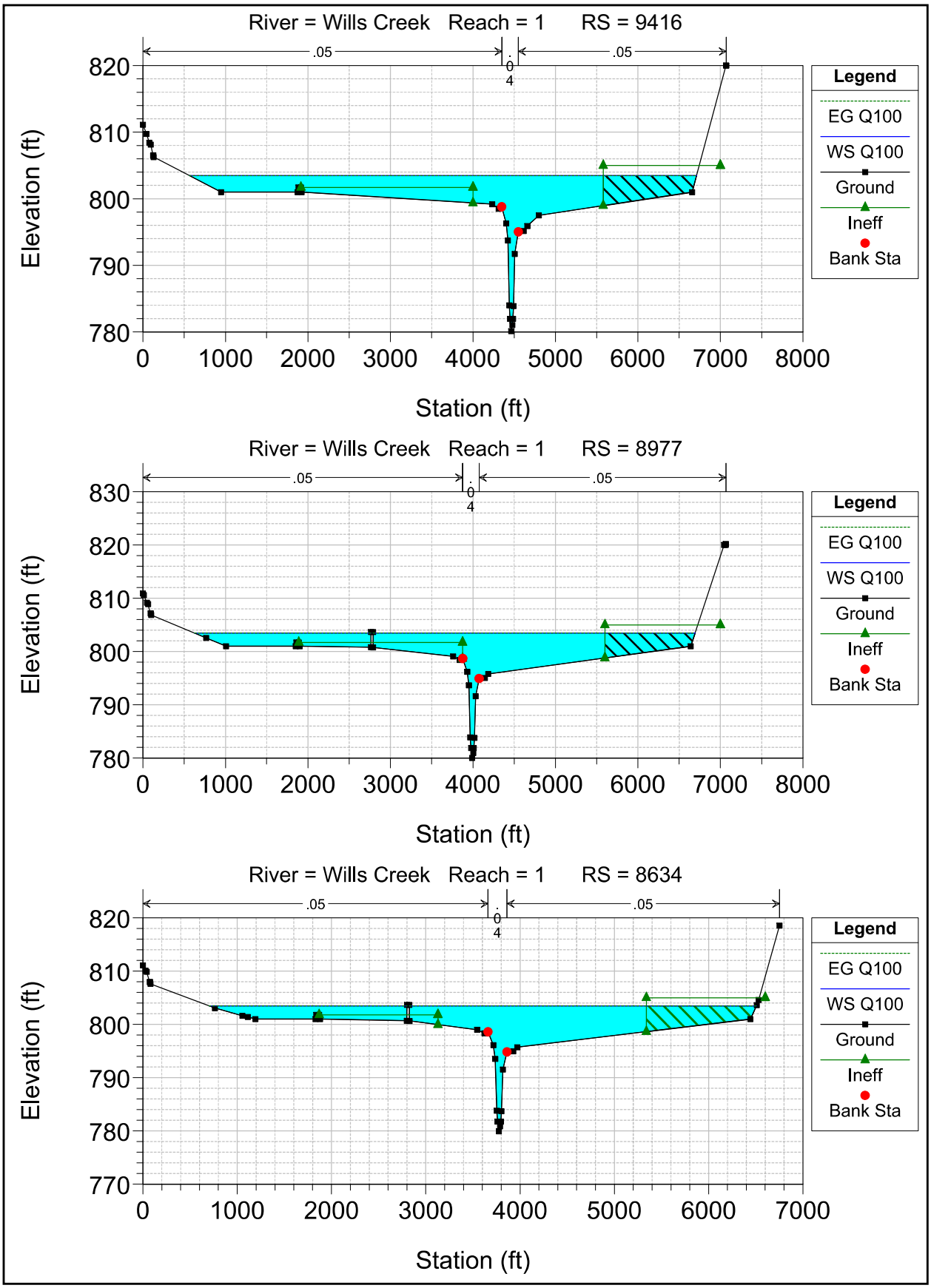
.05
.04
.05
Elevation (ft)
820
815
810
805
800
795
790
785
780
775
0
2000
4000
6000
8000
Station (ft)
Legend
EG Q100
WS Q100
Ground
Ineff
Bank Sta
River = Wills Creek Reach = 1 RS = 9879
.054
.04
.05
Elevation (ft)
Station (ft)
Legend
EG Q100
WS Q100
Ground
Ineff
Bank Sta
River = Wills Creek Reach = 1 RS = 9843 BR
.054
.04
.05
Elevation (ft)
Station (ft)
Legend
EG Q100
WS Q100
Ground
Ineff
Bank Sta


River = Wills Creek Reach = 1 RS = 9843 BR
.05
.05
.044
Elevation (ft)
820
815
810
805
800
795
790
785
780
775
0
1000
2000
3000
4000
5000
6000
7000
8000
Station (ft)
Legend
EG Q100
WS Q100
Ground
Ineff
Bank Sta
River = Wills Creek Reach = 1 RS = 9807
.05
.05
.044
Elevation (ft)
820
815
810
805
800
795
790
785
780
775
0
1000
2000
3000
4000
5000
6000
7000
8000
Station (ft)
Legend
EG Q100
WS Q100
Ground
Ineff
Bank Sta
River = Wills Creek Reach = 1 RS = 9704
.05
.05
.04
Elevation (ft)
815
810
805
800
795
790
785
780
0
1000
2000
3000
4000
5000
6000
7000
Station (ft)
Legend
EG Q100
WS Q100
Ground
Ineff
Bank Sta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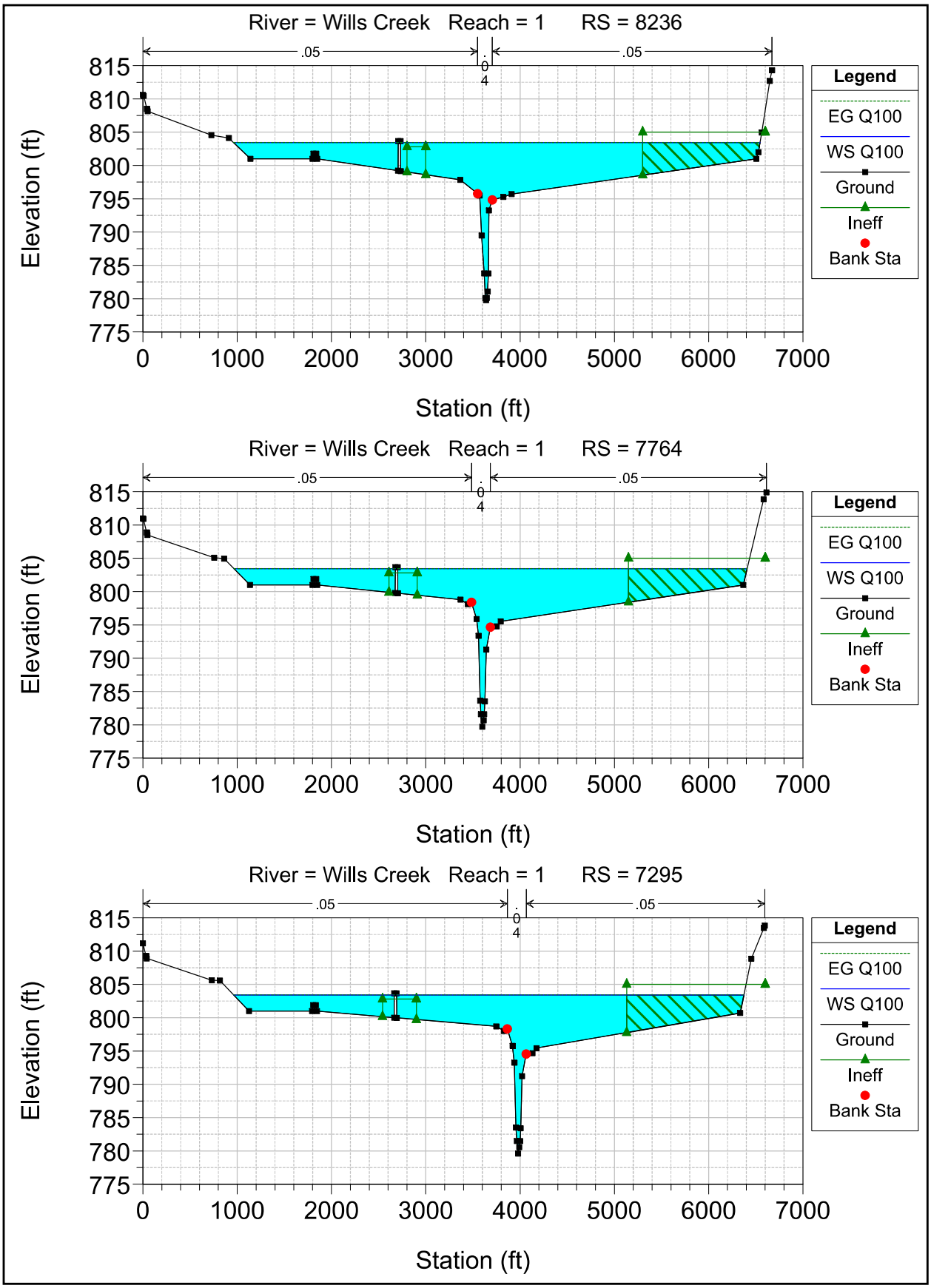
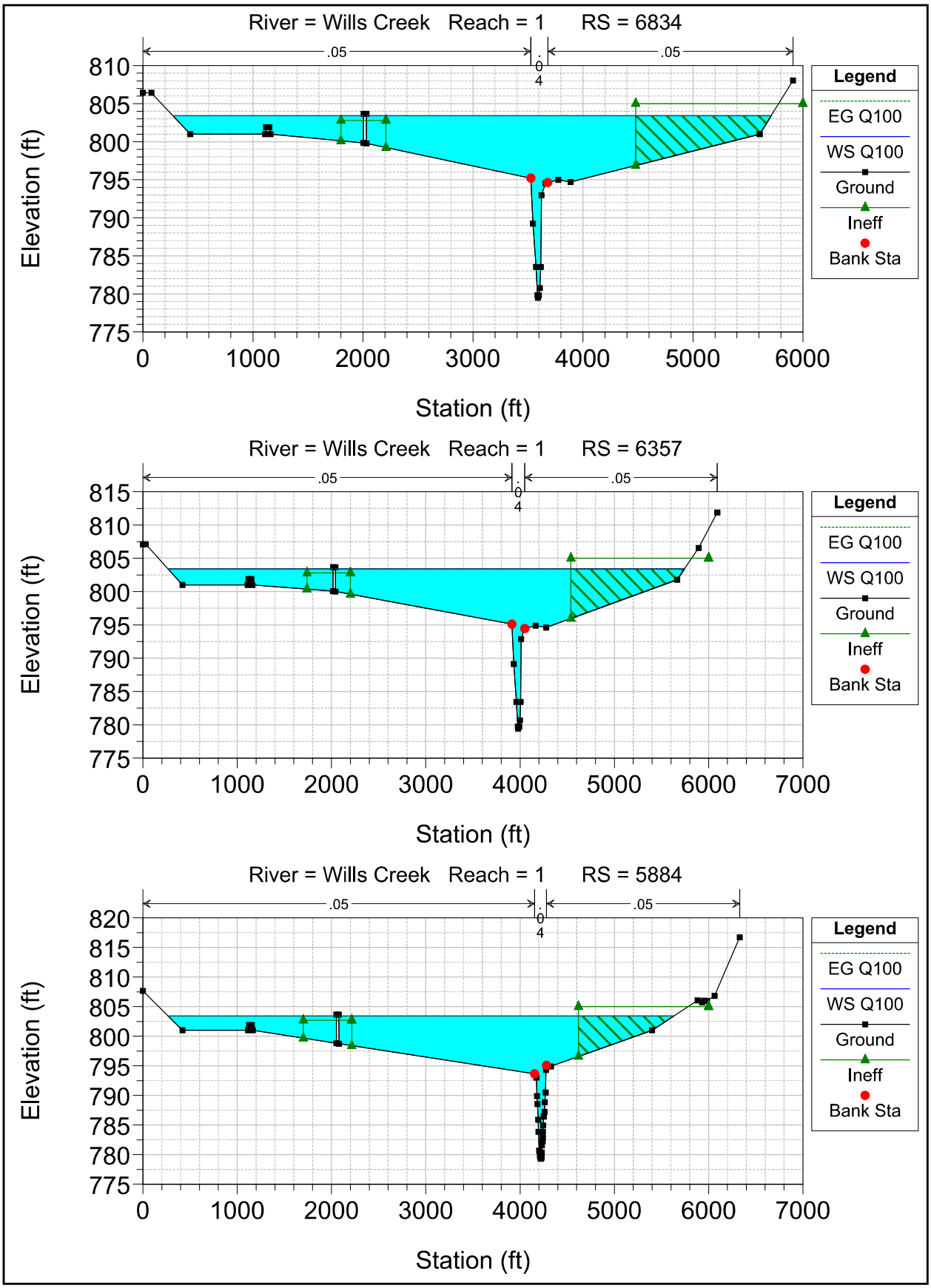
.05
.04
.05
Elevation (ft)
820
810
800
790
780
0
1000
2000
3000
4000
5000
6000
7000
8000
Station (ft)
Legend
EG Q100
WS Q100
Ground
Ineff
Bank Sta
River = Wills Creek Reach = 1 RS = 8977
.05
.04
.05
Elevation (ft)
830
820
810
800
790
780
0
1000
2000
3000
4000
5000
6000
7000
8000
Station (ft)
Legend
EG Q100
WS Q100
Ground
Ineff
Bank Sta
River = Wills Creek Reach = 1 RS = 8634
.05
.04
.05
Elevation (ft)
820
810
800
790
780
770
0
1000
2000
3000
4000
5000
6000
7000
Station (ft)
Legend
EG Q100
WS Q100
Ground
Ineff
Bank Sta


River = Wills Creek Reach = 1 RS = 8236
.05
.04
.05
Elevation (ft)
815
810
805
800
795
790
785
780
775
0
1000
2000
3000
4000
5000
6000
7000
Station (ft)
Legend
EG Q100
WS Q100
Ground
Ineff
Bank Sta
River = Wills Creek Reach = 1 RS = 7764
.05
.04
.05
Elevation (ft)
Station (ft)
Legend
EG Q100
WS Q100
Ground
Ineff
Bank Sta
River = Wills Creek Reach = 1 RS = 7295
.05
.04
.05
Elevation (ft)
Station (ft)
Legend
EG Q100
WS Q100
Ground
Ineff
Bank Sta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.05
.04
.05
Elevation (ft)
Station (ft)
Legend
EG Q100
WS Q100
Ground
Ineff
Bank Sta
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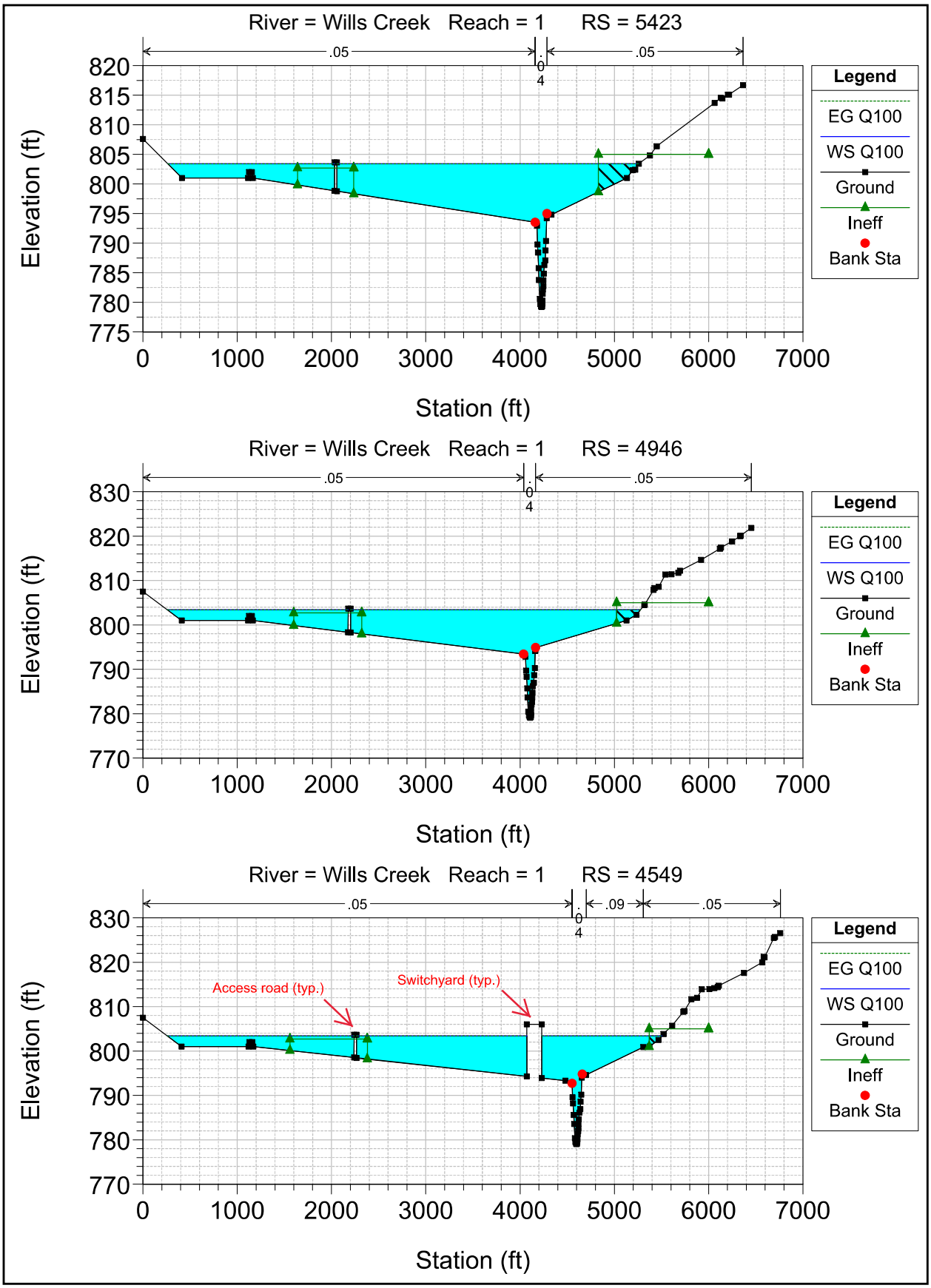
River = Wills Creek Reach = 1 RS = 5884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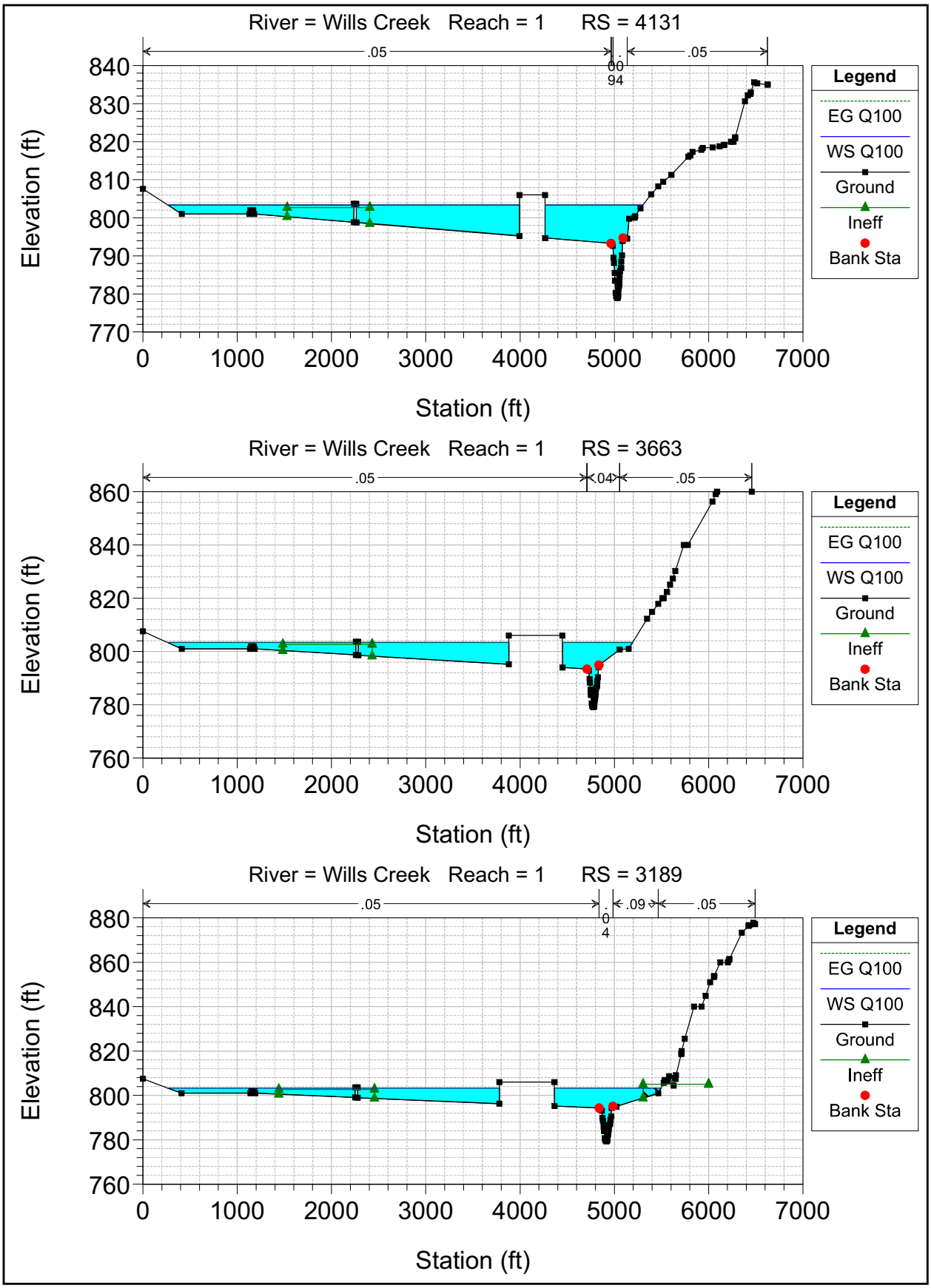
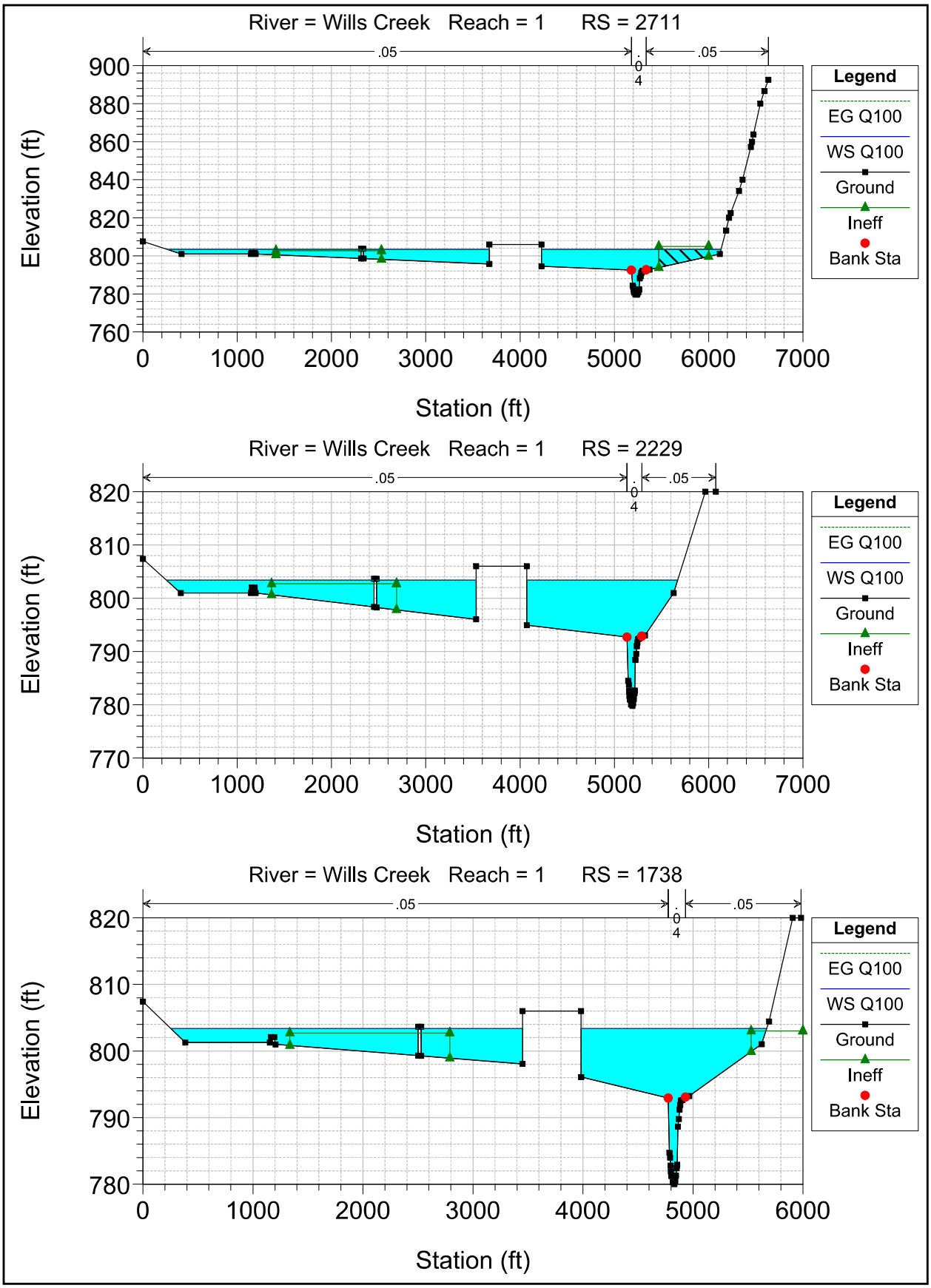
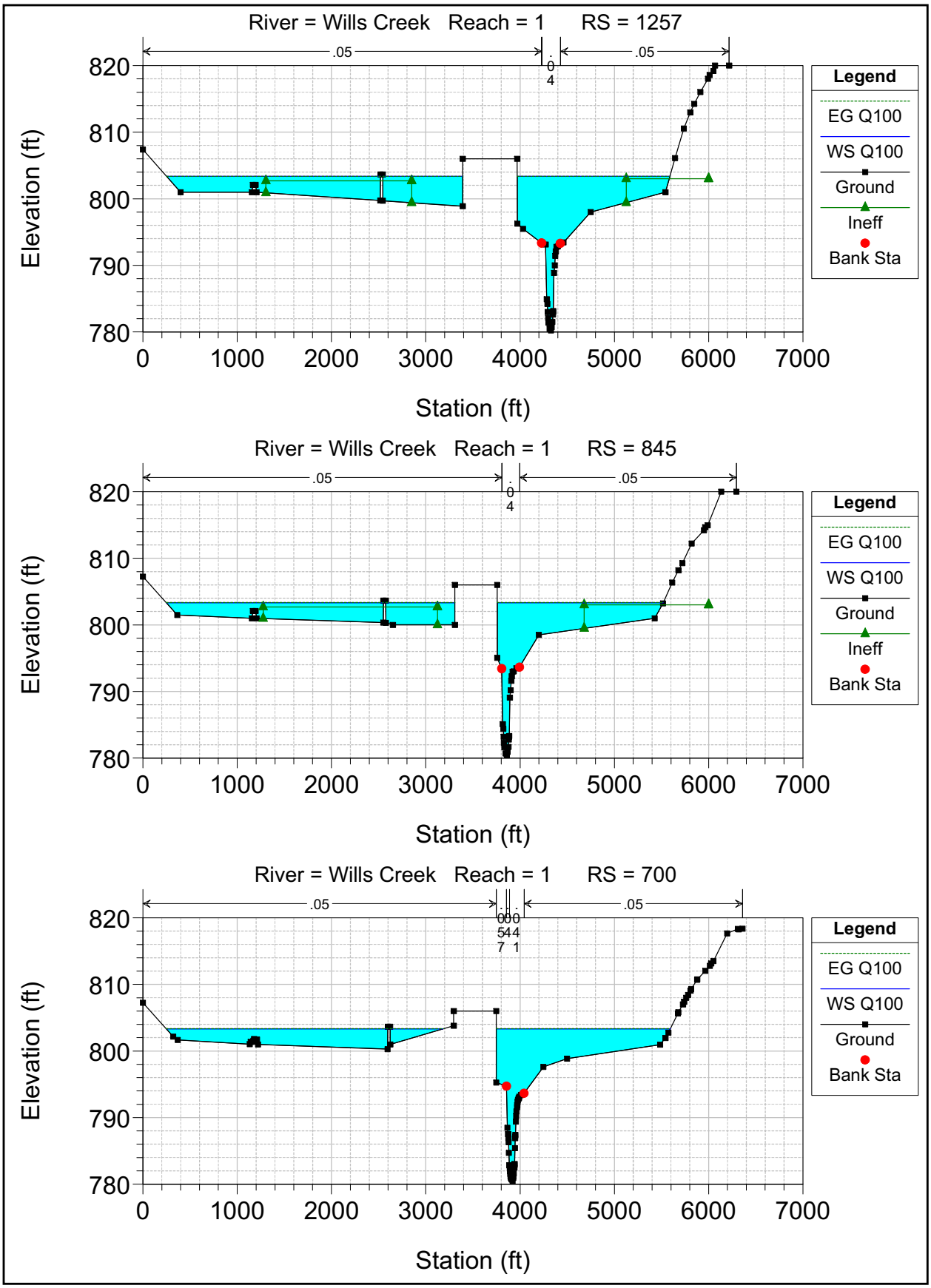
.05
.05
.04
Elevation (ft)
820
815
810
805
800
795
790
785
780
775
0
1000
2000
3000
4000
5000
6000
7000
Station (ft)
Legend
EG Q100
WS Q100
Ground
Ineff
Bank Sta
River = Wills Creek Reach = 1 RS = 4946
.05
.05
.04
Elevation (ft)
830
820
810
800
790
780
770
0
1000
2000
3000
4000
5000
6000
7000
Station (ft)
Legend
EG Q100
WS Q100
Ground
Ineff
Bank Sta
River = Wills Creek Reach = 1 RS = 4549
.05
.09
.05
.04
Access road (typ.)
Switchyard (typ.)
Elevation (ft)
830
820
810
800
790
780
770
0
1000
2000
3000
4000
5000
6000
7000
Station (ft)
Legend
EG Q100
WS Q100
Ground
Ineff
Bank Sta


River = Wills Creek Reach = 1 RS = 4131
.05
.00
94
.05
Elevation (ft)
840
830
820
810
800
790
780
770
0
1000
2000
3000
4000
5000
6000
7000
Station (ft)
Legend
EG Q100
WS Q100
Ground
Ineff
Bank Sta
River = Wills Creek Reach = 1 RS = 3663
.05
.04
.05
Elevation (ft)
860
840
820
800
780
760
0
1000
2000
3000
4000
5000
6000
7000
Station (ft)
Legend
EG Q100
WS Q100
Ground
Ineff
Bank Sta
River = Wills Creek Reach = 1 RS = 3189
.05
.0
4
.09
.05
Elevation (ft)
880
860
840
820
800
780
760
0
1000
2000
3000
4000
5000
6000
7000
Station (ft)
Legend
EG Q100
WS Q100
Ground
Ineff
Bank Sta


River = Wills Creek Reach = 1 RS = 2711
.05
.04
.05
Elevation (ft)
900
880
860
840
820
800
780
760
0
1000
2000
3000
4000
5000
6000
7000
Station (ft)
Legend
EG Q100
WS Q100
Ground
Ineff
Bank Sta
River = Wills Creek Reach = 1 RS = 2229
.05
.04
.05
Elevation (ft)
820
810
800
790
780
770
0
1000
2000
3000
4000
5000
6000
7000
Station (ft)
Legend
EG Q100
WS Q100
Ground
Ineff
Bank Sta
River = Wills Creek Reach = 1 RS = 1738
.05
.04
.05
Elevation (ft)
820
810
800
790
780
0
1000
2000
3000
4000
5000
6000
Station (ft)
Legend
EG Q100
WS Q100
Ground
Ineff
Bank Sta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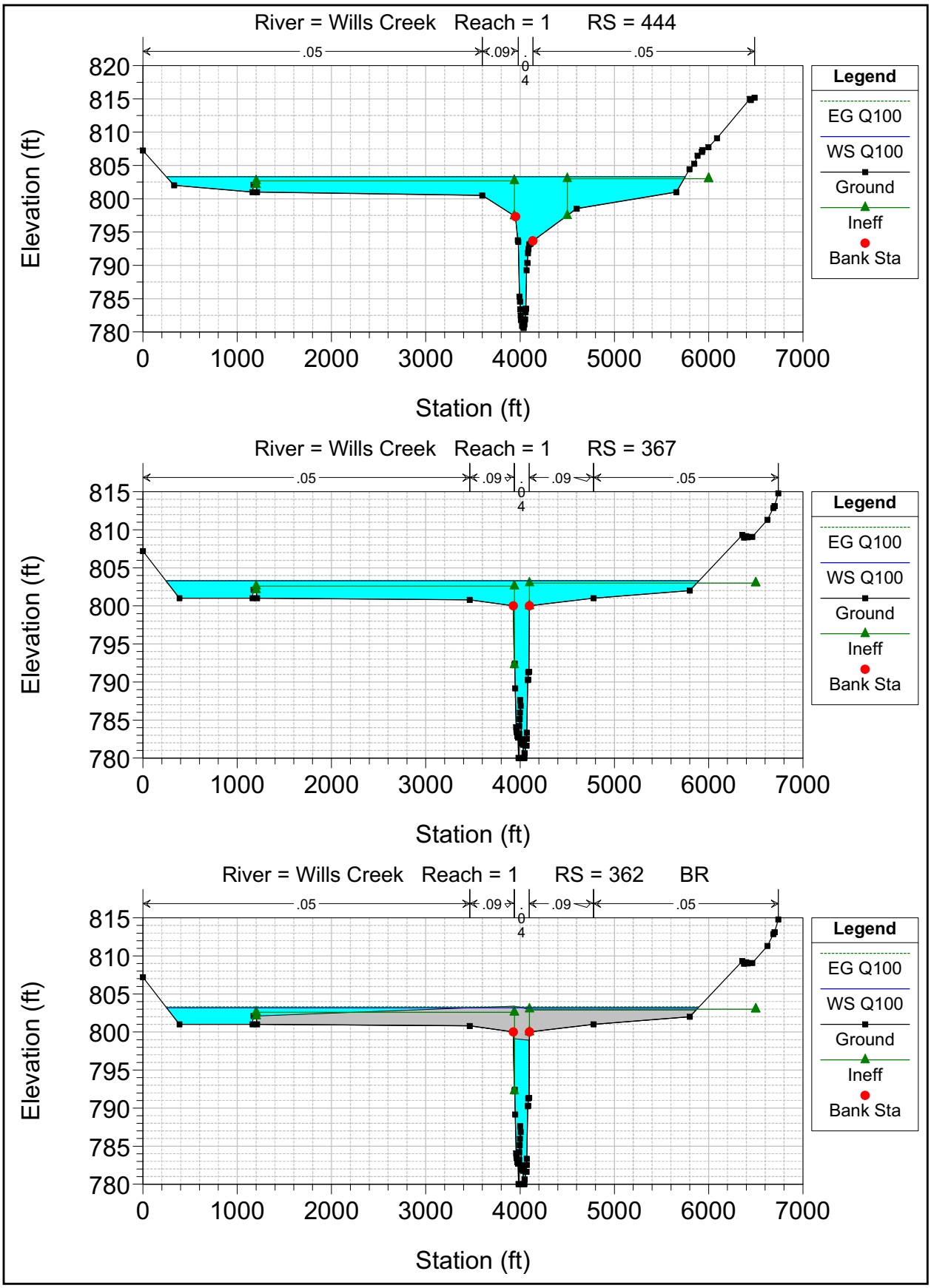
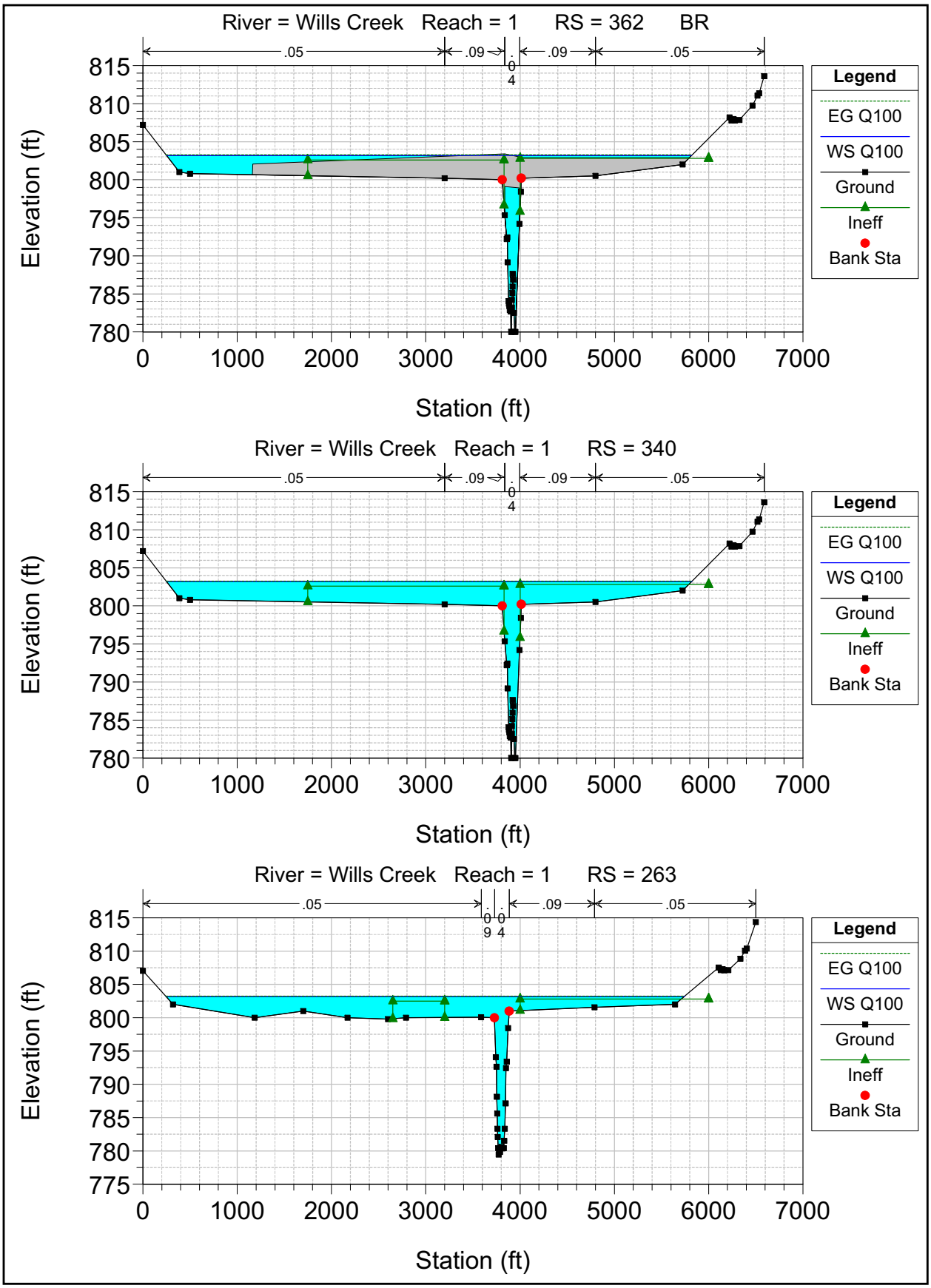
.05
.04
.05
Elevation (ft)
820
810
800
790
780
0
1000
2000
3000
4000
5000
6000
7000
Station (ft)
Legend
EG Q100
WS Q100
Ground
Ineff
Bank Sta
River = Wills Creek Reach = 1 RS = 845
.05
.04
.05
Elevation (ft)
820
810
800
790
780
0
1000
2000
3000
4000
5000
6000
7000
Station (ft)
Legend
EG Q100
WS Q100
Ground
Ineff
Bank Sta
River = Wills Creek Reach = 1 RS = 700
.05
.05
Elevation (ft)
820
810
800
790
780
0
1000
2000
3000
4000
5000
6000
7000
Station (ft)
Legend
EG Q100
WS Q100
Ground
Bank Sta


River = Wills Creek Reach = 1 RS = 444
.05
.09
.04
.05
Elevation (ft)
820
815
810
805
800
795
790
785
780
0
1000
2000
3000
4000
5000
6000
7000
Station (ft)
Legend
EG Q100
WS Q100
Ground
Ineff
Bank Sta
River = Wills Creek Reach = 1 RS = 367
.05
.09
.04
.09
.05
Elevation (ft)
815
810
805
800
795
790
785
780
0
1000
2000
3000
4000
5000
6000
7000
Station (ft)
Legend
EG Q100
WS Q100
Ground
Ineff
Bank Sta
River = Wills Creek Reach = 1 RS = 362 BR
.05
.09
.04
.09
.05
Elevation (ft)
815
810
805
800
795
790
785
780
0
1000
2000
3000
4000
5000
6000
7000
Station (ft)
Legend
EG Q100
WS Q100
Ground
Ineff
Bank Sta


River = Wills Creek Reach = 1 RS = 362 BR
.05
.09
.04
.09
.05
Elevation (ft)
815
810
805
800
795
790
785
780
0
1000
2000
3000
4000
5000
6000
7000
Station (ft)
Legend
EG Q100
WS Q100
Ground
Ineff
Bank Sta
River = Wills Creek Reach = 1 RS = 340
.05
.09
.04
.09
.05
Elevation (ft)
815
810
805
800
795
790
785
780
0
1000
2000
3000
4000
5000
6000
7000
Station (ft)
Legend
EG Q100
WS Q100
Ground
Ineff
Bank Sta
River = Wills Creek Reach = 1 RS = 263
.05
.09
.04
.09
.05
Elevation (ft)
815
810
805
800
795
790
785
780
775
0
1000
2000
3000
4000
5000
6000
7000
Station (ft)
Legend
EG Q100
WS Q100
Ground
Ineff
Bank Sta

Attachment D –
Updated Wetland Mitigation Credit Reservation Agreement

- Reservation Agreement
- Updated Application Pages

Reservation Agreement

The Nature Conservancy in Ohio
6375 Riverside Drive, Suite 100
Dublin, OH 43017-5045

Office: (614)717-2770
www.nature.org/ohio

Ohio Stream and Wetland In-Lieu Fee Mitigation Program

LETTER OF CREDIT AVAILABILTY AND RESERVATION

February 14, 2022

Lynn Gresock
Haley & Aldrich, Inc.
3 Bedford Farms Drive
Bedford, NH 03110

Re: Guernsey Power Station

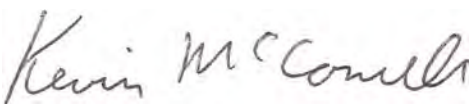
Dear Lynn:

This letter confirms that The Nature Conservancy has wetland mitigation credits available for Guernsey Power Station LLC. to purchase in the 05040005 8-digit HUC watershed (Wills Creek). TNC will reserve 2 forested wetland credits for the Purchaser in this watershed at a cost of $51,000 per credit, for a period of 90 days from the date of this letter specifically for Guernsey Power Station project. After that time, the Purchaser may request an extension of this reservation, but there is no guarantee of availability beyond this date. If TNC approves the extension, a new Letter of Credit Availability and Reservation will be issued.

This letter does not document payment for impacts. The Conservancy does not assume liability for the above mentioned impacts through this correspondence.

When the applicant is ready to submit payment for the above-mentioned credits, please submit the completed Final Credit Request Form and Conflict of Interest Disclosure Form, along with the payment written out to "Ohio Water Development Authority". Mail both the forms and the check to the Ohio Water Development Authority, Attn: Meg Cline, P.O. Box 73514, Cleveland, OH 44193; and email scanned copies to dschenk@tnc.org.

Sincerely,



Kevin McConnell
Finance Manager

Updated Application Pages

- Chippewa North
- Red Stone Farm Mitigation Bank

Emails stating that no credits were available to meet Project needs at this time were received from all inquiries except Chippewa North and Tuscarawas Mitigation Bank. Several sources noted that they hoped to have additional certified credits soon. The email responses are provided in Attachment B. Given the lack of mitigation bank credits available, it was determined that ILF programs should be considered for Project mitigation.

In-Lieu Fee Mitigation

ILF programs identified through the two methods used to search the mitigation database included the Big Darby-Hellbranch ILF source managed by the Ohio Stream & Wetlands Foundation and The Nature Conservancy's Ohio Stream and Wetland In-Lieu Fee Mitigation Program.

Inquiries with the Ohio Stream & Wetland Foundation confirmed that, while their bank credits were sold out, ILF credits would be available. The specific location of its ILF credits was not known. The Natural Conservancy noted that, while they do not have wetland credits available in the Wills Creek watershed, they have wetland credit availability in the adjacent Tuscarawas watershed. They recommended consultation with Ohio EPA to confirm whether credits from this watershed would be acceptable. The email responses are provided in Attachment B.

Subsequently, Ohio EPA requested that The Nature Conservancy be reengaged to determine whether credits are available within the Wills Creek watershed. A copy of the resulting reservation agreement is provided in Attachment C.

Attachments

- Attachment A: RIBITS Mitigation Credit Search Results
- Attachment B: Outreach to Mitigation Banks and ILF Programs
- Attachment C: Reservation Agreement

Guernsey Power Station
Ohio EPA Permit No. DSW 401175544
Revision Date 25 February 2022
Rev. 1

The Nature Conservancy in Ohio
6375 Riverside Drive, Suite 100
Dublin, OH 43017-5045

Office: (614)717-2770
www.nature.org/ohio

Ohio Stream and Wetland In-Lieu Fee Mitigation Program

LETTER OF CREDIT AVAILABILTY AND RESERVATION

February 14, 2022

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Sincerely,

Kevin McConnell
Finance Manager

Attachment E –
Brent Ball Private Property Documentation

- Existing Environmental Conditions Map
- Access Road Culvert Replacement – Nationwide Permit 03 – Maintenance
- Special Flood Hazard Area Development Permit – Culvert Replacement
- Gemma Off-Site Fill Placement Plan

Existing Environmental Conditions Map

Guernsey Power Station

Existing Environmental Conditions Map

Jackson Township, Guernsey County, Ohio

CESO

Date: 09/16/2019
By: Christian King

Access Road Culvert Replacement –
Nationwide Permit 03 – Maintenance

800 Bursca Drive, Suite 804
Bridgeville, Ohio 15017
(412) 504-0687
www.cesoinc.com

December 18, 2019

Gemma Power Systems, LLC
769 Hebron Avenue
Glastonbury, CT 06033

RE: Nationwide Permit 03 – Maintenance
Guernsey Power Station
Access Road Culvert Replacement Project
Byesville, Guernsey County, Ohio

CESO, Inc. is pleased to provide Gemma Power Systems with documentation for a non-reporting Nationwide Permit 03 (NWP-03) in support of the Guernsey Power Station Access Road Culvert Replacement project. The project proposes impact to one intermittent stream for the replacement of an existing culvert in Jackson Township, Guernsey County, Ohio.

The proposed project will not impact more than 0.1 acres of waterway and is within a 401 eligible area according to the Ohio EPA.

Should you have any questions or comments please feel free to contact me at envgroup@cesoinc.com or 412.504.0668.

Sincerely,

CESO, Inc.

Sara Krampe

Sara Krampe, PWS
Environmental Project Manager

Attachments
Attachment 1: Application for Department of the Army Permit (ENG Form)

Appendices
Appendix A: Location Map
Appendix B: Aquatic Resources Impact Exhibit, Impact Summary, and Photographs of Aquatic Features Proposed for Impact
Appendix C: Minimization and Avoidance
Appendix D: Natural Resources Technical Report
Appendix E: OHPO Map

Attachment 1: Application for Department of the Army Permit (ENG Form)

U.S. Army Corps of Engineers (USACE)

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT

33 CFR 325. The proponent agency is CECW-CO-R.

Form Approved - OMB No. 0710-0003 Expires: 02-28-2022

The public reporting burden for this collection of information, OMB Control Number 0710-0003, is estimated to average 11 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or burden reduction suggestions to the Department of Defense, Washington Headquarters Services, at whs.mc-alex.esd.mbx.dd-dod-information-collections@mail.mil. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. PLEASE DO NOT RETURN YOUR APPLICATION TO THE ABOVE EMAIL

PRIVACY ACT STATEMENT

Authorities: Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413; Regulatory Programs of the Corps of Engineers; Final Rule 33 CFR 320-332. Principal Purpose: Information provided on this form will be used in evaluating the application for a permit. Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public and may be made available as part of a public notice as required by Federal law. Submission of requested information is voluntary, however, if information is not provided the permit application cannot be evaluated nor can a permit be issued. One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and/or instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned. System of Record Notice (SORN). The information received is entered into our permit tracking database and a SORN has been completed (SORN #A1145b) and may be accessed at the following website: http://dpcld.defense.gov/Privacy/SORNsIndex/DOD-wide-SORN-Article-View/Article/570115/a1145b-ce.aspx

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETE

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME	8. AUTHORIZED AGENT'S NAME AND TITLE (agent is not required)
First - Alan Middle - Last - Smithe	First - Sara Middle - Last - Krampe
Company - Gemma Power Systems, LLC	Company - CESO, Inc.
E-mail Address - alansmithe@gemmapower.com	E-mail Address - envgroup@cesoinc.com
6. APPLICANT'S ADDRESS:	9. AGENT'S ADDRESS:
Address- 769 Hebron Avenue	Address- 800 Bursca Drive, Suite 804
City - Glastonbury State - CT Zip - 06033 Country - USA	City - Bridgeville State - PA Zip - 15017 Country - USA
7. APPLICANT'S PHONE NOs. w/AREA CODE	10. AGENTS PHONE NOs. w/AREA CODE
a. Residence b. Business 860-659-0509 c. Fax	a. Residence b. Business 412-504-0687 c. Fax

STATEMENT OF AUTHORIZATION

11. I hereby authorize, Sara Krampe to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

SIGNATURE OF APPLICANT DATE

NAME, LOCATION, AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE (see instructions)
Guernsey Power Plant Access Road Culvert Replacement

13. NAME OF WATERBODY, IF KNOWN (if applicable)	14. PROJECT STREET ADDRESS (if applicable)
N/A	Address 11135 Seneca Lane
15. LOCATION OF PROJECT	City - Byesville State- OH Zip- 43723
Latitude: °N 39.945108 Longitude: °W -81.538244	

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (see instructions)
State Tax Parcel ID 110003449000 Municipality Jackson Township
Section - Township - T1N Range - R3W

17. DIRECTIONS TO THE SITE
See Attached Directions

18. Nature of Activity (Description of project, include all features)
Gemma Power Systems, LLC proposes to replace an existing culvert within an unnamed tributary of Wills Creek in Jackson Township, Guernsey County, Ohio. The proposed structure is a 12 inch reinforced concrete pipe (Class V). No permanent stream impacts are planned.

19. Project Purpose (Describe the reason or purpose of the project, see instructions)
The project purpose is to replace a structurally deficient culvert located at the Guernsey Power Station access road to accommodate large construction equipment and maintain regional connectivity.

USE BLOCKS 20-23 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED

20. Reason(s) for Discharge
The replacement culvert will include 81 linear feet of temporary stream impacts. The replacement culvert will be the same size as the structurally deficient culvert. No additional discharge is planned for the culvert replacement

21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Yards:

Type Amount in Cubic Yards	Type Amount in Cubic Yards	Type Amount in Cubic Yards
N/A	N/A	N/A

22. Surface Area in Acres of Wetlands or Other Waters Filled (see instructions)
Acres
or
Linear Feet 0

23. Description of Avoidance, Minimization, and Compensation (see instructions)
See Attached.

24. Is Any Portion of the Work Already Complete? ☐ Yes ☒ No IF YES, DESCRIBE THE COMPLETED WORK

25. Addresses of Adjoining Property Owners, Lessees, Etc., Whose Property Adjoins the Waterbody (if more than can be entered here, please attach a supplemental list)

a. Address- 58379 Vocational Road - 110000761000

City - Senecaville State - OH Zip - 43780

b. Address- Interstate 77 - State of Ohio - 110003027000

City - Byesville State - OH Zip - 43723

c. Address- 11111 Seneca Lane - 110000030000

City - Byesville State - OH Zip - 43723

d. Address- 380000013000

City - Byesville State - OH Zip - 43723

e. Address- 110003508000 - Independence Rail Works LTD

City - Byesville State - OH Zip - 43723

26. List of Other Certificates or Approvals/Denials received from other Federal, State, or Local Agencies for Work Described in This Application.

AGENCY	TYPE APPROVAL*	IDENTIFICATION NUMBER	DATE APPLIED	DATE APPROVED	DATE DENIED
N/A					

* Would include but is not restricted to zoning, building, and flood plain permits

27. Application is hereby made for permit or permits to authorize the work described in this application. I certify that this information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

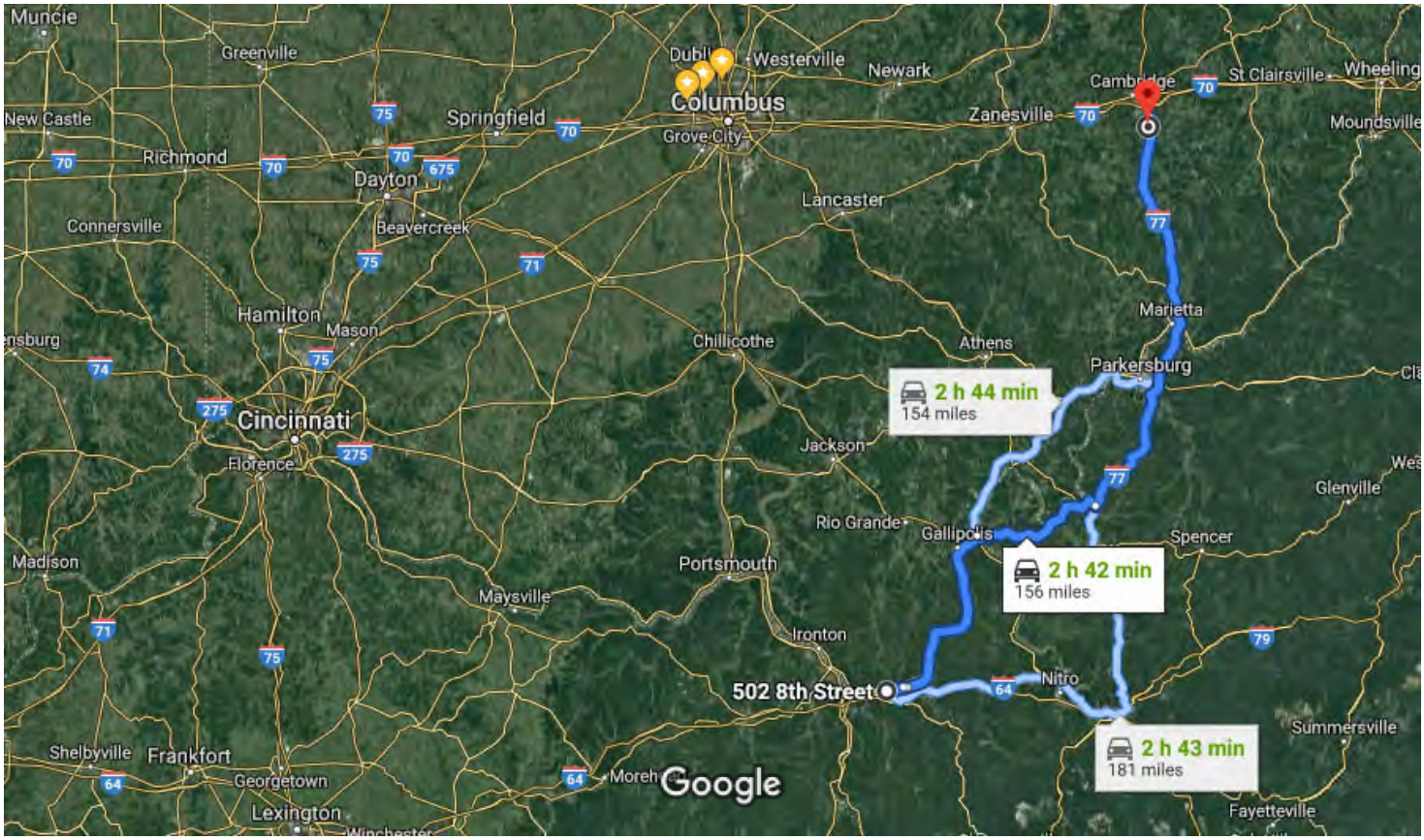
SIGNATURE OF APPLICANT DATE SIGNATURE OF AGENT DATE

The Application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in block 11 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.

502 8th St, Huntington, WV 25701 to 39.9451080, -81.5382440

Drive 156 miles, 2 h 42 min



Imagery ©2019 TerraMetrics, Map data ©2019 20 mi

502 8th St

Huntington, WV 25701

Get on I-77 N/WV-2 N in Northern

1 h 30 min (71.6 mi)

1. Head east on 5th Ave toward 9th St/Center Plaza
   Pass by Dairy Queen (on the left in 2.1 mi)

2.8 mi

2. Turn left onto 31st St

0.2 mi

3. Turn right onto 3rd Ave

0.2 mi

4. Continue onto Bridge St

0.5 mi

5. Continue onto 3rd Ave

0.5 mi

6. Continue onto WV-2 N/Ohio River Rd
   Continue to follow WV-2 N

37.7 mi

7. Turn right toward 3rd St

157 ft

8. Slight right onto 3rd St

0.3 mi

9. Turn right onto WV-2 N/WV-62 S
   Continue to follow WV-2 N

29.2 mi

10. Turn left to merge onto I-77 N/WV-2 N toward Parkersburg

0.2 mi

Drive to I-77 S in Jackson Township

1 h 14 min (84.8 mi)

11. Merge onto I-77 N/WV-2 N
    Continue to follow I-77 N
    Entering Ohio

82.4 mi

12. Take exit 41 for County Road 35 toward OH-209/OH-821/Byesville

0.3 mi

13. Turn left onto OH-209 W

0.3 mi

14. Turn left to merge onto I-77 S toward Marietta

1.8 mi

39.9451080, -81.5382440

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

Appendix A: Location Map

Guernsey Power Station

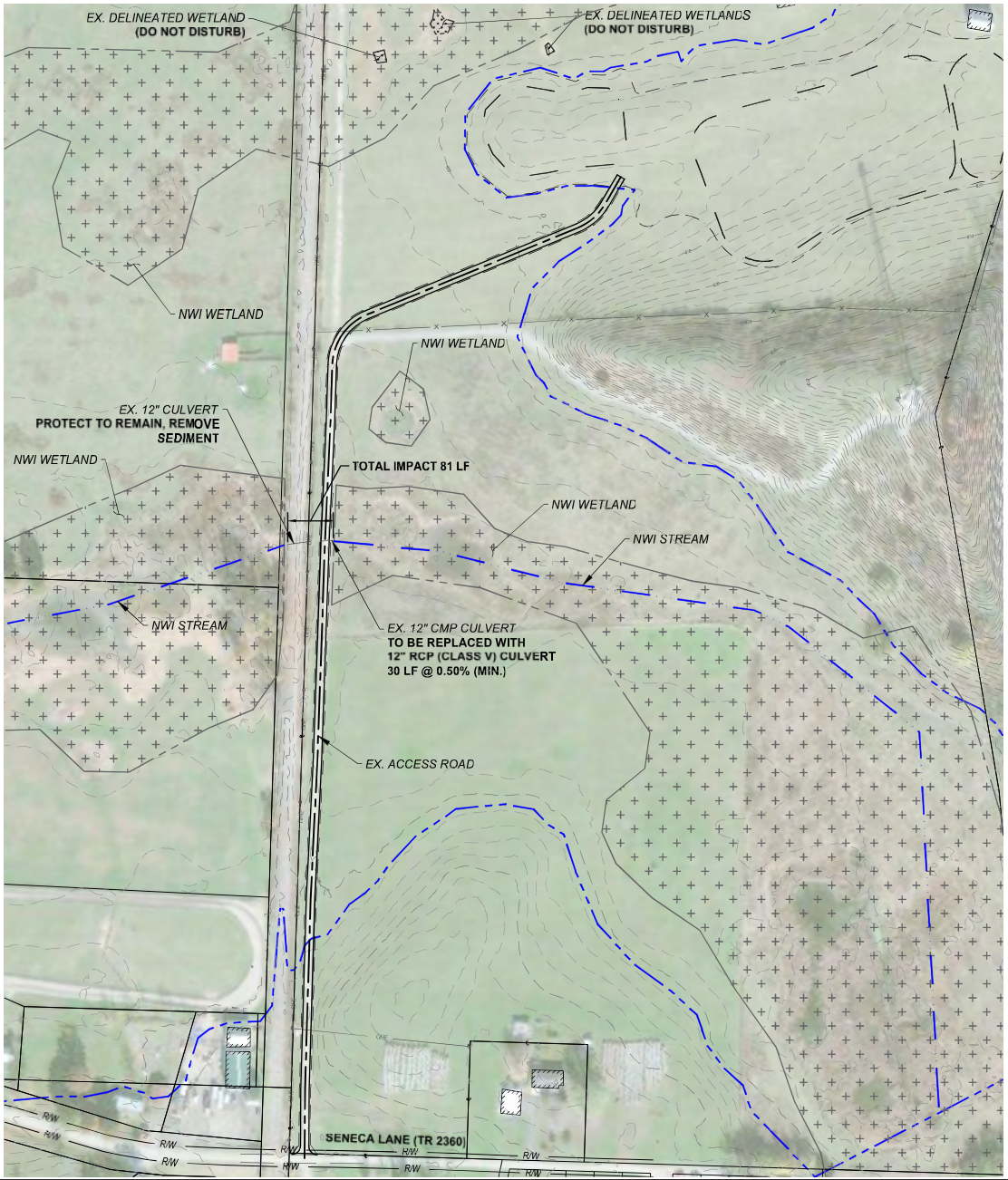
Topographical Location Map (Byesville Quad)
Jackson Township, Guernsey County, Ohio

CESO

ASCENT RESOURCES

Date: 12/18/2019
By: Christian King

Appendix B: Aquatic Resources Impact Exhibit, Impact Summary, and Photographs of Aquatic Features Proposed for Impact



VICINITY MAP

N.T.S.

GENERAL NOTES:

1. WORK TO BE PERFORMED UNDER THE REGULATIONS OF USACE NATIONWIDE PERMIT #3.
2. ALL EQUIPMENT MOBILIZATION TO BE FROM EXISTING ACCESS ROAD. NO EQUIPMENT PERMITTED WITHIN STREAM/WETLANDS.

LEGEND

EXISTING

- R/W — RIGHT OF WAY
- P.L. — PROPERTY LINE
- BUILDING
- 1000 — MAJOR CONTOUR
- 1002 — MINOR CONTOUR
- PAVEMENT
- X — X — FENCE
- FEMA 100 YEAR FLOOD PLAIN
- NWI STREAM
- DELINEATED WETLAND
- NWI WETLAND
- OHE — OVERHEAD ELECTRIC
- UTILITY POLE
- ODNR O&G WELL

PROPOSED

- 1200 — MAJOR CONTOUR
- 1202 — MINOR CONTOUR
- PAVEMENT
- CENTER LINE OF STABILIZED ACCESS DRIVE
- GRADE BREAK
- LIMITS OF DISTURBANCE

N

100 0 100 200

GRAPHIC SCALE (IN FEET)
1 inch = 100 ft.

OHIO Utilities Protection SERVICE
811 or 1-800-362-2764 Call Before You Dig

CESO
WWW.CESOINC.COM

NO.	DATE	REVISION DESCRIPTION

GEMMA POWER
BYESVILLE, OH

VALLEY TOWNSHIP, GUERNSEY COUNTY, OHIO

CULVERT REPLACEMENT EXHIBIT

ISSUE:	EXHIBIT
DATE:	12.17.2019
JOB NO.:	756527
DESIGN:	JMR
DRAWN:	JMR
CHECKED:	JRM
SHEET NO.	EX

W:\PROJECTS\GEMMA POWER\756527 GUERNSEY POWER STATION\03-CIVIL\PLAN\EXHIBITS\756527_CULVERT REPLACE.DWG - 12/17/2019 4:34 PM

Temporary Intermittent Stream Impacts – 81 Linear Feet

1. **Watercourse S-1 (Intermittent Channel)**
    - Impact Type: Culvert Replacement
        - Culvert Details: 12” diameter Class V reinforced concrete pipe
            - 30 total feet of pipe
    - Stream Impact Amount: 81 feet of temporary intermittent stream impact, no permanent impact.

Photograph #	1
Date:	12-06-2019
Description: *View from the south looking north at the access road, flooded field and wetland area.*	

Photograph #	2
Date:	12-06-2019
Description: *View from the northwest looking southeast at the access road, flooded field and wetland area.*	

Photograph #	3
Date:	12-06-2019
Description: *View from the west looking east at the damaged culvert and stream within the AOI.*	

Photograph #	4
Date:	12-06-2019
Description: *Additional view of damaged culvert and stream within the AOI.*	

Photograph #	5
Date:	12-06-2019
Description: *View of the existing culvert under the railroad adjoining the AOI to the west.*	

Photograph #	6
Date:	12-06-2019
Description: *View from the south looking north at the damaged culvert and flooding on the east side of the access road.*	

Photograph #	7
Date:	12-06-2019
Description: *Additional view from the south looking north at the flooded field and wetland area on the east side of the access road.*	

Photograph #	8
Date:	12-06-2019
Description: *View from the west looking east at the flooded field and wetland area on the east side of the access road.*	

Photograph #	9
Date:	12-06-2019
Description: *Additional view from the west looking east at the flooded field and wetland area on the east side of the access road.*	

Photograph #	10
Date:	12-06-2019
Description: *View from the north looking south at the access road over the damaged culvert within the AOI.*	

Appendix C: Minimization and Avoidance

AVOIDANCE AND MINIMIZATION (ENG Block 23)

This document provides a simplified alternatives analysis to demonstrate the avoidance and minimization measures taken for the proposed replacement of a culvert on the access road of Guernsey Power Station located in Jackson Township, Guernsey County, Ohio.

When developing power projects in the region, Gemma Power Systems must consider routes and haul roads that can carry equipment for construction and operational activities. Occasionally, stream crossings along the routes are discovered to be either structurally deficient or unsuitable to be utilized. Replacement of these culverts provide a reliable, efficient, and safe crossing for the Gemma Power Systems construction equipment and the travelling public, maintaining community and regional connectivity. Alternatives considered biological and physical impacts, technical feasibility, cost effectiveness, site safety, social and economic benefits and losses, environmental benefits and losses, and are described herein. Based on the available alternatives, Gemma Power Systems selected the on alignment build alternative with the least amount of impacts to streams, forested land, and private property. Gemma Power Systems considered several culvert replacement designs to reach required design criteria, limit impacts to the aquatic features on site, and also minimize impacts to private properties surrounding the crossing.

Selected Replacement Plan – On Alignment - Preferred Alternative- Alternative #1

Site design is restricted to the east and west by private property. Shifting the roadway and culvert in either direction would also have additional stream and wetland impacts. By using the existing roadway alignment and by reducing the proposed limits of disturbance, Gemma Power Systems was able to reduce impacts to the intermittent stream (S-1), avoid potential threatened & endangered species habitat impacts and to completely avoid impacts to private property owners.

New Culvert on New Alignment – Alternative #2

The new culvert on new alignment alternative was considered on either the east or west side of the existing culvert. As mentioned for the Alternative #1, the area for construction on this site is limited to the east and west, by private property. Shifts of the roadway and culvert placement in either direction would increase permanent and temporary impacts to aquatic features and other natural resources.

No-Build - Alternative #3

This alternative considers not replacing of the structure and performing minor rehabilitation efforts. Due to the existing condition of the culvert, the amount of rehabilitation effort needed would be financially unfeasible. This approach would have minimal stream impacts, but the culvert would still retain structural deficiencies making it unable to accommodate the necessary construction equipment and not maintain a safe and reliable stream crossing.

Alternative Natural Resources Impact Summary

Alternative Number	Proposed Wetland Impacts (ac)		Proposed Stream Impacts (linear ft)	
	Temporary	Permanent	Temporary	Permanent
Alternative #1 (Preferred Alternative)	0	0	81	0
Alternative #2 (New Culvert on New Alignment)	0	0	40+	40+
Alternative #3 (Concept Plan)	0	0	0	0

Avoidance, Minimization, and Compensatory Mitigation

The Preferred Alternative proposes 81 linear feet of temporary impacts to stream S-1. To reduce erosion and potential fill from entering other streams and wetlands on site, the project will implement erosion control methods consistent with the ODNR's Rainwater and Land Development- Ohio's Standards for Stormwater Management Land Development and Urban Stream Protection manual including the installation compost filter socks and silt fencing.

Gemma Power Systems has avoided and/or minimized impacts to aquatic features on site by reducing the originally proposed limits of disturbance for the project. Gemma Power Systems is minimizing impact to S-1 by installing the culvert using methods that reduce sedimentation in the stream flow. Gemma Power Systems is using the same size diameter culvert for the replacement as is currently present to ensure continued flow under high water conditions (during precipitation events). Gemma Power Systems will replace the culvert due to the damaged condition of the existing culvert and resulting flooding of private property.

Appendix D: Natural Resources Technical Report

800 Bursca Drive, Suite 804
Bridgeville, PA 15017
(412) 221-2236
www.cesoinc.com

Alan Smithe
Gemma Power Systems, LLC
769 Hebron Avenue
Glastonbury, CT 06033

AlanSmithe@gemmapower.com
(860)659-0509, x1193

December 18, 2019

Re: Gemma Power Station –Culvert Replacement
Stream and Wetland Field Review Results
Byesville, Guernsey County, Ohio

Dear Mr. Smithe:

CESO, Inc. is pleased to provide this letter summarizing the results of thestream and wetland field review conducted on December 6, 2019 at the proposed culvert replacement project located in Byesville, Guernsey County, Ohio. The culvert is under a private drive located off of Seneca Lane (Township Road 2360). The area of investigation (AOI) included the immediate vicinity of the culvert. A Topographical Location Map is provided as Attachment 1 and an Existing Environmental Conditions Map is provided as Attachment 2.

METHODOLOGY

The AOI was investigated for aquatic resources such as streams and wetlands on December 6, 2019. Prior to the field investigation, published resource information pertaining to the AOI was gathered and reviewed. The information sources used to prepare this report include but were not limited to:

- U.S. Geological Survey (USGS) 7.5-minute quadrangle maps (Byesville, OH);
- United States Fish and Wildlife Service (USFWS) National Wetlands Inventory website (USFWS 2012);
- Aerial photography (1:2400) of the Project Vicinity (ESRI, ArcGIS, GoogleEarth)
- National Hydrology Dataset

This information was used to identify high probability wetland locations prior to the field investigation. Two NWI Wetlands, (PSS1/EM1C) were mapped within the AOI, and the aerial imagery displayed evidence of inundation within the AOI. The National Hydrology Dataset display an unnamed intermittent tributary to Wills Creek within the AOI. The NWI and NHD information is displayed on the Existing Environmental Conditions Map and the aerial photography is included in Attachment 3.

FIELD OBSERVATIONS

The culvert is under a private drive located off of Seneca Lane (Township Road 2360). The AOI consists of existing developed roadway, cow pasture, and an active railroad line. Due to the failed and collapsed culvert,

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surface water was present on the eastern side of the roadway. CESO did not identify wetlands within the AOI at the culvert. Please note, due to the highwater conditions a formal delineation in the east was not conducted.

Attachment 2 includes the Existing Environmental Conditions Map which displays the AOI and the location of the culvert. Color photographs of the project area and the existing culvert are included as Attachment 4.

CONCLUSION

CESO, Inc. conducted a stream and wetland field review on December 6, 2019. One intermittent stream and no wetlands were identified. If all construction of the culvert replacement occurs from the existing road, no impacts to wetlands or streams are anticipated.

We appreciate the opportunity to be of service to you. If you have any questions regarding the information contained in this letter, please contact me at (412) 504-0687 or krampe@cesoinc.com

Sincerely,
CESO, Inc.

Sara Krampe, PWS
Environmental Project Manager

Attachment 1: Topographical Location Map
Attachment 2: Existing Environmental Conditions Map
Attachment 3: Aerial Photography
Attachment 4: Site Photographs

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Bridgeville, PA 15017
(412) 221-2236
www.cesoinc.com

Attachment 1: Topographical Location Map

Guernsey Power Station

Topographical Location Map (Byesville Quad)
Jackson Township, Guernsey County, Ohio

CESO

ASCENT RESOURCES

Date: 12/18/2019
By: Christian King

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Attachment 2: Existing Environmental Conditions Map

Gemma Power Station - Culvert Replacement

Existing Environmental Conditions Map

Jackson Township, Guernsey County, Ohio

CESO

Date: 09/16/2019
By: Christian King

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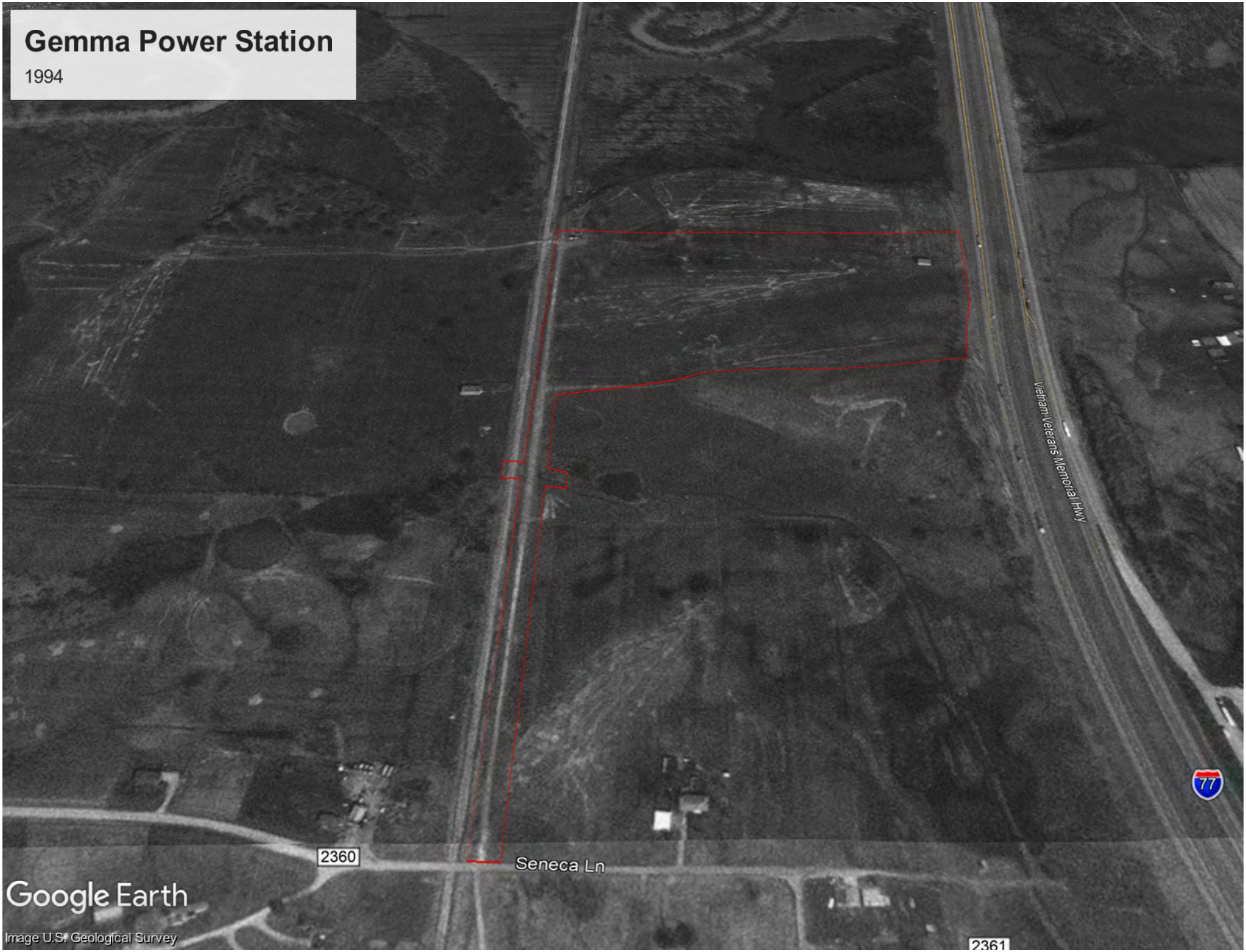
Bridgeville, PA 15017
(412) 221-2236
www.cesoinc.com

Attachment 3: Aerial Photography


Gemma Power Station
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Vietnam Veterans Memorial Hwy
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Image U.S. Geological Survey


Gemma Power Station
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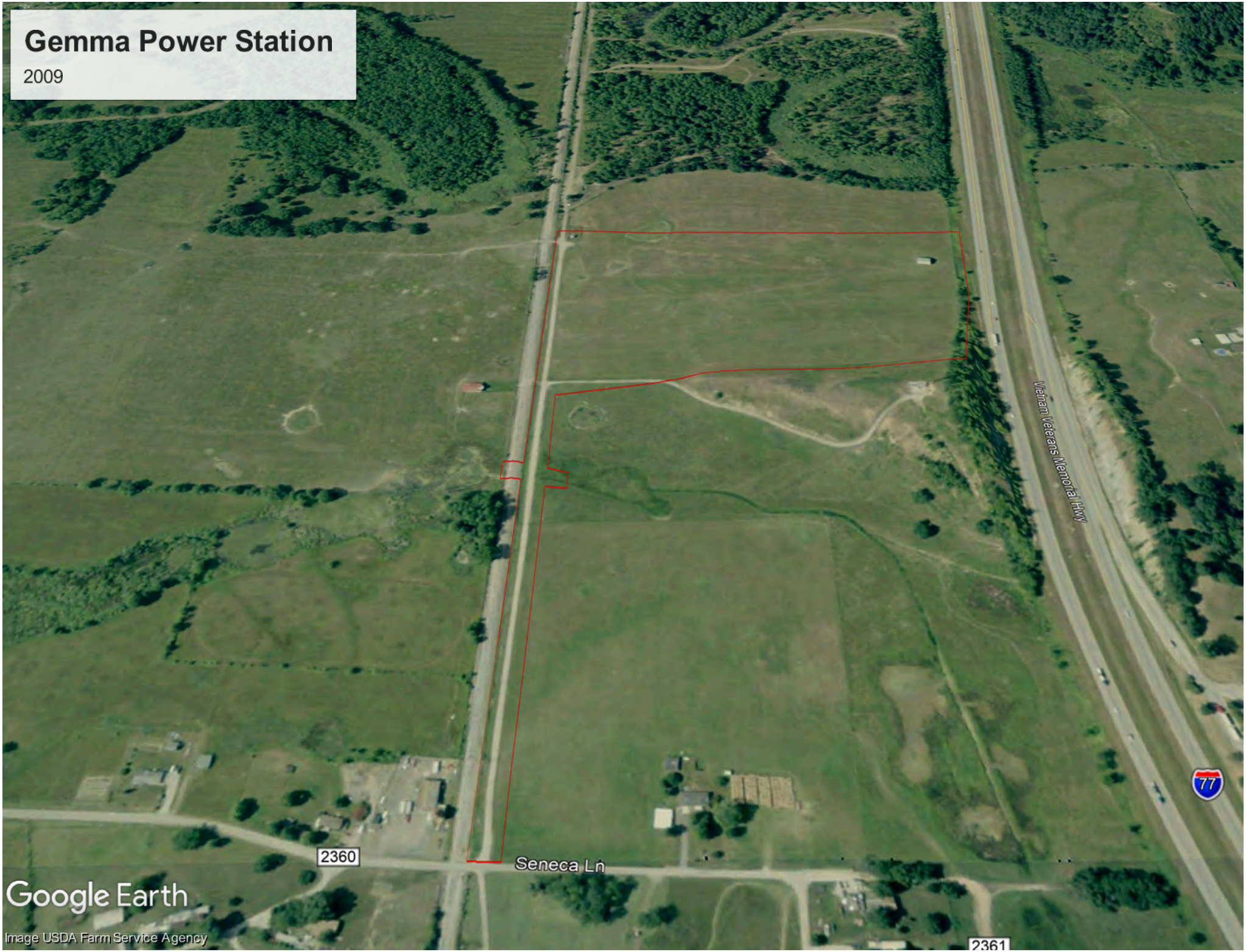
Image USDA Farm Service Agency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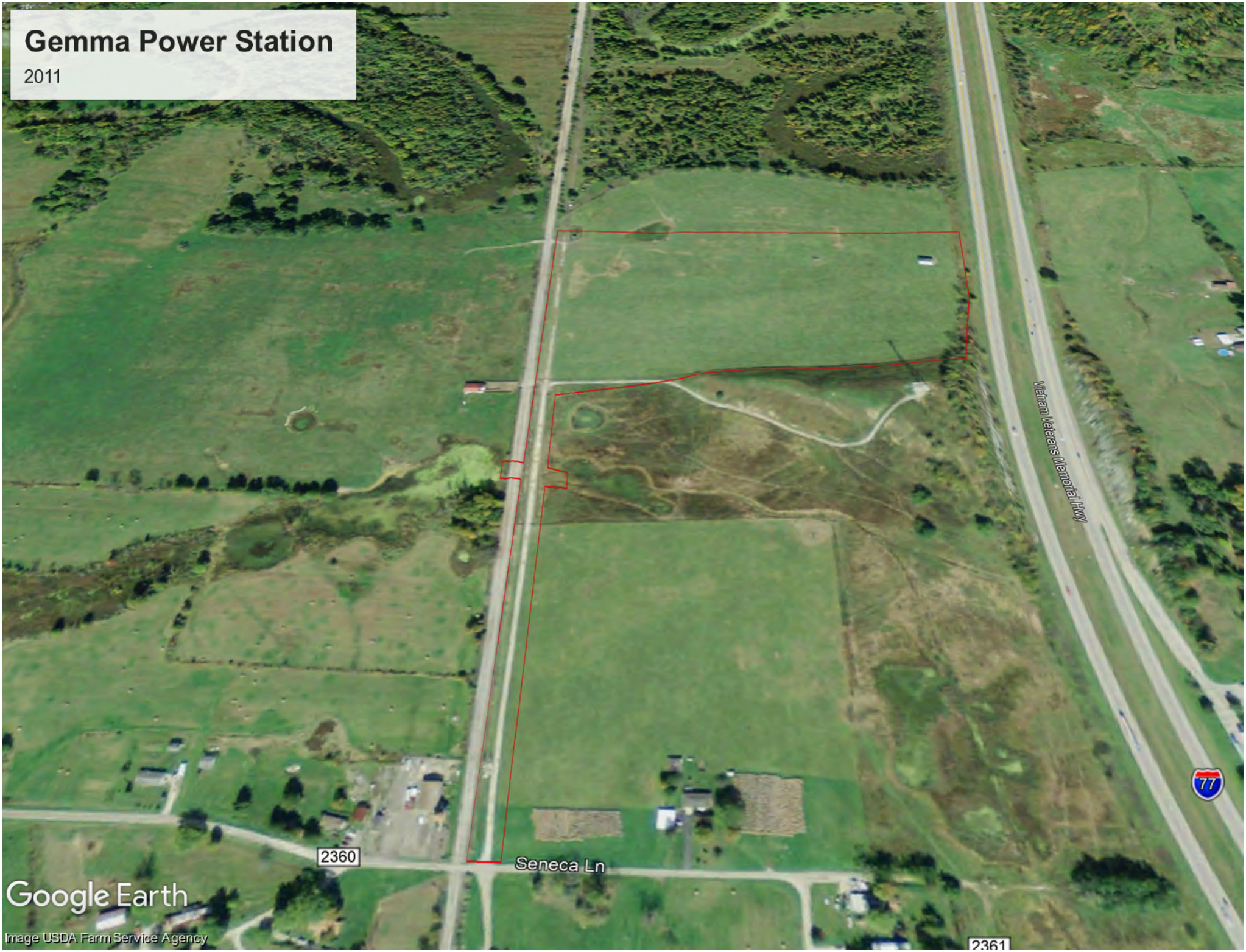
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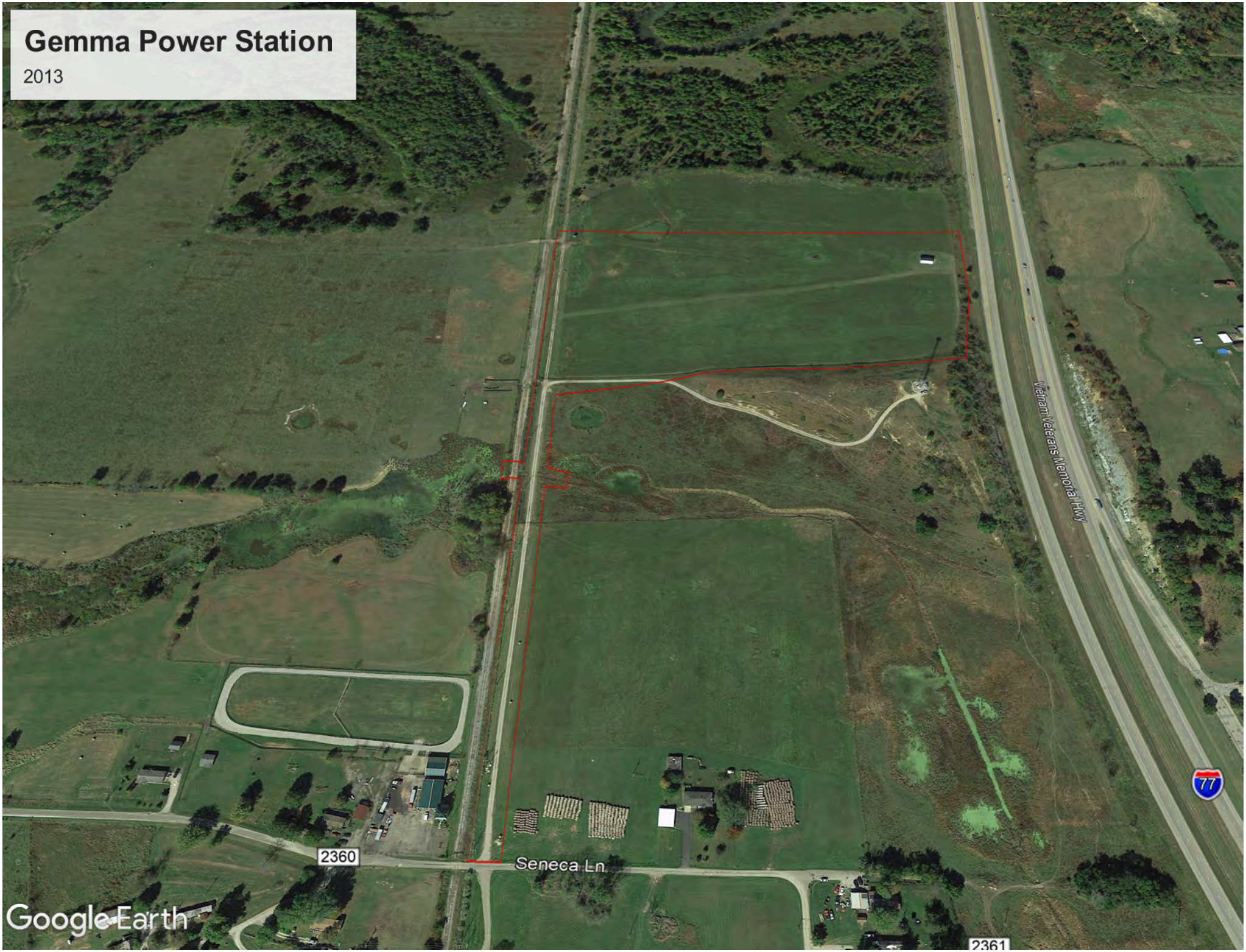
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Seneca Ln
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Google Earth

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Bridgeville, PA 15017
(412) 221-2236
www.cesoinc.com

Attachment 4: Site Photographs

Photograph #	1
Date:	12-06-2019
Description: *View from the south looking north at the access road, flooded field and wetland area.*	

Photograph #	2
Date:	12-06-2019
Description: *View from the northwest looking southeast at the access road, flooded field and wetland area.*	

Photograph #	3
Date:	12-06-2019
Description: *View from the west looking east at the damaged culvert and stream within the AOI.*	

Photograph #	4
Date:	12-06-2019
Description: *Additional view of damaged culvert and stream within the AOI.*	

Photograph #	5
Date:	12-06-2019
Description: *View of the existing culvert under the railroad adjoining the AOI to the west.*	

Photograph #	6
Date:	12-06-2019
Description: *View from the south looking north at the damaged culvert and flooding on the east side of the access road.*	

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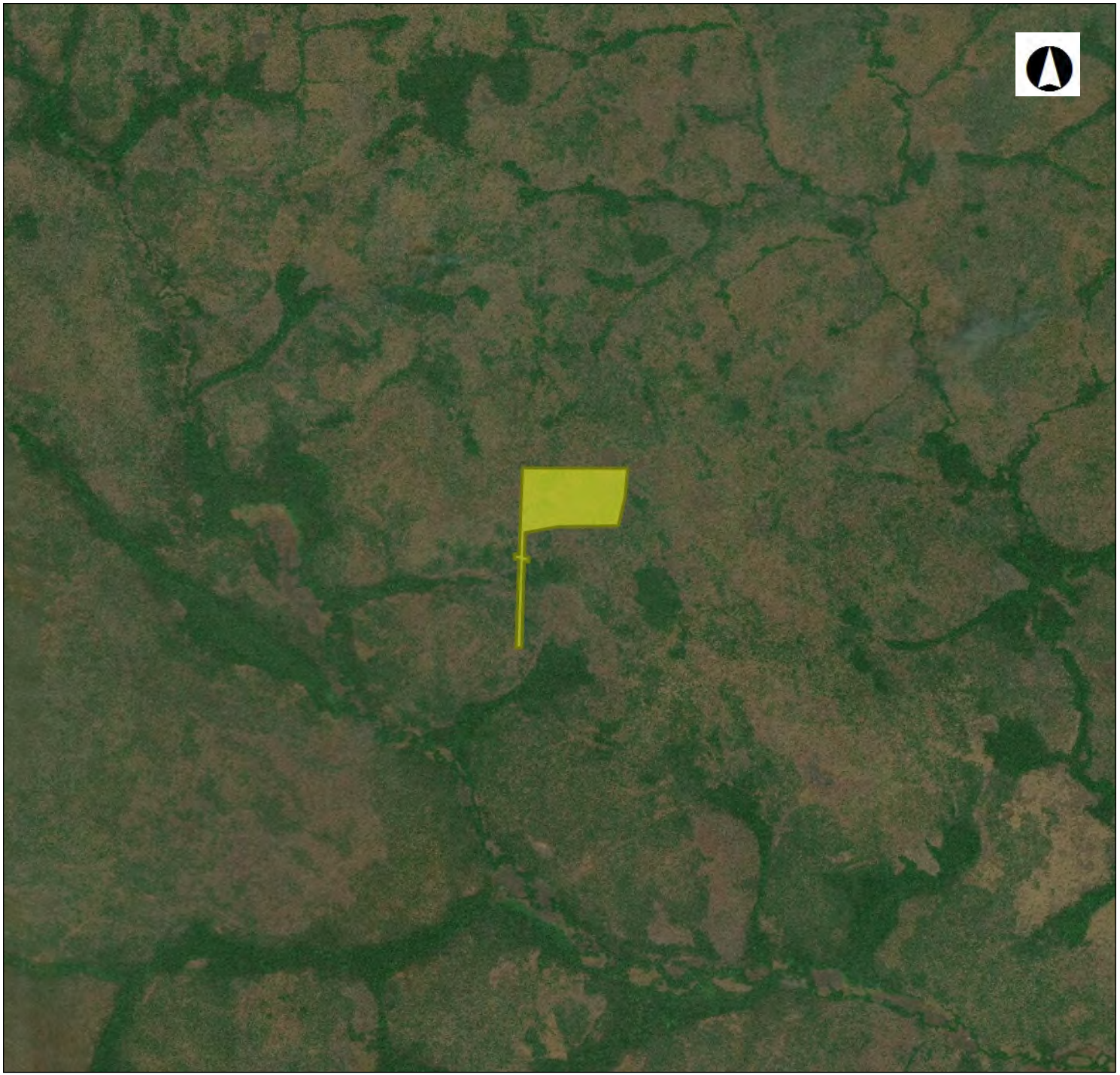
Photograph #	10
Date:	12-06-2019
Description: *View from the north looking south at the access road over the damaged culvert within the AOI.*	

Appendix E: OHPO MAP



OHIO HISTORY CONNECTION

State Historic Preservation Office

Legend

- NR Listings
  - Listed
  - National Historic Landmark
  - Delisted
- NR Determinations of Eligibi
- Archaeological Sites
- Historic Structures
- Historic Bridges
- Historic Tax Credit Projects
- OGS Cemeteries
  - Confident
  - Not Confident
- OHC Sites
- Dams
- UTM Zone Split
- NR Boundaries
- OAI Site Boundaries
- Phase1

0 0.88 1.75 Miles

1: 69,431

Copyright/Disclaimer

Datum: [Datum]

Projection: WGS_1984_Web_Mercator_Auxiliary_Sphere

Special Flood Hazard Area Development Permit – Culvert Replacement

PERMIT # FP - 2002

SPECIAL FLOOD HAZARD AREA DEVELOPMENT PERMIT

Alan Smithe on behalf of Ball, Willliam E & Shirley, ITES

APPLICANT

Replacement of structurally deficient 12" culvert pipe running under access road with new culvert pipe of the same diameter. Area must be returned to same elevation and contours as prior to any work. Applicant is responsible to provide photos of deficient pipe and replacement pipe to the Guernsey County Emergency Management Agency to be placed in permit file.

ACTIVITY DESCRIPTION

1.0 Is the proposed development in:
_____an identified floodway
_____a flood hazard area where base flood elevations exist with no identified floodway
__X__an area within the floodplain fringe
_____an approximate flood hazard area ZONE AO

2.0 The proposed development meets the Standards of Section __4.0__ of the regulations.

3.0 Base flood elevation (100-year) at proposed site _____N/A_____ feet m.s.l.
Data source __Guernsey County Flood Insurance Rate Maps & Flood Insurance Study
Map effective date: __08/16/2011_____ Community Panel No. __39059C0283D___.

4.0 Does the structure contain?:
__N/A__basement __N/A__enclosed area other than basement below lowest floor

5.0 For structures located in approximate AO zones (no BFE available) the structure's lowest floor is __N/A__feet above the highest grade adjacent to the structure.

6.0 The proposed development is in compliance with applicable floodplain standards.
PERMIT ISSUED ON __1/10/2020_____.

7.0 The proposed development is not in compliance with applicable floodplain standards.
PERMIT DENIED ON _____N/A_____.
Reason: _____N/A_____.

8.0 The proposed development is exempt from the floodplain standards per Section__N/A__of the Flood Damage Reduction Resolution.

Administrator's Signature: _____Date: 01/10/20
Gerry Beckner, Director of Emergency Management

9.0 The certified as-built elevation of the structure's lowest floor is __N/A__ feet above msl.*

10.0 The certified as-built floodproofed elevation of the structure is __N/A__feet above msl.*

NOTE *Certification by registered engineer or land surveyor documenting these elevations is necessary if elevations are provided by applicant.

AS BUILT ELEVATIONS SHALL BE PROVIDED AND CERTIFIED BY A REGISTERED SURVEYOR

National Flood Hazard Layer FIRMette

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

- **SPECIAL FLOOD HAZARD AREAS**
  - Without Base Flood Elevation (BFE) *Zone A, V, A99*
  - With BFE or Depth *Zone AE, AO, AH, VE, AR*
  - Regulatory Floodway
- **OTHER AREAS OF FLOOD HAZARD**
  - 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
  - Future Conditions 1% Annual Chance Flood Hazard *Zone X*
  - Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
  - Area with Flood Risk due to Levee *Zone D*
- **OTHER AREAS**
  - NO SCREEN Area of Minimal Flood Hazard *Zone X*
  - Effective LOMRs
  - Area of Undetermined Flood Hazard *Zone D*
- **GENERAL STRUCTURES**
  - Channel, Culvert, or Storm Sewer
  - Levee, Dike, or Floodwall
- **OTHER FEATURES**
  - 20.2 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
  - Coastal Transect
  - Base Flood Elevation Line (BFE)
  - Limit of Study
  - Jurisdiction Boundary
  - Coastal Transect Baseline
  - Profile Baseline
  - Hydrographic Feature
- **MAP PANELS**
  - Digital Data Available
  - No Digital Data Available
  - Unmapped

N

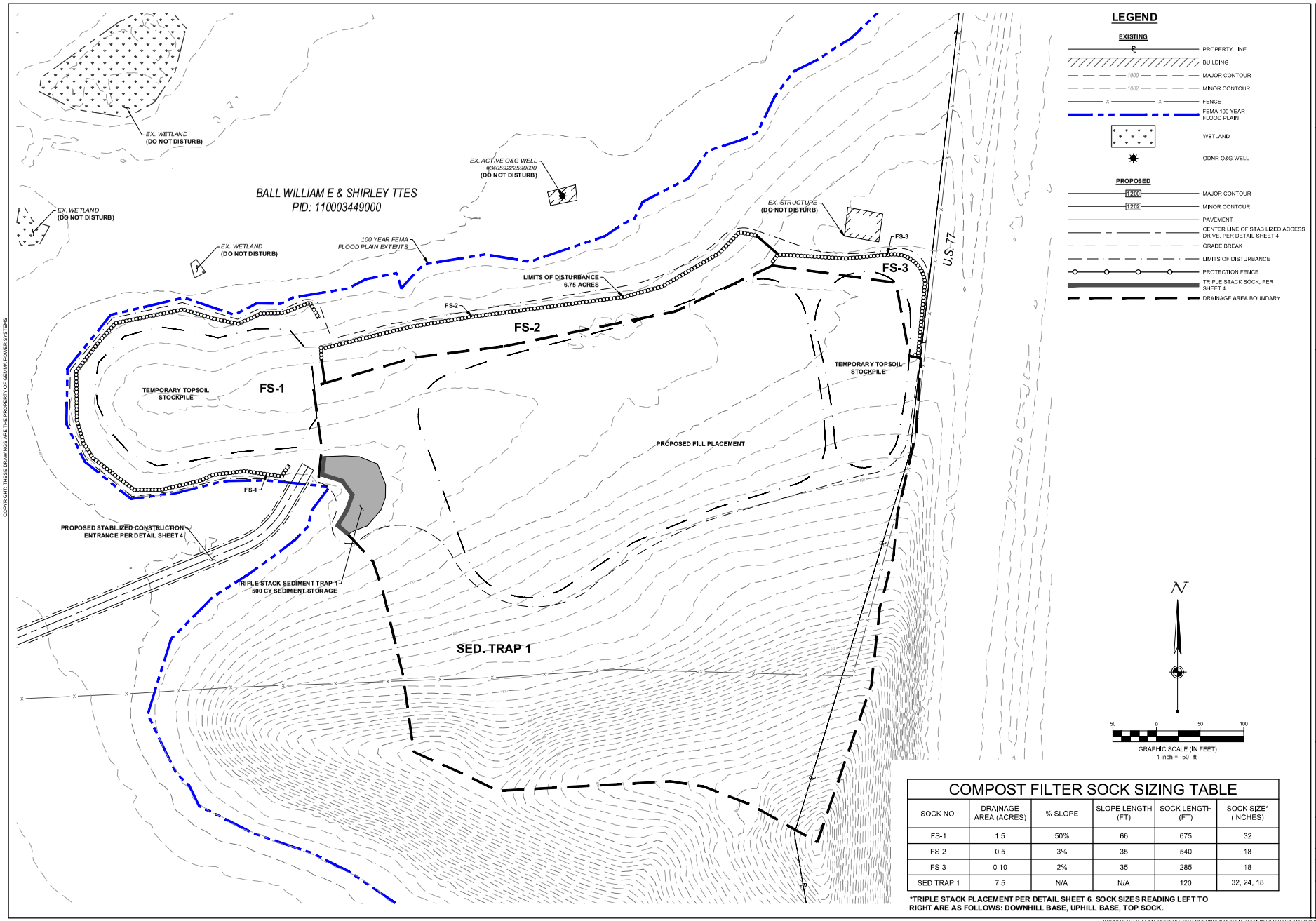
The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 1/12/2020 at 8:47:30 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Gemma Off-Site Fill Placement Plan



LEGEND

EXISTING

- PROPERTY LINE
- BUILDING
- MAJOR CONTOUR
- MINOR CONTOUR
- FENCE
- FEMA 100 YEAR FLOOD PLAIN
- WETLAND
- ODNR O&G WELL

PROPOSED

- MAJOR CONTOUR
- MINOR CONTOUR
- PAVEMENT
- CENTER LINE OF STABILIZED ACCESS DRIVE, PER DETAIL SHEET 4
- GRADE BREAK
- LIMITS OF DISTURBANCE
- PROTECTION FENCE
- TRIPLE STACK SOCK, PER SHEET 4
- DRAINAGE AREA BOUNDARY

N

GRAPHIC SCALE (IN FEET)
1 inch = 50 ft.

COMPOST FILTER SOCK SIZING TABLE

SOCK NO.	DRAINAGE AREA (ACRES)	% SLOPE	SLOPE LENGTH (FT)	SOCK LENGTH (FT)	SOCK SIZE* (INCHES)
FS-1	1.5	50%	66	675	32
FS-2	0.5	3%	35	540	18
FS-3	0.10	2%	35	285	18
SED TRAP 1	7.5	N/A	N/A	120	32, 24, 18

***TRIPLE STACK PLACEMENT PER DETAIL SHEET 6. SOCK SIZES READING LEFT TO RIGHT ARE AS FOLLOWS: DOWNHILL BASE, UPHILL BASE, TOP SOCK.**

CESO
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NO.	DATE	REVISION DESCRIPTION

GEMMA POWER
GUERNSEY POWER STATION
OFF-SITE FILL PLACEMENT PLAN

VALLEY TOWNSHIP, GUERNSEY COUNTY, OHIO

EROSION & SEDIMENT CONTROL PLAN

ISSUE: PERMIT
DATE: 09.24.2019
JOB NO.: 756527
DESIGN: BLB
DRAWN: BLB
CHECKED: JRM
SHEET NO. 5

Summary: Correspondence of Guernsey Power Station LLC Submitting Response to Comments Provided to the Ohio Environmental Protection Agency electronically filed by Teresa Orahood on behalf of Dylan F. Borchers