Entergy Services, LLC
Power Generation
10055 Grogan's Mill Road
The Woodlands, TX 77380
Tel 281-297-3319

July 28, 2021

Executive Director
Applications Review and Processing Team, MC-148
Texas Commission on Environmental Quality
12100 Park 35 Circle
Austin, Texas 78753

Subject: Submittal of TPDES Permit Major Amendment Application
WQ0000336000, Entergy Texas, Inc. Sabine Plant
1000 Powerhouse Road, Orange, Orange County, Texas 77630
CN 603282054; RN 102513041

To Whom It May Concern:

Entergy Texas, Inc. (Entergy) is submitting the enclosed application for a major amendment of Texas Pollutant Discharge Elimination System (TPDES) permit No. WQ0000336000 requesting authorization to discharge wastewater to the defined intake canal at Sabine (tidal), thence to Segment 2412 of Sabine Lake in Orange County, Texas.

As part of this major amendment process, Entergy is requesting the following phases to the permit:

- Phase 1 – Addition of three internal and one external outfalls for the construction and operation of a new power generation facility (Orange County Advanced Power Station) at the existing Sabine Plant.
- Phase 2 – Deactivation of Unit 1 at Sabine

The application package includes one original and two additional copies of the following items:

- Appendix A – TPDES Permit Major Amendment Application
  - This application includes the following:
    - Completed Industrial Administrative Report 1.0 and 1.1
    - SPIF
    - Core Data Form
    - Industrial Technical Report 1.0
    - Worksheets 1.0, 2.0, 4.0, and 4.1
    - USGS Map
    - Affected Landowner Map and Landowner Disk
    - Flow Diagram
    - Site Drawing
    - Original Photographs
- Appendix B – OCPS Thermal Modeling GEMSS Hydrodynamic Model Report
- Appendix C – OCPS Evaluation of Aquatic Resources in the Receiving Water

Please direct any questions or comments regarding this application to myself or Annisa White at awhite5@entergy.com or (281) 297-3386.

Sincerely,

Deborah C. Saxton

Deborah Saxton
Environmental Services Manager
Power Generation
(281) 297-3306

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APPENDIX A TPDES PERMIT MAJOR AMENDMENT APPLICATION

July 2021

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

TCEQ INDUSTRIAL WASTEWATER PERMIT APPLICATION

INDUSTRIAL ADMINISTRATIVE REPORT

Complete and submit this checklist with the application.

APPLICANT NAME: Entergy Texas, Inc.

PERMIT NUMBER: WQ0000336000

Check Y for each of the following items included in this application. If an item was not included, check N.

	Y	N		Y	N
Administrative Report 1.0	☒	☐	Worksheet 8.0	☐	☒
Administrative Report 1.1	☒	☐	Worksheet 9.0	☐	☒
SPIF	☒	☐	Worksheet 10.0	☐	☒
Core Data Form	☒	☐	Worksheet 11.0	☐	☒
Technical Report 1.0	☒	☐	Worksheet 11.1	☐	☒
Worksheet 1.0	☒	☐	Worksheet 11.2	☐	☒
Worksheet 2.0	☒	☐	Worksheet 11.3	☐	☒
Worksheet 3.0	☐	☒	Original USGS Map	☒	☐
Worksheet 3.1	☐	☒	Affected Landowners Map	☒	☐
Worksheet 3.2	☐	☒	Landowner Disk or Labels	☒	☐
Worksheet 3.3	☐	☒	Flow Diagram	☒	☐
Worksheet 4.0	☒	☐	Site Drawing	☒	☐
Worksheet 4.1	☒	☐	Original Photographs	☒	☐
Worksheet 5.0	☐	☒	Solids Management Program	☐	☒
Worksheet 6.0	☐	☒	Water Balance	☒	☐
Worksheet 7.0	☐	☒			

For Commission Use Only:
Segment Number: _____ County: _____ Expiration Date: _____
Proposed/Current Permit Number: _____ Region: _____

INDUSTRIAL ADMINISTRATIVE REPORT 1.0

The following information **is required** for **all** applications for TPDES permits and TLAPs.

1. TYPE OF APPLICATION AND FEES (Instructions, Page 21)

a. Permit No.: WQ0000336000 Expiration Date: December 11, 2024

EPA ID No.: TX0006696

b. Check the box next to the appropriate application type.

☐	New TPDES permit	☐	New TLAP permit
☐	Major amendment with renewal	☒	Major amendment without renewal
☐	Renewal with changes	☐	Renewal without changes
☐	Minor amendment without renewal	☐	Minor modification without renewal
☐	Stormwater only discharge		

c. If applying for an **amendment** or **modification** of a permit, describe the request in detail: Entergy is requesting a major amendment of the existing permit to include two phases. Phase 1 includes the addition of a new unit (Orange County Advanced Power Station [OCPS]) at the existing Sabine Plant. This application references ONLY information pertaining to the new unit as the water processes during operation of OCPS will be completely separate from the water processes at the existing Sabine units. Phase 2 includes the deactivation of Unit 1 at Sabine. Details are provided in Attachment L.

d. Application Fee

Check the box next to the amount submitted for the application fee:

EPA Classification	New	Major Amendment (With or Without Renewal)	Renewal (With or Without Changes)	Minor Amendment/ Minor Modification (Without Renewal)
Minor facility not subject to EPA categorical effluent guidelines (*40 CFR Parts 400-471*)	☐ $350	☐ $350	☐ $315	☐ $150
Minor facility subject to EPA categorical effluent guidelines (*40 CFR Parts 400-471*)	☐ $1,250	☐ $1,250	☐ $1,215	☐ $150
Major facility	N/A *	☒ $2,050	☐ $2,015	☐ $450

* All facilities are designated as minors until formally classified as a major by EPA.

e. Payment Information:

Mailed Check or money order number: Click to enter text.

Check or money order amount: Click to enter text.

Named printed on check or money order: Click to enter text.

ePAY Voucher number: 520923, 520924

Mailed Check or money order number: Click to enter text.

Copy of voucher attached? ☒ Yes **Attachment**: A

2. APPLICANT INFORMATION (Instructions, Pages 21-22)

a. Facility Owner (Owner of the facility must apply for the permit.)

- Provide the legal name of the entity (applicant) applying for this permit: Entergy Texas, Inc.

  (The legal name must be spelled exactly as filed with the TX SOS, Texas Comptroller of Public Accounts, County, or in the legal documents forming the entity.)

- If the applicant is currently a customer with the TCEQ, provide the Customer Number, which can be located using the TCEQ's Central Registry Customer Search[1]: **CN**603282054

- Provide the name and title of the person signing the application. The person must be an executive official meeting signatory requirements in *30 TAC § 305.44*.

  Mr. ☒ Ms. ☐ First/Last Name: Jason Evan Willis

  Title: Vice President Power Plant Operations Credential: N/A

b. Co-applicant Information

- Provide the legal name of the co-applicant applying for this permit, if applicable: N/A

  (The legal name must be spelled exactly as filed with the TX SOS, Texas Comptroller of Public Accounts, County, or in the legal documents forming the entity.)

- If the co-applicant is currently a customer with the TCEQ, provide the Customer Number, which can be located using the TCEQ's Central Registry Customer Search: **CN**N/A

- Provide the name and title of the person signing the application. The person must be an executive official meeting signatory requirements in *30 TAC § 305.44*.

  Mr. ☐ Ms. ☐ First/Last Name: N/A

  Title: N/A Credential: N/A

- Provide a brief description of the need for a co-permittee: N/A

c. Core Data Form

Complete the Core Data Form for each customer and include as an attachment. If the customer type selected on the Core Data Form is **Individual**, complete **Attachment 1** of the Administrative Report.

Attachment: B

3. APPLICATION CONTACT INFORMATION (Instructions, Page 22)

If the TCEQ needs additional information regarding this application, who should be contacted?

a. Mr. ☒ Ms. ☐ First/Last Name: Timothy Stone Credential: N/A

Organization Name: Entergy Services, Inc. Title: MS/TX Environmental Manager

Mailing Address: 308 E. Pearl Street City/State/ZIP Code: Jackson, Mississippi 39201

[1] http://www15.tceq.texas.gov/crpub/index.cfm?fuseaction=cust.CustSearch

Phone No.: 601-969-2316 Fax No.: N/A E-mail: tstone@entergy.com

Check one or both: ☒ Administrative Contact ☒ Technical Contact

b. Mr. ☐ Ms. ☒ First/Last Name: Deborah Saxton Credential: N/A

Organization Name: Entergy Services, LLC Title: Environmental Services Manager

Mailing Address: Parkwood Two Building, Suite 400, 10055 Grogan's Mill Road City/State/ZIP Code: The Woodlands, Texas 77380

Phone No.: 281-297-3306 Fax No.: N/A E-mail: dsaxton@entergy.com

Check one or both: ☒ Administrative Contact ☒ Technical Contact

Attachment: N/A

4. PERMIT CONTACT INFORMATION (Instructions, Page 22)

Provide two names of individuals that can be contacted throughout the permit term.

a. Mr. ☒ Ms. ☐ First/Last Name: Timothy Stone Credential: N/A

Organization Name: Entergy Services, Inc. Title: MS/TX Environmental Manager

Mailing Address: 308 E. Pearl Street City/State/ZIP Code: Jackson Mississippi 39201

Phone No.: 601-969-2316 Fax No.: N/A E-mail: tstone@entergy.com

b. Mr. ☒ Ms. ☐ First/Last Name: Tory Theriot Credential: N/A

Organization Name: Entergy Services, Inc. Title: Environmental Analyst

Mailing Address: 1000 Powerhouse Road City/State/ZIP Code: Orange Texas 77630

Phone No.: 409-734-3360 Fax No.: N/A E-mail: ttherio@entergy.com

Attachment: N/A

5. BILLING CONTACT INFORMATION (Instructions, Page 22)

The permittee is responsible for paying the annual fee. The annual fee will be assessed to permits **in effect on September 1 of each year**. *The TCEQ will send a bill to the address provided in this section. The permittee is responsible for terminating the permit when it is no longer needed (form TCEQ-20029).*

Provide the complete mailing address where the annual fee invoice should be mailed and the name and phone number of the permittee's representative responsible for payment of the invoice.

Mr. ☒ Ms. ☐ First/Last Name: Tory Theriot Credential: N/A

Organization Name: Entergy Services, Inc. Title: Environmental Analyst

Mailing Address: 1000 Powerhouse Road City/State/ZIP Code: Orange Texas 77630

Phone No.: 409-734-3360 Fax No.: N/A E-mail: ttherio@entergy.com

6. DMR/MER CONTACT INFORMATION (Instructions, Page 22)

Provide the name and mailing address of the person delegated to receive and submit DMRs or MERs.

Mr. ☒ Ms. ☐ First/Last Name: Tory Theriot Credential: N/A

Organization Name: Entergy Services, Inc. Title: Environmental Analyst

Mailing Address: 1000 Powerhouse Road City/State/ZIP Code: Orange Texas 77630

Phone No.: 409-734-3360 Fax No.: N/A E-mail: ttherio@entergy.com

DMR data must be submitted through the NetDMR[2] system. An electronic reporting account can be established once the facility has obtained the permit number.

7. NOTICE INFORMATION (Instructions, Pages 23-24)

a. Individual Publishing the Notices

Mr. ☐ Ms. ☒ First/Last Name: Annisa White Credential: N/A

Organization Name: Entergy Services, LLC Title: Environmental Senior Analyst

Mailing Address: Parkwood Two Building, Suite 400, 10055 Grogan's Mill Road City/State/ZIP Code: The Woodlands, Texas 77380

Phone No.: 281-297-3386 Fax No.: N/A E-mail: awhite5@entergy.com

b. Method for Receiving Notice of Receipt and Intent to Obtain a Water Quality Permit Package (only for NORI, NAPD will be sent via regular mail)

☒ E-mail: awhite5@entergy.com

☐ Fax: Click to enter text.

☐ Regular Mail (USPS)

Mailing Address: Click to enter text. City/State/ZIP Code: Click to enter text.

c. Contact in the Notice

Mr. ☐ Ms. ☒ First/Last Name: Annisa White Credential: N/A

Organization Name: Entergy Services, LLC Title: Environmental Senior Analyst

Phone No.: 281-297-3386 Fax No.: N/A E-mail: awhite5@entergy.com

d. Public Place Information

If the facility or outfall is located in more than one county, provide a public viewing place for each county.

Public building name: Bridge City Public Library Location within the building: N/A

Physical Address of Building: 101 Parkside Drive

City: Bridge City County: Orange

e. Bilingual Notice Requirements:

This information **is required** for **new, major amendment, and renewal applications**. It is not required for minor amendment or minor modification applications.

This section of the application is only used to determine if alternative language notices will be needed. Complete instructions on publishing the alternative language notices will be in your public notice package.

Please call the bilingual/ESL coordinator at the nearest elementary and middle schools and obtain the following information to determine whether an alternative language notices are required.

1. Is a bilingual education program required by the Texas Education Code at the elementary or middle school nearest to the facility or proposed facility?

[2] https://www.tceq.texas.gov/permitting/netdmr

☐ Yes ☒ No

If **no**, publication of an alternative language notice is not required; **skip to** Item 8 (REGULATED ENTITY AND PERMITTED SITE INFORMATION.)

2. Are the students who attend either the elementary school or the middle school enrolled in a bilingual education program at that school?

   ☐ Yes ☒ No

3. Do the students at these schools attend a bilingual education program at another location?

   ☐ Yes ☒ No

4. Would the school be required to provide a bilingual education program but the school has waived out of this requirement under 19 TAC §89.1205(g)?

   ☐ Yes ☒ No

5. If the answer is yes to question 1, 2, 3, or 4, public notices in an alternative language are required. Which language is required by the bilingual program? N/A

8. REGULATED ENTITY AND PERMITTED SITE INFORMATION (Instructions Pages 24-25)

If the site of your business is part of a larger business site, a Regulated Entity Number (RN) may already be assigned for the larger site. Use the RN assigned for the larger site. Search the TCEQ's Central Registry[3] to determine the RN or to see if the larger site may already be registered as a regulated site:

If the site is found, provide the assigned RN and the information for the site to be authorized through this application below. The site information for this authorization may vary from the larger site information.

a. TCEQ issued Regulated Entity Number (RN): **RN**102513041

b. Name of project or site (the name known by the community where located): Sabine Plant

c. Is the location address of the facility in the existing permit the same?

   ☒ Yes ☐ No

d. If the facility is located in Bexar, Comal, Hays, Kinney, Medina, Travis, Uvalde, or Williamson County, additional information concerning protection of the Edwards Aquifer may be required.

e. Owner of treatment facility: Entergy Texas, Inc.

   Ownership of Facility: ☐ Public ☒ Private ☐ Both ☐ Federal

f. Owner of land where treatment facility is or will be:

   Mr. ☒ Ms. ☐ First/Last or Organization Name: Entergy Texas, Inc.

   Mailing Address: 1000 Powerhouse Road City/State/ZIP Code: 77630

   Phone No.: 409-734-3360 Fax No.: N/A E-mail: ttherio@entergy.com

   If not the same as the facility owner, there must be a long-term lease agreement in effect for at least six years. In some cases, a lease may not suffice - see instructions. **Attachment:** N/A

g. Owner of effluent TLAP disposal site (if applicable):

   Mr. ☐ Ms. ☐ First/Last or Organization Name: N/A

[3] http://www15.tceq.texas.gov/crpub/index.cfm?fuseaction=regent.RNSearch

Mailing Address: N/A City/State/ZIP Code: N/A

Phone No.: N/A Fax No.: N/A E-mail: N/A

If not the same as the facility owner, there must be a long-term lease agreement in effect for at least six years. **Attachment**: N/A

h. Owner of sewage sludge disposal site (if applicable):

Mr. ☐ Ms. ☐ First/Last or Organization Name: N/A

Mailing Address: N/A City/State/ZIP Code: N/A

Phone No.: N/A Fax No.: N/A E-mail: N/A

If not the same as the facility owner, there must be a long-term lease agreement in effect for at least six years. **Attachment**: N/A

(This information is required only if authorization is sought in the permit for sludge disposal on property owned or controlled by the applicant.)

9. TDPES DISCHARGE/TLAP DISPOSAL INFORMATION (Instructions, Pages 25-28)

a. Is the facility located on or does the treated effluent cross American Indian Land?

☐ Yes ☒ No

b. Attach an **original** full size USGS Topographic Map (or an 8.5"×11" **reproduced** portion for renewal or amendment applications) with all required information. Check the box next to each item below to confirm it has been included on the map.

- ☒ One-mile radius and three-miles downstream information
- ☒ Applicant's property boundaries
- ☒ Treatment facility boundaries
- ☒ Labeled point(s) of discharge and highlighted discharge route(s)
- ☐ Effluent disposal site boundaries
- ☐ All wastewater ponds
- ☐ Sewage sludge disposal site
- ☐ New and future construction
- ☒ Attachment: C

c. Is the location of the sewage sludge disposal site in the existing permit accurate?

☐ Yes ☐ No ☒ N/A

If **no**, or a **new** application, please give an accurate description: N/A

d. Are the point(s) of discharge and the discharge route(s) in the existing permit correct?

☐ Yes ☒ No ☐ N/A

If **no**, or a **new or amendment** applications, provide an accurate description: OCPS will discharge via Outfall 002 to the defined intake canal at Sabine (tidal), thence to Segment 2412 of Sabine Lake.

e. City nearest the outfall(s): Port Arthur

f. County in which the outfalls(s) is/are located: Orange County

g. Is or will the treated wastewater discharge to a city, county, or state highway right-of-way, or a flood control district drainage ditch?

☐ Yes ☒ No

If **yes**, indicate by a check mark if: ☐ Authorization granted ☐ Authorization pending

For **new and amendment** applications, provide copies of letters that show proof of contact and the approval letter upon receipt.

Attachment: N/A

h. For all applications involving an average daily discharge of 5 MGD or more, provide the names of all counties located within 100 statute miles downstream of the point(s) of discharge. Orange and Jefferson Counties

i. For **TLAPs**, is the location of the effluent disposal site in the existing permit accurate?

☐ Yes ☐ No ☒ N/A

If **no**, or if this a **new or amendment** application, provide an accurate description: N/A

j. City nearest the disposal site: N/A

k. County in which the disposal site is located: N/A

l. Disposal Site Latitude: N/A Longitude: N/A

m. For **TLAPs**, describe how effluent is/will be routed from the treatment facility to the disposal site: N/A

n. For **TLAPs**, identify the nearest watercourse to the disposal site to which rainfall runoff might flow if not contained: N/A

10. MISCELLANEOUS INFORMATION (Instructions, Page 28)

a. Did any person formerly employed by the TCEQ represent your company and get paid for service regarding this application?

☐ Yes ☒ No

If **yes**, list each person: N/A

b. Do you owe any fees to the TCEQ?

☐ Yes ☒ No

If **yes**, provide the following:

- Acct. No.: N/A
- Amt. due: N/A

c. Do you owe any penalties to the TCEQ?

☐ Yes ☒ No

If **yes**, provide the following:

- Enforcement Order No.: N/A
- Amt. due: N/A

11. SIGNATURE PAGE (Instructions, Page 29)

Permit No: WQ0000336000

Applicant Name: Entergy Texas, Inc.

Certification:

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

I further certify that I am authorized under 30 Texas Administrative Code §305.44 to sign and submit this document, and can provide documentation in proof of such authorization upon request.

Signatory name (typed or printed): Jason Evan Willis

Signatory title: Vice President Power Plant Operations

Signature: _____ Date: 7/15/2021

(Use blue ink)

Subscribed and Sworn to before me by the said Jason Willis

on this 15 day of July, 2021.

My commission expires on the 8 day of July, 2024.

Lisa Gatewood
Notary Public

LISA GATEWOOD
Notary Public, State of Texas
Comm. Expires 07-08-2024
Notary ID 3618776
[SEAL]

Montgomery
County, Texas

If co-applicants are necessary, each entity must submit an original, separate signature page.

INDUSTRIAL ADMINISTRATIVE REPORT 1.1

The following information is required for **new** and **amendment** applications.

1. AFFECTED LANDOWNER INFORMATION (Instructions, Pages 30-32)

a. Attach a landowners map or drawing, with scale, as applicable. Check the box next to each item to confirm it has been provided.

- ☒ The applicant's property boundaries.
- ☒ The facility site boundaries within the applicant's property boundaries.
- ☐ The distance the buffer zone falls into adjacent properties and the property boundaries of the landowners located within the buffer zone.
- ☒ The property boundaries of all landowners surrounding the applicant's property. (**Note:** if the application is a major amendment for a lignite mine, the map must include the property boundaries of all landowners adjacent to the new facility (ponds).)
- ☒ The point(s) of discharge and highlighted discharge route(s) clearly shown for one mile downstream.
- ☒ The property boundaries of the landowners located on both sides of the discharge route for one full stream mile downstream of the point of discharge.
- ☒ The property boundaries of the landowners along the watercourse for a one-half mile radius from the point of discharge if the point of discharge is into a lake, bay, estuary, or affected by tides.
- ☐ The boundaries of the effluent disposal site (e.g., irrigation area or subsurface drainfield site) and all evaporation/holding ponds within the applicant's property.
- ☐ The property boundaries of all landowners surrounding the applicant's property boundaries where the effluent disposal site is located.
- ☐ The boundaries of the sludge land application site (for land application of sewage sludge for beneficial use) and the property boundaries of landowners within one-quarter mile of the applicant's property boundaries where the sewage sludge land application site is located.
- ☐ The property boundaries of landowners within one-half mile in all directions from the applicant's property boundaries where the sewage sludge disposal site (e.g., sludge surface disposal site or sludge monofill) is located.

Attachment: D

b. Check the box next to the format of the landowners list:

☒ Readable/Writeable CD ☐ Four sets of labels

c. ☒ Check this box to confirm a separate list with the landowners' names and mailing addresses cross-referenced to the landowners map has been attached.

Attachment: D

d. Provide the source of the landowners' names and mailing addresses: Orange County and Jefferson County Appraisal Districts

e. As required by *Texas Water Code § 5.115*, is any permanent school fund land affected by this application?

☐ Yes ☒ No

If **yes**, provide the location and foreseeable impacts and effects this application has on the land(s): N/A

2. ORIGINAL PHOTOGRAPHS (Instructions, Page 32)

Provide original ground level photographs. Indicate with checkmarks that the following information is provided.

☒ At least one original photograph of the new or expanded treatment unit location.

☒ At least two photographs of the existing/proposed point of discharge and as much area downstream (photo 1) and upstream (photo 2) as can be captured. If the discharge is to an open water body (e.g., lake, bay), the point of discharge should be in the right or left edge of each photograph showing the open water and with as much area on each respective side of the discharge as can be captured.

☐ At least one photograph of the existing/proposed effluent disposal site.

☒ A plot plan or map showing the location and direction of each photograph.

Attachment: E

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

SUPPLEMENTAL PERMIT INFORMATION FORM (SPIF)

FOR AGENCIES REVIEWING INDUSTRIAL TPDES WASTEWATER PERMIT APPLICATIONS

TCEQ USE ONLY:

Application type: ____Renewal _____Major Amendment ____Minor Amendment _____New

County: _____ Segment Number: _____

Admin Complete Date: _____

Agency Receiving SPIF:

_____ Texas Historical Commission _____ U.S. Fish and Wildlife

_____ Texas Parks and Wildlife Department _____ U.S. Army Corps of Engineers

This form applies to TPDES permit applications only. (Instructions, Page 33)

The SPIF must be completed as a separate document. The TCEQ will mail a copy of the SPIF to each agency as required by the TCEQ agreement with EPA. If any of the items are not completely addressed or further information is needed, you will be contacted to provide the information before the permit is issued. Each item must be completely addressed.

Do not refer to a response of any item in the permit application form. Each attachment must be provided with this form separately from the administrative report of the application. The application will not be declared administratively complete without this form being completed in its entirety including all attachments.

The following applies to all applications:

1. Permittee Name: Entergy Texas, Inc.

2. Permit No.: WQ0000336000 EPA ID No.: TX0006696

3. Address of the project (location description that includes street/highway, city/vicinity, and county): 1000 Powerhouse Road, Orange, Texas, 77630

4. Provide the name, address, phone and fax number, and email address of an individual that can be contacted to answer specific questions about the property.

   First/Last Name: Tory Theriot Title: Environmental Analyst Credential: N/A

   Organization Name: Entergy Services, Inc.

   Mailing Address: 1000 Powerhouse Road City/State/ZIP Code: Orange, Texas, 77630

   Phone No.: 409-734-3360 Fax No.: N/A E-mail: ttherio@entergy.com

5. List the county in which the facility is located: Orange County

6. If the property is publicly owned and the owner is different than the permittee/applicant, please list the owner of the property: N/A

7. Provide a description of the effluent discharge route. The discharge route must follow the flow of effluent from the point of discharge to the nearest major watercourse (from the point of discharge to a classified segment as defined in *30 TAC Chapter 307*). If known, please identify the classified segment number: via Outfall 002 to the defined intake canal at Sabine (tidal), thence to Segment 2412 of Sabine Lake.

8. Please provide a separate 7.5-minute USGS quadrangle map with the project boundaries plotted and a general location map showing the project area. Please highlight the discharge route from the point of discharge for a distance of one mile downstream. (This map is required in addition to the map in the administrative report.)

   Attachment: See SPIF Attachment A

9. Provide original photographs of any structures 50 years or older on the property.

   Attachment: See SPIF Attachment B

10. Does your project involve any of the following? Check all that apply.

- ☒ Proposed access roads, utility lines, construction easements
- ☐ Visual effects that could damage or detract from a historic property's integrity
- ☐ Vibration effects during construction or as a result of project design
- ☐ Additional phases of development that are planned for the future
- ☐ Sealing caves, fractures, sinkholes, other karst features
- ☒ Disturbance of vegetation or wetlands

11. List proposed construction impact (surface acres to be impacted, depth of excavation, sealing of caves, or other karst features): Construction of the new unit and associated facilities will temporarily impact approximately 42.2 acres and permanently impact approximately 26.2 acres. The associated transmission line will impact approximately 24.6 acres.

12. Describe existing disturbances, vegetation, and land use: N/A

THE FOLLOWING ITEMS APPLY ONLY TO APPLICATIONS FOR NEW TPDES PERMITS AND MAJOR AMENDMENTS TO TPDES PERMITS

13. List construction dates of all buildings and structures on the property: Units 1 & 2- Construction started October 15, 1959, Commercial operation March 31, 1962, Work completed November 1962 (Builder: Stone & Webster); Unit 3- Construction started September 1964, Commercial operation December 22, 1966, Work Completed August 25, 1967 (Builder: Stone & Webster); Unit 4-Construction started April 25 1969, Commercial Operation Date October 1, 1973, Work Completed June 1974 (Builder: Mid Valley); Unit 5- Construction started -1977/1978, completed & released for generation 1979 , Commercial Operation Date Work 12/21/1979.

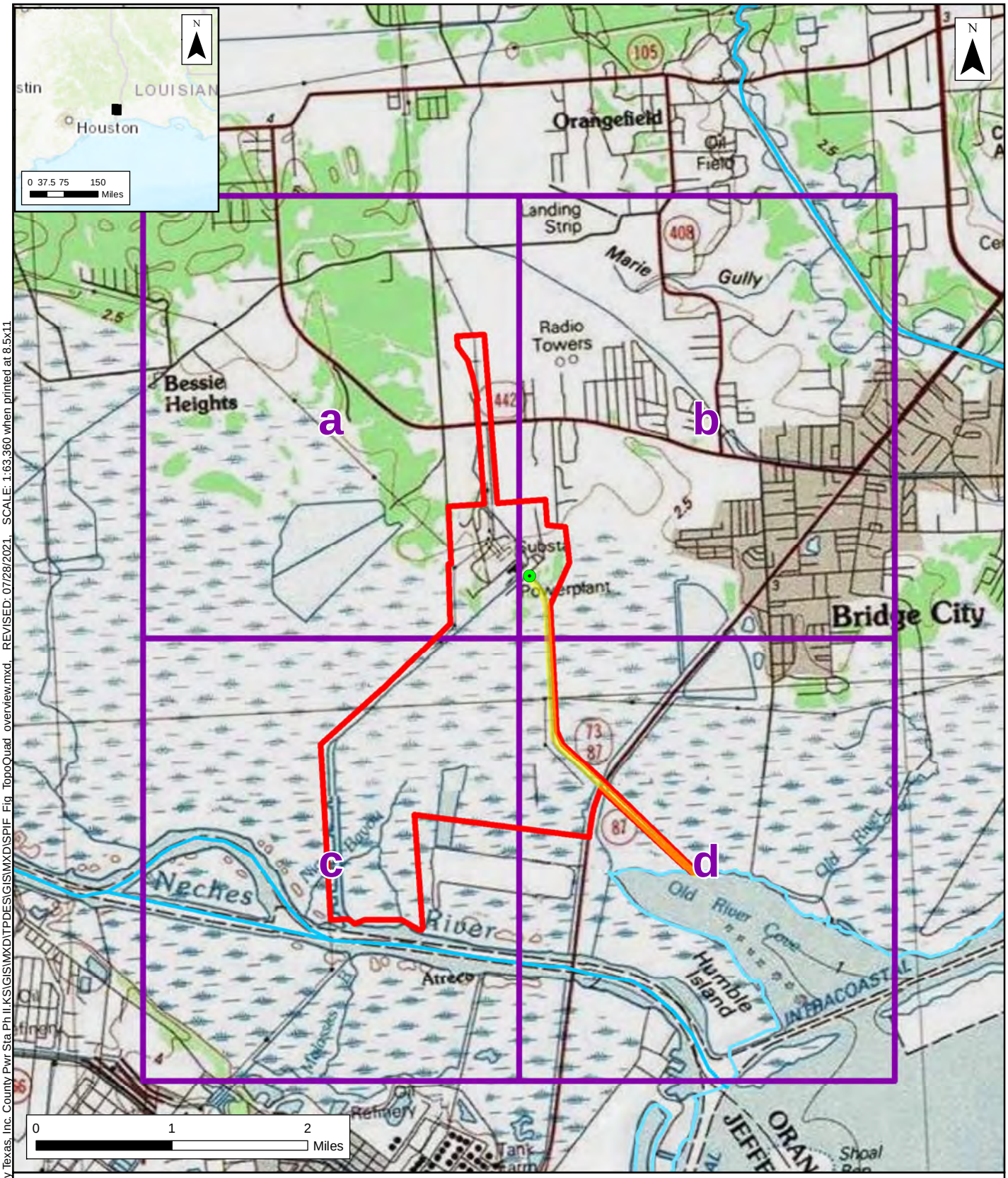
14. Provide a brief history of the property, and name of the architect/builder, if known: The Sabine property was coastal marsh prior to being purchased in the early 50s for the purpose of electrical generation. Construction was completed in 1979 and the builder was Mid Valley.

USGS Figure

SPIF Attachment A

July 2021
Project No. 0574234

Environmental Resources Management
CityCentre Four
840 West Sam Houston Parkway North, Suite 600
Houston, Texas 77024-3920
281-600-1000



H:\Houston\Projects\0574234 Entergy Texas, Inc. County Pwr Sta Ph II_KS\GIS\MXD\TPDES\GIS\MXD\SPIF Fig TopoQuad overview.mxd, REVISED: 07/29/2021, SCALE: 1:63,360 when printed at 8.5x11

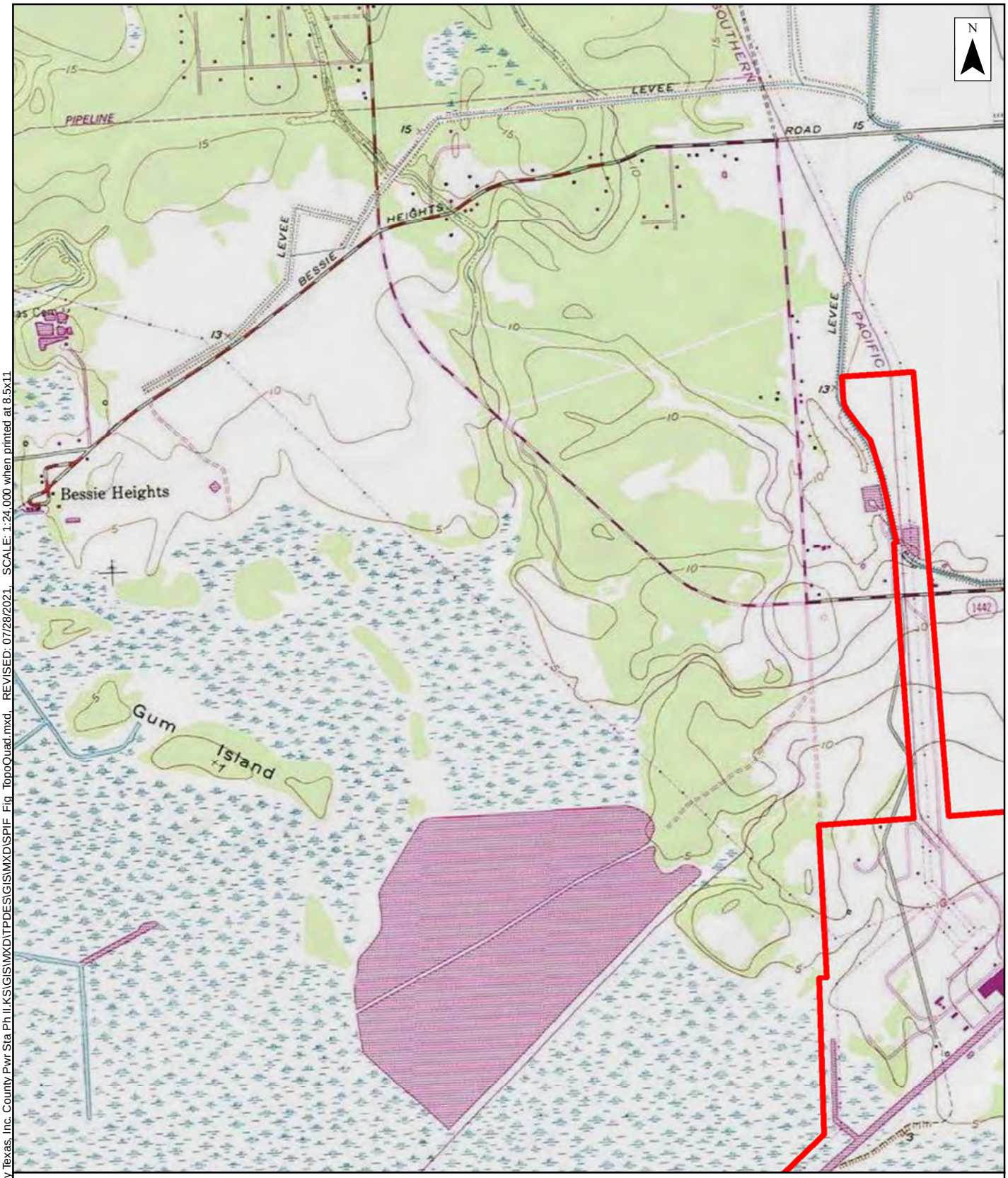
Legend

- Property Boundary
- Outfall
- OCPS Discharge route
- Map grid
- TCEQ Classified Segment

SPIF Figure Overview
Terry, Orangefield, Port Arthur North, and West of Greens Bayou 1:24,000 USGS Quadrangles
TPDES Permit Major Amendment
Entergy OCPS
Orange, Texas

Environmental Resources Management
www.erm.com

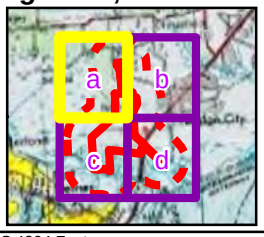
Source: Esri - World Topoographic Map; NAD 1983 StatePlane Texas South Central FIPS 4204 Feet



Legend

- Sabine Station
- TCEQ Classified Segment

Terry, Orangefield, Port Arthur North, and West of Greens Bayou
1:24,000 USGS Quadrangles
SPIF Figure a
TPDES Permit Major Amendment
Entergy OCPS
Orange, Texas



Environmental Resources Management
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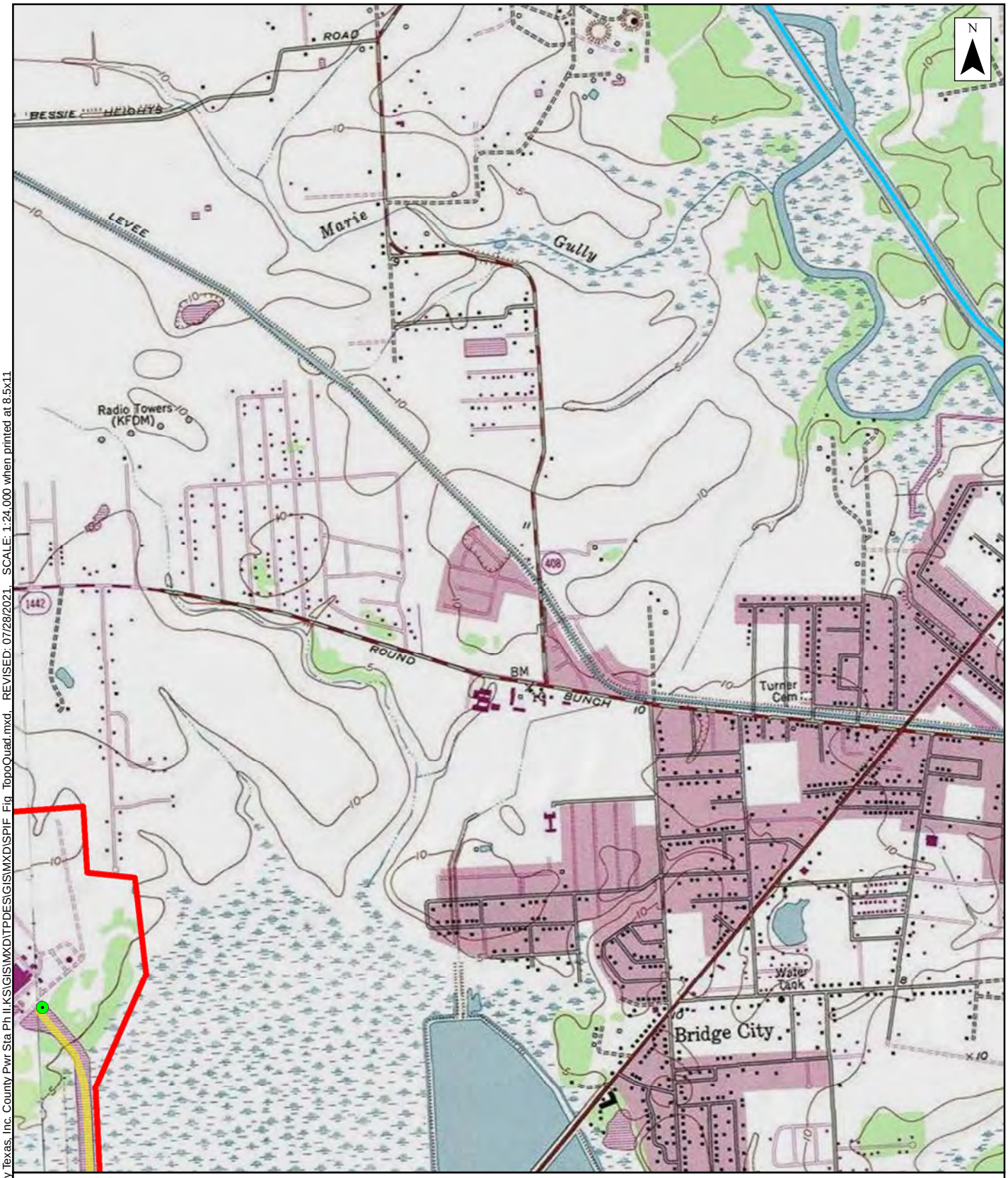
ERM

Source: Esri - World Topoographic Map; NAD 1983 StatePlane Texas South Central FIPS 4204 Feet

H:\Houston\Projects\0574234 Entergy Texas, Inc. County Pwr Sta Ph II.KS\GIS\MXD\TPDES\GIS\MXD\SPIF Fig TopoQuad.mxd, REVISED: 07/28/2021, SCALE: 1:24,000 when printed at 8.5x11



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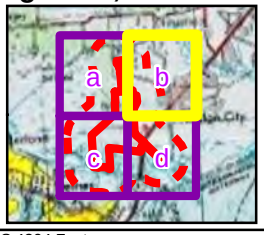
Legend

- Sabine Station
- Outfall
- OCPS Discharge route
- TCEQ Classified Segment



Terry, Orangefield, Port Arthur North, and West of Greens Bayou
1:24,000 USGS Quadrangles
SPIF Figure b
TPDES Permit Major Amendment
Entergy OCPS
Orange, Texas

Environmental Resources Management
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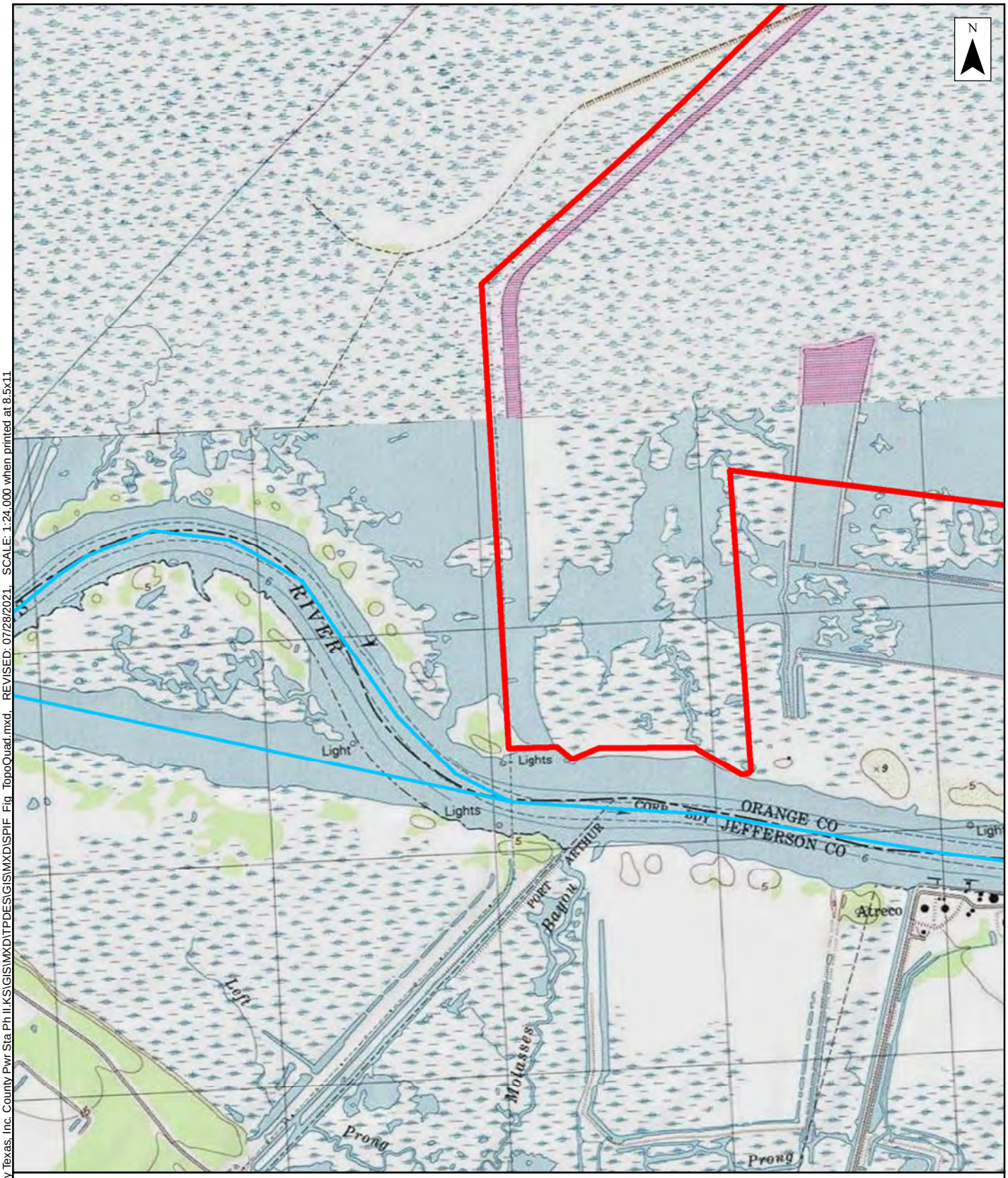
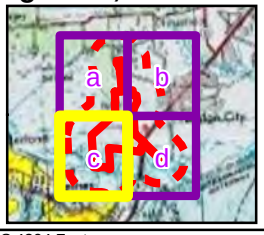
Source: Esri - World Topoographic Map; NAD 1983 StatePlane Texas South Central FIPS 4204 Feet



Legend

- Sabine Station
- TCEQ Classified Segment



Terry, Orangefield, Port Arthur North, and West of Greens Bayou
1:24,000 USGS Quadrangles
SPIF Figure c
TPDES Permit Major Amendment
Entergy OCPS
Orange, Texas

Environmental Resources Management
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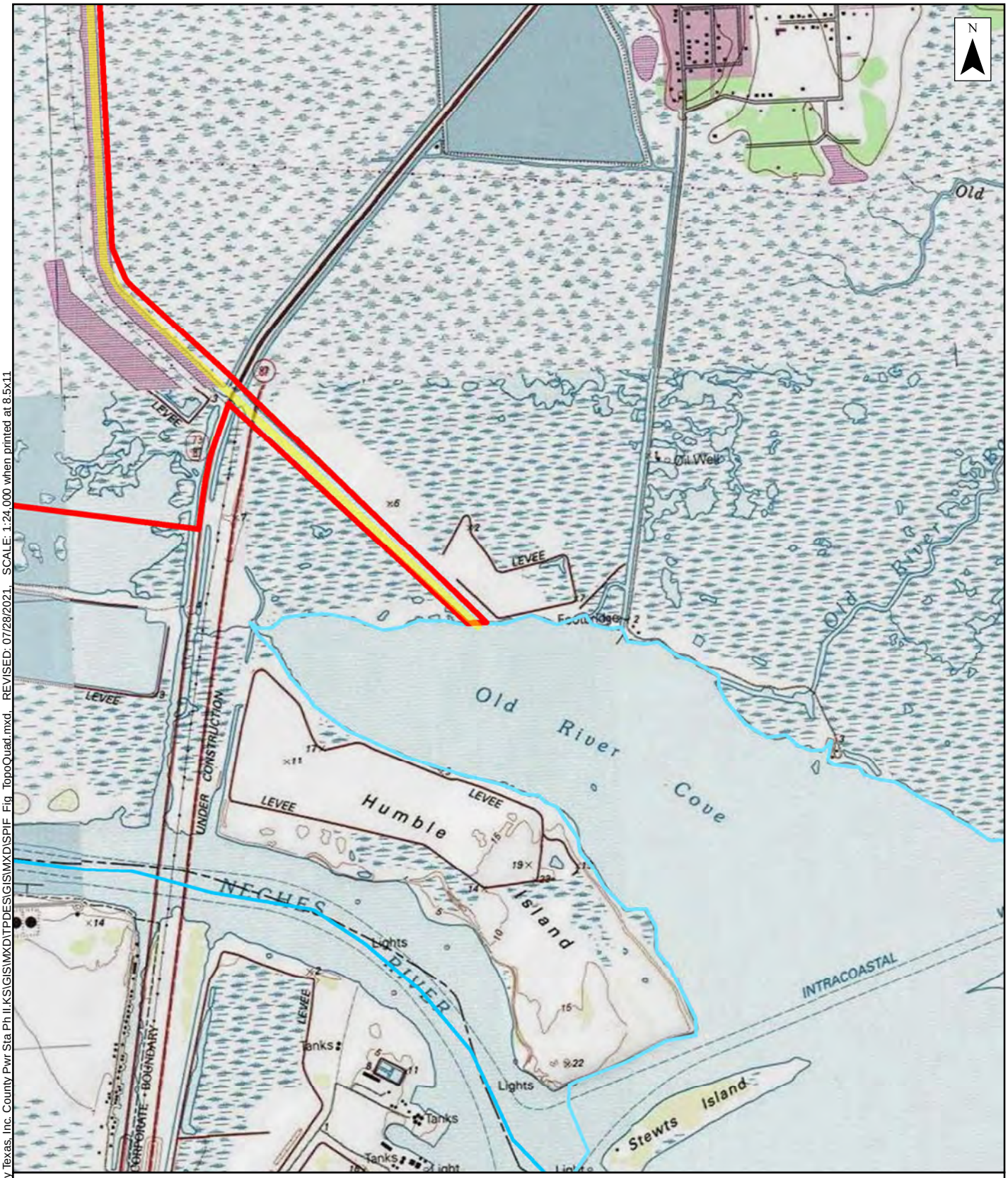
H:\Houston\Projects\0574234 Entergy Texas, Inc. County Pwr Sta Ph II.KS\GIS\MXD\TPDES\GIS\MXD\SPIF Fig TopoQuad.mxd, REVISED: 07/28/2021, SCALE: 1:24,000 when printed at 8.5x11

Source: Esri - World Topoographic Map; NAD 1983 StatePlane Texas South Central FIPS 4204 Feet



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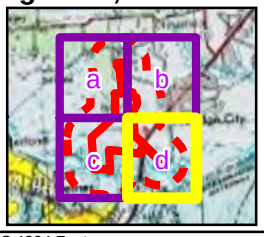
Legend

- Sabine Station
- OCPS Discharge route
- TCEQ Classified Segment

Terry, Orangefield, Port Arthur North, and West of Greens Bayou 1:24,000 USGS Quadrangles



SPIF Figure d

TPDES Permit Major Amendment
Entergy OCPS
Orange, Texas

Environmental Resources Management
www.erm.com
ERM

Source: Esri - World Topoographic Map; NAD 1983 StatePlane Texas South Central FIPS 4204 Feet

Photographs

SPIF Attachment B

July 2021
Project No. 0574234

Environmental Resources Management
CityCentre Four
840 West Sam Houston Parkway North, Suite 600
Houston, Texas 77024-3920
281-600-1000

Legend

★ Photo location

Photo Location Figure

Terry, Orangefield, Port Arthur North, and West of Greens Bayou 1:24,000 USGS Quadrangles

TPDES Permit - Major Amendment

Entergy Sabine Plant

Orange, Texas

Environmental Resources Management
www.erm.com

H:\Projects\0467513 Entergy Services, Inc. Permit Renewal.ARGIS\MXD\Photo location.mxd, REVISED: 10/24/2018, SCALE: 1:6,000 when printed at 8.5x11

Source: Esri - World Topoographic Map; NAD 1983 StatePlane Texas South Central FIPS 4204 Feet

Environmental Resources Management

CITYCENTRE FOUR
840 West Sam Houston Parkway North, Suite 600
Houston, Texas 77024
(281) 600-1000
(281) 520-4625 (Fax)

Client: Entergy Texas, Inc.	Project Number: 0467513
TPDES Permit Number: WQ0000336000	Location: Sabine Plant
Photograph ID: 1	
Feature: Administration Building	
Date: October 22, 2018	
Comments:	

Client: Entergy Texas, Inc.	Project Number: 0467513
TPDES Permit Number: WQ0000336000	Location: Sabine Plant
Photograph ID: 2	
Feature: Assembly Hall	
Date: October 22, 2018	
Comments:	

Environmental Resources Management

CITYCENTRE FOUR
840 West Sam Houston Parkway North, Suite 600
Houston, Texas 77024
(281) 600-1000
(281) 520-4625 (Fax)

Client: Entergy Texas, Inc.	Project Number: 0467513
TPDES Permit Number: WQ0000336000	Location: Sabine Plant
Photograph ID: 3	
Feature: Contractors Office Building	
Date: October 22, 2018	
Comments:	

Client: Entergy Texas, Inc.	Project Number: 0467513
TPDES Permit Number: WQ0000336000	Location: Sabine Plant
Photograph ID: 4	
Feature: Contractors Warehouse	
Date: October 22, 2018	
Comments:	

Environmental Resources Management

CITYCENTRE FOUR
840 West Sam Houston Parkway North, Suite 600
Houston, Texas 77024
(281) 600-1000
(281) 520-4625 (Fax)

Client: Entergy Texas, Inc.	Project Number: 0467513
TPDES Permit Number: WQ0000336000	Location: Sabine Plant
Photograph ID: 5	
Feature: Diesel Fire Pump House	
Date: October 22, 2018	
Comments:	

Client: Entergy Texas, Inc.	Project Number: 0467513
TPDES Permit Number: WQ0000336000	Location: Sabine Plant
Photograph ID: 6	
Feature: Electric Fire Pump House	
Date: October 22, 2018	
Comments:	

Environmental Resources Management

CITYCENTRE FOUR
840 West Sam Houston Parkway North, Suite 600
Houston, Texas 77024
(281) 600-1000
(281) 520-4625 (Fax)

Client: Entergy Texas, Inc.	Project Number: 0467513
TPDES Permit Number: WQ0000336000	Location: Sabine Plant
Photograph ID: 7	
Feature: IC&E Building	
Date: October 22, 2018	
Comments:	

Client: Entergy Texas, Inc.	Project Number: 0467513
TPDES Permit Number: WQ0000336000	Location: Sabine Plant
Photograph ID: 8	
Feature: Maintenance Shop	
Date: October 22, 2018	
Comments:	

Environmental Resources Management

CITYCENTRE FOUR
840 West Sam Houston Parkway North, Suite 600
Houston, Texas 77024
(281) 600-1000
(281) 520-4625 (Fax)

Client: Entergy Texas, Inc.	Project Number: 0467513
TPDES Permit Number: WQ0000336000	Location: Sabine Plant
Photograph ID: 9	
Feature: Potable Water Building	
Date: October 22, 2018	
Comments:	

Client: Entergy Texas, Inc.	Project Number: 0467513
TPDES Permit Number: WQ0000336000	Location: Sabine Plant
Photograph ID: 10	
Feature: Precipitator MCC Building	
Date: October 22, 2018	
Comments:	

Environmental Resources Management

CITYCENTRE FOUR
840 West Sam Houston Parkway North, Suite 600
Houston, Texas 77024
(281) 600-1000
(281) 520-4625 (Fax)

Client: Entergy Texas, Inc.	Project Number: 0467513
TPDES Permit Number: WQ0000336000	Location: Sabine Plant
Photograph ID: 11	
Feature: Retired Chlorine Building	
Date: October 22, 2018	
Comments:	

Client: Entergy Texas, Inc.	Project Number: 0467513
TPDES Permit Number: WQ0000336000	Location: Sabine Plant
Photograph ID: 12	
Feature: Retired MCW & Welding Building	
Date: October 22, 2018	
Comments:	

Environmental Resources Management

CITYCENTRE FOUR
840 West Sam Houston Parkway North, Suite 600
Houston, Texas 77024
(281) 600-1000
(281) 520-4625 (Fax)

Client: Entergy Texas, Inc.	Project Number: 0467513
TPDES Permit Number: WQ0000336000	Location: Sabine Plant
Photograph ID: 13	
Feature: Storeroom & Warehouse	
Date: October 22, 2018	
Comments:	

Client: Entergy Texas, Inc.	Project Number: 0467513
TPDES Permit Number: WQ0000336000	Location: Sabine Plant
Photograph ID: 14	
Feature: System Lab	
Date: October 22, 2018	
Comments:	

Environmental Resources Management

CITYCENTRE FOUR
840 West Sam Houston Parkway North, Suite 600
Houston, Texas 77024
(281) 600-1000
(281) 520-4625 (Fax)

Client: Entergy Texas, Inc.	Project Number: 0467513
TPDES Permit Number: WQ0000336000	Location: Sabine Plant
Photograph ID: 15	
Feature: Unit 1-2 Cooling Tower	
Date: October 22, 2018	
Comments:	

Client: Entergy Texas, Inc.	Project Number: 0467513
TPDES Permit Number: WQ0000336000	Location: Sabine Plant
Photograph ID: 16	
Feature: Units 3&4 Cooling Towers	
Date: October 22, 2018	
Comments:	

Environmental Resources Management

CITYCENTRE FOUR
840 West Sam Houston Parkway North, Suite 600
Houston, Texas 77024
(281) 600-1000
(281) 520-4625 (Fax)

Client: Entergy Texas, Inc.	Project Number: 0467513
TPDES Permit Number: WQ0000336000	Location: Sabine Plant
Photograph ID: 17	
Feature: Warehouse C	
Date: October 22, 2018	
Comments:	

Client: Entergy Texas, Inc.	Project Number: 0467513
TPDES Permit Number: WQ0000336000	Location: Sabine Plant
Photograph ID: 18	
Feature: Warehouse D	
Date: October 22, 2018	
Comments:	

Environmental Resources Management

CITYCENTRE FOUR
840 West Sam Houston Parkway North, Suite 600
Houston, Texas 77024
(281) 600-1000
(281) 520-4625 (Fax)

Client: Entergy Texas, Inc.	Project Number: 0467513
TPDES Permit Number: WQ0000336000	Location: Sabine Plant
Photograph ID: 19	
Feature: Waste Basin	
Date: October 22, 2018	
Comments:	

Client: Entergy Texas, Inc.	Project Number: 0467513
TPDES Permit Number: WQ0000336000	Location: Sabine Plant
Photograph ID: 20	
Feature: Water Plant & Tech Shop	
Date: October 22, 2018	
Comments:	

Environmental Resources Management

CITYCENTRE FOUR
840 West Sam Houston Parkway North, Suite 600
Houston, Texas 77024
(281) 600-1000
(281) 520-4625 (Fax)

Client: Entergy Texas, Inc.	Project Number: 0467513
TPDES Permit Number: WQ0000336000	Location: Sabine Plant
Photograph ID: 21	
Feature: Water Plant East View	
Date: October 22, 2018	
Comments:	

Client: Entergy Texas, Inc.	Project Number: 0467513
TPDES Permit Number: WQ0000336000	Location: Sabine Plant
Photograph ID: 22	
Feature: Water Plant North View	
Date: October 22, 2018	
Comments:	

Environmental Resources Management

CITYCENTRE FOUR
840 West Sam Houston Parkway North, Suite 600
Houston, Texas 77024
(281) 600-1000
(281) 520-4625 (Fax)

Client: Entergy Texas, Inc.	Project Number: 0467513
TPDES Permit Number: WQ0000336000	Location: Sabine Plant
Photograph ID: 23	
Feature: Unit 5 Cooling Towers	
Date: October 22, 2018	
Comments:	

Client: Entergy Texas, Inc.	Project Number: 0467513
TPDES Permit Number: WQ0000336000	Location: Sabine Plant
Photograph ID: 24	
Feature: Unit Block #1-3	
Date: October 22, 2018	
Comments:	

Environmental Resources Management

CITYCENTRE FOUR
840 West Sam Houston Parkway North, Suite 600
Houston, Texas 77024
(281) 600-1000
(281) 520-4625 (Fax)

Client: Entergy Texas, Inc.	Project Number: 0467513
TPDES Permit Number: WQ0000336000	Location: Sabine Plant
Photograph ID: 25	
Feature: Unit Block #4-5	
Date: October 22, 2018	
Comments:	

Client: Entergy Texas, Inc.	Project Number: 0467513
TPDES Permit Number: WQ0000336000	Location: Sabine Plant
Photograph ID: 26	
Feature: Unit 5 MCC Building	
Date: October 22, 2018	
Comments:	

TECHNICAL REPORT 1.0
INDUSTRIAL

The following information **is required** for all applications for a TLAP or an individual TPDES discharge permit.

For additional information or clarification on the requested information, refer to the Instructions for Completing the Industrial Wastewater Permit Application[1] available on the TCEQ website.

If more than one outfall is included in the application, provide applicable information for each individual outfall. **If an item does not apply to the facility, enter N/A** to indicate that the item has been considered. Include separate reports or additional sheets as **clearly cross-referenced attachments** and provide the attachment number in the space provided for the item the attachment addresses.

NOTE: This application is for an industrial wastewater permit only. Additional authorizations from the TCEQ Waste Permits Division or the TCEQ Air Permits Division may be needed.

1. FACILITY/SITE INFORMATION (Instructions, Pages 35-36)

a. Describe the general nature of the business and type(s) of industrial and commercial activities. Include all applicable SIC codes (up to 4).

The Facility is a steam electric power generator. SIC code is 4911.

b. Describe all wastewater-generating processes at the facility.

A detailed description of the wastewater generating process is attached. See Attachment F.

[1] https://www.tceq.texas.gov/permitting/wastewater/industrial/TPDES_industrial_wastewater_steps.html

c. Provide a list of raw materials, major intermediates, and final products handled at the facility.

Materials List

Raw Materials	Intermediate Products	Final Products
Natural Gas	Steam	Electricity
Water		

Attachment: N/A

d. Attach a facility map (drawn to scale) with the following information:

- Production areas, maintenance areas, materials-handling areas, waste-disposal areas, and water intake structures.
- The location of each unit of the WWTP including the location of wastewater collection sumps, impoundments, outfalls, and sampling points, if significantly different from outfall locations.

Attachment: G

e. Is this a new permit application for an existing facility?

☐ Yes ☒ No

If **yes**, provide background discussion: N/A

f. Is/will the treatment facility/disposal site be located above the 100-year frequency flood level.

☒ Yes ☐ No

List source(s) used to determine 100-year frequency flood plain: FEMA Flood Plain Maps (4805100150B and 4805100175B)

If **no**, provide the elevation of the 100-year frequency flood plain and describe what protective measures are used/proposed to prevent flooding (including tail water and rainfall run-on controls) of the treatment facility and disposal area: N/A

Attachment: N/A

g. For **new** or **major amendment** permit applications, will any construction operations result in a discharge of fill material into a water in the state?

☒ Yes ☐ No ☐ N/A (renewal only)

h. If **yes** to Item 1.g, has the applicant applied for a USACE CWA Chapter 404 Dredge and Fill permit?

☐ Yes ☒ No

If **yes**, provide the permit number: Click to enter text

If **no**, provide an approximate date of application submittal to the USACE: August 01, 2021

2. TREATMENT SYSTEM (Instructions, Page 36)

a. List any physical, chemical, or biological treatment process(es) used/proposed to treat wastewater at this facility. Include a description of each treatment process, starting with initial treatment and finishing with the outfall/point of disposal.

Outfall 202: Oily waste treatment in conventional oil/water separator(s) is the only form of treatment for the low volume waste sump. The waste after self-mixing is expected to be in the neutral range; there a pH control system will not be provided.

Outfall 302: In-situ neutralization of cleaning waste from the chemical cleaning of UF and RO membranes. In this process, which is included in the demineralizer vendor's scope of work, acid or caustic will be injected into the recirculation line between cleaning skid and membranes until pH is in the neutral range.

b. Attach a flow schematic **with a water balance** showing all sources of water and wastewater flow into the facility, wastewater flow into and from each treatment unit, and wastewater flow to each outfall/point of disposal.

Attachment: H

3. IMPOUNDMENTS (Instructions, Pages 36-38)

Does the facility use or plan to use any wastewater impoundments (e.g., lagoons or ponds?)

☐ Yes ☒ No

If **no**, proceed to Item 4. If **yes**, complete **Item 3.a** for **existing** impoundments and **Items 3.a - 3.e** for **new or proposed** impoundments. **NOTE:** See instructions, Pages 35-37, for additional information on the attachments required by Items 3.a – 3.e.

a. Complete the table with the following information for each existing, new, or proposed impoundment:

Use Designation: Indicate the use designation for each impoundment as Treatment (**T**), Disposal (**D**), Containment (**C**), or Evaporation (**E**).

Associated Outfall Number: Provide an outfall number if a discharge occurs or will occur.

Liner Type: Indicate the liner type as Compacted clay liner (**C**), In-situ clay liner (**I**), Synthetic/plastic/rubber liner (**S**), or Alternate liner (**A**). **NOTE:** See instructions for further detail on liner specifications. If an alternate liner (A) is selected, include an attachment that provides a description of the alternate liner and any additional technical information necessary for an evaluation.

Leak Detection System: If any leak detection systems are in place/planned, enter **Y** for yes. Otherwise, enter **N** for no.

Groundwater Monitoring Wells and Data: If groundwater monitoring wells are in place/planned, enter **Y** for yes. Otherwise, enter **N** for no. Attach any existing groundwater monitoring data.

Dimensions: Provide the dimensions, freeboard, surface area, storage capacity of the impoundments, and the maximum depth (not including freeboard). For impoundments with irregular shapes, submit surface area instead of length and width.

Compliance with 40 CFR Part 257, Subpart D: If the impoundment is required to be in compliance with 40 CFR Part 257, Subpart D, enter **Y** for yes. Otherwise, enter **N** for no.

Date of Construction: Enter the date construction of the impoundment commenced (mm/dd/yy).

Impoundment Information

Parameter	Pond #	Pond #	Pond #	Pond #
Use Designation: (T) (D) (C) or (E)	N/A			
Associated Outfall Number				
Liner Type (C) (I) (S) or (A)				
Alt. Liner Attachment Reference				
Leak Detection System, Y/N				
Groundwater Monitoring Wells, Y/N				
Groundwater Monitoring Data Attachment				
Pond Bottom Located Above The Seasonal High-Water Table, Y/N				
Length (ft)				
Width (ft)				
Max Depth From Water Surface (ft), Not Including Freeboard				
Freeboard (ft)				
Surface Area (acres)				
Storage Capacity (gallons)				
40 CFR Part 257, Subpart D, Y/N				
Date of Construction				

Impoundment Information

Parameter	Pond #	Pond #	Pond #	Pond #
Use Designation: (T) (D) (C) or (E)	N/A			
Associated Outfall Number				
Liner Type (C) (I) (S) or (A)				
Alt. Liner Attachment Reference				
Leak Detection System, Y/N				
Groundwater Monitoring Wells, Y/N				
Groundwater Monitoring Data Attachment				
Pond Bottom Located Above The Seasonal High-Water Table, Y/N				
Length (ft)				
Width (ft)				
Max Depth From Water Surface (ft), not including freeboard				
Freeboard (ft)				
Surface Area (acres)				
Storage Capacity (gallons)				
40 CFR Part 257, Subpart D, Y/N				
Date of Construction				

Attachment: N/A

The following information (**Items 3.b – 3.e**) is required only for **new or proposed** impoundments.

b. For new or proposed impoundments, attach any available information on the following items. If attached, check **yes** in the appropriate box. Otherwise, check **no** or **not yet designed**.

i. Liner data

☐ Yes ☐ No ☐ Not yet designed

ii. Leak detection system or groundwater monitoring data

☐ Yes ☐ No ☐ Not yet designed

iii. Groundwater impacts

☐ Yes ☐ No ☐ Not yet designed

NOTE: Item b.iii is required if the bottom of the pond is not above the seasonal high-water table in the shallowest water-bearing zone.

Attachment: N/A

For TLAP applications: Items 3.c – 3.e are **not required**, continue to Item 4.

c. Attach a USGS map or a color copy of original quality and scale which accurately locates and identifies all known water supply wells and monitor wells within ½-mile of the impoundments.

Attachment: N/A

d. Attach copies of State Water Well Reports (e.g., driller's logs, completion data, etc.), and data on depths to groundwater for all known water supply wells including a description of how the depths to groundwater were obtained.

Attachment: N/A

e. Attach information pertaining to the groundwater, soils, geology, pond liner, etc. used to assess the potential for migration of wastes from the impoundments or the potential for contamination of groundwater or surface water.

Attachment: N/A

4. OUTFALL/DISPOSAL METHOD INFORMATION (Instructions, Pages 39-40)

Complete the following tables to describe the location and wastewater discharge or disposal operations for each outfall for discharge operations, and for each point of disposal for TLAP operations.

If there are more outfalls/points of disposal at the facility than the spaces provided, copies of pages 6 and/or numbered accordingly (i.e., page 6a, 6b, etc.) may be used to provide information on the additional outfalls.

For TLAP applications: Indicate the disposal method and each individual irrigation area **I**, evaporation pond **E**, or subsurface drainage system **S** by providing the appropriate letter designation for the disposal method followed by a numerical designation for each disposal area in the space provided for **Outfall** number (e.g. **E1** for evaporation pond 1, **I2** for irrigation area No. 2, etc.).

Outfall Latitude and Longitude

Outfall Number	Latitude-decimal degrees	Longitude-decimal degrees
002	30.022644	-93.874859
102	30.022939	-93.873153
202	30.024241	-93.872522
302	30.022939	-93.873153

Outfall Location Description

Outfall Number	Location Description
002	External Outfall – Discharge Ditch
102	Internal Outfall – Cooling Tower Blowdown
202	Internal Outfall – Low Volume Waste Sump
302	Internal Outfall – Chemical Cleaning prior to discharge into Discharge Ditch

Description of Sampling Points (if different from Outfall location)

Outfall Number	Description of Sampling Point
002	Discharge Ditch
102	Where cooling tower blowdown is discharged, prior to mixing with any other waste streams
202	Where low volume wastes are discharged from the treatment facility, prior to mixing with other waste streams
302	Where chemical cleaning wastes are discharged, prior to mixing with any other waste streams

Outfall Flow Information – Permitted and Proposed

Outfall Number	Permitted Daily Avg Flow (MGD)	Permitted Daily Max Flow (MGD)	Proposed Daily Avg Flow (MGD)	Proposed Daily Max Flow (MGD)	Anticipated Discharge Date (mm/dd/yy)
002	N/A	N/A	1.007	1.401	03/28/2025
102	N/A	N/A	0.635	0.935	04/2025
202	N/A	N/A	0.069	0.084	04/2025
302	N/A	N/A	0.270	0.350	04/2025

Outfall Discharge – Method and Measurement

Outfall Number	Pumped Discharge? Y/N	Gravity Discharge? Y/N	Type of Flow Measurement Device Used
002	N	Y	Weir Structure
102	Y	N	Orifice
202	Y	N	Orifice
302	Y	N	Estimate

Outfall Discharge – Flow Characteristics

Outfall Number	Intermittent Discharge? Y/N	Continuous Discharge? Y/N	Seasonal Discharge? Y/N	Discharge Duration (hrs/day)	Discharge Duration (days/mo)	Discharge Duration (mo/yr)
002	N	Y	N	24	31	12
102	N	Y	N	24	31	12
202	Y	N	N	6	31	12
302	Y	N	N	24	31	12

Wastestream Contributions

Outfall No.: 002

Contributing Wastestreams	Volume (MGD)	% of Total Flow
Cooling Tower Blowdown	0.635	63.1
Low Volume Waste	0.069	6.9
Chemical Cleaning (Internal Outfall 302)	0.270	26.8
Stormwater	0.033	3.2
Total	1.007	100

Outfall No.: 102

Contributing Wastestreams	Volume (MGD)	% of Total Flow
Cooling tower blowdown	0.635	100
Total	0.635	100

Outfall No.: 202

Contributing Wastestreams	Volume (MGD)	% of Total Flow
Oily waste	0.059	85
Ultrafiltration backwash	0.010	15

Attachment: Additional Outfall wastestream contributions included as Attachment I

5. BLOWDOWN AND ONCE-THROUGH COOLING WATER DISCHARGES (Instructions, Page 40)

a. Does the facility use/propose to use any cooling towers which discharge blowdown or other wastestreams to the outfall(s)?

☒ Yes ☐ No

NOTE: If the facility uses or plans to use cooling towers, Item 12 **is required**.

b. Does the facility use or plan to use any boilers that discharge blowdown or other wastestreams to the outfall(s)?

☒ Yes ☐ No

c. Does or will the facility discharge once-through cooling water to the outfall(s)?

☐ Yes ☒ No

NOTE: If the facility uses or plans to use once-through cooling water, Item 12 **is required**.

d. If **yes** to Items 5.a, 5.b, **or** 5.c, attach the SDS with the following information for each chemical additive.

- Manufacturers Product Identification Number
- Product use (e.g., biocide, fungicide, corrosion inhibitor, etc.)
- Chemical composition including CASRN for each ingredient
- Classify product as non-persistent, persistent, or bioaccumulative
- Product or active ingredient half-life
- Frequency of product use (e.g., 2 hours/day once every two weeks)
- Product toxicity data specific to fish and aquatic invertebrate organisms
- Concentration of whole product or active ingredient, as appropriate, in wastestream.

Attach a summary of this information in addition to the submittal of the SDS for each specific wastestream and the associated chemical additives and specify which outfalls are affected.

Attachment: J

e. Cooling Towers and Boilers

If **yes** to either Item 5.a **or** 5.b, complete the following table.

Cooling Towers and Boilers

Type of Unit	Number of Units	Dly Avg Blowdown (gallons/day)	Dly Max Blowdown (gallons/day)
Cooling Towers	1	635,000	935,000
Boilers	2	63,000	190,000

6. STORMWATER MANAGEMENT (Instructions, Pages 40-41)

Are there any existing/proposed outfalls which discharge stormwater associated with industrial activities, as defined at *40 CFR § 122.26(b)(14)*, commingled with any other wastestream?

☒ Yes ☐ No

If **yes**, briefly describe the industrial processes and activities that occur outdoors or in some manner which may result in exposure of the activities or materials to stormwater: Attachment K

7. DOMESTIC SEWAGE, SEWAGE SLUDGE, AND SEPTAGE MANAGEMENT AND DISPOSAL (Instructions, Page 41)

Domestic Sewage - Waste and wastewater from humans or household operations that is discharged to a wastewater collection system or otherwise enters a treatment works.

a. Check the box next to the appropriate method of domestic sewage and domestic sewage sludge treatment or disposal. Complete Worksheet 5.0 or Item 7.b if directed to do so.

- ☒ Domestic sewage is routed (i.e., connected to or transported to) to a WWTP permitted to receive domestic sewage for treatment, disposal, or both. **Complete Item 7.b**.
- ☐ Domestic sewage disposed of by an on-site septic tank and drainfield system. **Complete Item 7.b**.
- ☐ Domestic and industrial treatment sludge **ARE commingled** prior to use or disposal.
- ☐ Industrial wastewater and domestic sewage are treated separately, and the respective sludge **IS NOT commingled** prior to sludge use or disposal. **Complete Worksheet 5.0**.
- ☐ Facility is a POTW. **Complete Worksheet 5.0**.
- ☐ Domestic sewage is not generated on-site.
- ☐ Other (e.g., portable toilets), specify and **Complete Item 7.b**: Click to enter text.

b. Provide the name and TCEQ, NPDES, or TPDES Permit No. of the waste-disposal facility which receives the domestic sewage/septage. If hauled by motorized vehicle, provide the name and TCEQ Registration No. of the hauler.

Domestic Sewage Plant/Hauler Name

Plant/Hauler Name	Permit/Registration No.
City of Bridge City	0025500

8. IMPROVEMENTS OR COMPLIANCE/ENFORCEMENT REQUIREMENTS (Instructions, Page 41)

a. Is the permittee currently required to meet any implementation schedule for compliance or enforcement?

☐ Yes ☒ No

b. Has the permittee completed or planned for any improvements or construction projects?

☐ Yes ☒ No

c. If **yes** to either 8.a **or** 8.b, provide a brief summary of the requirements and a status update: N/A

9. TOXICITY TESTING (Instructions, Page 42)

Have any biological tests for acute or chronic toxicity been made on any of the discharges or on a receiving water in relation to the discharge within the last three years?

☐ Yes ☒ No

If **yes**, identify the tests and describe their purposes: N/A

Additionally, attach a copy of all tests performed which **have not** been submitted to the TCEQ or EPA.

Attachment: N/A

10. OFF-SITE/THIRD PARTY WASTES (Instructions, Page 42)

a. Does or will the facility receive wastes from off-site sources for treatment at the facility, disposal on-site via land application, or discharge via a permitted outfall?

☐ Yes ☒ No

If **yes**, provide responses to Items 10.b through 10.d below.

If **no**, proceed to Item 11.

b. Attach the following information to the application:

- List of wastes received (including volumes, characterization, and capability with on-site wastes).
- Identify the sources of wastes received (including the legal name and addresses of the generators).
- Description of the relationship of waste source(s) with the facility's activities.

Attachment: N/A

c. Is or will wastewater from another TCEQ, NPDES, or TPDES permitted facility commingled with this facility's wastewater after final treatment and prior to discharge via the final outfall/point of disposal?

☐ Yes ☒ No

If **yes**, provide the name, address, and TCEQ, NPDES, or TPDES permit number of the contributing facility and a copy of any agreements or contracts relating to this activity.

Attachment: N/A

d. Is this facility a POTW that accepts/will accept process wastewater from any SIU and has/is required to have an approved pretreatment program under the NPDES/TPDES program?

☐ Yes ☒ No

If **yes**, **Worksheet 6.0** of this application **is required**.

11. RADIOACTIVE MATERIALS (Instructions, Pages 42-43)

a. Are/will radioactive materials be mined, used, stored, or processed at this facility?

☐ Yes ☒ No

If **yes**, use the following table to provide the results of one analysis of the effluent for all radioactive materials that may be present. Provide results in pCi/L.

Radioactive Materials Mined, Used, Stored, or Processed

Radioactive Material	Concentration (pCi/L)
N/A	

b. Does the applicant or anyone at the facility have any knowledge or reason to believe that radioactive materials may be present in the discharge, including naturally occurring radioactive materials in the source waters or on the facility property?

☐ Yes ☒ No

If **yes**, use the following table to provide the results of one analysis of the effluent for all radioactive materials that may be present. Provide results in pCi/L. Do not include information provided in response to Item 11.a.

Radioactive Materials Present in the Discharge

Radioactive Material	Concentration (pCi/L)
N/A	

12. COOLING WATER (Instructions, Pages 43-45)

a. Does the facility use or propose to use water for cooling purposes?

☒ Yes ☐ No

If **no**, stop here. If **yes**, complete Items 12.b thru 12.f.

b. Cooling water is/will be obtained from a groundwater source (e.g., on-site well).

☐ Yes ☒ No

If **yes**, stop here. If **no**, continue.

c. Cooling Water Supplier

i. Provide the name of the owner(s) and operator(s) for the CWIS that supplies or will supply water for cooling purposes to the facility.

Cooling Water Intake Structure(s) Owner(s) and Operator(s)

CWIS ID	N/A			
Owner				
Operator				

ii. Cooling water is/will be obtained from a Public Water Supplier (PWS)

☒ Yes ☐ No

If **no**, continue. If **yes**, provide the PWS Registration No. and stop here: PWS No. 1810193

iii. Cooling water is/will be obtained from a reclaimed water source?

☐ Yes ☐ No

If **no**, continue. If **yes**, provide the Reuse Authorization No. and stop here:

iv. Cooling water is/will be obtained from an Independent Supplier

☐ Yes ☐ No

If **yes**, provide the actual intake flow of the Independent Supplier's CWIS that is/will be used to provide water for cooling purposes to the facility and proceed: Click to enter text.

If **no**, proceed to Item 12.d.

d. 316(b) General Criteria

i. The CWIS(s) used to provide water for cooling purposes to the facility has or will have a cumulative design intake flow of 2 MGD or greater.

☐ Yes ☐ No

ii. At least 25% of the total water withdrawn by the CWIS is/will be used at the facility exclusively for cooling purposes on an annual average basis.

☐ Yes ☐ No

iii. The CWIS(s) withdraw(s)/propose(s) to withdraw water for cooling purposes from surface waters that meet the definition of Waters of the United States in *40 CFR § 122.2*.

☐ Yes ☐ No

If **no**, provide an explanation of how the waterbody does not meet the definition of Waters of the United States in *40 CFR § 122.2*: Click to enter text.

If **yes** to all three questions in Item 12.d, the facility **meets** the minimum criteria to be subject to the full requirements of Section 316(b) of the CWA. Proceed to **Item 12.f**.

If **no** to any of the questions in Item 12.d, the facility **does not meet** the minimum criteria to be subject to the full requirements of Section 316(b) of the CWA; however, a determination is required based upon BPJ. Proceed to **Item 12.e**.

e. The facility does not meet the minimum requirements to be subject to the fill requirements of Section 316(b) **and uses/proposes to use cooling towers**.

☐ Yes ☐ No

If **yes**, stop here. If **no**, complete Worksheet 11.0, Items 1(a), 1(b)(i-iii) and (vi), 2(b)(i), and 3(a) to allow for a determination based upon BPJ.

f. Oil and Gas Exploration and Production

i. The facility is subject to requirements at 40 CFR Part 435, Subparts A or D.

☐ Yes ☐ No

If **yes**, continue. If **no**, skip to Item 12.g.

ii. The facility is an existing facility as defined at 40 CFR § 125.92(k) or a new unit at an existing facility as defined at 40 CFR § 125.92(u).

☐ Yes ☐ No

If **yes**, complete Worksheet 11.0, Items 1(a), 1(b)(i-iii) and (vi), 2(b)(i), and 3(a) to allow for a determination based upon BPJ. If **no**, skip to Item 12.g.iii.

g. Compliance Phase and Track Selection

i. Phase I – New facility subject to 40 CFR Part 125, Subpart I

☐ Yes ☐ No

If **yes**, check the box next to the facility's compliance track selection, attach the requested information, and complete Worksheet 11.0, Items 2 and 3, and Worksheet 11.2.

☐ Track I – AIF greater than 2 MGD, but less than 10 MGD
- Attach information required by *40 CFR §§ 125.86(b)(2)-(4)*.

☐ Track I – AIF greater than 10 MGD
- Attach information required by *40 CFR § 125.86(b)*.

☐ Track II
- Attach information required by *40 CFR § 125.86(c)*.

Attachment: Click to enter text

ii. Phase II – Existing facility subject to 40 CFR Part 125, Subpart J

☐ Yes ☐ No

If **yes**, complete Worksheets 11.0 through 11.3, as applicable.

iii. Phase III – New facility subject to 40 CFR Part 125, Subpart N

☐ Yes ☐ No

If **yes**, check the box next to the facility's compliance track selection and provide the requested information.

☐ Track I – Fixed facility
- Attach information required by 40 CFR § 125.136(b) and complete Worksheet 11.0, Items 2 and 3, and Worksheet 11.2.

☐ Track I – Not a fixed facility
- Attach information required by 40 CFR § 125.136(b) and complete Worksheet 11.0, Item 2 (except the CWIS latitude and longitude under Item 2.a).

☐ Track II – Fixed facility
- Attach information required by 40 CFR § 125.136(c) and complete Worksheet 11.0, Items 2 and 3.

Attachment: Click to enter text

NOTE: Item 13 is required only for existing permitted facilities.

13. PERMIT CHANGE REQUESTS (Instructions, Pages 45-46)

a. Is the facility requesting a **major amendment** of an existing permit?

☒ Yes ☐ No

If **yes**, list each request individually and provide the following information: 1) detailed information regarding the scope of each request and 2) a justification for each request. Attach any supplemental information or additional data to support each request.

See Attachment L

b. Is the facility requesting any **minor amendments** to the permit?

☐ Yes ☒ No

If **yes**, list and discuss the requested changes.

Click to enter text.

c. Is the facility requesting any **minor modifications** to the permit?

☐ Yes ☒ No

If **yes**, list and discuss the requested changes.

Click to enter text.

WORKSHEET 1.0
EPA CATEGORICAL EFFLUENT GUIDELINES

This worksheet **is required** for all applications for TPDES permits for discharges of wastewaters subject to EPA categorical effluent limitation guidelines (ELGs).

1. CATEGORICAL INDUSTRIES (Instructions, Pages 50-51)

Is this facility subject to any of the 40 CFR categorical ELGs outlined on page 52 of the instructions?

☒ Yes ☐ No

If **no**, this worksheet is not required. If **yes**, provide the appropriate information in the table below.

40 CFR Effluent Guidelines

Industry	40 CFR Part
Steam Electric Power Generating	423

2. PRODUCTION/PROCESS DATA (Instructions, Page 51)

NOTE: For all TPDES permit applications requesting individual permit coverage for discharges of oil and gas exploration and production wastewater (discharges into or adjacent to water in the state, falling under the Oil and Gas Extraction Effluent Guidelines – 40 CFR Part 435), see Worksheet 12.0, Item 2 instead.

a. **Production Data**

Provide the appropriate data for effluent guidelines with production-based effluent limitations.

Production Data

Subcategory	Actual Quantity/Day	Design Quantity/Day	Units
N/A			

b. **Organic Chemicals, Plastics, and Synthetic Fibers Manufacturing Data (40 CFR Part 414)**

Provide each applicable subpart and the percent of total production. Provide data for metal-bearing and cyanide-bearing wastestreams, as required by *40 CFR Part 414, Appendices A and B*.

Percentages of Total Production

Subcategory	Percent of Total Production	Appendix A and B - Metal	Appendix A – Cyanide
N/A			

c. **Refineries (40 CFR Part 419)**

Provide the applicable subcategory and a brief justification.

N/A

3. PROCESS/NON-PROCESS WASTEWATER FLOWS (Instructions, Page 51)

Provide a breakdown of wastewater flow(s) generated by the facility, including both process and non-process wastewater flow(s). Specify which wastewater flows are to be authorized for discharge under this permit and the disposal practices for wastewater flows, excluding domestic, which are not to be authorized for discharge under this permit.

A breakdown of process and non-process wastewater flows is presented in Attachments F and H.

4. NEW SOURCE DETERMINATION (Instructions, Page 52)

Provide a list of all wastewater-generating processes subject to EPA categorical ELGs, identify the appropriate guideline Part and Subpart, and provide the date the process/construction commenced.

Wastewater-generating Processes Subject to Effluent Guidelines

Process	EPA Guideline: Part	EPA Guideline: Subpart	Date Process/ Construction Commenced
Cooling tower blowdown	40	423.15	Anticipated 2022
Low volume waste	40	423.15	Anticipated 2022
Chemical metal cleaning waste	40	423.15	Anticipated 2022

WORKSHEET 2.0
POLLUTANT ANALYSES REQUIREMENTS

Worksheet 2.0 **is required** for all applications submitted for a TPDES permit. Worksheet 2.0 is not required for applications for a permit to dispose of all wastewater by land disposal or for discharges solely of stormwater associated with industrial activities.

1. LABORATORY ACCREDITATION (Instructions, Page 53)

Effective July 1, 2008, all laboratory tests performed must meet the requirements of *30 TAC Chapter 25, Environmental Testing Laboratory Accreditation and Certification* with the following general exemptions:

a. The laboratory is an in-house laboratory and is:
   i. periodically inspected by the TCEQ; or
   ii. located in another state and is accredited or inspected by that state; or
   iii. performing work for another company with a unit located in the same site; or
   iv. performing pro bono work for a governmental agency or charitable organization.

b. The laboratory is accredited under federal law.

c. The data are needed for emergency-response activities, and a laboratory accredited under the Texas Laboratory Accreditation Program is not available.

d. The laboratory supplies data for which the TCEQ does not offer accreditation.

Review *30 TAC Chapter 25* for specific requirements. The following certification statement shall be signed and submitted with every application. See Instructions, Page 32, for a list of approved signatories.

I, Jason Willis, certify that all laboratory tests submitted with this application meet the requirements of *30 TAC Chapter 25, Environmental Testing Laboratory Accreditation and Certification.*

_____

(Signature)

2. GENERAL TESTING REQUIREMENTS (Instructions, Pages 53-55)

a. Provide the date range of all sampling events conducted to obtain the analytical data submitted with this application (e.g., 05/01/2018-05/30/2018): Anticipated discharged values were estimated based on water quality of the source water.

b. ☐ Check the box to confirm all samples were collected no more than 12 months prior to the date of application submittal.

c. Read the general testing requirements in the instructions for important information about sampling, test methods, and MALs. If a contact laboratory was used, attach a list which includes the name, contact information, and pollutants analyzed for each laboratory/firm. **Attachment:** N/A

3. SPECIFIC TESTING REQUIREMENTS (Instructions, Pages 55-66)

Attach correspondence from TCEQ approving submittal of less than the required number of samples, if applicable. **Attachment:** N/A

TABLE 1 and TABLE 2 (Instructions, Page 55)

Completion of Tables 1 and 2 **is required** for **all external outfalls** for all TPDES permit applications.

Table 1 for Outfall No.: 002 – Estimated Values

Samples are (check one): ☐ **Composite** ☐ **Grab**

Pollutant	Sample 1 (mg/L)	Sample 2 (mg/L)	Sample 3 (mg/L)	Sample 4 (mg/L)
BOD (5-day)	<15.0			
CBOD (5-day)	<15.0			
Chemical oxygen demand	147.4			
Total organic carbon	43.0			
Dissolved oxygen	4			
Ammonia nitrogen	<1.4			
Total suspended solids	<50			
Nitrate nitrogen	<0.38			
Total organic nitrogen	<1			
Total phosphorus	<8.4			
Oil and grease	<10.0			
Total residual chlorine	<0.2			
Total dissolved solids	537			
Sulfate	209			
Chloride	65.9			
Fluoride	<3.76			
Total alkalinity (mg/L as $CaCO_3$)	92.8			
Temperature (°F)	*See modeling report in Appendix B			
pH (standard units)	6.0-9.0			

Table 2 for Outfall No.: 002 – Estimated Values

Samples are (check one): ☐ **Composites** ☐ **Grabs**

Pollutant	Sample 1 (µg/L)	Sample 2 (µg/L)	Sample 3 (µg/L)	Sample 4 (µg/L)	MAL (µg/L)
Aluminum, total	880				2.5
Antimony, total	<38				5
Arsenic, total	5.8				0.5
Barium, total	438				3
Beryllium, total	<3.8				0.5
Cadmium, total	<8				1
Chromium, total	<23				3
Chromium, hexavalent	<3				3
Chromium, trivalent	<23				N/A
Copper, total	<20				2
Cyanide, available	<2				2/10
Lead, total	<4				0.5
Mercury, total	<3.8				0.005/0.0005
Nickel, total	<15				2
Selenium, total	<38				5
Silver, total	N/A				0.5

Pollutant	Sample 1 (µg/L)	Sample 2 (µg/L)	Sample 3 (µg/L)	Sample 4 (µg/L)	MAL (µg/L)
Thallium, total	<3.8				0.5
Zinc, total	<40				5.0

TABLE 3 (Instructions, Page 55)

Completion of Table 3 **is required** for all **external outfalls** which discharge process wastewater.

Partial completion of Table 3 **is required** for all **external outfalls** which discharge non-process wastewater and stormwater associated with industrial activities commingled with other wastestreams (see instructions for additional guidance).

Table 3 for Outfall No.: 002 – Estimated Values

Samples are (check one): ☐ **Composites** ☐ **Grabs**

Pollutant	Sample 1 (µg/L)*	Sample 2 (µg/L)*	Sample 3 (µg/L)*	Sample 4 (µg/L)*	MAL (µg/L)*
Acrylonitrile	<50				50
Anthracene	<10				10
Benzene	<10				10
Benzidine	<50				50
Benzo(a)anthracene	<5				5
Benzo(a)pyrene	<5				5
Bis(2-chloroethyl)ether	<10				10
Bis(2-ethylhexyl)phthalate	<10				10
Bromodichloromethane [Dichlorobromomethane]	<10				10
Bromoform	<10				10
Carbon tetrachloride	<2				2
Chlorobenzene	<10				10
Chlorodibromomethane [Dibromochloromethane]	<10				10
Chloroform	<10				10
Chrysene	<5				5
m-Cresol [3-Methylphenol]	<10				10
o-Cresol [2-Methylphenol]	<10				10
p-Cresol [4-Methylphenol]	<10				10
1,2-Dibromoethane	<10				10
m-Dichlorobenzene [1,3-Dichlorobenzene]	<10				10
o-Dichlorobenzene [1,2-Dichlorobenzene]	<10				10
p-Dichlorobenzene [1,4-Dichlorobenzene]	<10				10
3,3'-Dichlorobenzidine	<5				5
1,2-Dichloroethane	<10				10
1,1-Dichloroethene [1,1-Dichloroethylene]	<10				10

Pollutant	Sample 1 (µg/L)*	Sample 2 (µg/L)*	Sample 3 (µg/L)*	Sample 4 (µg/L)*	MAL (µg/L)*
Dichloromethane [Methylene chloride]	<20				20
1,2-Dichloropropane	<10				10
1,3-Dichloropropene [1,3-Dichloropropylene]	<10				10
2,4-Dimethylphenol	<10				10
Di-n-Butyl phthalate	<10				10
Ethylbenzene	<10				10
Fluoride	<500				500
Hexachlorobenzene	<5				5
Hexachlorobutadiene	<10				10
Hexachlorocyclopentadiene	<10				10
Hexachloroethane	<20				20
Methyl ethyl ketone	<50				50
Nitrobenzene	<10				10
N-Nitrosodiethylamine	<20				20
N-Nitroso-di-n-butylamine	<20				20
Nonylphenol	<333				333
Pentachlorobenzene	<20				20
Pentachlorophenol	<5				5
Phenanthrene	<10				10
Polychlorinated biphenyls (PCBs) (**)	<0.2				0.2
Pyridine	<20				20
1,2,4,5-Tetrachlorobenzene	<20				20
1,1,2,2-Tetrachloroethane	<10				10
Tetrachloroethene [Tetrachloroethylene]	<10				10
Toluene	<10				10
1,1,1-Trichloroethane	<10				10
1,1,2-Trichloroethane	<10				10
Trichloroethene [Trichloroethylene]	<10				10
2,4,5-Trichlorophenol	<50				50
TTHM (Total trihalomethanes)	<10				10
Vinyl chloride	<10				10

(*) Indicate units if different from µg/L.
(**) Total of detects for PCB-1242, PCB-1254, PCB-1221, PCB-1232, PCB-1248, PCB-1260, and PCB-1016. If all non-detects, enter the highest non-detect preceded by a "<".

TABLE 4 (Instructions, Pages 55-56)

Partial completion of Table 4 **is required** for each **external outfall** based on the conditions below.

a. Tributyltin

Is this facility an industrial/commercial facility which currently or proposes to directly dispose of wastewater from the types of operations listed below or a domestic facility which currently or proposes to receive wastewater from the types of industrial/commercial operations listed below?

☐ Yes ☒ No

If **yes**, check the box next to each of the following criteria which apply and provide the appropriate testing results in Table 4 below (check all that apply).

☐ Manufacturers and formulators of tributyltin or related compounds.
☐ Painting of ships, boats and marine structures.
☐ Ship and boat building and repairing.
☐ Ship and boat cleaning, salvage, wrecking and scaling.
☐ Operation and maintenance of marine cargo handling facilities and marinas.
☐ Facilities engaged in wood preserving.
☐ Any other industrial/commercial facility for which tributyltin is known to be present, or for which there is any reason to believe that tributyltin may be present in the effluent.

b. Enterococci (discharge to saltwater)

i. This facility discharges/proposes to discharge directly into saltwater receiving waters **and** Enterococci bacteria are expected to be present in the discharge based on facility processes.

☐ Yes ☒ No

ii. Domestic wastewater is/will be discharged.

☐ Yes ☒ No

If **yes to either** question, provide the appropriate testing results in Table 4 below.

c. E. coli (discharge to freshwater)

i. This facility discharges/proposes to discharge directly into freshwater receiving waters **and** *E. coli* bacteria are expected to be present in the discharge based on facility processes.

☐ Yes ☒ No

ii. Domestic wastewater is/will be discharged.

☐ Yes ☒ No

If **yes to either** question, provide the appropriate testing results in Table 4 below.

Table 4 for Outfall No.: N/A
Samples are (check one): ☐ **Composites** ☐ **Grabs**

Pollutant	Sample 1	Sample 2	Sample 3	Sample 4	MAL
Tributyltin (µg/L)	N/A				0.010
Enterococci (cfu or MPN/100 mL)					N/A
E. coli (cfu or MPN/100 mL)					N/A

TABLE 5 (Instructions, Page 56)

Completion of Table 5 **is required** for all **external outfalls** which discharge process wastewater from a facility which manufactures or formulates pesticides or herbicides or other wastewaters which may contain pesticides or herbicides.

If this facility does not/will not manufacture or formulate pesticides or herbicides and does not/will not discharge other wastewaters which may contain pesticides or herbicides, check N/A.

☒ N/A

Table 5 for Outfall No.: N/A

Samples are (check one): ☐ **Composites** ☐ **Grabs**

Pollutant	Sample 1 (µg/L)*	Sample 2 (µg/L)*	Sample 3 (µg/L)*	Sample 4 (µg/L)*	MAL (µg/L)*
Aldrin					0.01
Carbaryl					5
Chlordane					0.2
Chlorpyrifos					0.05
4,4'-DDD					0.1
4,4'-DDE					0.1
4,4'-DDT					0.02
2,4-D					0.7
Danitol [Fenpropathrin]					—
Demeton					0.20
Diazinon					0.5/0.1
Dicofol [Kelthane]					1
Dieldrin					0.02
Diuron					0.090
Endosulfan I (*alpha*)					0.01
Endosulfan II (*beta*)					0.02
Endosulfan sulfate					0.1
Endrin					0.02
Guthion [Azinphos methyl]					0.1
Heptachlor					0.01
Heptachlor epoxide					0.01
Hexachlorocyclohexane (*alpha*)					0.05
Hexachlorocyclohexane (*beta*)					0.05
Hexachlorocyclohexane (*gamma*) [Lindane]					0.05
Hexachlorophene					10
Malathion					0.1
Methoxychlor					2.0
Mirex					0.02
Parathion (ethyl)					0.1
Toxaphene					0.3
2,4,5-TP [Silvex]					0.3

* Indicate units if different from µg/L.

TABLE 6 (Instructions, Page 57)

Completion of Table 6 **is required** for all **external outfalls**.

Table 6 for Outfall No.: 002 – Estimated Values

Samples are (check one): ☐ **Composites** ☐ **Grabs**

Pollutants	Believed Present	Believed Absent	Sample 1 (mg/L)	Sample 2 (mg/L)	Sample 3 (mg/L)	Sample 4 (mg/L)	MAL (µg/L)*
Bromide	☐	☐					400
Color (PCU)	☐	☐					—
Nitrate-Nitrite (as N)	☒	☐	<0.38				—
Sulfide (as S)	☐	☐					—
Sulfite (as SO_3)	☐	☐					—
Surfactants	☐	☐					—
Boron, total	☐	☐					20
Cobalt, total	☐	☐					0.3
Iron, total	☒	☐	11.19				7
Magnesium, total	☒	☐	15.7				20
Manganese, total	☒	☐	0.56				0.5
Molybdenum, total	☐	☐					1
Tin, total	☐	☐					5
Titanium, total	☐	☐					30

* Indicate units if different from µg/L.

TABLE 7 (Instructions, Page 57)

Check the box next to any of the industrial categories applicable to this facility. If no categories are applicable, check N/A. If GC/MS testing is required, check the box provided to confirm the testing results for the appropriate parameters are provided with the application.

☐ N/A

Table 7 for Applicable Industrial Categories

Industrial Category	40 CFR Part	Volatiles Table 8	Acids Table 9	Bases/Neutrals Table 10	Pesticides Table 11
☐ Adhesives and Sealants		☐ Yes	☐ Yes	☐ Yes	No
☐ Aluminum Forming	467	☐ Yes	☐ Yes	☐ Yes	No
☐ Auto and Other Laundries		☐ Yes	☐ Yes	☐ Yes	☐ Yes
☐ Battery Manufacturing	461	☐ Yes	No	☐ Yes	No
☐ Coal Mining	434	No	No	No	No
☐ Coil Coating	465	☐ Yes	☐ Yes	☐ Yes	No
☐ Copper Forming	468	☐ Yes	☐ Yes	☐ Yes	No
☐ Electric and Electronic Components	469	☐ Yes	☐ Yes	☐ Yes	☐ Yes
☐ Electroplating	413	☐ Yes	☐ Yes	☐ Yes	No
☐ Explosives Manufacturing	457	No	☐ Yes	☐ Yes	No
☐ Foundries		☐ Yes	☐ Yes	☐ Yes	No
☐ Gum and Wood Chemicals - Subparts A,B,C,E	454	☐ Yes	☐ Yes	No	No
☐ Gum and Wood Chemicals - Subparts D,F	454	☐ Yes	☐ Yes	☐ Yes	No
☐ Inorganic Chemicals Manufacturing	415	☐ Yes	☐ Yes	☐ Yes	No
☐ Iron and Steel Manufacturing	420	☐ Yes	☐ Yes	☐ Yes	No
☐ Leather Tanning and Finishing	425	☐ Yes	☐ Yes	☐ Yes	No
☐ Mechanical Products Manufacturing		☐ Yes	☐ Yes	☐ Yes	No
☐ Nonferrous Metals Manufacturing	421,471	☐ Yes	☐ Yes	☐ Yes	☐ Yes
☐ Oil and Gas Extraction - Subparts A, D, E, F, G, H	435	☐ Yes	☐ Yes	☐ Yes	No
☐ Ore Mining - Subpart B	440	No	☐ Yes	No	No
☐ Organic Chemicals Manufacturing	414	☐ Yes	☐ Yes	☐ Yes	☐ Yes
☐ Paint and Ink Formulation	446,447	☐ Yes	☐ Yes	☐ Yes	No
☐ Pesticides	455	☐ Yes	☐ Yes	☐ Yes	☐ Yes
☐ Petroleum Refining	419	☐ Yes	No	No	No
☐ Pharmaceutical Preparations	439	☐ Yes	☐ Yes	☐ Yes	No
☐ Photographic Equipment and Supplies	459	☐ Yes	☐ Yes	☐ Yes	No
☐ Plastic and Synthetic Materials Manufacturing	414	☐ Yes	☐ Yes	☐ Yes	☐ Yes
☐ Plastic Processing	463	☐ Yes	No	No	No
☐ Porcelain Enameling	466	No	No	No	No
☐ Printing and Publishing		☐ Yes	☐ Yes	☐ Yes	☐ Yes
☐ Pulp and Paperboard Mills - Subpart C	430	☐ *	☐ Yes	☐ *	☐ Yes
☐ Pulp and Paperboard Mills - Subparts F, K	430	☐ *	☐ Yes	☐ *	☐ *
☐ Pulp and Paperboard Mills - Subparts A, B, D, G, H	430	☐ Yes	☐ Yes	☐ *	☐ *
☐ Pulp and Paperboard Mills - Subparts I, J, L	430	☐ Yes	☐ Yes	☐ *	☐ Yes
☐ Pulp and Paperboard Mills - Subpart E	430	☐ Yes	☐ Yes	☐ Yes	☐ *
☐ Rubber Processing	428	☐ Yes	☐ Yes	☐ Yes	No
☐ Soap and Detergent Manufacturing	417	☐ Yes	☐ Yes	☐ Yes	No
☒ Steam Electric Power Plants	423	☒ Yes	☒ Yes	No	No
☐ Textile Mills (Not Subpart C)	410	☐ Yes	☐ Yes	☐ Yes	No
☐ Timber Products Processing	429	☐ Yes	☐ Yes	☐ Yes	☐ Yes

* Test if believed present.

TABLES 8, 9, 10, and 11 (Instructions, Page 57)

Completion of Tables 8, 9, 10, and 11 **is required** as specified in Table 7 for all **external outfalls** that contain process wastewater.

Completion of Tables 8, 9, 10, and 11 **may be required** for types of industry not specified in Table 7 for specific parameters that are believed to be present in the wastewater.

Table 8 for Outfall No.: 002 – Estimated Values : Volatile Compounds

Samples are (check one): ☐ Composites ☐ Grabs

Pollutant	Sample 1 (µg/L)*	Sample 2 (µg/L)*	Sample 3 (µg/L)*	Sample 4 (µg/L)*	MAL (µg/L)
Acrolein	<50				50
Acrylonitrile	<50				50
Benzene	<10				10
Bromoform	<10				10
Carbon tetrachloride	<2				2
Chlorobenzene	<10				10
Chlorodibromomethane	<10				10
Chloroethane	<50				50
2-Chloroethylvinyl ether	<10				10
Chloroform	<10				10
Dichlorobromomethane [Bromodichloromethane]	<10				10
1,1-Dichloroethane	<10				10
1,2-Dichloroethane	<10				10
1,1-Dichloroethylene [1,1-Dichloroethene]	<10				10
1,2-Dichloropropane	<10				10
1,3-Dichloropropylene [1,3-Dichloropropene]	<10				10
Ethylbenzene	<10				10
Methyl bromide [Bromomethane]	<50				50
Methyl chloride [Chloromethane]	<50				50
Methylene chloride [Dichloromethane]	<20				20
1,1,2,2-Tetrachloroethane	<10				10
Tetrachloroethylene [Tetrachloroethene]	<10				10
Toluene	<10				10
1,2-Trans-dichloroethylene [1,2-Trans-dichloroethene]	<10				10
1,1,1-Trichloroethane	<10				10
1,1,2-Trichloroethane	<10				10
Trichloroethylene [Trichloroethene]	<10				10
Vinyl chloride	<10				10

* Indicate units if different from µg/L.

Table 9 for Outfall No.: 002 – Estimated Values : Acid Compounds

Samples are (check one): ☐ Composites ☐ Grabs

Pollutant	Sample 1 (µg/L)*	Sample 2 (µg/L)*	Sample 3 (µg/L)*	Sample 4 (µg/L)*	MAL (µg/L)
2-Chlorophenol	<10				10
2,4-Dichlorophenol	<10				10
2,4-Dimethylphenol	<10				10
4,6-Dinitro-o-cresol	<50				50
2,4-Dinitrophenol	<50				50
2-Nitrophenol	<20				20
4-Nitrophenol	<50				50
p-Chloro-m-cresol	<10				10
Pentachlorophenol	<5				5
Phenol	<10				10
2,4,6-Trichlorophenol	<10				10

* Indicate units if different from µg/L.

Table 10 for Outfall No.: N/A : Base/Neutral Compounds

Samples are (check one): ☐ Composites ☐ Grabs

Pollutant	Sample 1 (µg/L)*	Sample 2 (µg/L)*	Sample 3 (µg/L)*	Sample 4 (µg/L)*	MAL (µg/L)
Acenaphthene	N/A				10
Acenaphthylene					10
Anthracene					10
Benzidine					50
Benzo(a)anthracene					5
Benzo(a)pyrene					5
3,4-Benzofluoranthene [Benzo(b)fluoranthene]					10
Benzo(ghi)perylene					20
Benzo(k)fluoranthene					5
Bis(2-chloroethoxy)methane					10
Bis(2-chloroethyl)ether					10
Bis(2-chloroisopropyl)ether					10
Bis(2-ethylhexyl)phthalate					10
4-Bromophenyl phenyl ether					10
Butylbenzyl phthalate					10
2-Chloronaphthalene					10
4-Chlorophenyl phenyl ether					10
Chrysene					5
Dibenzo(a,h)anthracene					5
1,2-Dichlorobenzene [o-Dichlorobenzene]					10
1,3-Dichlorobenzene [m-Dichlorobenzene]					10
1,4-Dichlorobenzene [p-Dichlorobenzene]					10
3,3'-Dichlorobenzidine					5

Pollutant	Sample 1 (µg/L)*	Sample 2 (µg/L)*	Sample 3 (µg/L)*	Sample 4 (µg/L)*	MAL (µg/L)
Diethyl phthalate	N/A				10
Dimethyl phthalate					10
Di-n-butyl phthalate					10
2,4-Dinitrotoluene					10
2,6-Dinitrotoluene					10
Di-n-octyl phthalate					10
1,2-Diphenylhydrazine (as Azobenzene)					20
Fluoranthene					10
Fluorene					10
Hexachlorobenzene					5
Hexachlorobutadiene					10
Hexachlorocyclopentadiene					10
Hexachloroethane					20
Indeno(1,2,3-cd)pyrene					5
Isophorone					10
Naphthalene					10
Nitrobenzene					10
N-Nitrosodimethylamine					50
N-Nitrosodi-n-propylamine					20
N-Nitrosodiphenylamine					20
Phenanthrene					10
Pyrene					10
1,2,4-Trichlorobenzene					10

* Indicate units if different from µg/L.

Table 11 for Outfall No.: N/A : Pesticides

Samples are (check one): ☐ Composites ☐ Grabs

Pollutant	Sample 1 (µg/L)*	Sample 2 (µg/L)*	Sample 3 (µg/L)*	Sample 4 (µg/L)*	MAL (µg/L)
Aldrin	N/A				0.01
alpha-BHC [alpha-Hexachlorocyclohexane]					0.05
beta-BHC [beta-Hexachlorocyclohexane]					0.05
gamma-BHC [gamma-Hexachlorocyclohexane]					0.05
delta-BHC [delta-Hexachlorocyclohexane]					0.05
Chlordane					0.2
4,4'-DDT					0.02
4,4'-DDE					0.1
4,4'-DDD					0.1
Dieldrin					0.02
Endosulfan I (alpha)					0.01
Endosulfan II (beta)					0.02
Endosulfan sulfate					0.1

Pollutant	Sample 1 (µg/L)*	Sample 2 (µg/L)*	Sample 3 (µg/L)*	Sample 4 (µg/L)*	MAL (µg/L)
Endrin	N/A				0.02
Endrin aldehyde					0.1
Heptachlor					0.01
Heptachlor epoxide					0.01
PCB 1242					0.2
PCB 1254					0.2
PCB 1221					0.2
PCB 1232					0.2
PCB 1248					0.2
PCB 1260					0.2
PCB 1016					0.2
Toxaphene					0.3

* Indicate units if different from µg/L.

Attachment: N/A

TABLE 12 (DIOXINS/FURAN COMPOUNDS)

Complete of Table 12 **is required** for **external outfalls**, as directed below. (Instructions, Pages 57-58)

a. Indicate which compound(s) are manufactured or used at the facility and provide a brief description of the conditions of its/their presence at the facility (check all that apply).

- ☐ 2,4,5-trichlorophenoxy acetic acid (2,4,5-T) CASRN 93-76-5
- ☐ 2-(2,4,5-trichlorophenoxy) propanoic acid (Silvex, 2,4,5-TP) CASRN 93-72-1
- ☐ 2-(2,4,5-trichlorophenoxy) ethyl 2,2-dichloropropionate (Erbon) CASRN 136-25-4
- ☐ 0,0-dimethyl 0-(2,4,5-trichlorophenyl) phosphorothioate (Ronnel) CASRN 299-84-3
- ☐ 2,4,5-trichlorophenol (TCP) CASRN 95-95-4
- ☐ hexachlorophene (HCP) CASRN 70-30-4
- ☒ None of the above

Description: N/A

b. Does the applicant or anyone at the facility know or have any reason to believe that 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) or any congeners of TCDD may be present in the effluent proposed for discharge?

☐ Yes ☒ No

Description: N/A

If **yes** to either Items a **or** b, complete Table 12 as instructed.

Table 12 for Outfall No.: N/A

Samples are (check one): ☐ **Composites** ☐ **Grabs**

Compound	Toxicity Equivalent Factors	Wastewater Concentration (ppq)	Wastewater Toxicity Equivalents (ppq)	Sludge Concentration (ppt)	Sludge Toxicity Equivalents (ppt)	MAL (ppq)
2,3,7,8-TCDD	1	N/A				10
1,2,3,7,8-PeCDD	1.0					50
2,3,7,8-HxCDDs	0.1					50
1,2,3,4,6,7,8-HpCDD	0.01					50
2,3,7,8-TCDF	0.1					10
1,2,3,7,8-PeCDF	0.03					50
2,3,4,7,8-PeCDF	0.3					50
2,3,7,8-HxCDFs	0.1					50
2,3,4,7,8-HpCDFs	0.01					50
OCDD	0.0003					100
OCDF	0.0003					100
PCB 77	0.0001					500
PCB 81	0.0003					500
PCB 126	0.1					500
PCB 169	0.03					500
Total						

TABLE 13 (HAZARDOUS SUBSTANCES)

Complete Table 13 **is required** for all **external outfalls** as directed below. (Instructions, Page 59)

a. Are there any pollutants listed in the instructions (pages 55-62) believed present in the discharge?

☐ Yes ☒ No

b. Are there pollutants listed in Item 1.c. of Technical Report 1.0 which are believed present in the discharge and have not been analytically quantified elsewhere in this application?

☐ Yes ☒ No

If **yes** to either Items a **or** b, complete Table 13 as instructed.

Table 13 for Outfall No.: N/A

Samples are (check one): ☐ **Composites** ☐ **Grabs**

Pollutant	CASRN	Sample 1 (µg/L)	Sample 2 (µg/L)	Sample 3 (µg/L)	Sample 4 (µg/L)	Analytical Method
N/A						

WORKSHEET 4.0
RECEIVING WATERS

This worksheet **is required** for all TPDES permit applications.

1. DOMESTIC DRINKING WATER SUPPLY (Instructions, Page 78)

a. There is a surface water intake for domestic drinking water supply located within 5 (five) miles downstream from the point/proposed point of discharge.

☐ Yes ☒ No

If **no**, stop here and proceed to Item 2. If **yes**, provide the following information:

i. The legal name of the owner of the drinking water supply intake: Click to enter text.

v. The distance and direction from the outfall to the drinking water supply intake: Click to enter text.

b. Locate and identify the intake on the USGS 7.5-minute topographic map provided for Administrative Report 1.0.

☐ Check this box to confirm the above requested information is provided.

2. DISCHARGE INTO TIDALLY INFLUENCED WATERS (Instructions, Page 78)

If the discharge is to tidally influenced waters, complete this section. Otherwise, proceed to Item 3.

a. Width of the receiving water at the outfall: 530 feet

b. Are there oyster reefs in the vicinity of the discharge?

☐ Yes ☒ No

If **yes**, provide the distance and direction from the outfall(s) to the oyster reefs: Click to enter text.

c. Are there sea grasses within the vicinity of the point of discharge?

☐ Yes ☒ No

If **yes**, provide the distance and direction from the outfall(s) to the grasses: Click to enter text.

3. CLASSIFIED SEGMENT (Instructions, Page 78)

The discharge is/will be directly into (or within 300 feet of) a classified segment.

☐ Yes ☒ No

If **yes**, stop here. It is not necessary to complete Items 4 and 5 of this worksheet or Worksheet 4.1.

If **no**, complete Items 4 and 5 and Worksheet 4.1 may be required.

4. DESCRIPTION OF IMMEDIATE RECEIVING WATERS (Instructions, Page 79)

a. Name of the immediate receiving waters: Sabine Intake Canal

b. Check the appropriate description of the immediate receiving waters:

☐ Lake or Pond
- Surface area (acres): Click to enter text.
- Average depth of the entire water body (feet): Click to enter text.
- Average depth of water body within a 500-foot radius of the discharge point (feet): Click to enter text.

☒ Man-Made Channel or Ditch
☐ Stream or Creek
☐ Freshwater Swamp or Marsh
☐ Tidal Stream, Bayou, or Marsh
☐ Open Bay
☐ Other, specify: Click to enter text.

If **Man-Made Channel or Ditch** or **Stream or Creek** were selected above, provide responses to Items 4.c – 4.g below:

c. For **existing discharges**, check the description below that best characterizes the area **upstream** of the discharge.

For **new discharges**, check the description below that best characterizes the area **downstream** of the discharge.

☐ Intermittent (dry for at least one week during most years)
☐ Intermittent with Perennial Pools (enduring pools containing habitat to maintain aquatic life uses)
☒ Perennial (normally flowing)

Check the source(s) of the information used to characterize the area upstream (existing discharge) or downstream (new discharge):

☐ USGS flow records
☒ personal observation
☐ historical observation by adjacent landowner(s)
☐ other, specify: Click to enter text.

d. List the names of all perennial streams that join the receiving water within three miles downstream of the discharge point: None

e. The receiving water characteristics change within three miles downstream of the discharge (e.g., natural or man-made dams, ponds, reservoirs, etc.).

☒ Yes ☐ No

If **yes**, describe how: Canal flows into Sabine Lake

f. General observations of the water body during normal dry weather conditions: Intake water calm (no chop). Water visibility approximately 5-6 in of clarity with incoming tide. No floating vegetation or debris observed. No visible mud flats above water line due to incoming tide. Vegetation growth along canal in healthy condition with no erosion or rilling noted.

Date and time of observation: April 20, 2021 at 15:12

g. The water body was influenced by stormwater runoff during observations.

☐ Yes ☒ No

If **yes**, describe how: Click to enter text

5. GENERAL CHARACTERISTICS OF WATER BODY (Instructions, Page 79)

a. Is the receiving water upstream of the existing discharge or proposed discharge site influenced by any of the following (check all that apply):

- ☐ oil field activities
- ☐ agricultural runoff
- ☐ upstream discharges
- ☒ urban runoff
- ☐ septic tanks
- ☐ other, specify: Click to enter text

b. Uses of water body observed or evidence of such uses (check all that apply):

- ☐ livestock watering
- ☐ non-contact recreation
- ☐ domestic water supply
- ☐ contact recreation
- ☐ fishing
- ☐ industrial water supply
- ☐ irrigation withdrawal
- ☐ navigation
- ☐ picnic/park activities
- ☒ other, specify: Existing intake canal will be converted to discharge canal

c. Description which best describes the aesthetics of the receiving water and the surrounding area (check only one):

- ☐ **Wilderness:** outstanding natural beauty; usually wooded or un-pastured area: water clarity exceptional
- ☒ **Natural Area:** trees or native vegetation common; some development evident (from fields, pastures, dwellings); water clarity discolored
- ☐ **Common Setting:** not offensive, developed but uncluttered; water may be colored or turbid
- ☐ **Offensive:** stream does not enhance aesthetics; cluttered; highly developed; dumping areas; water discolored

WORKSHEET 4.1
WATERBODY PHYSICAL CHARACTERISTICS

The following information **is required** for new applications, EPA-designated Major facilities, and major amendment applications requesting to add an outfall if the receiving waters are perennial or intermittent with perennial pools (including impoundments) for a TDPES permit.

Complete the transects downstream of the existing or proposed discharges.

1. DATA COLLECTION (Instructions, Pages 80-81)

a. Date of study: April 20, 2021 Time of study: 15:12

Waterbody name: Intake Canal at Sabine

General location: South of Sabine, connecting to Sabine Lake

b. Type of stream upstream of an existing discharge or downstream of a proposed discharge (check only one):

☒ perennial ☐ intermittent with perennial pools ☐ impoundment

c. No. of defined stream bends:

Well: 1 Moderately: Click to enter text Poorly: Click to enter text

d. No. of riffles: 0

e. Evidence of flow fluctuations (check one):

☐ Minor ☒ Moderate ☐ Severe

f. Provide the observed stream uses and where there is evidence of channel obstructions/modifications: Stream is currently used as an intake canal for Sabine and will be converted to a discharge canal for OCPS; No evidence of channel obstructions

g. Complete the following table with information regarding the transect measurements.

Stream Transect Data

Transect Location	Habitat Type*	Water Surface Width (ft)	Stream Depths (ft)**								
Outfall	Run	525	9	15	20	20	21	21	16	9	5
D-1	Run	528	8	13	14	18	18	12	7	5	5
D-2	Run	520	9	13	10	6	3	1	1	3	4
D-3	Run	504	8	13	9	10	5	3	2	2	1
D-4	Run	472	6	13	11	6	5	4	4	5	2
D-5	Run	409	5	11	14	11	6	3	3	2	1
D-6	Run	325	4	9	13	14	11	6	3	2	4
D-7	Run	270	4	8	13	15	12	7	3	1	1
D-8	Run	232	4	8	12	15	14	9	5	2	1
D-9	Run	212	6	10	12	14	12	9	5	2	2

* riffle, run, glide, or pool
** channel bed to water surface

2. SUMMARIZE MEASUREMENTS (Instructions, Page 81)

Provide the following information regarding the transect measurements:

Streambed slope of entire reach (from USGS map in ft. /ft.): 0.009 ft./ft

Approximate drainage area above the most downstream transect from USGS map or county highway map (square miles): 0 square miles – The waterbody is a man-made canal with levees higher than the surrounding land elevations and therefore there is no direct drainage into the canal.

Length of stream evaluated (ft): 430

Number of lateral transects made: 10

Average stream width (ft): 399.7

Average stream depth (ft): 8.3

Average stream velocity (ft/sec): Flow was not measured as it is not indicative of operations for OCPS. Once the once-through units at Sabine are deactivated, the canal will be tidally influenced.

Instantaneous stream flow (ft^3/sec): Flow was not measured as it is not indicative of operations for OCPS. Once the once-through units at Sabine are deactivated, the canal will be tidally influenced.

Indicate flow measurement method (VERY IMPORTANT – type of meter, floating chip timed over a fixed distance, etc.): N/A

Flow fluctuations (i.e., minor, moderate, or severe): Moderate

Size of pools (i.e., large, small, moderate, or none): None

Maximum pool depth (ft): N/A

Total number of stream bends: 0

Number well defined: 0

Number moderately defined: 0

Number poorly defined: 0

Total number of riffles: 0

Copy of Payment Information

Attachment A

July 2021
Project No. 0574234

Environmental Resources Management
CityCentre Four
840 West Sam Houston Parkway North, Suite 600
Houston, Texas 77024-3920
281-600-1000

TCEQ ePay Voucher Receipt

Transaction Information

Voucher Number:	520923
Trace Number:	582EA000441123
Date:	07/26/2021 05:24 PM
Payment Method:	CC - Authorization 0000046377
Voucher Amount:	$2,000.00
Fee Type:	WW PERMIT - MAJOR INDUSTRIAL FACILITY - MAJOR AMENDMENT
ePay Actor:	LISA GATEWOOD

Payment Contact Information

Name:	LISA GATEWOOD
Company:	ENTERGY
Address:	10055 GROGANS MILL RD, THE WOODLANDS, TX 77380
Phone:	281-297-3421

Site Information

Site Name:	SABINE PLANT
Site Address:	1000 POWERHOUSE ROAD, ORANGE, TX 77630
Site Location:	1000 POWERHOUSE ROAD ORANGE TX 77630

Customer Information

Customer Name:	ENTERGY TEXAS INC
Customer Address:	1000 POWERHOUSE ROAD, ORANGE, TX 77630
State Tax ID:	16114357987

Other Information

Program Area ID:	WQ00003360
Comments:	WQ0000336000

TCEQ ePay Voucher Receipt

Transaction Information

Voucher Number:	520924
Trace Number:	582EA000441123
Date:	07/26/2021 05:24 PM
Payment Method:	CC - Authorization 0000046377
Voucher Amount:	$50.00
Fee Type:	30 TAC 305.53B WQ NOTIFICATION FEE
ePay Actor:	LISA GATEWOOD

Payment Contact Information

Name:	LISA GATEWOOD
Company:	ENTERGY
Address:	10055 GROGANS MILL RD, THE WOODLANDS, TX 77380
Phone:	281-297-3421

Core Data Form

Attachment B

July 2021
Project No. 0574234

Environmental Resources Management
CityCentre Four
840 West Sam Houston Parkway North, Suite 600
Houston, Texas 77024-3920
281-600-1000

TCEQ Core Data Form

TCEQ Use Only

For detailed instructions regarding completion of this form, please read the Core Data Form Instructions or call 512-239-5175.

SECTION I: General Information

1. Reason for Submission (*If other is checked please describe in space provided.*)

☐ New Permit, Registration or Authorization (*Core Data Form should be submitted with the program application.*)

☐ Renewal (*Core Data Form should be submitted with the renewal form*) ☒ Other **Major Amendment**

2. Customer Reference Number *(if issued)*	Follow this link to search for CN or RN numbers in Central Registry**	3. Regulated Entity Reference Number *(if issued)*
CN **603282054**		RN **102513041**

SECTION II: Customer Information

4. General Customer Information	5. Effective Date for Customer Information Updates (mm/dd/yyyy)	7/15/2021

☐ New Customer ☒ Update to Customer Information ☐ Change in Regulated Entity Ownership

☐ Change in Legal Name (Verifiable with the Texas Secretary of State or Texas Comptroller of Public Accounts)

The Customer Name submitted here may be updated automatically based on what is current and active with the Texas Secretary of State (SOS) or Texas Comptroller of Public Accounts (CPA).

6. Customer Legal Name *(If an individual, print last name first: eg: Doe, John)*	*If new Customer, enter previous Customer below:*
Entergy Texas, Inc.	N/A

7. TX SOS/CPA Filing Number	8. TX State Tax ID (11 digits)	9. Federal Tax ID (9 digits)	10. DUNS Number *(if applicable)*
0800911623	16114357987	611435798	617251533

11. Type of Customer:	☒ Corporation	☐ Individual	Partnership: ☐ General ☐ Limited
Government: ☐ City ☐ County ☐ Federal ☐ State ☐ Other		☐ Sole Proprietorship	☐ Other:

12. Number of Employees
☐ 0-20 ☐ 21-100 ☐ 101-250 ☐ 251-500 ☒ 501 and higher

13. Independently Owned and Operated?
☒ Yes ☐ No

14. Customer Role (Proposed or Actual) – *as it relates to the Regulated Entity listed on this form. Please check one of the following*

☐ Owner ☐ Operator ☒ Owner & Operator
☐ Occupational Licensee ☐ Responsible Party ☐ Voluntary Cleanup Applicant ☐ Other:

15. Mailing Address:							
	1000 Powerhouse Road						
City	Orange	State	TX	ZIP	77630	ZIP + 4	0102

16. Country Mailing Information *(if outside USA)*	17. E-Mail Address *(if applicable)*
	jwill72@entergy.com

18. Telephone Number	19. Extension or Code	20. Fax Number *(if applicable)*
(281) 297-1937		( ) -

SECTION III: Regulated Entity Information

21. General Regulated Entity Information (*If 'New Regulated Entity" is selected below this form should be accompanied by a permit application*)

☐ New Regulated Entity ☐ Update to Regulated Entity Name ☒ Update to Regulated Entity Information

The Regulated Entity Name submitted may be updated in order to meet TCEQ Agency Data Standards (removal of organizational endings such as Inc, LP, or LLC).

22. Regulated Entity Name (*Enter name of the site where the regulated action is taking place.*)

Sabine Plant

23. Street Address of the Regulated Entity: *(No PO Boxes)*	100 Powerhouse Road							
	City	Orange	**State**	TX	**ZIP**	77630	**ZIP + 4**	
24. County	Orange							

Enter Physical Location Description if no street address is provided.

25. Description to Physical Location:	N/A

26. Nearest City	**State**	**Nearest ZIP Code**
Orange	TX	77630

27. Latitude (N) In Decimal:			**28. Longitude (W) In Decimal:**		
Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
29	59	12	-93	54	00

29. Primary SIC Code (4 digits)	**30. Secondary SIC Code** (4 digits)	**31. Primary NAICS Code** (5 or 6 digits)	**32. Secondary NAICS Code** (5 or 6 digits)
4911		221112	

33. What is the Primary Business of this entity? *(Do not repeat the SIC or NAICS description.)*

Electrical generation

34. Mailing Address:	**1000 Powerhouse Road**							
	City	**Orange**	**State**	**TX**	**ZIP**	**77630**	**ZIP + 4**	
35. E-Mail Address:	**ttherlo@entergy.com**							

36. Telephone Number	**37. Extension or Code**	**38. Fax Number** *(If applicable)*
(409) 734-3360		**( ) -**

39. TCEQ Programs and ID Numbers Check all Programs and write in the permits/registration numbers that will be affected by the updates submitted on this form. See the Core Data Form instructions for additional guidance.

☐ Dam Safety	☐ Districts	☐ Edwards Aquifer	☐ Emissions Inventory Air	☐ Industrial Hazardous Waste
☐ Municipal Solid Waste	☐ New Source Review Air	☐ OSSF	☐ Petroleum Storage Tank	☐ PWS
☐ Sludge	☐ Storm Water	☐ Title V Air	☐ Tires	☐ Used Oil
☐ Voluntary Cleanup	☒ Waste Water	☐ Wastewater Agriculture	☐ Water Rights	☐ Other:
	WQ0000336000			

SECTION IV: Preparer Information

40. Name:	Amanda Ragatz	**41. Title:**	Senior Scientist

42. Telephone Number	**43. Ext./Code**	**44. Fax Number**	**45. E-Mail Address**
(314) 551-7099		( ) -	amanda.ragatz@erm.com

SECTION V: Authorized Signature

46. By my signature below, I certify, to the best of my knowledge, that the information provided in this form is true and complete, and that I have signature authority to submit this form on behalf of the entity specified in Section II, Field 6 and/or as required for the updates to the ID numbers identified in field 39.

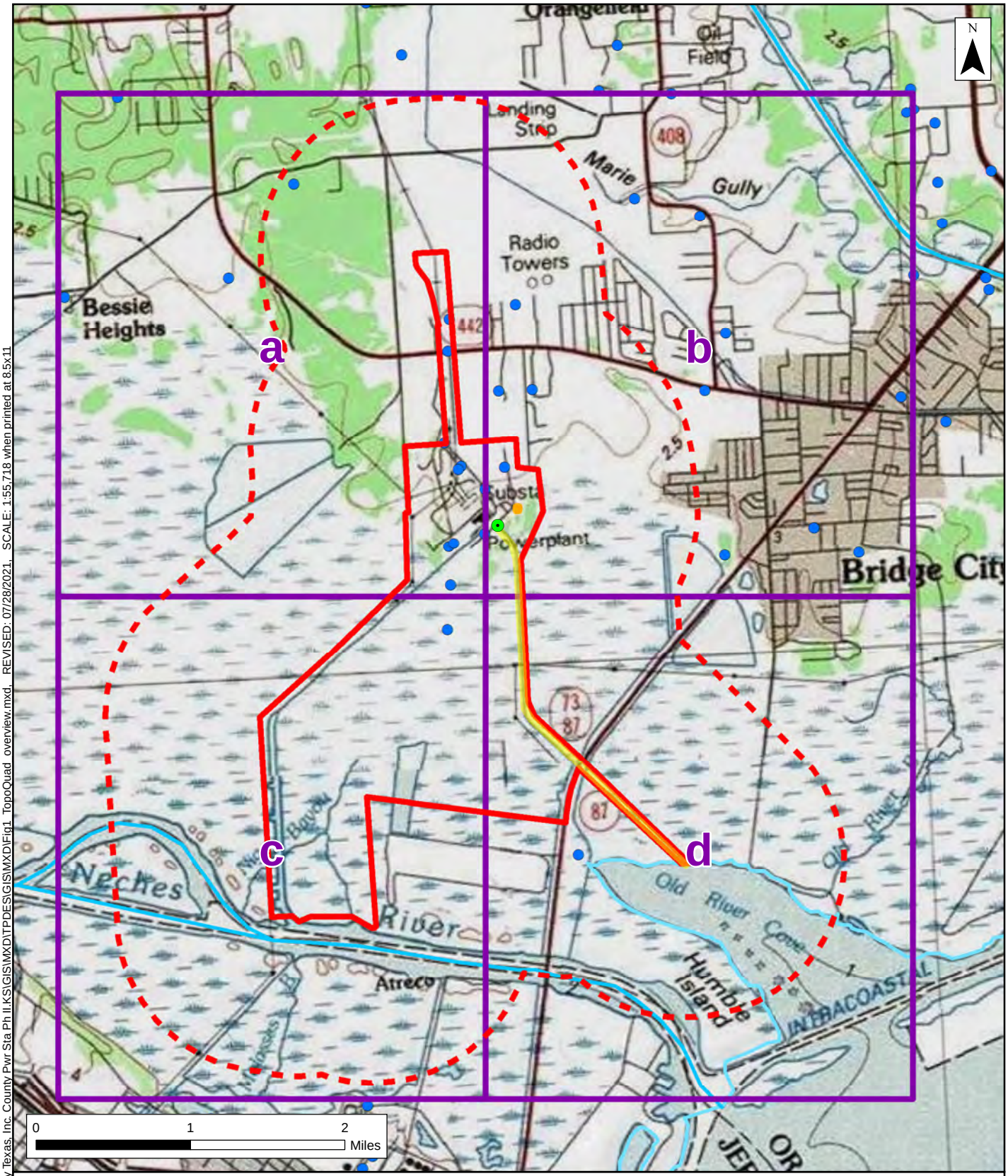
Company:	Entergy Services, Inc.	**Job Title:**	Vice President Power Plant Operations
Name *(In Print):*	Jason Willis	**Phone:**	(281) 297- 1937
Signature:		**Date:**	7/15/2021

USGS Figure

Attachment C

July 2021
Project No. 0574234

Environmental Resources Management
CityCentre Four
840 West Sam Houston Parkway North, Suite 600
Houston, Texas 77024-3920
281-600-1000



Legend

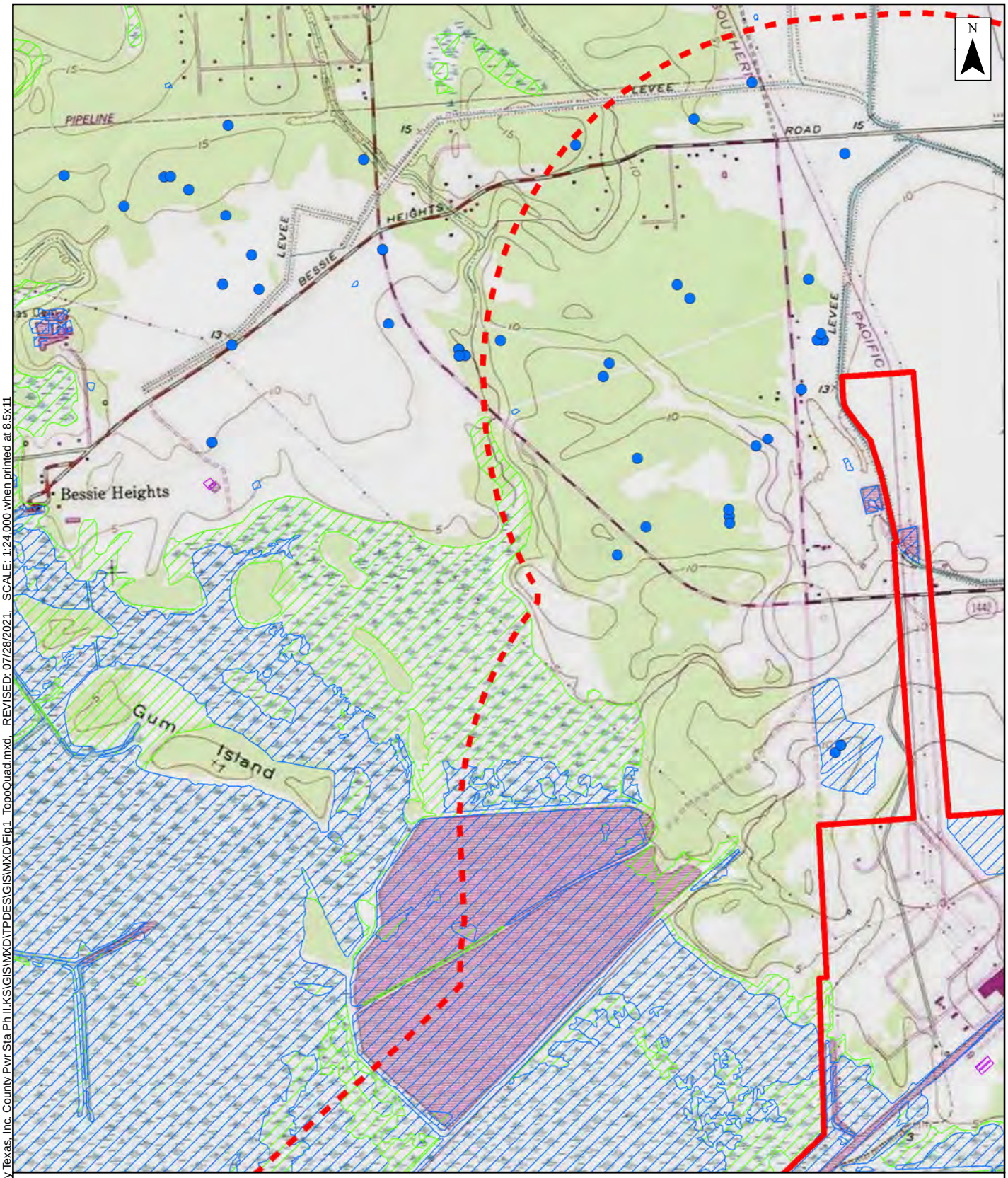
- Property Boundary
- 1-mile radius
- Outfall
- OCPS Discharge route
- Map grid
- TCEQ Stream Segment
- TWDB Water Wells

USGS Figure Overview
Terry, Orangefield, Port Arthur North, and West of Greens Bayou 1:24,000 USGS Quadrangles
TPDES Permit Major Amendment
Entergy OCPS
Orange, Texas

Environmental Resources Management
www.erm.com

Source: Esri - World Topoographic Map; NAD 1983 StatePlane Texas South Central FIPS 4204 Feet

H:\Houston\Projects\0574234 Entergy Texas, Inc. County Pwr Sta Ph II.KS\GIS\MXD\TPDES\GIS\MXD\Fig1 TopoQuad overview.mxd, REVISED: 07/28/2021, SCALE: 1:55,718 when printed at 8.5x11



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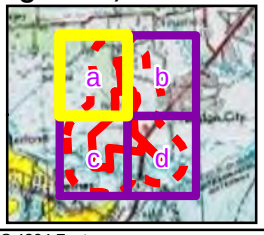
Legend

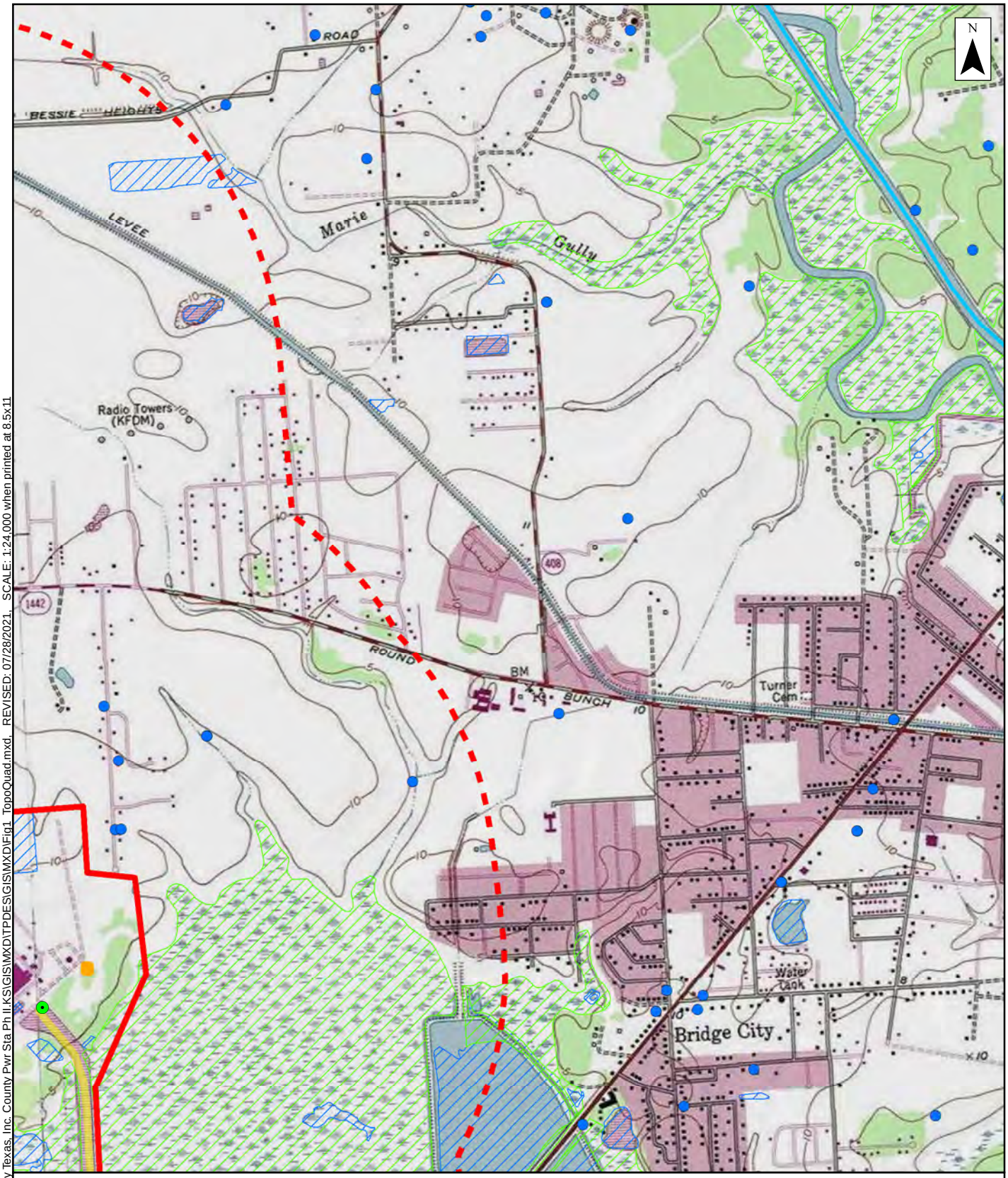
- Property Boundary
- 1-mile radius
- Lake/Pond
- Reservoir
- Swamp/Marsh
- TCEQ Stream Segment
- TWDB Water Wells



Terry, Orangefield, Port Arthur North, and West of Greens Bayou
1:24,000 USGS Quadrangles
USGS Figure 1a
TPDES Permit Major Amendment
Entergy OCPS
Orange, Texas

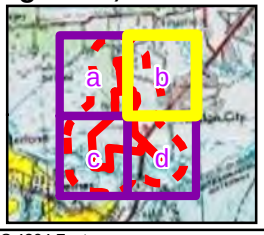
Environmental Resources Management
www.erm.com
ERM

Source: Esri - World Topoographic Map; NAD 1983 StatePlane Texas South Central FIPS 4204 Feet



Legend

- Property Boundary
- 1-mile radius
- Outfall
- Discharge route
- Treatment facility
- Lake/Pond
- Swamp/Marsh
- TCEQ Stream Segment
- TWDB Water Wells



Terry, Orangefield, Port Arthur North, and West of Greens Bayou
1:24,000 USGS Quadrangles
USGS Figure 1b
TPDES Permit Major Amendment
Entergy OCPS
Orange, Texas

Environmental Resources Management
www.erm.com

Source: Esri - World Topoographic Map; NAD 1983 StatePlane Texas South Central FIPS 4204 Feet

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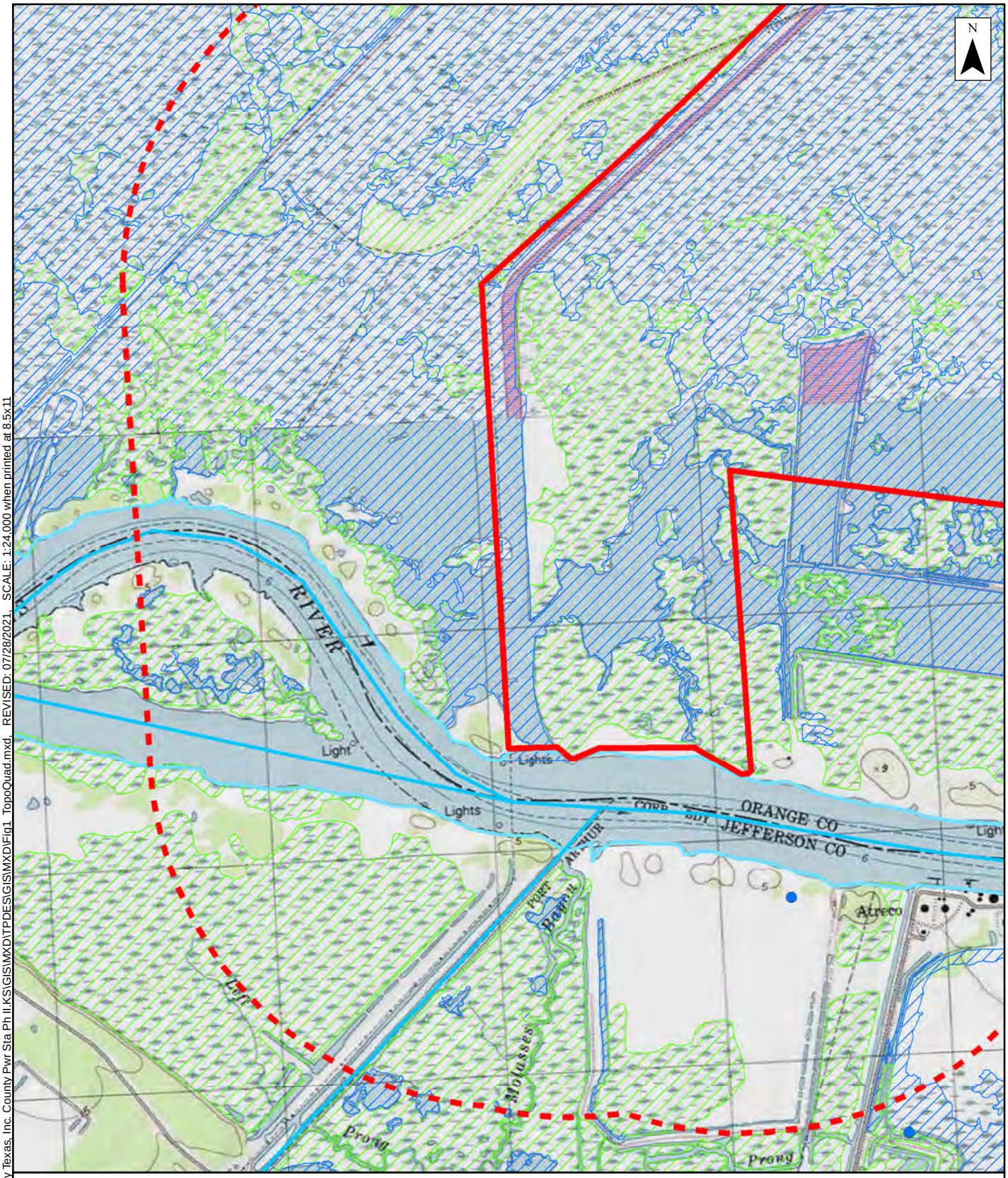
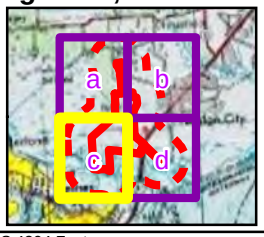


Legend

- Property Boundary
- 1-mile radius
- Lake/Pond
- Swamp/Marsh
- TCEQ Stream Segment
- TWDB Water Wells



Terry, Orangefield, Port Arthur North, and West of Greens Bayou
1:24,000 USGS Quadrangles
USGS Figure 1c
TPDES Permit Major Amendment
Entergy OCPS
Orange, Texas

Environmental Resources Management
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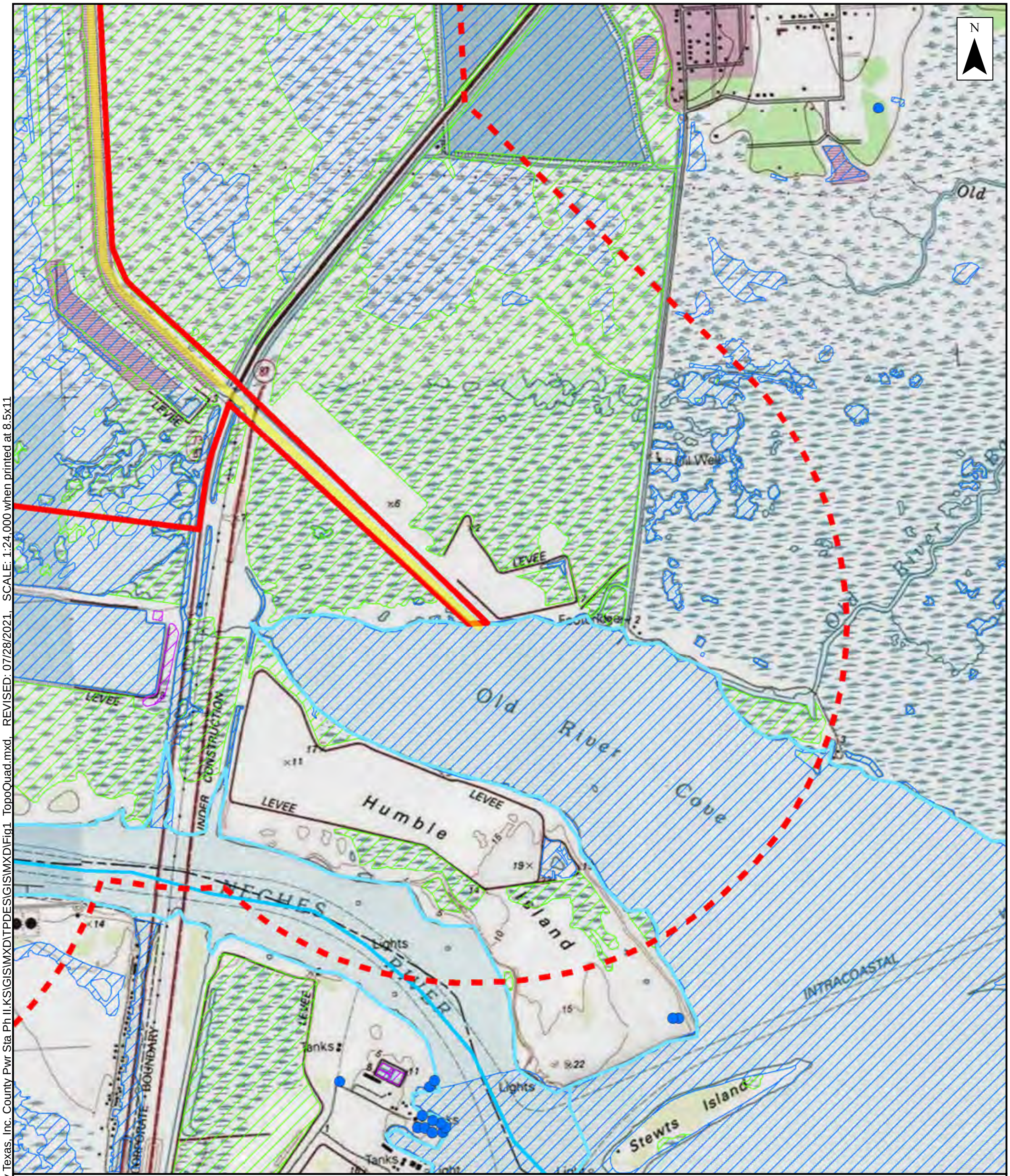
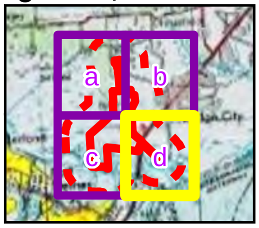
Source: Esri - World Topoographic Map; NAD 1983 StatePlane Texas South Central FIPS 4204 Feet



Legend

- Property Boundary
- 1-mile radius
- Discharge route
- Lake/Pond
- Reservoir
- Swamp/Marsh
- TCEQ Stream Segment
- TWDB Water Wells



Terry, Orangefield, Port Arthur North, and West of Greens Bayou
1:24,000 USGS Quadrangles
USGS Figure 1d

TPDES Permit Major Amendment
Entergy OCPS
Orange, Texas

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Source: Esri - World Topoographic Map; NAD 1983 StatePlane Texas South Central FIPS 4204 Feet

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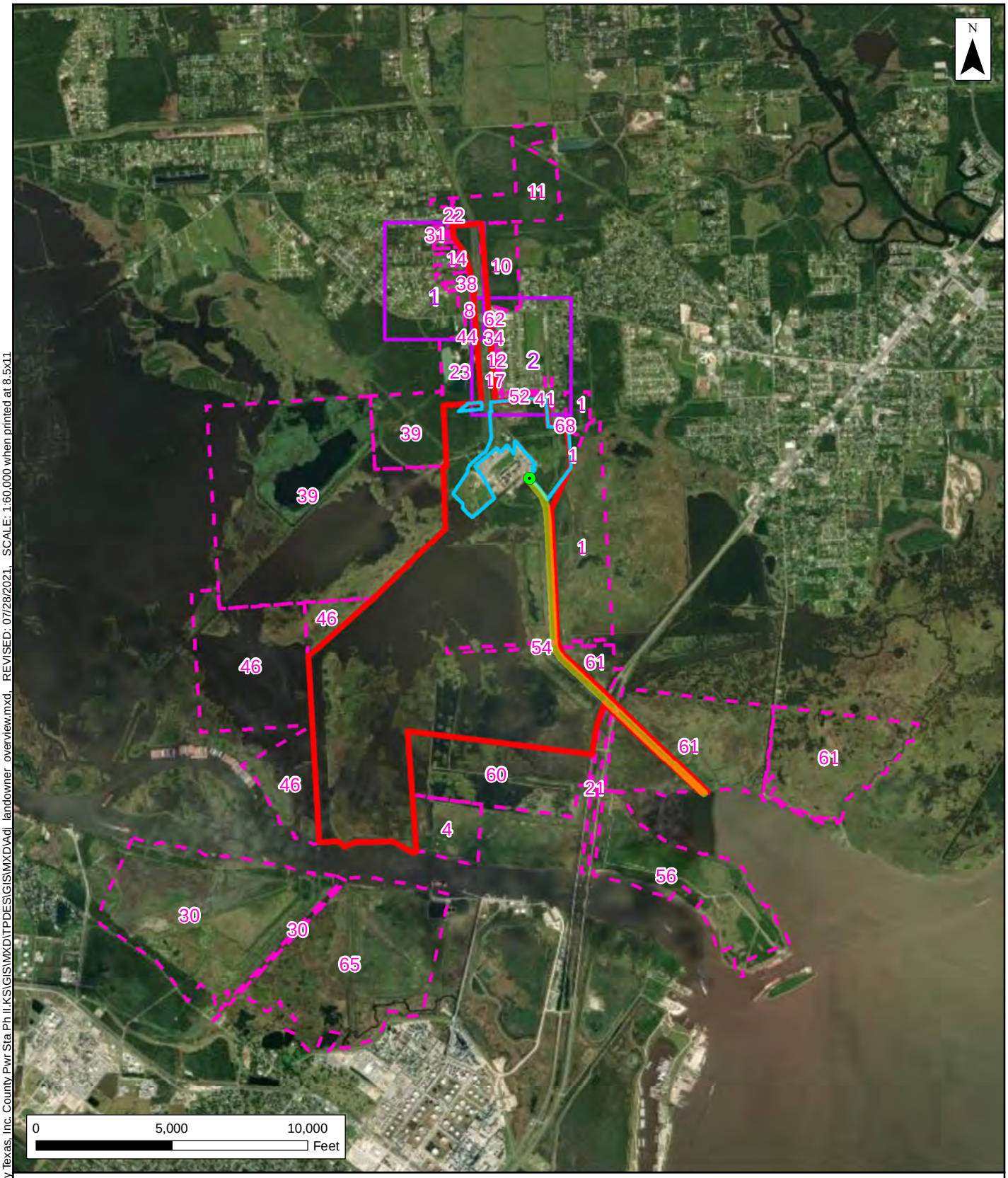
Landowner Information

Attachment D

July 2021
Project No. 0574234

Environmental Resources Management
CityCentre Four
840 West Sam Houston Parkway North, Suite 600
Houston, Texas 77024-3920
281-600-1000



Legend

- Property Boundary
- Facility Boundary
- Outfall
- OCPS Discharge route
- Adjacent Landowner
- Map grid

Adjacent Landowner Figure

TPDES Permit Major Amendment
Entergy OCPS
Orange, Texas

Environmental Resources Management
www.erm.com

ERM

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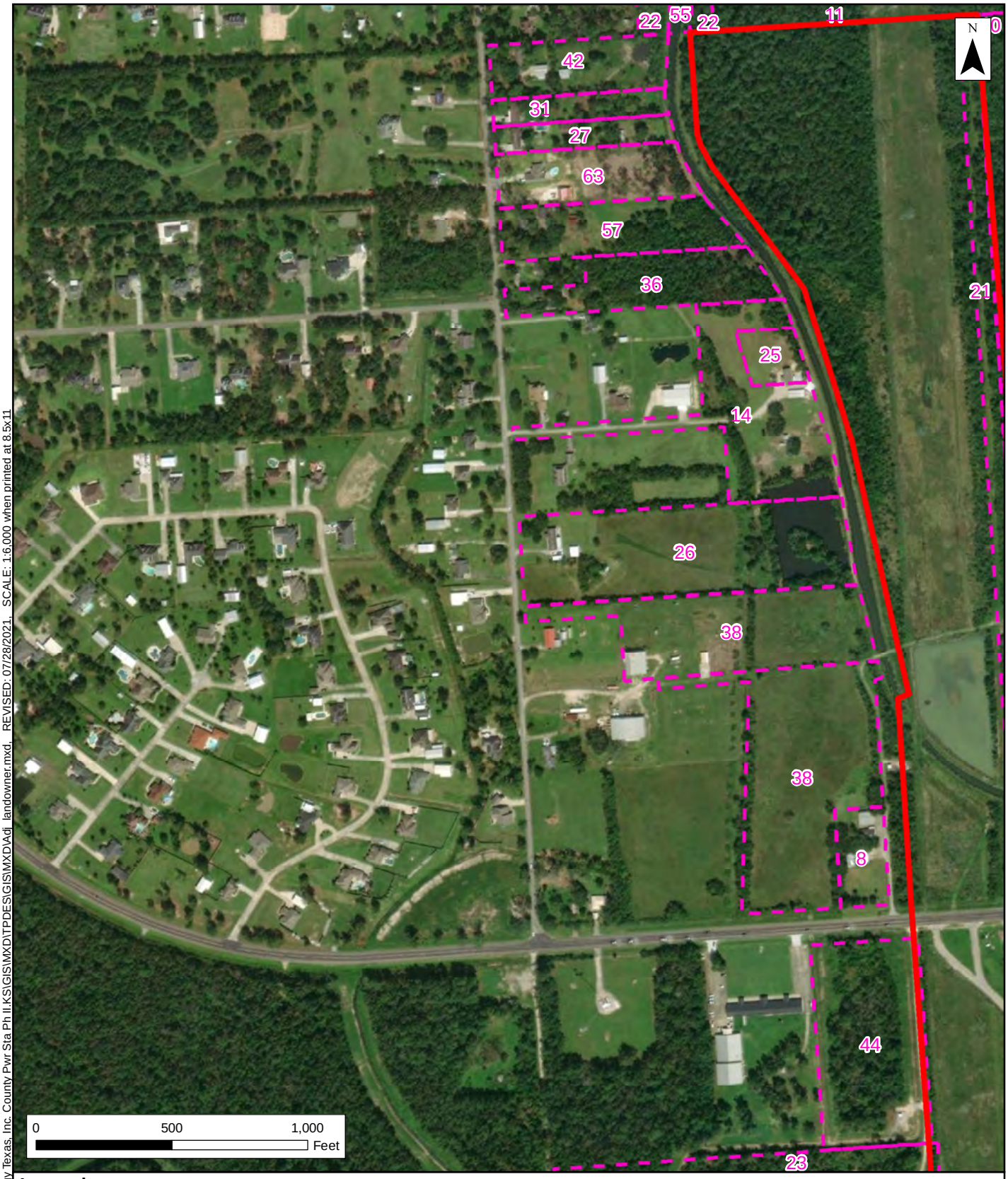
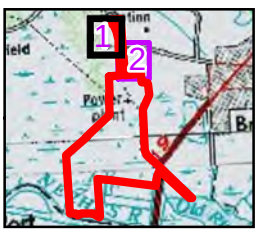
Source: Esri - USGS Topoographic Map; NAD 1983 StatePlane Texas South Central FIPS 4204 Feet



Legend

- Property Boundary
- Adjacent Landowner



Adjacent Landowner Figure 1

TPDES Permit Major Amendment
Entergy OCPS
Orange, Texas

Environmental Resources Management
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ERM

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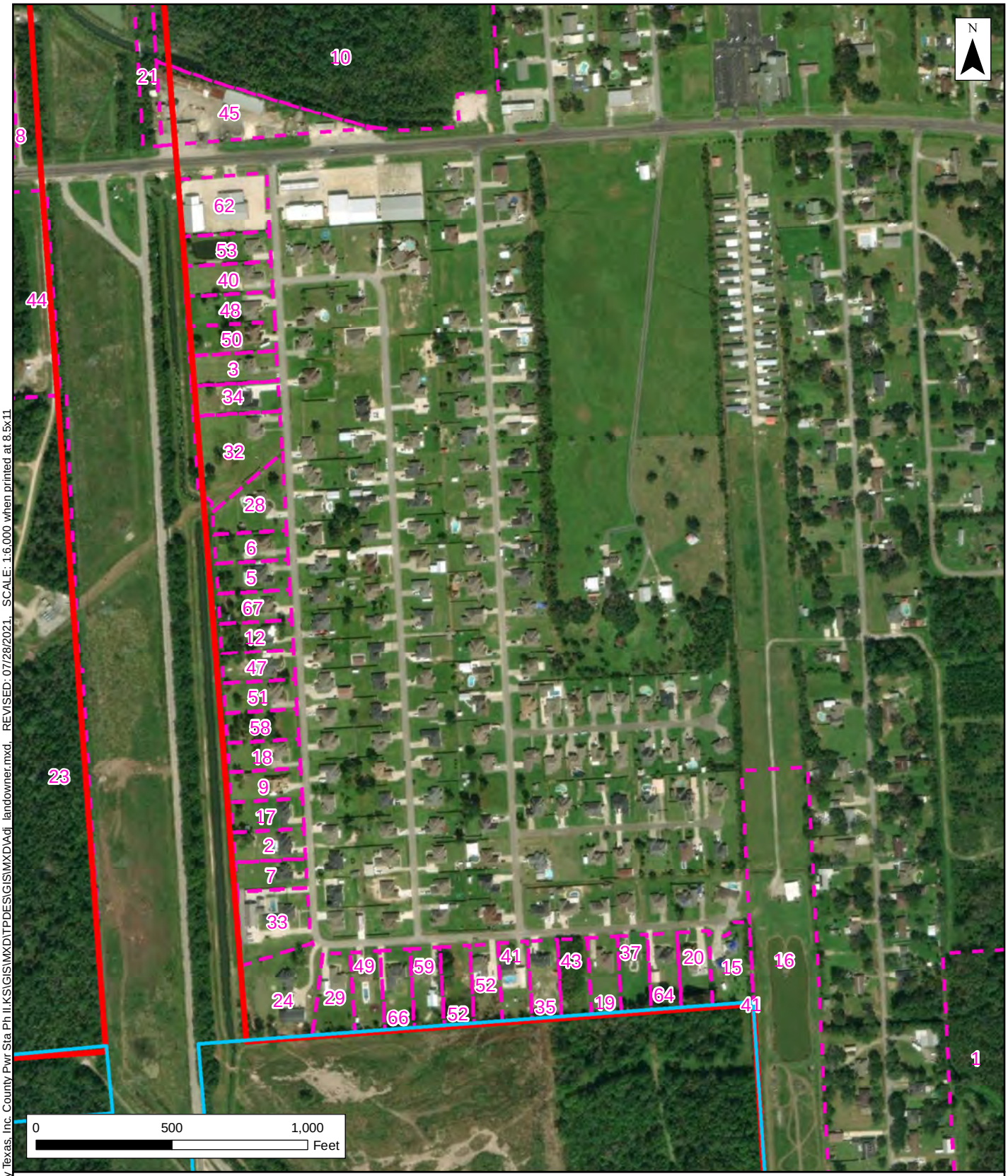
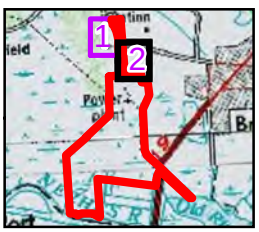
Source: Esri - USGS Topoographic Map; NAD 1983 StatePlane Texas South Central FIPS 4204 Feet



Legend

- Property Boundary
- Facility Boundary
- Adjacent Landowner



Adjacent Landowner Figure 2

TPDES Permit Major Amendment
Entergy OCPS
Orange, Texas

Environmental Resources Management
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ERM

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Source: Esri - USGS Topoographic Map; NAD 1983 StatePlane Texas South Central FIPS 4204 Feet

MapID	Owner	Mailing Address
1	7UP TRUST	ATTN: FRANK BROWN, 611 8TH ST, ORANGE, TX 77630-5623
2	ARCENEAUX, LESLIE P & DOLLY	310 LAUREN DR, ORANGE, TX 77630-2446
3	BERNARD, RUSTY J & TIFFANY A	160 LAUREN DR, ORANGE, TX 77630-2419
4	BURCHETT, JOHN KIRK	3525 TURTLE CREEK BLVD, APT 8C, DALLAS, TX 75219-5516
5	BURNAMAN, GASTON A & DENISE M	220 LAUREN DR, ORANGE, TX 77630
6	BURNAMAN, JOEY L & SHARION N	210 LAUREN DR, ORANGE, TX 77630-2440
7	CARLIN, BROCK & MEAGAN	320 LAUREN DR, ORANGE, TX 77630-2440
8	CHOATE, COLTON JAMES & HALEIGH DENISE	2630 W ROUNDBUNCH, ORANGE, TX 77630-9037
9	CLARK, JIMMY	290 LAUREN DR, ORANGE, TX 77630-2440
10	CORMIER FAMILY LIMITED PARTNERSHIP	PO BOX 226, ORANGEFIELD, TX 77639-0226
11	COW BAYOU HOLDINGS LLC	5443 FM 408, ORANGE, TX 77630-9054
12	DUPLANTIS, JAMES & JILL C	240 LAUREN DR, ORANGE, TX 77630-2440
13	EAVES, CHARLES D	930 SUNCREST DR, ORANGE, TX 77630-8279
14	ELLIS, ERIC & MARY A	5310 OAKWOOD CIR, ORANGE, TX 77630-0224
15	ERNST, BENJAMIN & BRITTANY	705 JACOB CIR, ORANGE, TX 77360-2646
16	ERNST, TIM	700 JACOB CIR, ORANGE, TX 77630-2644
17	FABRE, WILLIE J & CRYSTAL	300 LAUREN DR, ORANGE, TX 77630-2446
18	GEREAU, COLTON J & CARLIE LYNNE	4690 THACKER DR, ORANGE, TX 77630-5074
19	GRANGER, JOSHUA MATTHEW & MEGAN	745 JACOB CIR, ORANGE, TX 77630-2646
20	GUIDRY, KENT M & JENNIFER L	715 JACOB CIR, ORANGE, TX 77630-2646
21	GULF STATES UTILITIES COMPANY	PO BOX 61000, NEW ORLEANS, LA 70161-1000
22	HANKS, WILLIE MAE	490 TEXAS AVE, BRIDGE CITY, TX 77611-4222
23	HARGRODER, GRETCHEN	2301 LONG ST, BEAUMONT, TX 77702-1716
24	HARTJE, CHARLES & JESSICA	845 JACOB CIR, ORANGE, TX 77630-2678
25	HATTON, MILDRED SHANNON	5855 TURNER RD, ORANGE, TX 77630-0171
26	HATTON, TERRELL	5787 TURNER RD, ORANGE, TX 77630-0152
27	HILL, MARK E & ODETTE M	5481 TURNER RD, ORANGE, TX 77630-1665
28	HOFFPAUIR, WILLIAM ROBERT & JAIME NICOLE	200 LAUREN DR, ORANGE, TX 77630
29	HUFSTETLER, ROBERT	835 JACOB CIR, ORANGE, TX 77630-2678
30	INDORAMA VENTURES OXIDES LLC	24 WATERWAY AVE, STE 1100, THE WOODLANDS, TX 77380-3445
31	JARRETT, MONTY U & SHARON RENEE	5463 TURNER RD, ORANGE, TX 77630
32	JOHNSON, JEREMY L & KRYSTLE	180 LAUREN DR, ORANGE, TX 77630-2419
33	JONES, ROBBY JOE	340 LAUREN DR, ORANGE, TX 77630-2446
34	JONES, SCOTTY J	170 LAUREN DR, ORANGE, TX 77630-2419
35	JONES, SHEENA C	765 JACOB CIR, ORANGE, TX 77630-2646
36	KELLEY, DONALD & PATRICIA	5607 TURNER RD, ORANGE, TX 77630-0169
37	KINCANNON, JUSTIN WILLIAM & TARA ANN	735 JACOB CIR, ORANGE, TX 77630-2646
38	LATIOLAIS, STEPHANIE J	1452 ELIZABETH STONE DR, BRIDGE CITY, TX 77611-3648
39	LONESOME GAME, LLC	8395 E BRIDGEFIELD DR, ORANGE, TX 77630-8539
40	MANUEL, JESSICA N	130 LAUREN DR, ORANGE, TX 77630-2419
41	MELANSON, NICHALES A	775 JACOB CIR, ORANGE, TX 77630-2646
42	OLIVER, BRENDA	5433 TURNER RD, ORANGE, TX 77630-1665
43	ORANGE COUNTY DRAINAGE DISTRICT	8081 OLD HIGHWAY 90, ORANGE, TX 77630-1036
44	ORANGE COUNTY EMERGENCY SERVICES DISTRICT NO. 2	PO BOX 942, BRIDGE CITY, TX 77611-0942
45	ORANGE COUNTY, TX	123 S 6TH ST, ORANGE, TX 77630-6302
46	PDG RESOURCES LLC	PO BOX 6804, HOUSTON, TX 77265-6804
47	PERKINS, BRIDGET LEE	250 LAUREN DR, ORANGE, TX 77630-2440
48	PITRE, RYAN D & MICHELE R	140 LAUREN DR, ORANGE, TX 77630-2419
49	POWERS, RICHARD LEE & LACY	825 JACOB CIR, ORANGE, TX 77630-2678
50	RICHARD, CHAD & KRISTA	150 LAUREN DR, ORANGE, TX 77630-2419
51	RICHARD, TRAVIS SHANE & CARRIE ELIZABETH	260 LAUREN DR, ORANGE, TX 77630-2440
52	ROBINSON, PATRICK A & CANDACE M	785 JACOB CIR, ORANGE, TX 77630-2646
53	ROWE, HEATHER S & REID W	120 LAUREN DR, ORANGE, TX 77630-2419
54	SABINE PIPE LINE LLC	C/O ENLINK MIDSTREAM, ATTN: TAX DEPARTMENT 2501 CEDAR SPRINGS, SUITE 100, DALLAS, TX 75201
55	SABINE RIVER AUTHORITY OF TEXAS	PO BOX 579, ORANGE, TX 77631-0579
56	SHBS DEVELOPMENT, LLC	906 MAIN ST, PORT NECHES, TX 77651-2538
57	SHOOK, DEAN ANTHONY	3903 LAKE BRAZOS LN, RICHMOND, TX 77406-8089

58	STERLING, CHUCK	100 PARKSIDE PLACE DR, BRIDGE CITY, TX 77611-2441
59	STERLING, LARRY & AMANDA	1819 GARY AVE, NEDERLAND, TX 77627-4932
60	TCWL INVESTMENTS, LLC	4301 ALTANTIC RD, PORT ARTHUR, TX 77642-0132
61	TEXAS PARKS & WILDLIFE DEPARTMENT	4200 SMITH SCHOOL RD, AUSTIN, TX 78744-3291
62	THE EVIV CHARITABLE FOUNDATION	9355 LYNNE CIR, ORANGE, TX 77630-8283
63	TOWNSEND, RODNEY & DEBRA	5467 TURNER RD, ORANGE, TX 77630-1665
64	TRAN, TERALYN L & ANH L	725 JACOB CIR, ORANGE, TX 77630-2646
65	TRANS GLOBAL SOLUTIONS INC	% DUDLEY VEAL PROP TAX GROUP 9502 OXTED LN, SPRING, TX 77379-6624
66	WILLIAMS, JASON WAYNE & ALISSA	815 JACOB CIR, ORANGE, TX 77630-2678
67	YADON, BRYAN TODD & AMY L	1407 GREEN AVE, #270, ORANGE, TX 77630-5538
68	YU, DUSTIN M & BRITTANY M	929 SUNCREST DR, ORANGE, TX 77630-8280

Source: Orange County Appraisal District; Jefferson County Appraisal District

7UP TRUST
ATTN: FRANK BROWN
611 8TH ST
ORANGE TX 77630-5623

ARCENEAUX, LESLIE P & DOLLY
310 LAUREN DR
ORANGE TX 77630-2446

BERNARD, RUSTY J & TIFFANY A
160 LAUREN DR
ORANGE TX 77630-2419

BURCHETT, JOHN KIRK
3525 TURTLE CREEK BLVD
APT 8C
DALLAS TX 75219-5516

BURNAMAN, GASTON A & DENISE M
220 LAUREN DR
ORANGE TX 77630

BURNAMAN, JOEY L & SHARION N
210 LAUREN DR
ORANGE TX 77630-2440

CARLIN, BROCK & MEAGAN
320 LAUREN DR
ORANGE TX 77630-2440

CHOATE, COLTON JAMES & HALEIGH DENISE
2630 W ROUNDBUNCH
ORANGE TX 77630-9037

CLARK, JIMMY
290 LAUREN DR
ORANGE TX 77630-2440

CORMIER FAMILY LIMITED PARTNERSHIP
PO BOX 226
ORANGEFIELD TX 77639-0226

COW BAYOU HOLDINGS LLC
5443 FM 408
ORANGE TX 77630-9054

DUPLANTIS, JAMES & JILL C
240 LAUREN DR
ORANGE TX 77630-2440

EAVES, CHARLES D
930 SUNCREST DR
ORANGE TX 77630-8279

ELLIS, ERIC & MARY A
5310 OAKWOOD CIR
ORANGE TX 77630-0224

ERNST, BENJAMIN & BRITTANY
705 JACOB CIR
ORANGE TX 77360-2646

ERNST, TIM
700 JACOB CIR
ORANGE TX 77630-2644

FABRE, WILLIE J & CRYSTAL
300 LAUREN DR
ORANGE TX 77630-2446

GEREAU, COLTON J & CARLIE LYNNE
4690 THACKER DR
ORANGE TX 77630-5074

GRANGER, JOSHUA MATTHEW & MEGAN
745 JACOB CIR
ORANGE TX 77630-2646

GUIDRY, KENT M & JENNIFER L
715 JACOB CIR
ORANGE TX 77630-2646

GULF STATES UTILITIES COMPANY
PO BOX 61000
NEW ORLEANS LA 70161-1000

HANKS, WILLIE MAE
490 TEXAS AVE
BRIDGE CITY TX 77611-4222

HARGRODER, GRETCHEN
2301 LONG ST
BEAUMONT TX 77702-1716

HARTJE, CHARLES & JESSICA
845 JACOB CIR
ORANGE TX 77630-2678

HATTON, MILDRED SHANNON
5855 TURNER RD
ORANGE TX 77630-0171

HATTON, TERRELL
5787 TURNER RD
ORANGE TX 77630-0152

HILL, MARK E & ODETTE M
5481 TURNER RD
ORANGE TX 77630-1665

HOFFPAUIR, WILLIAM ROBERT & JAIME NICOLE
200 LAUREN DR
ORANGE TX 77630

HUFSTETLER, ROBERT
835 JACOB CIR
ORANGE TX 77630-2678

INDORAMA VENTURES OXIDES LLC
24 WATERWAY AVE
STE 1100
THE WOODLANDS TX 77380-3445

JARRETT, MONTY U & SHARON RENEE
5463 TURNER RD
ORANGE TX 77630

JOHNSON, JEREMY L & KRYSTLE
180 LAUREN DR
ORANGE TX 77630-2419

JONES, ROBBY JOE
340 LAUREN DR
ORANGE TX 77630-2446

JONES, SCOTTY J
170 LAUREN DR
ORANGE TX 77630-2419

JONES, SHEENA C
765 JACOB CIR
ORANGE TX 77630-2646

KELLEY, DONALD & PATRICIA
5607 TURNER RD
ORANGE TX 77630-0169

KINCANNON, JUSTIN WILLIAM & TARA ANN
735 JACOB CIR
ORANGE TX 77630-2646

LATIOLAIS, STEPHANIE J
1452 ELIZABETH STONE DR
BRIDGE CITY TX 77611-3648

LONESOME GAME, LLC
8395 E BRIDGEFIELD DR
ORANGE TX 77630-8539

MANUEL, JESSICA N
130 LAUREN DR
ORANGE TX 77630-2419

MELANSON, NICHALES A
775 JACOB CIR
ORANGE TX 77630-2646

OLIVER, BRENDA
5433 TURNER RD
ORANGE TX 77630-1665

ORANGE COUNTY DRAINAGE DISTRICT
8081 OLD HIGHWAY 90
ORANGE TX 77630-1036

ORANGE COUNTY EMERGENCY SERVICES DISTRICT NO. 2
PO BOX 942
BRIDGE CITY TX 77611-0942

ORANGE COUNTY, TX
123 S 6TH ST
ORANGE TX 77630-6302

PDG RESOURCES LLC
PO BOX 6804
HOUSTON TX 77265-6804

PERKINS, BRIDGET LEE
250 LAUREN DR
ORANGE TX 77630-2440

PITRE, RYAN D & MICHELE R
140 LAUREN DR
ORANGE TX 77630-2419

POWERS, RICHARD LEE & LACY
825 JACOB CIR
ORANGE TX 77630-2678

RICHARD, CHAD & KRISTA
150 LAUREN DR
ORANGE TX 77630-2419

RICHARD, TRAVIS SHANE & CARRIE ELIZABETH
260 LAUREN DR
ORANGE TX 77630-2440

ROBINSON, PATRICK A & CANDACE M
785 JACOB CIR
ORANGE TX 77630-2646

ROWE, HEATHER S & REID W
120 LAUREN DR
ORANGE TX 77630-2419

SABINE PIPE LINE LLC
C/O ENLINK MIDSTREAM
ATTN: TAX DEPARTMENT
2501 CEDAR SPRINGS
SUITE 100
DALLAS, TX 75201

SABINE RIVER AUTHORITY OF TEXAS
PO BOX 579
ORANGE TX 77631-0579

SHBS DEVELOPMENT, LLC
906 MAIN ST
PORT NECHES TX 77651-2538

SHOOK, DEAN ANTHONY
3903 LAKE BRAZOS LN
RICHMOND TX 77406-8089

STERLING, CHUCK
100 PARKSIDE PLACE DR
BRIDGE CITY TX 77611-2441

STERLING, LARRY & AMANDA
1819 GARY AVE
NEDERLAND TX 77627-4932

TCWL INVESTMENTS, LLC
4301 ALTANTIC RD
PORT ARTHUR TX 77642-0132

TEXAS PARKS & WILDLIFE DEPARTMENT
4200 SMITH SCHOOL RD
AUSTIN TX 78744-3291

THE EVIV CHARITABLE FOUNDATION
9355 LYNNE CIR
ORANGE TX 77630-8283

TOWNSEND, RODNEY & DEBRA
5467 TURNER RD
ORANGE TX 77630-1665

TRAN, TERALYN L & ANH L
725 JACOB CIR
ORANGE TX 77630-2646

TRANS GLOBAL SOLUTIONS INC
% DUDLEY VEAL PROP TAX GROUP
9502 OXTED LN
SPRING, TX 77379-6624

WILLIAMS, JASON WAYNE & ALISSA
815 JACOB CIR
ORANGE TX 77630-2678

YADON, BRYAN TODD & AMY L
1407 GREEN AVE
#270
ORANGE, TX 77630-5538

YU, DUSTIN M & BRITTANY M
929 SUNCREST DR
ORANGE TX 77630-8280

Original Photographs

Attachment E

July 2021
Project No. 0574234

Environmental Resources Management
CityCentre Four
840 West Sam Houston Parkway North, Suite 600
Houston, Texas 77024-3920
281-600-1000

Photo 1: Intake Canal Discharge Point 002, facing south.

Photo 2: Looking Southwest towards Outfall 002 from OCPS.

Photo 3: Looking south towards Outfall 102 from OCPS.

Photo 4: Looking southeast towards Outfall 102.

Photo 5: Looking north towards Outfall 202 from OCPS.

Photo 6: Stormwater ditch, formally Outfall 701 of Sabine TPDES

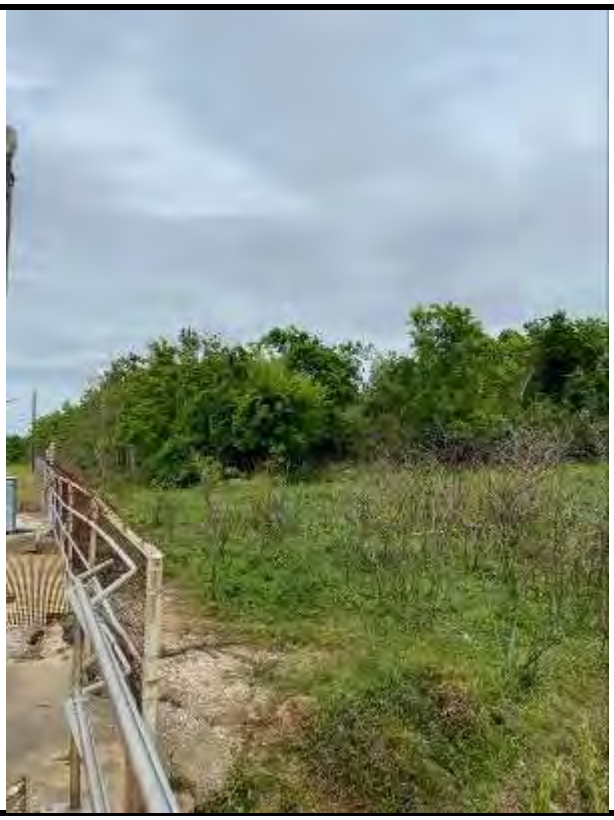


Photo 7: At intake, looking east towards OCPS.

Photo 8: Proposed Turbine Generator Building, looking northeast towards OCPS.

Legend

- Outfall
- OCPS Discharge route
- Photo location
- Photo direction

Photo Location Figure

TPDES Permit Major Amendment
Entergy OCPS
Orange, Texas

Environmental Resources Management
www.erm.com
ERM

Source: Esri - World Topoographic Map; NAD 1983 StatePlane Texas Central FIPS 4203 Feet

H:\Houston\Projects\0574234 Entergy Texas, Inc. County Pwr Sta Ph II.KS\GIS\MXD\TPDES\GIS\MXD\Photo_location.mxd, REVISED: 07/28/2021, SCALE: 1:3,000 when printed at 8.5x11

Wastewater Generating Process

Attachment F

July 2021
Project No. 0574234

Environmental Resources Management
CityCentre Four
840 West Sam Houston Parkway North, Suite 600
Houston, Texas 77024-3920
281-600-1000

1.b. Describe the wastewater-generating processes.

Facility Location

The Sabine Plant is a steam electric generating station located approximately 2 miles from Bridge City, Texas within the incorporated limits of the city of Port Arthur, Texas. The site is located 1.5 miles south of Farm-to-Market (FM) Road 1442 at a point approximately 2.5 miles west of the intersection of FM Road 1442 and State Highway 97 in Orange County. The plant consists of 2,440 acres with approximately 54 developed acres with an average site elevation of 8-10 feet above mean sea level. The surrounding property consists mainly of marshy area with a housing development to the northeast of the plant property.

Description of Process

The proposed amendment to the Sabine Plant consists of the construction of a 1,215 megawatt (MW) unit consisting of (2) combined-cycle gas turbines (CCGT) with heat recovery steam generators (HRSG), one steam turbine generator, and evaporative cooling towers.

Water Use and Wastewater Generation

Refer to Attachment H for the general water balance diagram for the proposed unit. Raw water for process demand will be drawn from the SRA Canal via a new intake structure, and is split between cooling tower and service / fire protection water storage makeups.

The primary water use for the unit is for makeup of the evaporative cooling tower system. The makeup requirements are supplemented by internal recycle streams from reverse osmosis (RO) reject, HRSG blowdown and occasional evaporative cooler blowdown. Water treatment additives (shown in Attachment J) are injected to allow for achievement of approximately (8) cycles of concentration. The cooling tower blowdown is discharged via new internal Outfall 102 then onward to new external Outfall 002.

A portion of CCGT raw service water is used for HRSG blowdown quenching; the volume that is not evaporated in the quench operation is combined with the HRSG blowdown and transferred to the cooling tower as supplemental makeup. Other raw service water is used for miscellaneous operations, then directed through an oil/water separator and into the low volume waste (LVW) collection sumps. Stormwater runoff from the power block is also captured and directed through the oil/water separator.

The remainder of the raw service water is processed in the onsite demineralization water plant, treated by ultrafiltration (UF), RO, and demineralizer to produce demineralized water for the HRSG makeup as well as turbine washing. Wastewater is generated by the UF reject (discharged to LVW sump) and RO reject (directed to cooling tower makeup or LVW). The demineralizers will be regenerated offsite, thus no wastewater stream is generated by this operation.

The low volume waste streams previously described are discharged via new internal Outfall 202 then onward to new external Outfall 002.

Both chemical and non-chemical metal cleaning operations will be conducted as needed to maintain the performance of the CCGT unit. Because these activities are infrequent and spread across the facility, OCPS intends to utilize portable tankage for the collection and treatment of the chemical metal cleaning wastewater. The treated wastewater will be transferred via temporary piping or hose to internal Outfall 302 then onward to new external Outfall 002.

Plant Commissioning and Startup Considerations

The new CCGT unit will be commissioned over a period of several months, prior to the retirement of Units 3 and 4. Unit 3 or Unit 4 will likely be in operation during the time wastewater is generated by the various commissioning operations. While each of these wastewater sources will be similar to the operational discharges, the volumes and frequencies of discharges will differ from the steady state operation of the unit. The identified waste streams an approximate schedule of discharge are as follows:

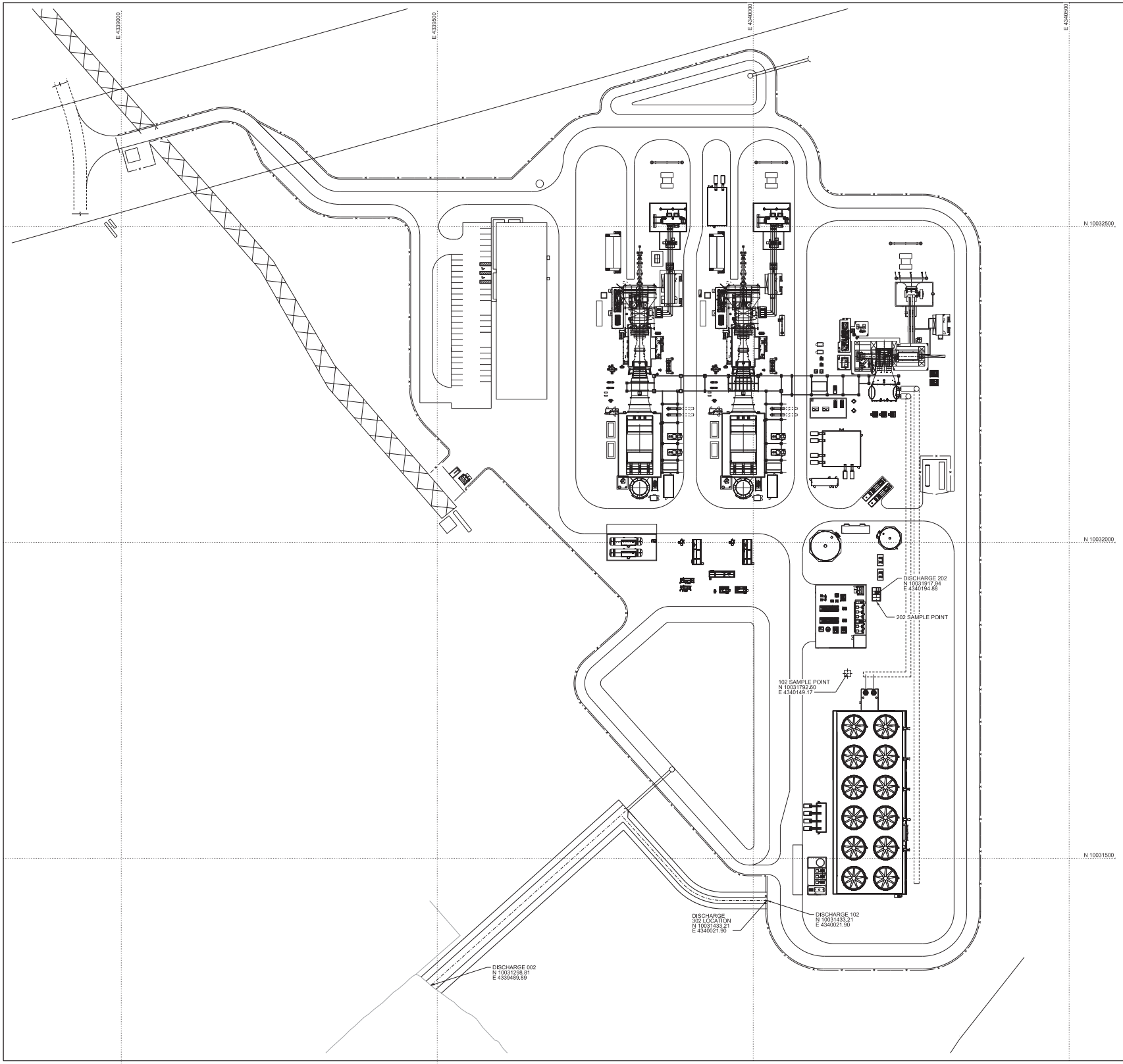
Discharge	Outfall	Rate / Volume	Approx. Date
Piping cleaning / flushing	302	~2.73 MG total	2Q25
Demin water plant / cold commissioning	202	~3.9 MG total	2Q25
HRSG piping chemical metal cleaning	302	~0.5 MG total	2Q25
Cooling Tower cold commissioning	102	~0.3 MG total	2Q25
Cooling Tower hot commissioning	102	~0.78 MGD	2Q25
Commercial Operation	All		2Q26

Facility Map

Attachment G

July 2021
Project No. 0574234

Environmental Resources Management
CityCentre Four
840 West Sam Houston Parkway North, Suite 600
Houston, Texas 77024-3920
281-600-1000



NOTE:

1. COORDINATES SHOWN ON THIS DRAWING ARE IN NAD83 TEXAS STATE PLANE CETNRAL ZONE STATE PLANE SYSTEM.

NORTH

50' 0' 50' 100'

GRAPHIC SCALE

Sargent & Lundy

DATE
04-14-2021
SKETCH NUMBER
OCPS-CSK-04122021

Flow Schematic and Water Balance

Attachment H

July 2021
Project No. 0574234

Environmental Resources Management
CityCentre Four
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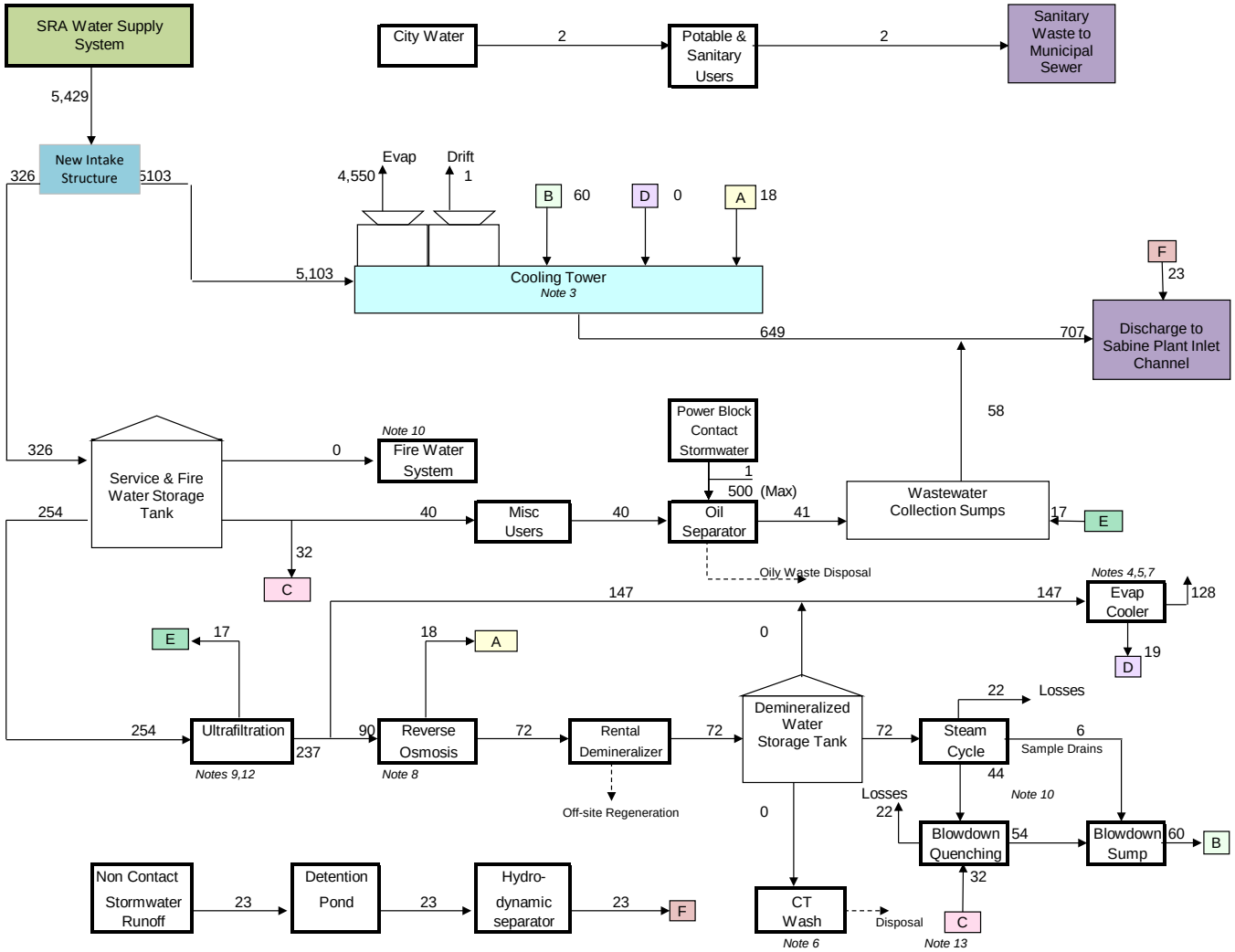
Houston, Texas 77024-3920
281-600-1000



Water Balance Notes and Assumptions

1. Unless otherwise specified, all flow rates are time average in gpm.
2. Water balance based on the following conditions:
   106.1 °F/30.1% RH
   Evap Cooling - OFF
3. Cooling tower operated at 8.0 cycles of concentration:
   based on preliminary review of water quality data. To be verified based on experience at existing Sabine facility.
4. Evaporative cooling water supply consists of 100% ultrafiltered raw water due to the very low dissolved solids content of the water supply.
5. Evaporative cooler operates at 8.0 cycles of concentration based on preliminary review of quality data.
6. CT Water Wash assumes:
   Online Washing: 1 per week 240 gal/wash/CT
   Offline with Detergent: Every other Month 400 gal/wash/CT
7. Evaporative Cooler operates at ambient temperatures greater than 59 deg F.
8. RO system operates at 80% recovery factor based on preliminary review of water quality data.
9. UF system requirements are based on an assumed 93% recovery factor
10. HRSG Blowdown is total for two HRSG's based on:1% of total steam production. Flows represent normal day to day operation; equipment sizing to be based on higher blowdown.
11. Fire water system flow is limited to incidental leakage (assumed to be 0) and normal system testing protocol which will be conducted on a scheduled basis.
12. The ultrafiltration system will also be the source of evaporative cooler makeup in the absence of SRA makeup pretreatment.
13. Amount of quench water based on 70 °F supply temperature.
14. Wastewater routings shown on water balance are conceptual. Some streams may be routed to intermediate tanks or sumps prior to being recycled to cooling tower.
15. All flows shown on the water balance are considered preliminary and will be verified during detailed design. regardless of actual water quality. Therefore makeup and blowdown flows in water balances may be different.

S&L Project No: IV0287.089

Owner: Entergy

EPC Contractor:

Engineer: Sargent & Lundy

Entergy

Orange County Advanced Power Station

CALC NUMBER

00-M9006

Sheet 4 of 5

Summer Extreme Water Balance

Drawing Release Record

Rev	Date	Prepared	Reviewed	Approved	Purpose
4	19-Aug-20	M. Rosen	M. Heerman	P. Czarny	For Use
3	24-Apr-20	M. Rosen	M. Heerman	P. Czarny	For Use
2	5-Mar-20	M. Rosen	M. Heerman	P. Czarny	For Use
1	23-Dec-19	M. Rosen	M. Heerman	P. Czarny	For Use

Additional Outfall Wastestream Contributions

Attachment I

July 2021
Project No. 0574234

Environmental Resources Management
CityCentre Four
840 West Sam Houston Parkway North, Suite 600
Houston, Texas 77024-3920
281-600-1000

Attachment I
Technical Report, page 8

Outfall No.: 302

Contributing Wastestreams	Volume (MGD)	% of Total Flow
Chemical Cleaning Waste	0.270	100
Total	0.270	100

Chemical Summary and SDS for Cooling Water Discharges

Attachment J

July 2021
Project No. 0574234

Environmental Resources Management
CityCentre Four
840 West Sam Houston Parkway North, Suite 600
Houston, Texas 77024-3920
281-600-1000

Attachment J
Technical Report

Cooling Tower Chemicals

Chemicals listed are those anticipated to be used during operation at OCPS. Update information will be provided to TCEQ prior to use of any chemicals other than those listed.

Chemical Name	Sulfuric Acid 93%	Dixichlor Max	Sodium Bisulfite
Manufacturers Product Identification Number	Sulfuric Acid 93%	Sodium Hypochlorite 12.5%	Sodium Bisulfite Solution
Product Use	pH adjustment	Biocide	Surfactant
Chemical Composition	Sulfuric acid 93% Water 7%	Sodium hypochlorite Sodium chloride Sodium hydroxide	Sodium Bisulfite Sodium Sulfite Water
Chemical Abstract Number	7664-93-9 7732-18-5	7681-52-9 7647-14-5 1310-73-2	7631-90-5 757-83-7 7732-18-5
Persistence	This product is likely to persist in the environment. The product is not biodegradable.	No information available	No information available
Active Ingredient Half-life	No information available	No information available	No information available
Frequency of Product Use	Continuous	Continuous	Continuous
Toxicity	Low toxicity to aquatic organisms.	96h LC50 Pimephales promelas: 0.08mg/L	96 hr LC50 Goldfish: 100 mg/l.
Whole Product or Active Ingredient	Active Ingredient	Active Ingredient	Active Ingredient
Product Concentration	93 wt%	12.5 wt%	38 wt%

Chemical Name	NALCO 3DT118	NALCO H-130
Manufacturers Product Identification Number	3D TRASAR® 3DT118	H-130 Microbiocide
Product Use	Cooling Water Treatment	Biocide
Chemical Composition	No hazardous ingredients	Didecyl-Dimethyl-Ammonium chloride 50%
Chemical Abstract Number	No information available	7173-51-5
Persistence	No information available	The organic portion of this preparation is expected to be readily biodegradable.
Active Ingredient Half-life	No information available	No information available
Frequency of Product Use	Continuous	Once weekly
Toxicity	LC50 Fathead minnow: 1,165 mg/L 96h LC50 Rainbow trout: 3,223 mg/L 96h	LC50 Rainbow trout: 2.2 mg/L 96h LC50 Bluegill sunfish: 0.32 mg/L 96h
Whole Product or Active Ingredient	Whole Product	Whole Product
Product Concentration	Proprietary	Proprietary

Attachment J
Technical Report

Boiler Chemicals

Chemical Name	**AS-9007**
Manufacturers Product Identification Number	AS-9007
Product Use	Boiler water treatment
Chemical Composition	Ammonium hydroxide
Chemical Abstract Number	1336-21-6
Persistence	No information available
Active Ingredient Half-life	No information available
Frequency of Product Use	Continuous
Toxicity	96hr LC50 Oncorhynchus mykiss: 0.89 mg/L
Whole Product or Active Ingredient	Active ingredient
Product Concentration	20 wt%

Safety Data Sheet

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product identifier: **DIXICHLOR MAX**
Synonyms: Bleach, Sodium Hypochlorite, Sodium Hypochlorite 12.5%
Intended use: Swimming pool chlorinator, Hard surface cleaner, Water treatment chemical, Biocides
Uses Advised Against: None identified. This is a pesticide product, do not use in a pesticide application that is not included on the label.

Company Identification
DPC Industries, Inc.
DPC Enterprises, LP
DXI Industries, Inc.
DX Terminals
Petra Chemical Company
PO Box 24600
Houston, TX 77229-4600

Emergency
CHEMTREC (USA) (800) 424-9300
24 hour Emergency Telephone No. (281) 457-4888
www.dxgroup.com

2. Hazard identification of the product

Physical hazards	Corrosive to metals	Category 1
Health hazards	Skin corrosion/irritation Serious eye damage/eye irritation Specific target organ toxicity, single exposure	Category 1C Category 1 Category 3 respiratory tract irritation
Environmental hazards	Hazardous to the aquatic environment, acute hazard Hazardous to the aquatic environment, long-term hazard	Category 1 Category 2

Label elements
Using the Toxicity Data listed in section 11 and 12 the product is labeled as follows.

Signal Word	**Danger**
Hazard Statements	CORROSIVE. Causes serious eye damage. Causes severe skin burns. Causes damage to respiratory system when inhaled. Very toxic to aquatic life. Toxic to aquatic life with long lasting effects. May be corrosive to metals.
Precautionary Statements	
Prevention	Do not breathe mist / vapors / spray. Avoid contact with skin, eyes and clothing. Wash thoroughly after handling. Avoid release to the environment. Wear protective gloves / eye protection / face protection. Keep only in original container. Use in well ventilated area. Store in corrosive resistant container with a resistant inner liner.
Response	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. IF ON SKIN: Remove / Take off immediately all contaminated clothing. Wash with plenty of soap and water. IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor / physician if you feel unwell. IF IN EYES: Rinse continuously with water for several minutes. Remove contact lenses if present and easy to do - continue rinsing. Immediately call a POISON CENTER or doctor / physician. Wash contaminated clothing before reuse. Collect spillage.
Storage	Store in a well-ventilated place. Keep container tightly closed. Store locked up. Protect from sunlight.
Disposal	Dispose of contents / container in accordance with local / national regulations.

3. Composition/information on ingredients

Synonyms: Bleach, Sodium Hypochlorite, Sodium Hypochlorite 12.5%

Ingredient	CAS Number	Percent (%)	GHS Classification	NOTES
Sodium hypochlorite.	7681-52-9	12.5 - 15.6	Skin Corr. 1B; Aquatic Acute 1; Eye Dam. 1 .	**[1]**
Sodium chloride	7647-14-5	9 - 10	Not classified	**[1]**
Sodium hydroxide	1310-73-2	0.5 - 2	Skin Corr. 1A;H314 Met. Corr. 1;H290	**[1][2]**

In accordance with paragraph (i) of §1910.1200, the specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret.

[1] Substance classified with a health or environmental hazard. [2] Substance with a workplace exposure limit.

*The full texts of the phrases are shown in Section 16.

4. First Aid Measures

General	Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed. Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.
Inhalation	Move victim to fresh air. Call emergency medical care. Apply artificial respiration if victim is not breathing. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Administer oxygen if breathing is difficult.
Eyes	Irrigate copiously with clean fresh water for at least 10 minutes, holding the eyelids apart. Get medical attention. Remove contact lenses if present and easy to do - continue rinsing.
Skin	Remove contaminated clothing. Wash skin thoroughly with soap and water or use a recognized skin cleanser. Do NOT use solvents or thinners.
Ingestion	If accidentally swallowed obtain immediate medical attention. Rinse mouth. Keep at rest. Do NOT induce vomiting. If vomiting occurs, keep head low so that stomach content does not get into lungs.
Most important symptoms and effects, both acute and delayed	
Overview	Corrosive effects. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result.
Indication of immediate medical attention and special treatment needed	Treat symptomatically. Chemical burns: Flush with water immediately. While flushing, remove clothes which do not adhere to affected area. Call an ambulance. Continue flushing during transport to hospital
General information	Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance.

5. Fire-fighting measures

Recommended Extinguishing media	Alcohol resistant foam, CO^2, dry chemical powder, water spray. Do not use water jet.
Special hazards arising from the substance or mixture	Hydrogen chloride and chlorine. Chlorine gas rate of decomposition increases with the concentration with temperatures above 85 °F (30 °C). Do not breathe mist / vapors / spray.
Advice for fire-fighters	Wear positive pressure self-contained breathing apparatus (SCBA). Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection. Structural firefighters' protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible. Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes. Some are oxidizers and may ignite combustibles (wood, paper, oil, clothing, etc.). Contact with metals may evolve flammable hydrogen gas. Containers may explode when heated. TOXIC; inhalation, ingestion or skin contact with material may cause severe injury or death. Contact with molten substance may cause severe burns to skin and eyes. Avoid any skin contact. Effects of contact or inhalation may be delayed. Fire may produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution. **ERG Guide No.** 154

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Wash hands before eating, drinking, smoking or using toilet. Promptly remove soiled clothing and wash thoroughly before reuse. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. Local authorities should be contacted if significant spill cannot be contained.
Environmental precautions	Do not allow spills to enter drains or watercourses.
Methods and material for containment and cleaning up	Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Absorb in vermiculite, dry sand or earth and place into containers. Following product recovery, flush area with water. Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination. Never return spills in original containers for re-use. For waste disposal, see Section 13 of the SDS.

7. Handling and storage

Precautions for safe handling	Wear appropriate personal protective equipment. Do not get in eyes, on skin, on clothing. Chemical attack increases with solution strength. Use with adequate ventilation. Observe good industrial hygiene practices. Do not apply heat or direct sunlight. Temperature and product concentration affect product quality and decomposition rates.
Conditions for safe storage, including any incompatibilities	Handle containers carefully to prevent damage and spillage. Keep container tightly closed. Store in a cool and well-ventilated place. Store in a corrosive resistant container. Consult container manufacturer for additional guidance. Store away from and do not mix with incompatible materials such as acids, ammonia, urea, oxidizers, organics and metals such as nickel, copper, tin, aluminum and iron.

8. Exposure controls and personal protection

Exposure Control Parameters

CAS No.	Ingestion	Source	Value
1310-73-2	Sodium hydroxide	OSHA	TWA 2 mg/m3
		ACGIH	Ceiling: 2 mg/m3
		NIOSH	C 2 mg/m3
7647-14-5	Sodium chloride	OSHA	No Established Limit
		ACGIH	No Established Limit
		NIOSH	No Established Limit
7681-52-9	Sodium hypochlorite.	OSHA	No Established Limit
		ACGIH	No Established Limit
		NIOSH	No Established Limit

Individual protection measures, such as personal protective equipment

Respiratory	Use NIOSH/MSHA approved respirator, following manufacturer's recommendations when concentrations exceed permissible exposure limits.
Eyes	Wear face shield with safety glasses with side shields and/or safety goggles.
Skin	Chemical resistant clothing such as coveralls/apron boots should be worn. Chemical Impervious gloves.
Engineering Controls	Provide adequate ventilation. Where reasonably practicable this should be achieved by the use of local exhaust ventilation and good general extraction. If these are not sufficient to maintain concentrations of particulates and any vapor below occupational exposure limits suitable respiratory protection must be worn. Eye wash and safety shower must be available when handling this product
Other Work Practices	Use good personal hygiene practices. Wash hands before eating, drinking, smoking or using toilet. Promptly remove soiled clothing and wash thoroughly before reuse.

9. Physical and chemical properties

Appearance	Clear, pale yellow, or greenish Liquid
Odor	Pungent, chlorine odor
Odor threshold	0.9 mg/m^3
pH	12 - 13
Melting point / freezing point	-3 °F (-19.4 °C)
Initial boiling point and boiling range	Decomposes above 230 °F (110 °C)
Flash Point	Nonflammable
Evaporation rate (Ether = 1)	Not Established
Flammability (solid, gas)	Not Applicable
Upper/lower flammability or explosive limits	**Lower Explosive Limit:** Not Measured **Upper Explosive Limit:** Not Measured
Vapor pressure (mmHg)	17.5 (@ 20° C)
Vapor Density	Not Established
Specific Gravity	1.20 - 1.40
Solubility in Water	Complete
Partition coefficient n-octanol/water (Log Kow)	Not Measured
Auto-ignition temperature (°C)	Not Measured
Decomposition temperature	Not Measured
Viscosity (cSt)	Not Measured
VOC %	Not Measured
Other information	No other relevant information.

10. Stability and reactivity

Reactivity	Hazardous Polymerization will not occur.
Chemical stability	Stable under normal circumstances.
Possibility of hazardous reactions	No data available.
Conditions to avoid	Contact with incompatible materials. Acid contact will produce chlorine gas.
Incompatible materials	Any acidic material, ammonia, urea, oxidizers, organics and metals such as nickel, copper, tin, aluminum and iron.
Hazardous decomposition products	No hazardous decomposition products are known.

11. Toxicological information

Acute toxicity

Ingredient	Oral LD50, mg/kg	Skin LD50, mg/kg	Inhalation Vapor LC50, mg/L/4hr	Inhalation Dust/Mist LC50, mg/L/4hr	Inhalation Gas LC50, ppm
Sodium hypochlorite (7681-52-9)	5,000.00, Rat - Category: 5	10,000.00, Rabbit - Category: NA	10.50, Rat - Category: 4	No data available	No data available
Sodium chloride (7647-14-5)	1,350.00, Rabbit - Category: 4	100.00, Rat - Category: 2	40.00, Mouse - Category: NA	10,500.00, Rat - Category: NA	No data available
Sodium hydroxide (1310-73-2)	6,600.00, Mouse - Category: NA	1,350.00, Rabbit - Category: 4	600.00, Mouse - Category: NA	No data available	No data available

11. Toxicological information

Acute toxicity (cont.)

Item	Hazard
Acute Toxicity (mouth)	Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea. Ingestion may produce burns to the lips, oral cavity, upper airway, esophagus and possibly the digestive tract.
Acute Toxicity (skin)	Harmful in contact with skin.
Acute Toxicity (inhalation)	Vapors and spray mist may irritate throat and respiratory system and cause coughing.
Skin corrosion/irritation	Causes severe skin burns and eye damage.
Eye damage/irritation	Causes serious eye damage.
Sensitization (respiratory)	No data available.
Sensitization (skin)	No data available.
Germ toxicity	No data available.
Carcinogenicity	Not considered to be a carcinogen by IARC, ACGIH, NTP or OSHA.
Reproductive Toxicity	No data available.
Specific target organ systemic toxicity (single exposure)	May cause respiratory irritation.
Specific target organ systemic Toxicity (repeated exposure)	Not Applicable.
Aspiration hazard	Not classified; however droplets of product may be aspirated into lungs, through ingestion or vomiting and may cause serious chemical pneumonia.

12. Ecological information

Toxicity: Very toxic to aquatic life. Toxic to aquatic life with long lasting effects.

Aquatic Ecotoxicity

Ingredient	96 hr LC50 fish, mg/l	48 hr EC50 crustacea, mg/l	ErC50 algae, mg/l
Sodium hypochlorite (7681-52-9)	0.08, Pimephales promelas	0.032, Daphnia magna	0.40 (72 hr), Dunaliella primolecta
Sodium chloride (7647-14-5)	1,100.00, Freshwater Fish	3,310.00, Daphnia magna	Not Available
Sodium hydroxide (1310-73-2)	196.00, Poecilia reticulata	40.38, Ceriodaphnia dubia	Not Available

Persistence and degradability:	There is no data available on the preparation itself.
Bioaccumulative potential:	Not Measured
Mobility in soil:	No data available.
Results of PBT and vPvB assessment:	This product contains no PBT/vPvB chemicals.
Other adverse effects:	No other effects are expected.

13. Disposal considerations

Waste treatment methods:	Do not allow into drains or water courses. Wastes and emptied containers should be disposed of in accordance with regulations made under the Control of Pollution Act and the Environmental Protection Act. Using information provided in this data sheet, advice should be obtained from the Waste Regulation Authority, whether the special waste regulations apply.
Waste from material:	The waste determination should be made in discussion between the user and the waste disposal company**.**
Container Management:	Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied.

14. Transport information

UN number:	UN1791
UN proper shipping name:	Hypochlorite solutions
Transport hazard class(es)	
DOT (Domestic Surface Transportation)	
DOT Proper Shipping Name:	Hypochlorite solutions
DOT Hazard Class: **DOT Label:**	8 8
UN / NA Number:	UN1791
DOT Packing Group:	III
CERCLA/DOT RQ:	100 lbs.
Environmental hazards:	IMDG Marine Pollutant: Yes (Sodium hypochlorite)
Special precautions for user:	Not Applicable

15. Regulatory information

Regulatory Overview:	The regulatory data in Section 15 is not intended to be all-inclusive, only selected regulations are represented. All ingredients of this product are listed on the TSCA (Toxic Substance Control Act) Inventory.	
WHMIS Classification	D2B E	
US EPA Tier II Hazards:	**Fire:**	No
	Sudden Release of Pressure:	No
	Reactive:	No
	Immediate (Acute):	Yes
	Delayed (Chronic):	No
SARA 302 Extremely Hazardous Substance:		No
SARA 311/312 Chemicals and RQs (lbs) (>0.1%) :		100
SARA 313 (TRI):		No
CAA Section 112 Hazardous Air Pollutant:		No
CAA Section 112R Risk Management Plan:		No
State Regulations	**N.J. RTK Substances (>1%) :**	Listed
	Penn RTK Substances (>1%) :	Listed
	California Prop 65:	Not Listed

16. Other information:

EPA Registration Number: 813-15
NSF Maximum Use Level (STD 60): Check BOL for facility Data. (37 to 84 mg/L)

H314 Causes severe skin burns and eye damage.
H290. May be corrosive to metals

Revision Information:

5/2019 Section 2: Health Hazard, Skin Corrosion – Subcategory added
Section 3: Revised Sodium hydroxide concentration (EPA registration).

The information and recommendations contained herein are based upon data believed to be correct. However, no guarantee or warranty of any kind, expressed or implied, is made with respect to the information contained herein. We accept no responsibility and disclaim all liability for any harmful effects which may be caused by exposure to our products. Customers/users of this product must comply with all applicable health and safety laws, regulations, and orders.

THE USER IS CAUTIONED TO PERFORM HIS OWN HAZARD EVALUATION AND TO RELY ON HIS OWN DETERMINATIONS.

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: **AS-9007**

Synonyms/ Use: Boiler water treatment

Manufacturer/Supplier: Applied Specialties, Inc.
33555 Pin Oak Parkway
Avon Lake, OH 44012

Customer Information Number: 440-933-9442

For Chemical Emergency Spills, Leaks, Fire, Exposure or Accident, **call Chemtrec: (800) 424-9300** day or night

2. HAZARDOUS IDENTIFICATION

Signal Word: **Danger**

Pictograms:

Hazard Statements: Causes serious eye damage. Causes severe skin burns and eye damage. Harmful if swallowed. Harmful in contact with skin. Harmful if inhaled. Harmful to aquatic life.

Precautionary Statements:

Prevention	Do not breathe mist or vapors.	(P260)
	Wash hands thoroughly after handling.	(P264)
	Do not eat, drink or smoke when using this product.	(P270)
	Use only outdoors or in a well-ventilated area.	(P271)
	Avoid release to the environment.	(P273)
	Wear protective gloves and eye/ face protection.	(P280)

Carcinogenicity: None of the components in this product at concentrations greater than 0.1% are listed by IARC, NTP, OSHA or ACGIH as a carcinogen

Reproductive toxicity: No reproductive effects reported

Teratogenicity: No teratogenic effects reported

Genotoxicty: No mutagenic effects reported

3. CHEMICAL COMPOSITION

COMPONENT	CAS NUMBER	WT %
Ammonium hydroxide	1336-21-6	<19.5%

Chemical identity of some ingredients may be withheld as confidential as permitted by 29 CFR 1910.1200 and various State right to know laws.

4. FIRST AID MEASURES

General Advice: Remove contaminated clothing immediately.

Eye Contact: Immediately flush eyes with large amounts of running water for at least 15 minutes, lifting the lower and upper lids. Consult an ophthalmologist if irritation persists.

Skin Contact: Wash thoroughly with soap and water to remove any chemical from skin. Get medical attention if irritation persists. Contaminated clothing should be removed and laundered.

Inhalation: If difficulties occur after mist or vapors have been inhaled, remove to fresh air and get medical attention immediately.

Ingestion: Immediately rinse mouth and get medical attention immediately. Do not induce vomiting unless instructed to do so by a physician. Never give anything by mouth to an unconscious person or if person is having convulsions. If vomiting occurs naturally, have casualty lean forward to reduce the risk of aspiration.

Note to Physician: Treat according to symptoms (decontamination, vital functions); no known specific antidote.

5. FIRE FIGHTING MEASURES

Flash Point and Method: Not applicable

Extinguishing Media: water spray or water fog - restrict pedestrian and vehicular traffic in areas where a slip hazard may exist. Do not use water jet.

General Hazard: Keep upwind. Restrict pedestrian and vehicular traffic. Avoid bodily contact with the material. Containers can build pressure if exposed to heat. Cool containers using water. Caution – Evolution of fumes/ fog can occur during fire.

Fire Fighting Equipment: Wear NIOSH/MSHA approved, pressure-demand self-contained breathing apparatus and full protective gear. The degree of risk is governed by the burning substance and the fire conditions. Contaminated extinguishing water must be disposed in accordance with all federal, state and local regulations.

6. ACCIDENTAL RELEASE MEASURES

Restrict access until clean-up operations are complete. Wear appropriate Personal Protective Equipment and stay upwind. Note that spills pose a slip hazard.

1. Ventilate the spill area and dike around spill to prevent spreading.
2. Wear self-contained breathing apparatus and full protective clothing.
3. Spills should be contained, diluted to minimize ammonia vapors, and placed in suitable containers for disposal.
4. Dispose of material in accordance with to all FEDERAL, STATE AND LOCAL REGULATIONS.

NOTE: Do not pour product, as supplied, into ground waters, streams, or directly into sewers.

7. HANDLING AND STORAGE

Handling: Avoid contact with eyes, skin and clothing. Use with adequate ventilation. Keep away from sources of ignition and heat. Practice good industrial hygiene. Wash after handling and before eating, drinking, or smoking.

Storage: Keep container tightly closed in a cool, dry and well-ventilated place. Store in original containers. Store in a secured place.

Temperature Tolerance: Avoid extremes.

Applied Specialties, Inc.
33555 Pin Oak Parkway, Avon Lake, OH 44012
P: 440-933-9442 F: 440-933-9439

8. EXPOSURE CONTROLS/ PERSONAL PROTECTION

Occupational Exposure Limits: Ammonium hydroxide ACGIH TLV: 25 ppm

Exposure Guidelines: Work in well ventilated areas. Do not breathe mist or vapors. Wear protective clothing as necessary to minimize contact. Handle in accordance with good industrial hygiene and safety practice.

Engineering Controls: Use process enclosures, local exhaust ventilation, or other engineering controls to reduce airborne levels below established guidelines. Use local exhaust ventilation in areas where these levels may be exceeded.

Personal Protection:

Respirator:	Wear a NIOSH/MSHA approved or equivalent vapor/particulate respirator as necessary.
Eye Protection:	Tight fitting safety goggles and face shield
Gloves:	Chemical resistant gloves and check with glove manufacturers' recommendations, consider all work functions when selecting the best glove.
Clothing:	Impermeable protective clothing as necessary to minimize contact.
Other:	Eye wash and safety showers should be in immediate work area; practice good industrial hygiene and safety practices.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Clear, colorless to yellow liquid
Odor	Ammonia
Viscosity	<50 cps @ 20°C
Freeze Point	Not determined
Boiling Point	38°C
Flash Point	Not applicable
Specific Gravity	~0.93 g/mL
Product pH	~11.0
Solubility in Water	100%

10. STABILITY AND REACTIVITY

Stability: The product is stable under normal temperatures and proper storage conditions.

Hazardous Reactions: Vapors may form unstable or explosive compounds with: acetaldehyde, chlorosilicane, ethylene oxide, fluorine, hydrogen bromide, hypochlorites, iodine, nitric acid, nitrozil chloride, phosphorous, hydrogen phosphate, picric acid, arsenic hydrogen, antimony hydride, sodium, sulfuric oxide, silver, Mercury, and lead. Can react violently if in contact with strong acids or nitrogen oxides.

Incompatibilities: Oxidizers, strong acids, copper, zinc, aluminum and their alloys.

Conditions to avoid: Avoid extreme temperatures; Avoid all sources of ignition, heat, spark, open flame.

Hazardous Decomposition Products: Nitrogen oxides.

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11. TOXICOLOGICAL INFORMATION

Acute Toxicity:

Oral:	LD50	Rat	350 mg/Kg
Irritation/ corrosion:	Eye	Rabbit	Severe irritant
	Skin	Rabbit	irritant
	Respiratory	severe irritant	

Sensitization: This product is not expected to be a sensitizer

Carcinogenicity: None of the substances in this product are listed as carcinogens by the IARC, NTP, or ACGIH

12. ECOLOGICAL INFORMATION

Ecotoxicity:

	LC50 (96hr)	Oncorhynchus mykiss	0.89 mg/L
	EC50 (48hr)	Daphnia magna	101 mg/L

Bioaccumulation: Accumulation in organisms is not expected.

13. DISPOSAL CONSIDERATIONS

Product Residues: Prohibition – Do not discharge product, as supplied, to drains, sewers, or ground waters. Disposal – Dispose in accordance with all federal, state, and local regulations. It is the waste generator's responsibility to determine if a particular waste is hazardous under RCRA

Used Packaging: Dispose of in a licensed facility and in compliance with local, state, and federal regulations. Recommend crushing, puncturing or other means to prevent unauthorized use of used containers.

14. TRANSPORT INFORMATION

Proper Shipping Name: Ammonia solution

Hazard Class: 8

Identification Number: UN 2672

Packaging Group: III

Label Required: Corrosive

15. REGULATORY INFORMATION

FEDERAL REGULATIONS:

CERCLA/SUPERFUND (40 CFR 117, Section 302)

Component	CAS Number	Concentration	RQ
Ammonium hydroxide	1336-21-6	17 – 22%	4,545 lbs *as product*

SARA EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355)

Component	CAS Number
No components listed	

SARA HAZARD CATEGORIES (40 CFR 370, Sections 311, 312)

[X] Acute [ ] Chronic [ ] Fire [ ] Pressure [ ] Reactive [ ] None

SARA TOXIC SUBSTANCES (40 CFR 372, Section 313)

This product contains the following toxic chemicals subject to the reporting requirements of section 313 of the emergency planning and Right – to – know Act of 1986 and of 40CFR 372.

Component	CAS Number
Ammonium hydroxide	1336-21-6

US TOXIC SUBSTANCES CONTROL ACT/INVENTORY STATUS (TSCA)

All components are listed

RCRA STATUS

It is the waste generator's responsibility to determine if a particular waste is hazardous under RCRA

NTP, IARC, OSHA, & ACGIH STATUS

None of the components in this product at concentrations greater than 0.1% are listed

DOT REPORTABLE QUANTITY (RQ) (49 CFR, Subchapter C, Section 172.101, Appendix A)

Component	CAS Number	Concentration	RQ
Ammonium hydroxide	1336-21-6	17 – 22%	4,545 lbs *as product*

STATE REGULATIONS:

PENNSYLVANIA, NEW JERSEY, and MASSACHUSETTS RIGHT-TO-KNOW INFORMATION

Component	CAS Number
Ammonium hydroxide	1336-21-6

CALIFORNIA PROPOSITION 65:

THIS PRODUCT DOES NOT CONTAIN ANY CHEMICALS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER OR REPRODUCTIVE HARM.

16. OTHER INFORMATION

Precautionary Statements for response, storage, and disposal:

This information is given without any warranty or representation and is presented in good faith and believed to be accurate. We do not assume any legal responsibility for same, nor do we give permission, inducement, or recommendation to practice any patented invention without a license. It is offered solely for your consideration, investigation and verification. Before using any product, read its label carefully and completely.

Revision 3/ supersedes 12/06/13/ mtl

Revisions: format, all sections

Applied Specialties, Inc.
33555 Pin Oak Parkway, Avon Lake, OH 44012
P: 440-933-9442 F: 440-933-9439

SAFETY DATA SHEET

Sulfuric Acid All Grades

Section 1: Identification

Company Identification:
PREMIER CHEMICALS & SERVICES, LLC
4856 Revere Avenue, Suite A
Baton Rouge, LA 70808

24 Hour Emergency Telephone: Call Chemtrec 800-424-9300 Ref#: 200235

Customer Service: Call 225-926-0059

Common Names: Sulfuric Acid

Chemical Formula: H_2SO_4

Synonym: Sulphuric Acid

Product Uses: Used in manufacturing processes. Used for processing mineral ores, metal refining, petrochemical processing and water treatment.

Section 2: Hazard(s) Identification

2.1. Classification of the substance or mixture

Causes severe skin burns and eye damage.

2.2. Label elements

GHS-US labelling Hazard pictograms (GHS-US) :

Signal word (GHS-US) : **DANGER**

Hazard Statement(s)
Causes severe skin burns and eye damage.

Precautionary Statement(s)
Do not breathe mist/vapors.
Wear protective gloves/protective clothing/eye protection/face protection.
IF SWALLOWED: rinse mouth. Do NOT induce vomiting.
IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

2.3. Other hazards

Reacts violently with water.
No additional information available

Section 3: Composition/Information on Ingredients

Composition:

Name	CAS #	% by Concentration
Sulfuric Acid	7664-93-9	93% - 98%

Section 4: First-Aid Measures

4.1 Description of first aid measures

Inhalation IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/physician if you feel unwell.

Skin Contact IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. Wash contaminated clothing before reuse. Immediately call a POISON CENTER or doctor/physician.

Eye Contact IF IN EYES: Flush eyes with water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor/physician.

Ingestion IF SWALLOWED: rinse mouth. Do NOT induce vomiting. Immediately call a POISON CENTER or doctor/physician.

4.2 Most important symptoms and effects, both acute and delayed

Inhalation: Corrosive, Burns, Sore throat, Cough.

Skin Contact: Corrosive, Redness, Pain, Blisters, Causes severe skin burns.

Eye Contact: Corrosive, Redness, Pain, Causes severe burns.

Ingestion: Corrosive, Abdominal pain, Burns, Shock, Collapse.

4.3 Indication of any immediate medical attention and special treatment needed
Treat symptomatically.

Section 5: Fire-Fighting Measures

Non-combustible.

5.1 Extinguishing Media
Suitable Extinguishing Media Extinguish preferably with foam, carbon dioxide or dry chemical.
Unsuitable Extinguishing Media Water.

5.2 Special hazards arising from the substance or mixture
Risk of fire and explosion on contact with base(s), combustible substances, oxidants, reducing agents or water. Thermal decomposition will evolve toxic and corrosive vapors. (Sulfur oxides)

5.3 Advice for fire-fighters Fire fighters should wear complete protective clothing including self-contained breathing apparatus. Keep containers cool by spraying with water if exposed to fire.
Avoid direct contact with water.

Section 6: Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures
In event of a spill, evacuate danger area. Stop leak if safe to do so. Ensure adequate ventilation. Do not breathe mist/vapors. Avoid contact with skin and eyes. Ensure suitable personal protection (including respiratory protection) during removal of spillages. Wash hands thoroughly after handling.

6.2 Environmental precautions Do not allow to enter drains, sewers or waterways.

6.3 Methods and material for containment and cleaning up
Small spillages:
Contain spillages with sand, earth or any suitable adsorbent material. Do NOT absorb in saw-dust or other combustible absorbents. Wash the spillage area with water.

Large spillages:
Cautiously neutralize spilled liquid. Neutralize with: Lime, Soda Ash, Sodium hydroxide, Sodium Bicarbonate. Wash the spillage area with water. Contaminated adsorbent must be removed in sealed, plastic lined drums and disposed of via an authorized waste disposal contractor.

6.4 Reference to other sections See Also Section 8, 13.

Section 7: Handling and Storage

7.1 Precautions for safe handling
Provide adequate ventilation. Do not breathe mist/vapors. Wear appropriate personal protective equipment, avoid direct contact. See Section: 8. Wash hands thoroughly after handling. When using do not eat, drink or smoke.

7.2 Conditions for safe storage, including any incompatibilities
Keep/store away from: Incompatible materials. Keep away from food, drink and animal feeds. Keep away from any possible contact with water, because of violent reaction and possible flash fire. Store in corrosive resistant container with a resistant inner liner.

7.2.1 Storage temperature Stable at ambient temperatures.

7.2.2 Storage life Stable under normal conditions.

7.2.3 Incompatible materials Water, Metals, Combustible materials, Oxidizing agents, Reducing agent, Alkalis, Acrylonitrile, Chlorates, Finely powdered metals, Nitrates, Perchlorates, Permanganates, Epichlorohydrin, Aniline, Carbides, Fulminates, Picrates, Organic materials, Flammable liquid.

Section 8: Exposure Controls/Personal Protection

8.1 Control parameters
Occupational Exposure Limits

SUBSTANCE	CAS No.	LTEL (8 hr TWA ppm)	LTEL (8 hr TWA mg/m³)	STEL (ppm)	STEL (mg/m³)	Note
Sulfuric acid	7664-93-9	-	1	-	-	USA (NIOSH/OSHA)
		-	1	-	3	TLV (ACGIH)

Source: NIOSH = National Institute of Occupational Safety & Health
OSHA = Occupational Safety and Health Administration
TLV = Threshold Limit Value
ACGIH = American Conference of Industrial Hygienists

8.2 Appropriate engineering controls
Recommended: Use in closed systems. Provide adequate ventilation. Use with local exhaust ventilation.

8.3 Individual protection measures, such as personal protective equipment (PPE)
Eye/face protection Wear protective eye glasses for protection against liquid splashes. Wear close fitting goggles or full face shield.
Skin protection Wear suitable protective clothing and gloves. Wear: Impervious gloves. Gloves should be changed regularly to avoid permeation problems. Unsuitable gloves materials: Natural rubber, Polychloroprene, Nitrile rubber, PVC.
Respiratory protection Normally no personal respiratory protection is necessary. Wear suitable respiratory protective equipment if exposure to levels above the occupational exposure limit is likely. Thermal hazards Not applicable.

Section 9: Physical and Chemical Properties

This product is hygroscopic.

9.1 Information on basic physical and chemical properties

Appearance	Clear.
Color	Liquid.
Odor	Odorless.
Odor Threshold	Not applicable.
pH	0.01 (N = 1.2) 1.0 (N = 0.3)
Melting Point/Freezing Point	Sulfuric acid, 98%: -1.3°C
Initial boiling point and boiling range	Sulfuric acid, 98%: 323°C
Flash point	Not applicable.
Evaporation Rate	< Ether.
Flammability (solid, gas)	Non-flammable.
Upper/lower flammability or explosive limits	Not applicable.
Vapor pressure	<0.001mm Hg @ 20°C
Vapor density	3.38 (Air = 1)
Relative density	1615 – 1841kg/m^3 (OECD 109)
Solubility(ies)	Soluble in water.
Partition coefficient: n-octanol/water	Not applicable.
Auto-ignition temperature	Not applicable.
Decomposition Temperature	340°C
Viscosity	Sulfuric acid, 98%: 22.5 cP
Explosive properties	Not explosive.
Oxidizing properties	Not oxidizing.

9.2 Other information

Percent Volatile by volume (%)	0 – 20 (Water)
Dissociation constant	pKa = 1.92 (OECD 112)

Section 10: Stability and Reactivity

10.1 Reactivity

Reacts violently with - Water, Organic materials, Inorganic materials.

10.2 Chemical stability

Stable at ambient temperatures.

10.3 Possibility of hazardous reactions

Risk of fire and explosion on contact with base(s), combustible substances, oxidants, reducing agents or water.

10.4 Conditions to avoid

Keep away from any possible contact with water, because of violent reaction and possible flash fire.
Keep/store away from: Incompatible materials.

10.5 Incompatible materials Water, Metals, Combustible materials, Oxidizing agents,

Reducing agent, Alkalis, Acrylonitrile, Chlorates, Finely powdered metals, Nitrates, Perchlorates, Permanganates, Epichlorohydrin, Aniline, Carbides, Fulminates, Picrates, Organic materials, Flammable liquid.

10.6 Hazardous decomposition product(s)
Sulfur oxides.

Section 11: Toxicological Information

11.1 Information on toxicological effects
Acute toxicity
An acute toxicity test does not generally need to be conducted if the substance is classified as corrosive to the skin.

Ingestion Low oral toxicity, but ingestion may cause irritation of the gastrointestinal tract.
LD50 (rat) = 2140 mg/kg

Inhalation Low acute toxicity.
OECD 403: LC50 (rat) = 375 mg/m³

Skin corrosion/irritation Causes severe skin burns.

Serious eye damage/irritation Causes serious eye damage.

Respiratory or skin sensitization It is not a skin sensitizer.

Germ cell mutagenicity There is no evidence of mutagenic potential.

Carcinogenicity No evidence of carcinogenicity.

Reproductive toxicity None anticipated.
OECD 414: NOAEC (mouse), (rabbit) = 19.3 mg/m³

STOT - single exposure Mist is severely irritant to the respiratory tract. Effect may vary from irritation of the nasal mucous membrane to severe lung irritation.

STOT - repeated exposure Repeated exposure to high levels produces adverse effects on the: Respiratory tract.

Aspiration hazard None anticipated.

11.2 Other information None.

Section 12: Ecological Information (non-mandatory)

12.1 Toxicity

Low toxicity to aquatic organisms. OECD201:
ErC50 (Desmodesmus subspicatus) (72 hour) >100 mg/l
EyC50 (Desmodesmus subspicatus) (72 hour) >100 mg/l
OECD 202: EC50 (Daphnia magna) (48 hour) >100 mg/l

12.2 Persistence and degradability The product is likely to persist in the environment. The

product is not biodegradable.

12.3 Bioaccumulative potential The product has no potential for bioaccumulation.

12.4 Mobility in soil The product is soluble in water.

12.5 Other adverse effects Large discharges may contribute to the acidification of water and soil and will injure aquatic life and soil micro-organisms.

Section 13: Disposal Considerations (non-mandatory)

13.1 Waste treatment methods Neutralize with: Lime, Soda Ash, Sodium hydroxide, Sodium Bicarbonate. Contaminated solids from neutralization activities should be recovered and containerized for proper disposal at a permitted facility.

13.2 Additional information Disposal should be in accordance with local, state or national legislation. Spillages or uncontrolled discharges into waterways must be reported to the appropriate regulatory body. US RCRA Hazard Class Not listed. May be a RCRA D002 characteristically corrosive waste if not neutralized.

Section 14: Transport Information (non-mandatory)

D.O.T. Classification

14.1 UN number	UN 1830
14.2 Proper Shipping Name	SULFURIC ACID.
14.3 Transport hazard class(es)	8
14.4 Packing group	II
14.5 Environmental hazards	Not classified as a Marine Pollutant.
14.6 Special precautions for user	None.
14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code	Not applicable.

Section 15: Regulatory Information (non-mandatory)

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

15.1.1 OSHA

Toxic and hazardous substances (29 CFR 1910; Subpart Z): Not listed.
Requirements for preparation, adoption, and submittal of implementation plans (40 CFR 51.100): Not listed.
National emission standards for hazardous air pollutants (40 CFR 61.01): Not listed.

Oil pollution prevention (40 CFR 112): Subjected to plan.
Current good manufacturing practice in manufacturing, processing, packing, or holding of drugs; general (21 CFR 210): Evaluated.

15.1.2 Title III Consolidated List of Lists Listed.

Sec. 302 (EHS) TPQ	1000 lbs
EHS RQ	1000 lbs
CERCLA RQ	1000 lbs
Sec 313	313

15.1.3 OSPAR List of Chemicals for Priority Action Not listed.

15.1.4 State Right to Know Lists
Sulfuric acid (CAS No.: 7664-93-9): California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

15.1.5 TSCA Listed.

15.1.6 Proposition 65 (California) Not listed.

15.1.7 Ozone Depleting Substances Not listed.

Section 16: Other Information

Disclaimer:
Premier Chemicals & Services ("Premier") expressly disclaims all express or implied warranties of merchantability and fitness for a particular purpose, with respect to the product or information provided herein.
All information appearing herein is based upon data obtained from the manufacturer and/or recognized technical sources. While the information is believed to be accurate, Premier makes no representations as to its accuracy or sufficiency. Conditions of use are beyond Premier's control, and, therefore, users are responsible to verify this data under their own operating conditions to determine whether the product is suitable for their particular purposes, and they assume all risks of their use, handling, and disposal of the product, or from the publication or use of, or reliance upon, information contained herein. This information relates only to the product designated herein, and does not relate to its use in combination with any other material or in any other process.

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	3D TRASAR® 3DT118
Other means of identification	:	Not applicable.
Recommended use	:	COOLING WATER TREATMENT
Restrictions on use	:	Refer to available product literature or ask your local Sales Representative for restrictions on use and dose limits.
Company	:	Nalco Company 1601 W. Diehl Road Naperville, Illinois 60563-1198 USA TEL: (630)305-1000
Emergency telephone number	:	(800) 424-9300 (24 Hours) CHEMTREC
Issuing date	:	07/09/2014

SECTION 2. HAZARDS IDENTIFICATION

GHS Classification

Not a hazardous substance or mixture.

GHS Label element

Precautionary Statements : **Prevention:**
Wash hands thoroughly after handling.
Response:
Specific measures: consult MSDS Section 4.
Storage:
Store in accordance with local regulations.

Other hazards : None known.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

No hazardous ingredients

SECTION 4. FIRST AID MEASURES

In case of eye contact	:	Rinse with plenty of water. Get medical attention if symptoms occur.
In case of skin contact	:	Wash off with soap and plenty of water. Get medical attention if symptoms occur.
If swallowed	:	Rinse mouth. Get medical attention if symptoms occur.
If inhaled	:	Get medical attention if symptoms occur.
Protection of first-aiders	:	In event of emergency assess the danger before taking action. Do not put yourself at risk of injury. If in doubt, contact emergency responders.Use personal protective equipment as required.

Notes to physician	:	Treat symptomatically.

See toxicological information (Section 11)

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media	:	Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
Unsuitable extinguishing media	:	Do not use water unless flooding amounts are available.
Specific hazards during firefighting	:	Not flammable or combustible.
Hazardous combustion products	:	Carbon oxides
Special protective equipment for firefighters	:	Use personal protective equipment.
Specific extinguishing methods	:	Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations. In the event of fire and/or explosion do not breathe fumes.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Refer to protective measures listed in sections 7 and 8.
Environmental precautions	:	Do not allow contact with soil, surface or ground water.
Methods and materials for containment and cleaning up	:	Stop leak if safe to do so. Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13). Flush away traces with water. For large spills, dike spilled material or otherwise contain material to ensure runoff does not reach a waterway.

SECTION 7. HANDLING AND STORAGE

Advice on safe handling	:	Wash hands thoroughly after handling. Use only with adequate ventilation.
Conditions for safe storage	:	Keep out of reach of children. Keep container tightly closed. Store in suitable labeled containers.
Suitable material	:	The following compatibility data is suggested based on similar product data and/or industry experience: Compatibility with Plastic Materials can vary; we therefore recommend that compatibility is tested prior to use.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

This product does not contain any substance that has an established exposure limit.
Contains no substances with occupational exposure limit values.

Engineering measures	:	Good general ventilation should be sufficient to control worker exposure to airborne contaminants.

Personal protective equipment

Eye protection	:	Safety glasses
Hand protection	:	Wear protective gloves. Gloves should be discarded and replaced if there is any indication of degradation or chemical breakthrough.
Skin protection	:	Wear suitable protective clothing.
Respiratory protection	:	No personal respiratory protective equipment normally required.
Hygiene measures	:	Remove and wash contaminated clothing before re-use. Wash hands before breaks and immediately after handling the product. Wash face, hands and any exposed skin thoroughly after handling.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	Liquid
Colour	:	Clear Yellow Amber
Odour	:	Slight
Flash point	:	does not flash
pH	:	4.1, 100 %
Odour Threshold	:	no data available
Melting point/freezing point	:	no data available
Initial boiling point and boiling range	:	no data available
Evaporation rate	:	no data available
Flammability (solid, gas)	:	no data available
Upper explosion limit	:	no data available
Lower explosion limit	:	no data available
Vapour pressure	:	no data available
Relative vapour density	:	no data available
Relative density	:	1.13 (15.5 °C)
Density	:	9.4 lb/gal
Water solubility	:	completely soluble
Solubility in other solvents	:	no data available
Partition coefficient: n-octanol/water	:	no data available

Auto-ignition temperature	:	no data available
Thermal decomposition	:	Carbon oxides
Viscosity, dynamic	:	no data available
Viscosity, kinematic	:	12.7 mm2/s (20 °C)
VOC	:	0 %

SECTION 10. STABILITY AND REACTIVITY

Chemical stability	:	Stable under normal conditions.
Possibility of hazardous reactions	:	No dangerous reaction known under conditions of normal use.
Conditions to avoid	:	None known.
Incompatible materials	:	Contact with strong oxidizers (e.g. chlorine, peroxides, chromates, nitric acid, perchlorate, concentrated oxygen, permanganate) may generate heat, fires, explosions and/or toxic vapors.
Hazardous decomposition products	:	Oxides of carbon

SECTION 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure	:	Inhalation, Eye contact, Skin contact

Potential Health Effects

Eyes	:	Health injuries are not known or expected under normal use.
Skin	:	Health injuries are not known or expected under normal use.
Ingestion	:	Health injuries are not known or expected under normal use.
Inhalation	:	Health injuries are not known or expected under normal use.
Chronic Exposure	:	Health injuries are not known or expected under normal use.

Experience with human exposure

Eye contact	:	No symptoms known or expected.
Skin contact	:	No symptoms known or expected.
Ingestion	:	No symptoms known or expected.
Inhalation	:	No symptoms known or expected.

Toxicity

Product

Acute oral toxicity	:	no data available

Acute inhalation toxicity	:	no data available
Acute dermal toxicity	:	no data available
Skin corrosion/irritation	:	no data available
Serious eye damage/eye irritation	:	no data available
Respiratory or skin sensitization	:	no data available

Carcinogenicity

IARC	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
OSHA	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.
NTP	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

Reproductive effects	:	no data available
Germ cell mutagenicity	:	no data available
Teratogenicity	:	no data available
STOT - single exposure	:	no data available
STOT - repeated exposure	:	no data available
Aspiration toxicity	:	no data available

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Environmental Effects	:	This product has no known ecotoxicological effects.

Product

Toxicity to fish	:	LC50 Fathead Minnow: 1,165 mg/l Exposure time: 96 hrs Test substance: Product LC50 Rainbow Trout: 3,223 mg/l Exposure time: 96 hrs Test substance: Product
Toxicity to daphnia and other aquatic invertebrates	:	EC50 Ceriodaphnia dubia: 884 mg/l Exposure time: 48 hrs Test substance: Product

Toxicity to algae : no data available

Persistence and degradability

The organic portion of this preparation is expected to be poorly biodegradable.

Total Organic Carbon (TOC) : 55,000 mg/l

Chemical Oxygen Demand (COD): 170,000 mg/l

Biochemical Oxygen Demand (BOD):

Incubation Period	Value	Test Descriptor
5 d	76 mg/l	Product

Mobility

The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM, provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is intended to give the user a general estimate of the environmental fate of this product under the defined conditions of the models.
If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages;

Air : <5%
Water : 30 - 50%
Soil : 50 - 70%

The portion in water is expected to be soluble or dispersible.

Bioaccumulative potential

This preparation or material is not expected to bioaccumulate.

Other information

no data available

SECTION 13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it is not a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261, since it does not have the characteristics of Subpart C, nor is it listed under Subpart D.

Disposal methods : Where possible recycling is preferred to disposal or incineration. If recycling is not practicable, dispose of in compliance with local regulations. Dispose of wastes in an approved waste disposal facility.

Disposal considerations : Dispose of as unused product. Empty containers should be taken to an approved waste handling site for recycling or disposal. Do not re-use empty containers.

SECTION 14. TRANSPORT INFORMATION

The shipper/consignor/sender is responsible to ensure that the packaging, labeling, and markings are in compliance with the selected mode of transport.

Land transport (DOT)

Proper shipping name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

Air transport (IATA)

Proper shipping name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

Sea Transport (IMDG/IMO)

Proper shipping name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

SECTION 15. REGULATORY INFORMATION

EPCRA - Emergency Planning and Community Right-to-Know Act

CERCLA Reportable Quantity

This material does not contain any components with a CERCLA RQ.

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 311/312 Hazards : No SARA Hazards

SARA 302 : SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 : SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

California Prop 65

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

INTERNATIONAL CHEMICAL CONTROL LAWS :

TOXIC SUBSTANCES CONTROL ACT (TSCA)
The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710)

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA)
The substance(s) in this preparation are included in or exempted from the Domestic Substance List (DSL).

AUSTRALIA
All substances in this product comply with the National Industrial Chemicals Notification & Assessment Scheme (NICNAS).

EUROPE
The substances in this preparation have been reviewed for compliance with the EINECS or ELINCS inventories.

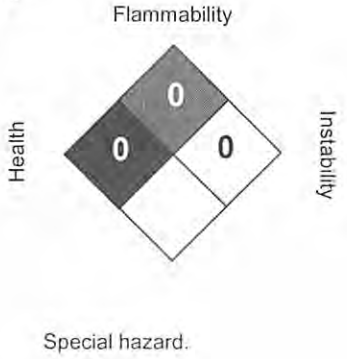
JAPAN
All substances in this product comply with the Law Regulating the Manufacture and Importation Of Chemical Substances and are listed on the Existing and New Chemical Substances list (ENCS).

KOREA
All substances in this product comply with the Toxic Chemical Control Law (TCCL) and are listed on the Existing Chemicals List (ECL)

PHILIPPINES
All substances in this product comply with the Republic Act 6969 (RA 6969) and are listed on the Philippines Inventory of Chemicals & Chemical Substances (PICCS).

SECTION 16. OTHER INFORMATION

NFPA:



HMIS III:

HEALTH	0
FLAMMABILITY	0
PHYSICAL HAZARD	0

0 = not significant, 1 =Slight,
2 = Moderate, 3 = High
4 = Extreme, * = Chronic

Revision Date	:	07/09/2014
Version Number	:	1.0
Prepared By	:	Regulatory Affairs

REVISED INFORMATION: Significant changes to regulatory or health information for this revision is indicated by a bar in the left-hand margin of the SDS.

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

For additional copies of an MSDS visit www.nalco.com and request access.

Section: 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	H-130 Microbiocide
Other means of identification	:	Not applicable.
Recommended use	:	BIOCIDE TWIN-CHAIN QUATERNARY AMMONIUM COMPOUND CONCENTRATE BIOCIDE
Restrictions on use	:	Refer to available product literature or ask your local Sales Representative for restrictions on use and dose limits.
Company	:	Nalco Company 1601 W. Diehl Road Naperville, Illinois 60563-1198 USA TEL: (630)305-1000
Emergency telephone number	:	(800) 424-9300 (24 Hours) CHEMTREC
Issuing date	:	02/09/2015

Section: 2. HAZARDS IDENTIFICATION

GHS Classification

Flammable liquids	:	Category 3
Acute toxicity (Oral)	:	Category 3
Acute toxicity (Inhalation)	:	Category 3
Acute toxicity (Dermal)	:	Category 4
Skin corrosion	:	Category 1B
Serious eye damage/eye irritation	:	Category 1
Skin sensitization	:	Category 1

GHS Label element

Hazard pictograms :

Signal Word : Danger

Hazard Statements : Flammable liquid and vapour.
Toxic if swallowed or if inhaled
Harmful in contact with skin.
Causes severe skin burns and eye damage.
May cause an allergic skin reaction.

Precautionary Statements : **Prevention:**
Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Keep container tightly closed. Ground/bond container and

receiving equipment. Use explosion-proof electrical/ ventilating/ lighting/ equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray. Wash skin thoroughly after handling. Do not eat, drink or smoke when using this product. Use only outdoors or in a well-ventilated area. Contaminated work clothing should not be allowed out of the workplace. Wear protective gloves/ protective clothing/ eye protection/ face protection.

Response:

IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. IF SWALLOWED: rinse mouth. Do NOT induce vomiting. IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor/ physician. If skin irritation or rash occurs: Get medical advice/ attention. Wash contaminated clothing before reuse. In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.

Storage:

Store in a well-ventilated place. Keep container tightly closed. Store in a well-ventilated place. Keep cool. Store locked up.

Disposal:

Dispose of contents/ container to an approved waste disposal plant.

Other hazards : None known.

Section: 3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS-No.	Concentration: (%)
Didecyl-Dimethyl-Ammonium chloride	7173-51-5	50
Ethanol	64-17-5	10 - 30

Section: 4. FIRST AID MEASURES

In case of eye contact : Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention immediately.

In case of skin contact : Wash off immediately with plenty of water for at least 15 minutes. Use a mild soap if available. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

If swallowed : Get medical attention immediately. Rinse mouth with water. Do NOT induce vomiting. Never give anything by mouth to an unconscious person.

If inhaled : Remove to fresh air. Treat symptomatically. Get medical attention immediately.

Protection of first-aiders : In event of emergency assess the danger before taking action. Do not put yourself at risk of injury. If in doubt, contact emergency responders.Use personal protective equipment as required.

Notes to physician	:	Treat symptomatically.
Most important symptoms and effects, both acute and delayed	:	See Section 11 for more detailed information on health effects and symptoms.

Section: 5. FIREFIGHTING MEASURES

Suitable extinguishing media	:	Foam Carbon dioxide Dry powder Other extinguishing agent suitable for Class B fires For large fires, use water spray or fog, thoroughly drenching the burning material.
Specific hazards during firefighting	:	Combustible Liquid; may form combustible mixtures at or above the flash point. Empty product containers may contain product residue. Do not pressurize, cut, heat, weld, or expose containers to flame or other sources of ignition. May evolve oxides of carbon (COx) under fire conditions. May evolve oxides of nitrogen (NOx) under fire conditions. May evolve HCl under fire conditions. May evolve ammonia under fire conditions.
Hazardous combustion products	:	Decomposition products may include the following materials: Carbon oxides nitrogen oxides (NOx) Sulphur oxides Oxides of phosphorus
Special protective equipment for firefighters	:	Use personal protective equipment.
Specific extinguishing methods	:	Use water spray to cool unopened containers. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations. In the event of fire and/or explosion do not breathe fumes.

Section: 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Restrict access to area as appropriate until clean-up operations are complete. Use personal protective equipment recommended in Section 8 (Exposure Controls/Personal Protection). Stop or reduce any leaks if it is safe to do so. Keep people away from and upwind of spill/leak. Ventilate spill area if possible. Remove sources of ignition. Ensure clean-up is conducted by trained personnel only. Do not touch spilled material. Have emergency equipment (for fires, spills, leaks, etc.) readily available. Notify appropriate government, occupational health and safety and environmental authorities.
Environmental precautions	:	This product is toxic to fish and other water organisms. Do not discharge directly into lakes, ponds, streams, waterways or public water supplies.
Methods and materials for containment and cleaning up	:	Eliminate all ignition sources if safe to do so. Stop leak if safe to do so. Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local /

national regulations (see section 13). For large spills, dike spilled material or otherwise contain material to ensure runoff does not reach a waterway. Flush away traces with water.

Section: 7. HANDLING AND STORAGE

Advice on safe handling : Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. Do not breathe vapors/gases/dust. Keep the containers closed when not in use. Have emergency equipment (for fires, spills, leaks, etc.) readily available. Ensure all containers are labeled. Do not use, store, spill or pour near heat, sparks or open flame.

Conditions for safe storage : Store in suitable labeled containers. Store the containers tightly closed. Store away from heat and sources of ignition. Have appropriate fire extinguishers available in and near the storage area. Connections must be grounded to avoid electrical charges. Store separately from oxidizers.

Suitable material : Keep in properly labelled containers.

Unsuitable material : not determined

Section: 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Form of exposure	Permissible concentration	Basis
Ethanol	64-17-5	TWA	1,000 ppm 1,900 mg/m3	NIOSH REL
		TWA	1,000 ppm 1,900 mg/m3	OSHA Z1

Engineering measures : Effective exhaust ventilation system Maintain air concentrations below occupational exposure standards.

Personal protective equipment

Eye protection : Safety goggles
Face-shield

Hand protection : Wear the following personal protective equipment:
Standard glove type.
Gloves should be discarded and replaced if there is any indication of degradation or chemical breakthrough.

Skin protection : Personal protective equipment comprising: suitable protective gloves, safety goggles and protective clothing

Respiratory protection : When workers are facing concentrations above the exposure limit they must use appropriate certified respirators.

Hygiene measures : Handle in accordance with good industrial hygiene and safety practice. Remove and wash contaminated clothing before re-use. Wash face, hands and any exposed skin thoroughly after handling.

Provide suitable facilities for quick drenching or flushing of the eyes and body in case of contact or splash hazard.

Section: 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	Liquid
Colour	:	colourless
Odour	:	Alcoholic
Flash point	:	43 °C Method: ASTM D 3278, Seta closed cup
pH	:	6.5 - 9.0, Concentration:: 100.00 g/l (25 °C)
Odour Threshold	:	no data available
Melting point/freezing point	:	no data available
Initial boiling point and boiling range	:	no data available
Evaporation rate	:	no data available
Flammability (solid, gas)	:	no data available
Upper explosion limit	:	no data available
Lower explosion limit	:	no data available
Vapour pressure	:	30 mm Hg (25 °C)
Relative vapour density	:	no data available
Relative density	:	0.93 (25 °C)
Density	:	0.93 g/cm3 7.7 lb/gal
Water solubility	:	completely soluble
Solubility in other solvents	:	no data available
Partition coefficient: n-octanol/water	:	no data available
Auto-ignition temperature	:	no data available
Thermal decomposition temperature	:	no data available
Viscosity, dynamic	:	< 100 mPa.s (25 °C)
Viscosity, kinematic	:	no data available
VOC	:	10 % 92.27 g/l

Section: 10. STABILITY AND REACTIVITY

Chemical stability	:	Stable under normal conditions.
Possibility of hazardous reactions	:	No dangerous reaction known under conditions of normal use.
Conditions to avoid	:	Heat and sources of ignition including static discharges.

		Extremes of temperature
Incompatible materials	:	Contact with strong oxidizers (e.g. chlorine, peroxides, chromates, nitric acid, perchlorate, concentrated oxygen, permanganate) may generate heat, fires, explosions and/or toxic vapors. Contact with reducing agents (e.g. hydrazine, sulfites, sulfide, aluminum or magnesium dust) may generate heat, fires, explosions and toxic vapors.
Hazardous decomposition products	:	Oxides of carbon Oxides of nitrogen HCl

Section: 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure	:	Inhalation, Eye contact, Skin contact

Potential Health Effects

Eyes	:	Causes serious eye damage.
Skin	:	Harmful in contact with skin. Causes severe skin burns. May cause allergic skin reaction.
Ingestion	:	Toxic if swallowed. Causes digestive tract burns.
Inhalation	:	Toxic if inhaled. May cause nose, throat, and lung irritation.
Chronic Exposure	:	Health injuries are not known or expected under normal use.

Experience with human exposure

Eye contact	:	Redness, Pain, Corrosion
Skin contact	:	Redness, Pain, Irritation, Corrosion, Allergic reactions
Ingestion	:	Corrosion, Abdominal pain
Inhalation	:	Respiratory irritation, Cough

Toxicity

Product

Acute oral toxicity	:	no data available
Acute inhalation toxicity	:	no data available
Acute dermal toxicity	:	no data available
Skin corrosion/irritation	:	no data available
Serious eye damage/eye irritation	:	no data available
Respiratory or skin	:	Test substance: Product

sensitization

Carcinogenicity	:	no data available
Reproductive effects	:	no data available
Germ cell mutagenicity	:	Animal testing did not show any mutagenic effects.
Teratogenicity	:	no data available
STOT - single exposure	:	no data available
STOT - repeated exposure	:	no data available
Aspiration toxicity	:	no data available

Components

Acute oral toxicity : Didecyl-Dimethyl-Ammonium chloride
LD50 rat 1,150 mg/kg

Components

Acute inhalation toxicity : Didecyl-Dimethyl-Ammonium chloride
LC50 rat: 0.07 mg/l
Exposure time: 4 h

Components

Acute dermal toxicity : Didecyl-Dimethyl-Ammonium chloride
LD50 rabbit: 2,930 mg/kg

Section: 12. ECOLOGICAL INFORMATION

Ecotoxicity

Environmental Effects : Very toxic to aquatic life with long lasting effects.

Product

Toxicity to fish : LC50 Oncorhynchus mykiss (rainbow trout): 2.2 mg/l
Exposure time: 96 hrs

LC50 Lepomis macrochirus (Bluegill sunfish): 0.32 mg/l
Exposure time: 96 hrs
Test substance: Active Substance
Test Type: Static

LC50 Oncorhynchus mykiss (rainbow trout): 1.0 mg/l
Exposure time: 96 hrs
Test substance: Active Substance

LC50 Oncorhynchus kisutch (coho salmon): 1.0 mg/l
Exposure time: 96 hrs
Test substance: Active Substance
Test Type: Static

LC50 Pimephales promelas (fathead minnow): 0.19 mg/l
Exposure time: 96 hrs

Test substance: Active Substance

LC50 Pimephales promelas (fathead minnow): 1.2 mg/l
Exposure time: 96 hrs
Test substance: Active Substance tested with 20 mg/L Humic Acid

NOEC Lepomis macrochirus (Bluegill sunfish): 0.1 mg/l
Exposure time: 96 hrs
Test substance: Active Substance
Test Type: Static

NOEC Oncorhynchus kisutch (coho salmon): 0.59 mg/l
Exposure time: 96 hrs
Test substance: Active Substance
Test Type: Static

NOEC Pimephales promelas (fathead minnow): 0.092 mg/l
Exposure time: 96 hrs
Test substance: Active Substance

NOEC Pimephales promelas (fathead minnow): 0.94 mg/l
Exposure time: 96 hrs
Test substance: Active Substance tested with 20 mg/L Humic Acid

Toxicity to daphnia and other aquatic invertebrates : LC50 Daphnia magna (Water flea): 0.19 mg/l
Exposure time: 48 hrs

EC50 Daphnia magna (Water flea): 0.94 mg/l
Exposure time: 48 hrs
Test substance: Product

Toxicity to algae : LC50 Green Algae (Pseudokirchneriella subcapitata, previously Selenastrum capricornutum): 0.026 mg/l
Exposure time: 96 hrs
Test substance: Active Substance

Toxicity to fish (Chronic toxicity) : NOEC: 0.032 mg/l
Exposure time: 34 Days
Species: Zebra Danio
Test substance: Active Substance

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : NOEC: 0.01 mg/l
Exposure time: 21 Days
Species: Daphnia magna
Test substance: Active Substance

Persistence and degradability

The organic portion of this preparation is expected to be readily biodegradable.

Biochemical Oxygen Demand (BOD):Biological degradation: Approx OECD 303 A 24-70 Day >80%

Mobility

no data available

Bioaccumulative potential

This preparation or material is not expected to bioaccumulate.

Other information

no data available

Section: 13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it could meet the criteria of a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261. Before disposal, it should be determined if the waste meets the criteria of a hazardous waste.

Hazardous Waste:	:	D001
Disposal methods	:	Pesticide wastes are acutely hazardous. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste Representative at the nearest EPA Regional Office for guidance. The product should not be allowed to enter drains, water courses or the soil. Where possible recycling is preferred to disposal or incineration. If recycling is not practicable, dispose of in compliance with local regulations. Dispose of wastes in an approved waste disposal facility.
Disposal considerations	:	Dispose of as unused product. Empty containers should be taken to an approved waste handling site for recycling or disposal. Do not re-use empty containers.

Section: 14. TRANSPORT INFORMATION

The shipper/consignor/sender is responsible to ensure that the packaging, labeling, and markings are in compliance with the selected mode of transport.

Land transport (DOT)

Proper shipping name	:	CORROSIVE LIQUID, FLAMMABLE, N.O.S.
Technical name(s)	:	DIDECYLDIMETHYLAMMONIUM CHLORIDE, ETHANOL
UN/ID No.	:	UN 2920
Transport hazard class(es)	:	8, 3
Packing group	:	II

Air transport (IATA)

Proper shipping name	:	CORROSIVE LIQUID, FLAMMABLE, N.O.S.
Technical name(s)	:	DIDECYLDIMETHYLAMMONIUM CHLORIDE, ETHANOL
UN/ID No.	:	UN 2920
Transport hazard class(es)	:	8, 3
Packing group	:	II

Sea transport (IMDG/IMO)

Proper shipping name	:	CORROSIVE LIQUID, FLAMMABLE, N.O.S.
Technical name(s)	:	DIDECYLDIMETHYLAMMONIUM CHLORIDE, ETHANOL
UN/ID No.	:	UN 2920

Transport hazard class(es) : 8, 3
Packing group : II

*Marine pollutant : DIDECYLDIMETHYLAMMONIUM CHLORIDE

*Note: This product is regulated as a Marine Pollutant when shipped by Rail, Highway (in bulk quantities), or Air (if no other hazard class applies), and when shipped by water in all quantities.

Section: 15. REGULATORY INFORMATION

EPA Reg. No. : 1706-186

EPCRA - Emergency Planning and Community Right-to-Know Act

CERCLA Reportable Quantity

This material does not contain any components with a CERCLA RQ.

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 311/312 Hazards : Fire Hazard
Acute Health Hazard

SARA 302 : No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 : This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

California Prop 65

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

INTERNATIONAL CHEMICAL CONTROL LAWS :

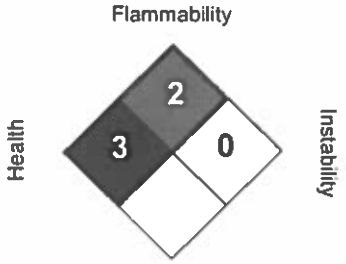
TOXIC SUBSTANCES CONTROL ACT (TSCA)
This product is exempted under TSCA and regulated under FIFRA. The inerts are on the Inventory List.

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA)
The substance(s) in this preparation are included in or exempted from the Domestic Substance List (DSL).

EUROPE
The substances in this preparation have been reviewed for compliance with the EINECS or ELINCS inventories.

Section: 16. OTHER INFORMATION

NFPA:



Special hazard.

HMIS III:

HEALTH	3*
FLAMMABILITY	2
PHYSICAL HAZARD	0

0 = not significant, 1 =Slight,
2 = Moderate, 3 = High
4 = Extreme, * = Chronic

Revision Date	:	02/09/2015
Version Number	:	1.0
Prepared By	:	Regulatory Affairs

REVISED INFORMATION: Significant changes to regulatory or health information for this revision is indicated by a bar in the left-hand margin of the SDS.

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.
For additional copies of an MSDS visit www.nalco.com and request access.

Sodium Bisulfite Solution

Sodium Bisulfite Solution

Material Safety Data Sheet

Chemical: Sodium Bisulfite Solution

NFPA: H=2 F=0 I= 1 S=None
HMIS: H=2 F=0 R=1 PPE= Supplied by user; dependent on conditions

MSDS Number: sodbisulf-1003
Effective Date: 6 October 2003
Issued by: Solvay Chemicals, Inc. Regulatory Affairs Department

Not valid three years after effective date or after issuance of superseding MSDS, whichever is earlier. French or Spanish translations of this MSDS may be available. Check www.solvaychemicals.us or call Solvay Chemicals, Inc. to verify the latest version or translation availability.

Material Safety Data Sheets contain country specific regulatory information; therefore, the MSDS's provided are for use only by customers of Solvay Chemicals, Inc. in North America. If you are located in a country other than Canada, Mexico or the United States, please contact the Solvay Group company in your country for MSDS information applicable to your location.

1. Company and Product Identification

1.1 Product Name: Sodium Bisulfite Solution
Chemical Name: Sodium Bisulfite
Synonyms: Sodium hydrogen sulfite-sulfurous acid monosodium salt, aqueous solution.
Chemical Formula: $NaHSO_3 \cdot H_20$
Molecular Weight: 104
CAS Number: 7631-90-5
EINECS Number: 231-548-0

1.2 Recommended Uses: Pulp and paper, dyeing, organic synthesis, water treatment, food, photography, reducing agent, surfactant.

1.3 Supplier:
Solvay Chemicals, Inc.
PO BOX 27328 Houston, TX 77227-7328
3333 Richmond Ave. Houston, Texas 77098

1.4 Emergency Telephone Numbers
Emergencies (USA): 1-800-424-9300 (CHEMTREC®)
Transportation Emergencies (INTERNATIONAL/MARITIME): 1-703-527-3887 (CHEMTREC®)
Transportation Emergencies (CANADA): 1-613-996-6666 (CANUTEC)
Transportation Emergencies (MEXICO-SETIQ): 01-800-00-214-00 (MEX. REPUBLIC)
525-559-1588 (Mexico City and metro area)

Responsible Care®
Good Chemistry at Work

MSDS No. sodbisulf-1003 Revised 10-06-03

www.solvaychemicals.us 1.800.765.8292

Solvay Chemicals
Interox, Fluorides & Minerals

SOLVAY

Sodium Bisulfite Solution

Material Safety Data Sheet

2. Composition/Information on Ingredients

INGREDIENTS	FORMULA	WT. PERCENT	CAS #
Sodium Bisulfite	$NaHSO_3$	38-42	7631-90-5
Sodium Sulfite	Na_2SO_3	1-3	757-83-7
Water	H_20	54-60	7732-18-5

3. Hazards Identification

Emergency Overview: May cause irritation. Sulfite-sensitive individuals may experience a severe allergic reaction.

3.1 Route of Entry: Inhalation: Yes Skin: Yes Ingestion: Yes

3.2 Potential Effects of exposure: May cause mild irritation.

Inhalation(mists): May cause irritation. Sulfite-sensitive individuals may experience a severe allergic reaction.

Eyes(mists): May cause mild irritation or severe burns with prolonged exposure.

Skin contact: May cause mild irritation with prolonged exposure.

Ingestion: Oral exposure or swallowing may produce gastrointestinal upset, nausea or vomiting. Ingestion of large doses may be fatal. Sulfite sensitive individuals may experience a severe allergic reaction.

Carcinogenicity: See section 11.3

4. First-Aid Measures

General Recommendations: Product evolves sulfur dioxide gas. Move patient to fresh air.

4.1 Inhalation: Remove the patient to fresh air. If breathing has stopped or patient experiences difficulty in breathing, administer artificial respiration.

Eyes: Immediately remove contact lenses and gently flush the eyes and surrounding areas with lukewarm water for 15 minutes. If irritation persists, seek medical attention.

Skin: Remove contaminated clothing. Wipe material from the skin. Rinse the affected area with large amounts of water for 15 minutes. If irritation persists, seek medical attention.

Ingestion:

If the subject is completely conscious: Give 8-12 ounces of water and seek medical attention.

If the subject is unconscious: Remove any residual substance from the patient's mouth. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.

4.2 Medical Treatment/Notes to Physician: Breathing of mists may aggravate asthma or other pulmonary diseases.

5. Fire-Fighting Measures

5.1 **Flash point:** Non-combustible

5.2 **Auto-ignition Temperature**: Not applicable.

5.3 **Flammability Limits:** Not applicable.

5.4 **Unusual Fire and Explosion Hazards:** Non combustible. Generates hazardous sulfur dioxide gas upon heating.

5.5 **Common Extinguishing Methods:** In case of fire in close proximity, all means of extinguishing are acceptable

5.6 **Fire Fighting Procedures:** Wear NIOSH-approved self-contained breathing apparatus. Use water spray to keep containers cool and to knock down fumes. CAUTION: When subjected to excess heat (>150°C), product releases additional sulfur dioxide gas.

6. Accidental Release Measures

6.1 **Precautions:** Avoid breathing mists.

6.2 **Cleanup methods:** While wearing proper protective clothing (see section 8), stop or control the leak using an absorbent material. Control the spill and contaminated absorbent in a suitable dry container.

6.3 **Precautions for protection of the environment:** Spills to the environment exceeding the Reportable Quantity (5,000 LBS or 1,265 gallons @ 39% solution) must be reported to the National Response Center. Dispose of waste in accordance with applicable federal, state, and local environmental laws and regulations.

7. Handling and Storage

7.1 **Handling:** Avoid prolonged or repeated contact with the skin or eyes. Do not wear contact lenses without proper eye protection when using this product. Wash exposed areas promptly and thoroughly after skin contact from working with this product and before eating, drinking, using tobacco products or using the rest room. Avoid prolonged or repeated breathing of mists.

7.2 **Storage:** Keep in a closed, properly labeled container away from acids, oxidizers and heat sources. Protect from physical damage.

7.3 **Specific Uses:** See Section 1.2

7.4 **Packaging:** Bulk rail tank car & tank truck

8. Exposure Controls/Personal Protection

8.1 Exposure Limit Values:

Exposure Limit Values	TLV® ACGIH®-USA (2002)	OSHA PEL
Sodium bisulfite solution	5 mg/m^3, for an 8 hour TWA	5 mg/m^3, for an 8 hour TWA
Sulfur dioxide	TWA=2 ppm, STEL=5 ppm, IDLH=100 ppm	

ACGIH® and TLV® are registered trademarks of the American Conference of Governmental Industrial Hygienists.

8.2 Exposure Controls:

8.2.1 Ventilation: In places with the possibility for creating mists in excess of exposure limits, ventilation should be provided.

8.2.2 Respiratory protection: In case of significant or accidental mist emissions, a NIOSH/MSHA approved mask should be worn. If sulfur dioxide gas is present, (see section 10), use an NIOSH-approved respirator or self-contained breathing apparatus.

8.2.3 Hand protection: Acid impervious gloves are required for routine handling of hot solution product.

8.2.4 Eye protection: Wear chemical safety goggles. Do not wear contact lenses without proper eye protection.

8.2.5 Skin protection: Wear boots, apron, long sleeves and other protective clothing suitable for use to prevent contact with the skin.

8.3 Other precautions: An eyewash and safety shower should be nearby and ready for use. Use good hygiene practices when handling this product including changing work clothes after use. Do not eat, drink or smoke in areas where this material is handled.

9. Physical and Chemical Properties

9.1 Appearance: Slightly cloudy liquid.
Color: Yellow
Odor: Sulfur dioxide odor (pungent smell)

9.2 Important Health, Safety and Environmental information:
pH: 4.5

Change of state:
Melting point: Not applicable
Boiling point: 104°C (220°F).
Decompositon Temperature: Sodium Bisulfite (solid) decomposes at 150°C (302°F).

Flash Point: Not applicable

Flammability (solid, gas): Not applicable

Explosive Properties: Not applicable

Oxidizing Properties: Decomposition of sodium bisulfite releases oxides of sulfur

Vapor Pressure: 1.3mm Hg @ 42%, 25°C (77°F).

Relative Density:
Specific gravity: 1.33 @ 20°C (68°F).
(H_2O=1)

Bulk Density: Not applicable

Solubility:
Water: 42% $NaHSO_3$ at 6°C (43°F).
Fat: No data

Partition coefficient: Not applicable
P (n-octanol/water)

Viscosity: Not listed

Vapor Density (air=1): Not applicable

Evaporation Rate (water=1): 1

9.3 Other Information: Freezing Point: 6°C (43°F).

10. Stability and Reactivity

Stability: At ambient temperatures and atmospheric pressure, product decomposes giving off sulfur dioxide gas.

10.1 Conditions to avoid: Contact with excess heat (>150°C or 302°F), oxidizers, acids and water releases sulfur dioxide gas which may be harmful or deadly when inhaled.

10.2 Materials and substances to avoid:
- Oxidizing agents
- Acids
- Excess heat (>150°C or 302°F).

10.3 Hazardous decomposition products: Sulfur dioxide gas.

10.4 Hazardous Polymerization: None.

10.5 Other information: None.

11. Toxicological Information

11.1 Acute toxicity:

Oral: LD_{50} - 2 gm/kg species: rat

Comments: Sulfite-sensitive individuals may experience a severe allergic reaction.

11.2 Chronic toxicity: Can cause allergic reactions (including headaches, difficulty in breathing, rapid heart rate, anaphylaxis) to susceptible individuals.

11.3 Carcinogenic Designation: None

12. Ecological Information

12.1 Acute ecotoxicity:

- Aquatic Toxicity: 96 hour LC_{50} Goldfish: 100 mg/l. (Sodium Sulfite)
- 24, 48, 96 hour TLm, Mosquito fish: 2,600 ppm.
- BOD (Biological Oxygen Demand) = 0.12 lb/lb instantaneous. Sodium Bisulfite is an oxygen scavenger when introduced to water.

13. Disposal Considerations

13.1 Waste treatment: Sodium bisulfite solution is not a listed hazardous waste under 40 CFR 261. However, state and local regulations for waste disposal may be more restrictive. It is recommended that Sodium Bisulfite Solution be disposed of in an EPA approved disposal facility in accordance with applicable environmental laws and regulations.

13.2 Packaging treatment: Use dedicated containers where possible. Rinse the empty containers and treat the effluent in the same way as waste. Consult current federal, state and local regulations regarding the proper disposal of emptied containers.

13.3 RCRA Hazardous Waste: Not Listed

14. Transport Information

Mode	DOT	IMDG	IATA
UN Number	2693	2693	2693
Class (Subsidiary)	8	8	8
Proper Shipping Name	Bisulfites, aqueous solutions, N.O.S.	Bisulfites, aqueous solutions, N.O.S.	Bisulfites, aqueous solutions, N.O.S.
Hazard label (Subsidiary)	corrosive	corrosive	corrosive
Marine Pollutant	No	No	No
Packing Group	III	III	III
Reportable Quantity	5,000 lbs. (1265 gallons)	5,000 lbs. (1265 gallons)	5,000 lbs. (1265 gallons)
MFAG			
Emergency Info	ERG Guide # 154:	EmS: 8-08	ERG Code 5L
STCC#	4932376		

15. Regulatory Information

National Regulations (US)

TSCA Inventory 8(b): Yes

SARA Title III Sec. 302/303 Extremely Hazardous Substances (40 CFR 355): No

SARA Title III Sec. 311/312 (40 CFR 370:
Hazard Category Acute & chronic health hazard; Reactive hazard
Threshold planning quantity - 10,000 lbs

SARA Title III Sec. 313 Toxic Chemical Emissions Reporting (40 CFR 372): No

CERCLA Hazardous Substance (40CFR Part 302)
Listed: Yes
Reportable Quantity: 5,000 lbs

State Component Listing:

State	Comment
CA	Hazardous substance list
CT	Hazardous material survey
IL	Toxic substances disclosure to employees Act
LA	Spill reporting
MA	Right to Know substance list
MN	Hazardous substance list
NJ	Right to Know substance list
NY	Release reporting
NC	Exposure limits for air contaminants
PA	Right to Know substance list
RI	Right to Know substance list

National Regulations (Canada)

Canadian NDSL/DSL Registration: DSL

WHMIS Classification: D2B - Materials causing other toxic effects
E - (Corrosive)

This product has been classified in accordance with the hazard criteria of the ***Controlled Products Regulations*** and the MSDS contains all the information required by the ***Controlled Products Regulations.***

Labeling according to Directive 1999/45/EC.

Symbols	None	
Phrases R	20	When using do not eat or drink.
	22	Harmful if swallowed.
	36	Irritating to eyes.
	37	Wear suitable gloves.
	38	In case of insufficient ventilation, wear suitable respiratory equipment.
Phrases S	26	In case of contact with eyes, rinse immediately with plenty of water and seek medical attention.
	36	Wear suitable protective clothing.

16. Other Information

16.1 Ratings:

NFPA (NATIONAL FIRE PROTECTION ASSOCIATION)

Health = 2 Flammability = 0 Instability = 1 Special = None

HMIS (HAZARDOUS MATERIAL INFORMATION SYSTEM)

Health = 2 Fire = 0 Reactivity = 1 PPE = Supplied by User; dependent on local conditions

16.2 Other Information:

This product is not for food or drug use unless material is labeled "food grade".
For food grade product, the following applies:

1) Effective August 8, 1987, the FDA has banned the use of "Sulfiting Agents" or "Sulfites" on fruits and vegetables intended to be served raw or sold raw to consumers.
2) Effective January 9, 1987, the FDA is requiring when a sulfite is present in a detectable amount in a finished food, regardless of whether it has been directly or indirectly added via one or more of the food ingredients, it must be declared on the label. The regulation defines a "detectable amount" of sulfite to be 10 ppm.
3) Sulfiting agents or sulfites are not to be used on foods or meats recognized as a source of Vitamin B1.

The NSF International recommends that the maximum usage level is 46 mg/l for potable water.

The previous information is based upon our current knowledge and experience of our product and is not exhaustive. It applies to the product as defined by the specifications. In case of combinations or mixtures, one must confirm that no new hazards are likely to exist. In any case, the user is not exempt from observing all legal, administrative and regulatory procedures relating to the product, personal hygiene, and integrity of the work environment. (Unless noted to the contrary, the technical information applies only to pure product).

To our actual knowledge, the information contained herein is accurate as of the date of this document. However, neither Solvay Chemicals, Inc. nor any of its affiliates makes any warranty, express or implied, or accepts any liability in connection with this information or its use. This information is for use by technically skilled persons at their own discretion and risk and does not relate to the use of this product in combination with any other substance or any other process. This is not a license under any patent or other proprietary right. The user alone must finally determine suitability of any information or material for any contemplated use, the manner of use and whether any patents are infringed.

16.3 Reason for revision:

Supersedes edition: Solvay Minerals MSDS # 007 dated June 26, 2003
Purpose of revision: Change Company name and MSDS format

Stormwater Management

Attachment K

July 2021
Project No. 0574234

Environmental Resources Management
CityCentre Four
840 West Sam Houston Parkway North, Suite 600
Houston, Texas 77024-3920
281-600-1000

Attachment K
Technical Report

6. Briefly describe the industrial processes and activities that occur outdoors or in some manner that may result in exposure of the materials to precipitation or runoff in areas where runoff is generated.

Stormwater makes up a very small percentage of the water discharged through Outfall 002.

All stormwater from the process areas containing lubricants, oils and chemicals is routed through an oily water separator prior to commingling with non-contact cooling water.

Non-contact stormwater runoff collected in the southern detention pond will be routed through a hydro-dynamic separator before being discharged through Outfall 002.

Non-contact stormwater runoff collected in the northern detention pond is exempt from stormwater coverage based on Part V. Section O.3 of the Stormwater Multi-Sector General Permit (MSGP).

Major Amendment Request

Attachment L

July 2021
Project No. 0574234

Environmental Resources Management
CityCentre Four
840 West Sam Houston Parkway North, Suite 600
Houston, Texas 77024-3920
281-600-1000

Attachment L
Technical Report

13.a. Is the facility requesting a **major amendment** of an existing permit?

☒ Yes ☐ No

If yes, list each request individually and provide the following information: 1) detailed information regarding the scope of each request and 2) a justification for each request. Attach any supplemental information or additional data to support each request.

As noted in the permit application, Entergy is proposing a major amendment of the existing permit to include two phases. Phase 1 includes the installation of a new gas-fired combined cycle power generation unit at the Sabine site. This unit will generate cooling tower blowdown, low volume wastewater and occasional metal cleaning wastewater during initial commissioning and on to commercial operation. The unit will require new internal outfalls and a single new external outfall for discharge. Phase 2 includes the deactivation of Unit 1 at Sabine. Entergy will work with TCEQ to provide the necessary information for the Unit 1 deactivation in a supplement to this application package. The project timeline and anticipated wastewater generation are outlined below.

OCPS TPDES Permitting Timeline

- 2021
  - July – Submit major amendment without renewal to Sabine TPDES permit to add Phase 1 for the addition of OCPS and Phase 2 for the deactivation of Unit 1
- 2022
  - Quarter 3 – Expected issuance of Major Amendment to Sabine TPDES permit assuming no extended agency review or public comment (i.e. contested case, public hearing, additional agency data requests, etc.)
- 2023
  - January – Unit 1 deactivation
  - March – Excavation dewatering
    - Discharged under Construction general permit
- 2024
  - January – Construction of wastewater treatment facilities
  - June – Sabine Permit renewal due June 14, 2024
    - Submit major amendment with renewal including phase for deactivation of Units 3 & 4
  - December – Sabine Permit expires December 11, 2024
  - December – Cold Commissioning Demin water plant (RO reject and UF backwash)
    - No discharge; will be using rental equipment
  - December – Cold Commissioning Demin water rental trailers (RO reject)
    - No discharge; will be using rental equipment
- 2025
  - March – Construction hydrostatic discharges (permitted under hydrostatic general permit)
  - April – Cold Commissioning demin water rental trailers (filter backwash)
    - Discharged into wastewater sump

  - April – Cold Commissioning demin water rental trailers (RO reject)
    - Discharged into cooling tower basin
  - April – Cold Commissioning high pressure hydrolazing
    - Discharged under TPDES permit into Sabine Intake Canal
  - April – Cold Commissioning pipe flushing
    - Discharged under TPDES permit into Sabine Intake Canal
  - April – Cold Commissioning water treatment systems lay-up preservative disposal
    - Discharged under TPDES permit into Sabine Intake Canal
  - April – Cold Commissioning water treatment systems flushing
    - Discharged under TPDES permit into Sabine Intake Canal
  - April – HRSG 1 boiler & feedwater piping chemical clean
    - Stored in temporary frac tank(s) where it can be tested prior to discharge via Outfall 301, thence via temporary piping/pump to Outfall 002 into the Sabine Intake Canal if it meets permit limits; will also apply to long term operations
  - May – HRSG 2 boiler & feedwater piping chemical clean
    - Stored in temporary frac tank(s) where it can be tested prior to discharge via Outfall 301, thence via temporary piping/pump to Outfall 002 into the Sabine Intake Canal if it meets permit limits; will also apply to long term operations
  - May – Hot Commissioning – Non-contact cooling water (cooling tower blowdown)
    - Discharged under TPDES permit into Sabine Intake Canal
  - June – Cold Commissioning closed cooling water (CCW) flush
    - Discharged under TPDES permit into Sabine Intake Canal
  - October – Construction steam blows
    - Condensed/demin water collected in HRSG blowdown sump and discharged under TPDES permit into Sabine Intake Canal

- 2026
  - January – Units 3 & 4 deactivation
  - February – Target for substantial completion
  - May – Commercial Operation
    - Discharged under TPDES permit into Sabine Intake Canal

Discharge	**Outfall**	**Rate / Volume**	**Approx. Date**
Piping cleaning / flushing	302	~2.73 MG total	2Q25
Demin water plant / cold commissioning	202	~3.9 MG total	2Q25
HRSG piping chemical metal cleaning	302	~0.5 MG total	2Q25
Cooling Tower cold commissioning	102	~0.3 MG total	2Q25
Cooling Tower hot commissioning	102	~0.78 MGD	2Q25
Commercial Operation	All		2Q26

APPENDIX B OCPS THERMAL MODELING GEMSS HYDRODYNAMIC MODEL REPORT

July 2021

OCPS Thermal Modeling

GEMSS Hydrodynamic Model

7 July 2021

Project No.: 0574234

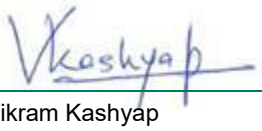
The business of sustainability

Signature Page

7 July 2021

OCPS Thermal Modeling

GEMSS Hydrodynamic Model



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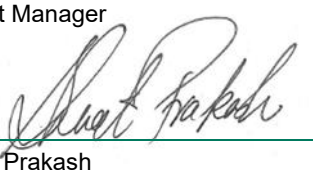

Shwet Prakash
Partner, Engineering Consultant

Environmental Resources Management

75 Valley Stream Parkway, Suite 200, Malvern, PA 19355

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Acronyms and Abbreviations

Name	Description
CCP	Combined Cycle Plant
gpm	Gallons per minute
MW	Megawatt
OCPS	Orange County Advanced Power Station
ppt	Parts per thousand
TCEQ	Texas Commission on Environmental Quality

1. INTRODUCTION

1.1 Background

Sabine Plant, located in Bridge City, Texas, is owned by Entergy Texas, Inc. (Entergy) and consists of four operating units capable of generating about 1500 MW. Entergy is proposing a new Combined Cycle Plant (CCP) adjacent to the existing Sabine Plant (Figure 1-1), referred to as the Orange County Advanced Power Station (OCPS).

This assessment uses numerical modeling to examine a future scenario where the Sabine Plant no longer withdraws cooling water from the Sabine Intake Canal and OCPS will release cooling tower blowdown discharge into the Sabine Intake Canal.

The Sabine Intake Canal is a manmade canal with an approximate length of 15,000 ft. and approximate width of 200 ft. for a significant portion. The average depth of the canal ranges between 10-20 ft. The Sabine Intake Canal empties into Sabine Lake which also receives water from the Sabine River and Neches River. The Sabine Intake Canal and Sabine Lake as well as the lower Neches and Sabine Rivers are tidally influenced.

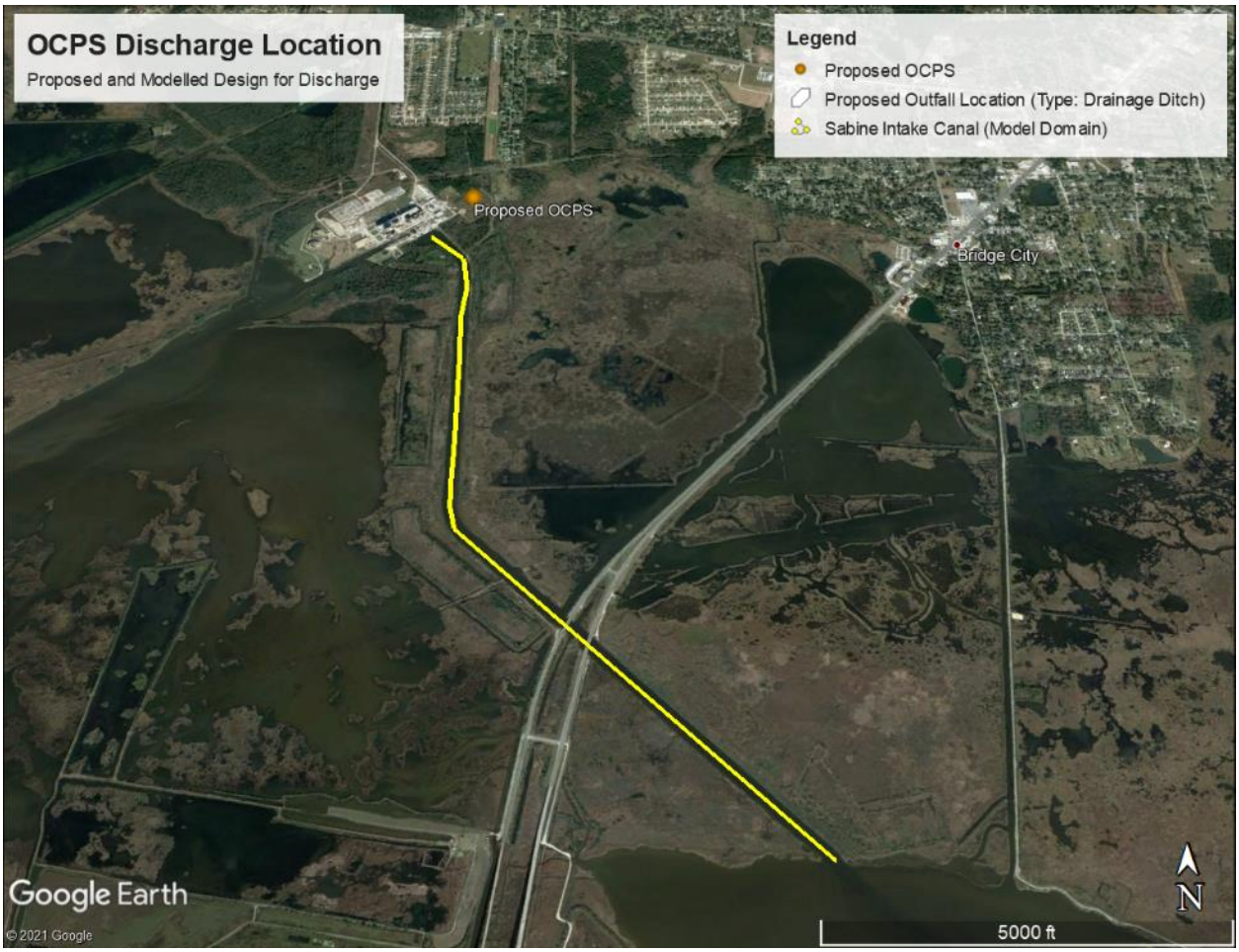


Figure 1-1: OCPS Discharge Location

1.2 Study Objectives

Generalized Environmental Modeling System for Surfacewaters (GEMSS), a comprehensive hydrodynamic and water quality model (hereinaft.er will be referred as “the model”), was used to achieve the study objectives. The goal of the modeling study is to evaluate potential changes in the flow and water quality dynamics within the Sabine Intake Canal due to the discharge from the proposed OCPS facility. As such, the scope of the modeling study includes developing a reliable hydrodynamic and transport model to help quantify the following:

- characterize the thermal plume’s size and configuration in the Sabine Intake Canal;
- demonstrate how plume size and configuration varies during different combinations of extreme ambient conditions and maximum discharge scenarios throughout the year; and
- understand the tidal system’s influences across several cycles to examine the likelihood of stagnation and pollutant load buildup.

The model used datasets that represent spatial coverage of the modeling domain and time periods of extreme ambient conditions.

1.3 Regulatory Context

The allowable TCEQ maximum temperature differentials (rise over ambient) except for “industrial cooling impoundments, temperature elevations due to discharges of treated domestic (sanitary) effluent, and temperature elevations within designated mixing zones or industrial cooling water areas”[1] are

1. freshwater streams: 5 degrees Fahrenheit (degrees F);
2. freshwater lakes and impoundments: 3 degrees F; and
3. tidal river reaches, bay, and gulf waters: 4 degrees F in fall, winter, and spring, and 1.5 degrees F in summer (June, July, and August).

The Sabine Intake Canal and Sabine Lake system is close to Sabine/Neches Canal Tidal (Segment 0701) which is classified as a tidal reach. Additionally, there is a specified temperature limit of 95 degrees Fahrenheit for this segment.

[1] Texas Commission on Environmental Quality, 30 Texas Administrative Code (TAC) Chapter 307 - Texas Surface Water Quality Standards, at 30 TAC Section 307.4(f).

2. GEMSS

GEMSS is an integrated system of three-dimensional hydrodynamic and transport modules (Figure 2-1) embedded in a geographic information and environmental data system. GEMSS is in the public domain and has been used for hydrodynamic and water quality studies in the United States, Canada and world-wide. ERM staff contributed to the source code and have completed many applications with the GEMSS model. Organizations in the United States (Washington Department of Ecology, BOR, USGS), Korea (Ewha Womans University, National Institute of Environmental Research), Canada (Alberta Environment), Norway (Norwegian Institute for Water Research and Akvaplan-niva AS), Poland (Maritime Institute in Gdańsk) and Sweden (Royal Institute of Technology), among others, routinely use GEMSS.

GEMSS was developed in the mid-80s as a hydrodynamic platform for transport and fate modeling of many types of constituents introduced into waterbodies. The hydrodynamic platform (“kernel”) provides three-dimensional flow fields from which the distribution of various constituents can be computed. The constituent transport and fate computations are grouped into modules. GEMSS modules include those used for thermal analysis, water quality, sediment transport, particle tracking, oil and chemical spills, entrainment, and other COPCs.

The theoretical basis of the hydrodynamic kernel of GEMSS is the three-dimensional Generalized, Longitudinal-Lateral-Vertical Hydrodynamic and Transport (GLLVHT) model, which was first presented in Edinger and Buchak (1980) and subsequently in Edinger and Buchak (1985). The GLLVHT computation has been peer reviewed and published (Edinger and Buchak, 1995; Edinger, et al., 1994 and 1997; Edinger and Kolluru, 1999). The kernel is an extension of the well-known longitudinal-vertical transport model written by Buchak and Edinger (1984) that forms the hydrodynamic and transport basis of the Corps of Engineers' water quality model CE-QUAL-W2 (US Army Engineer Waterways Experiment Station, 1986).

Improvements to the transport scheme, construction of the constituent modules, incorporation of supporting software tools, GIS interoperability, visualization tools, graphical user interface (GUI), and post-processors have been developed by Kolluru et al. (1998; 1999; 2003a; 2003b) and by Prakash and Kolluru (2006).

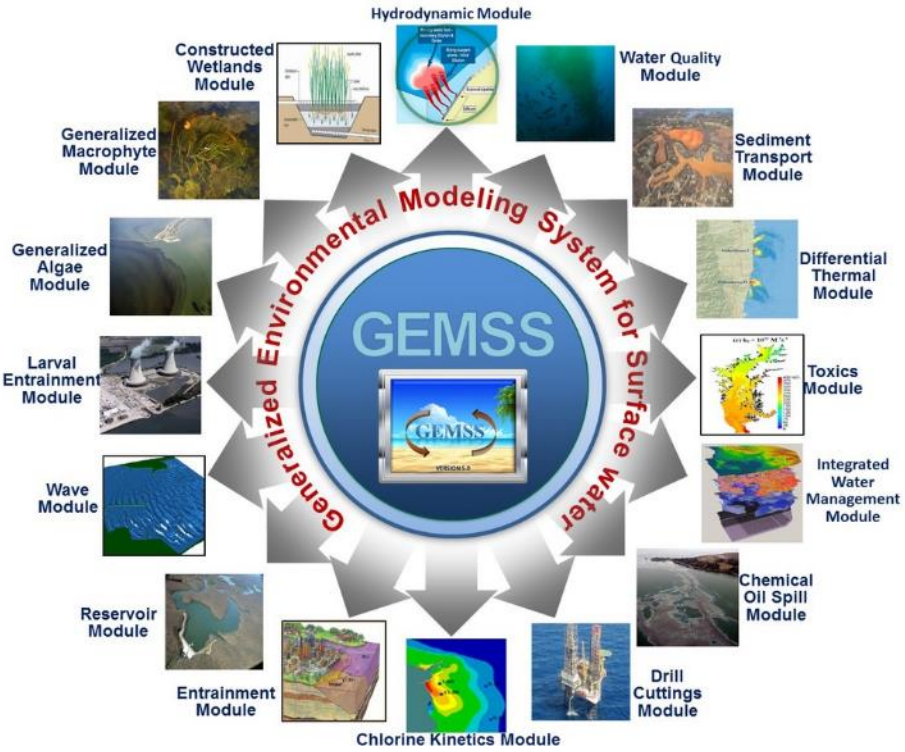


Figure 2-1: GEMSS Modeling System and Individual Modules

GEMSS development continues as additional applications are completed. A second hydrodynamic kernel, the Princeton Ocean Model (POM), has been added as an alternative to GLLVHT for deep ocean systems. In addition, new constituent modules have been developed and tested, including source water protection (Kolluru and Prakash, 2012), watershed nutrient load allocation (Kolluru et al, 2009), chlorine and chlorine by-products fate and transport (Kolluru et al., 2012); mine pit lake analysis (Vandenberg et al, 2011; Prakash et al, 2012); debris fouling at cooling water intakes (Prakash et al, 2012); coliform fate and transport (Tryland et al, 2012); thermal avoidance calculations (Buchak et al, 2012); impact assessment (Fichera et al, 2013); and contaminated sediment transport (Kolluru et al, 2006.)

GEMSS applications to estuarine and coastal waterbodies have been validated by comparisons to extensive, field-collected datasets. These include currents, temperature and chlorine and chlorine by-products offshore Qatar (Kolluru et al., 2005; Adenekan et al., 2009; Febbo et al., 2012; Kolluru et al., 2003; Kolluru et al., 2012); currents, temperatures and nutrient water quality in Puget Sound (Albertson et al., 2009); nutrients in coastal Delaware (Kolluru and Fichera, 2003), and the Vistula River in Poland (Kruk et al., 2011); currents and temperatures in the New York Harbor area (Edinger et al., 1997); larval populations in coastal Alaska (Edinger et al.,1994); and, mine tailings ponds (Prakash et al., 2011).

For inland waterbodies, GEMSS has been validated for temperatures in cooling lakes (Buchak et al., 2012 and Long et al., 2011); temperatures and nutrients in the Han River and Lake Paldang, Korea (Kim and Park, 2012a and 2012b; Na and Park, 2005 and 2006, respectively); temperature and fecal coliforms in Norwegian water supply reservoirs (Tryland et al., 2012). More specifically, in Canada, GEMSS has been applied to a constructed lake (Jiang et al., 2015) and to study mine water discharges (Vandenberg et al., 2016; Snow and Vandenberg, 2016). Many other inland, estuarine and coastal waterbody model validations have been completed and published as client reports.

3. MODEL INPUTS

The size of the thermal plume is typically sensitive to tidally driven currents, meteorological conditions, discharge conditions (flows and temperature), and ambient water quality (temperature and salinity). Available data related to these parameters were collected for the period of 2016 to 2020 to capture more recent conditions. The datasets were plotted and examined to identify seasonal variations and existing data gaps. Based on this analysis, 2018 was selected as the representative year for modeling purposes due to complete data availability and higher season variability (wider range of potential thermal plume outcomes) when compared to other years. With the primary constituent of interest being water temperature, the respective dataset was analyzed to identify the 5th, 50th and 95th percentile water temperature occurrences within 2018. Each time-varying model simulation was set to be 20 days long centered around the identified dates when these temperatures occurred. The duration of 20 days allows the model to capture several tidal cycles, and allows an initial spin-up period. Each simulation included a 6 day spin-up period and a 14 day analysis period. The identified modeling data periods are shown in Table 3-1. The model scenarios are further detailed in Section 4.

Table 3-1: Modeling Periods

Percentile	Season	Start Date	End Date
5th	Winter	1/15/2018	2/5/2018
50th	Spring	3/18/2018	4/8/2018
95th	Summer	7/21/2018	8/11/2018

3.1 Data

Application of GEMSS requires three types of data: effluent data, receiving waterbody data, and meteorological data. The effluent was characterized by the water balances for seasonal extreme scenarios. The discharge structure in this case will be a discharge ditch emptying into the mouth of the Sabine Intake Canal. The Sabine Intake Canal (receiving waterbody) was characterized by its width and depth. The hydrodynamic model was set up using the available tidal data (measured by NOAA at the mouth of the Neches River at the Texas Highway 87 bridge (“Rainbow Bridge”) (ID: TCOON, Station: 8770520); temperatures and salinity were sourced from the Upper Sabine Station 2 (Station: SAB1) measured by Texas Water Development Board. Meteorological data from the Orange County Airport, Texas (ORG) station was gathered through the Iowa Environmental Mesonet: https://mesonet.agron.iastate.edu/.

3.1.1 Effluent Data

The discharge structure design is a drainage ditch lined with a large diameter riprap. The D50 stone size will be in the 12” to 18” diameter range and approximately 18” to 30” in thickness. The discharge elevation of the ditch is half a foot above the Sabine Intake Canal’s water surface. The modeling assumes that there is no heat loss as the water travels through the discharge ditch, a conservative assumption.

The discharge rate and temperature vary based on the seasonal extremes as shown in Table 3-2. The effluent will be freshwater, therefore the salinity is assumed to be zero.

Table 3-2: Effluent Characteristics under Extreme Cases of Operation

Seasonal Extreme	Discharge Rate (gpm)	Maximum Discharge Temperature (deg F)
Winter	430	99
Summer	722	118

Source: OCPS Extreme Case Water Balances

3.1.2 Hydrodynamic Data

3.1.2.1 Water Levels

Water level data were available at a 6 minute interval for the modeling periods from the NOAA Rainbow Bridge Station (ID: TCOON, Station: 8770520) which is located approximately 3 miles away from the Project Site. These elevations are shown in Figure 3-1, Figure 3-2 and Figure 3-3.

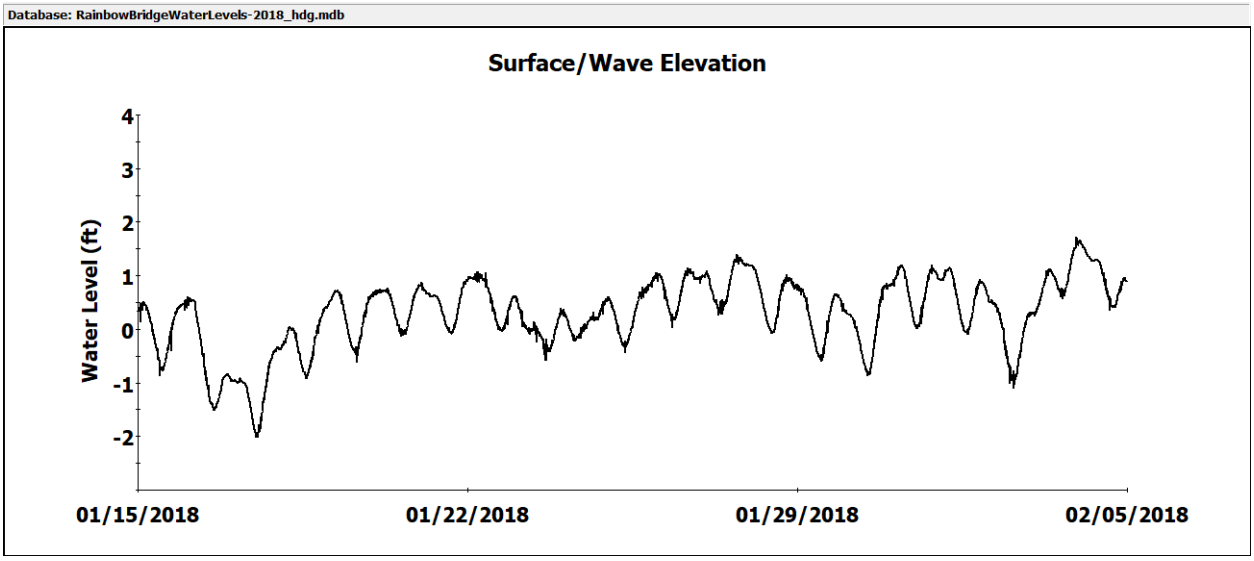


Figure 3-1: Winter Modeling Period Water Levels

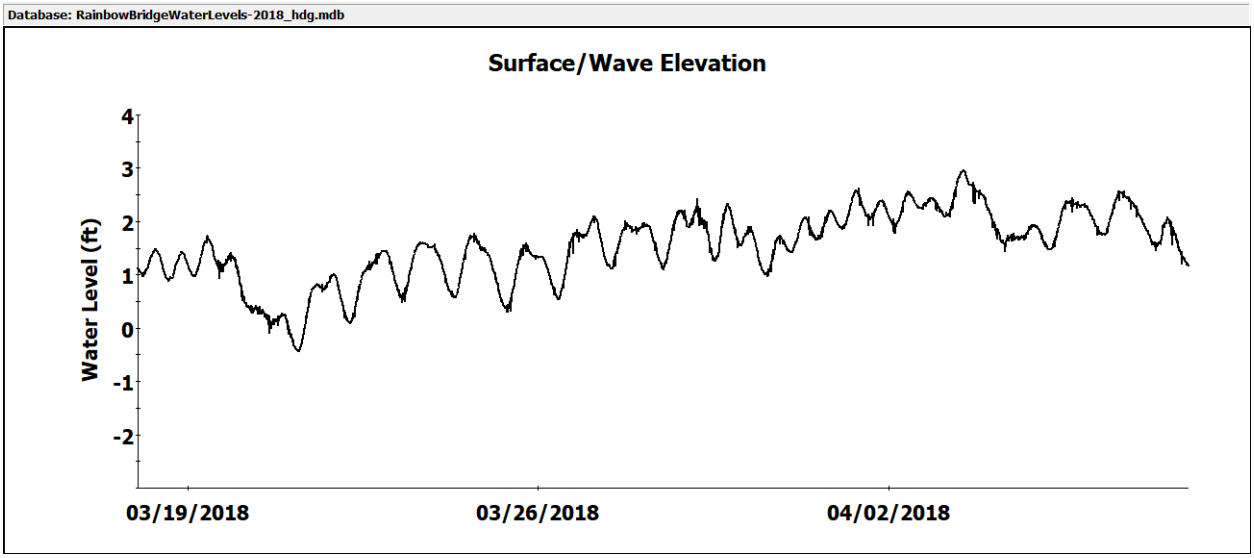


Figure 3-2: Spring Modeling Period Water Levels

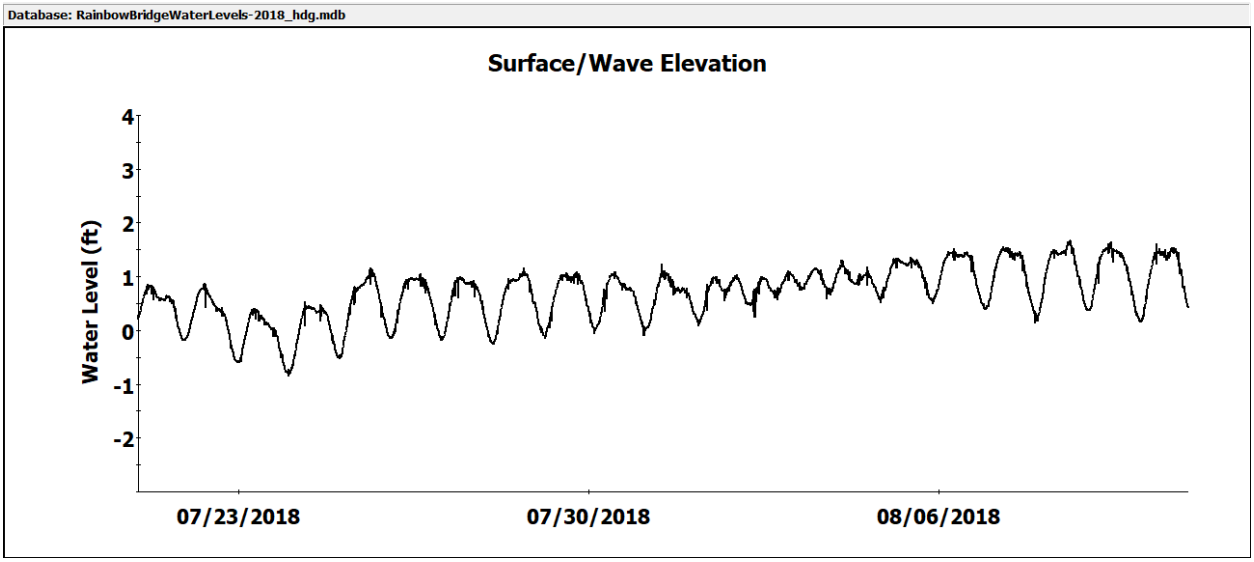


Figure 3-3: Summer Modeling Period Water Levels

3.1.3 Ambient Waterbody Data

3.1.3.1 Water Temperature and Salinity

Upper Sabine Station 2 (Station: SAB1) measured by Texas Water Development Board provided water and salinity data at an hourly frequency. In order to understand whether the use of this station is appropriate, the station's data was compared with data collected near the discharge location at a weekly frequency for a 5 year period (Entergy 2020). Once it was determined that the datasets were in

agreement, SAB1 dataset was analyzed for the year of 2018 to determine the range of constant temperature and salinity values to develop the model runs. The probability distribution of the water temperature and salinity data in 2018 are shown in Figure 3-4 and Figure 3-5 respectively.

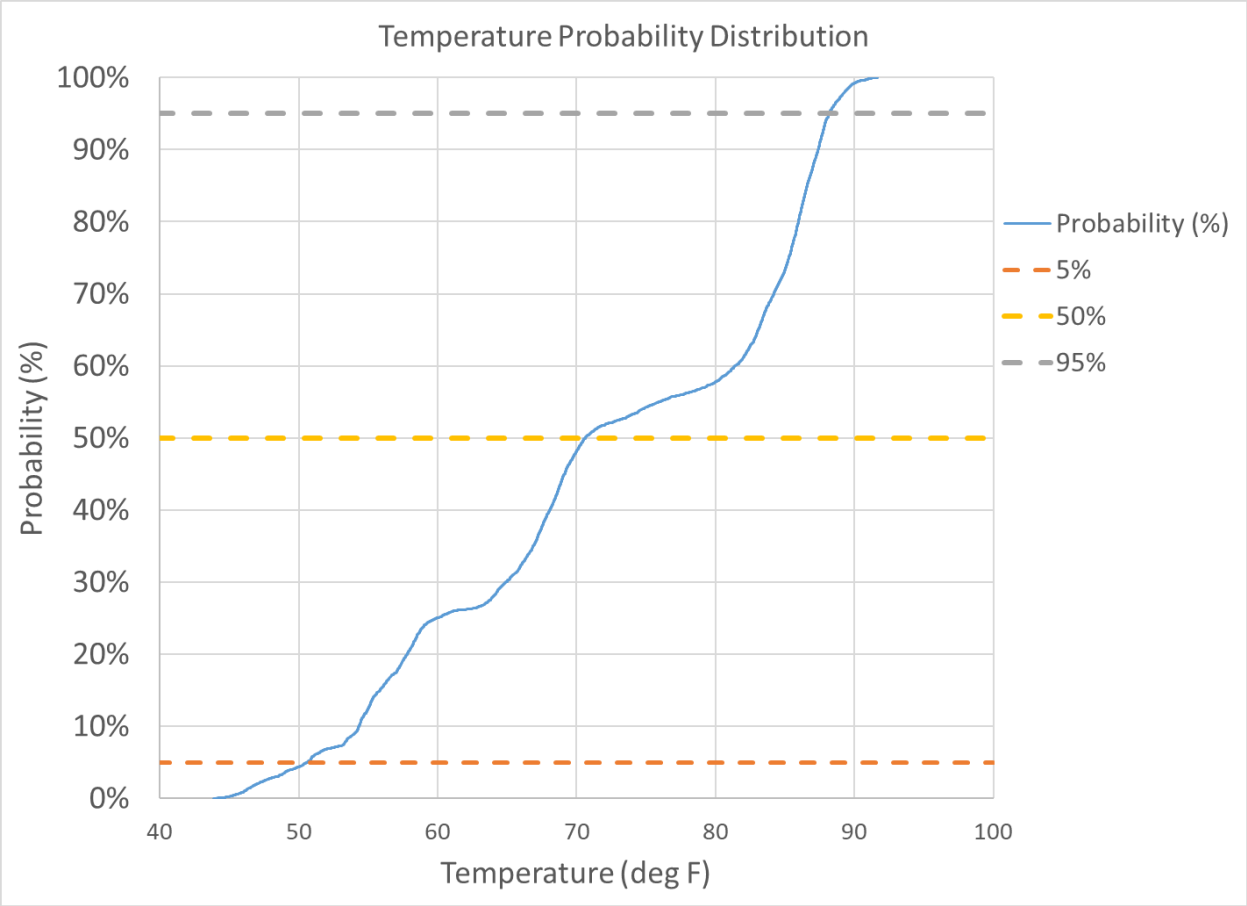


Figure 3-4: 2018 Water Temperature Data Probability Distribution

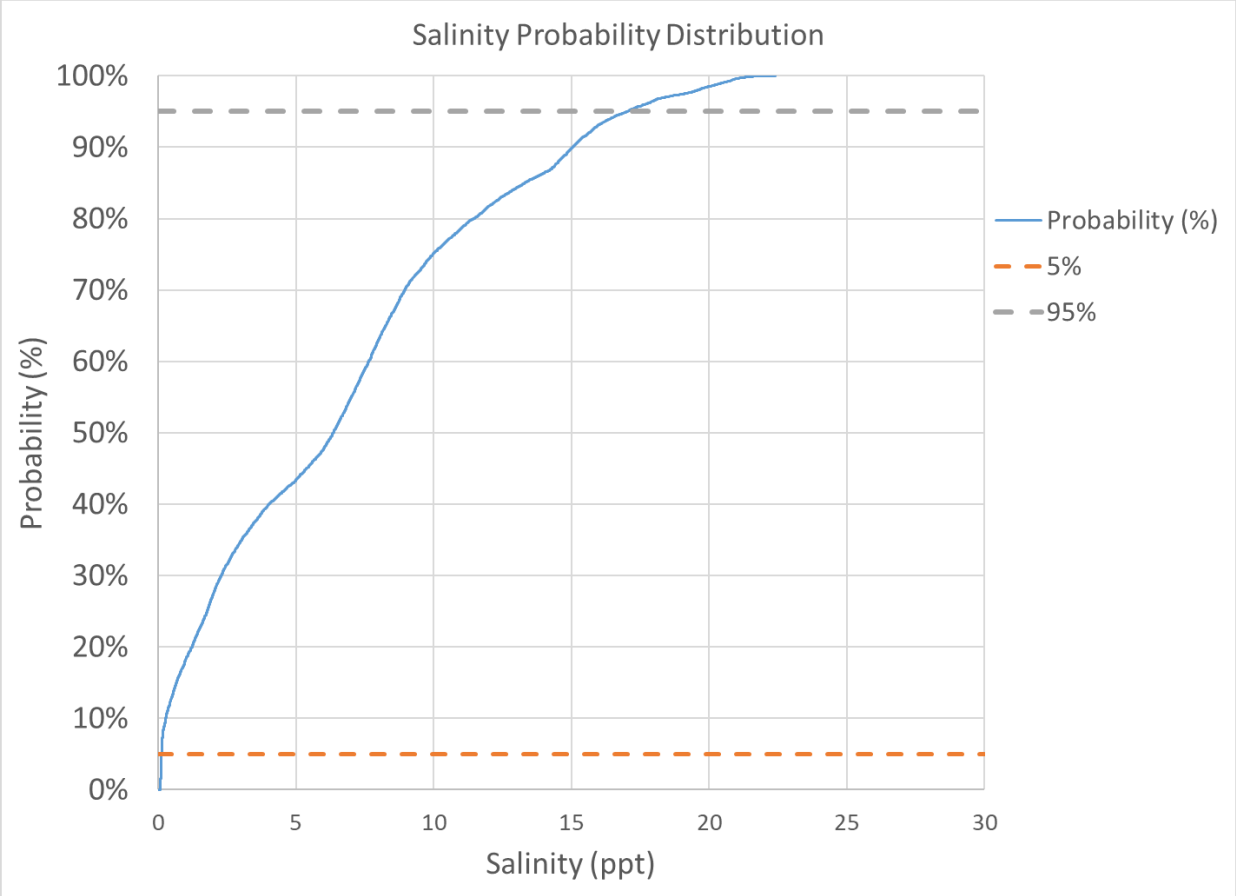


Figure 3-5: 2018 Salinity Data Probability Distribution

3.1.3.2 Bathymetry

The bathymetric data was digitized from a previously completed hydrographic survey (Hydro Consultants Inc. 2014). Detailed bathymetry was available near the discharge location. Assumptions were made to fill remaining uniform-width portion of the canal based on available contours.

3.1.4 Meteorological Data

Meteorological observations at Orange County Airport, Texas were obtained for simulation periods from the Iowa Environmental Mesonet: https://mesonet.agron.iastate.edu/. Coordinates of the location are Latitude 30.068˚N and Longitude 93.804˚W. Observations of wind speed and direction, air and dew point temperatures, and air pressure are available for the simulation periods. Relative humidity and wet bulb temperature were calculated using air and wet bulb temperatures. Solar radiation was also calculated using these available parameters. Time series of meteorological properties are presented in Figure 3-6, Figure 3-7, and Figure 3-8 for the model simulation periods. Wind roses for the simulation months for winter, spring and summer simulation periods are presented in Figure 3-9, Figure 3-10 and Figure 3-11. All three periods show the prevalence of northern winds. The meteorological data are used in the model to calculate surface wind stress and heat exchange with the atmosphere.

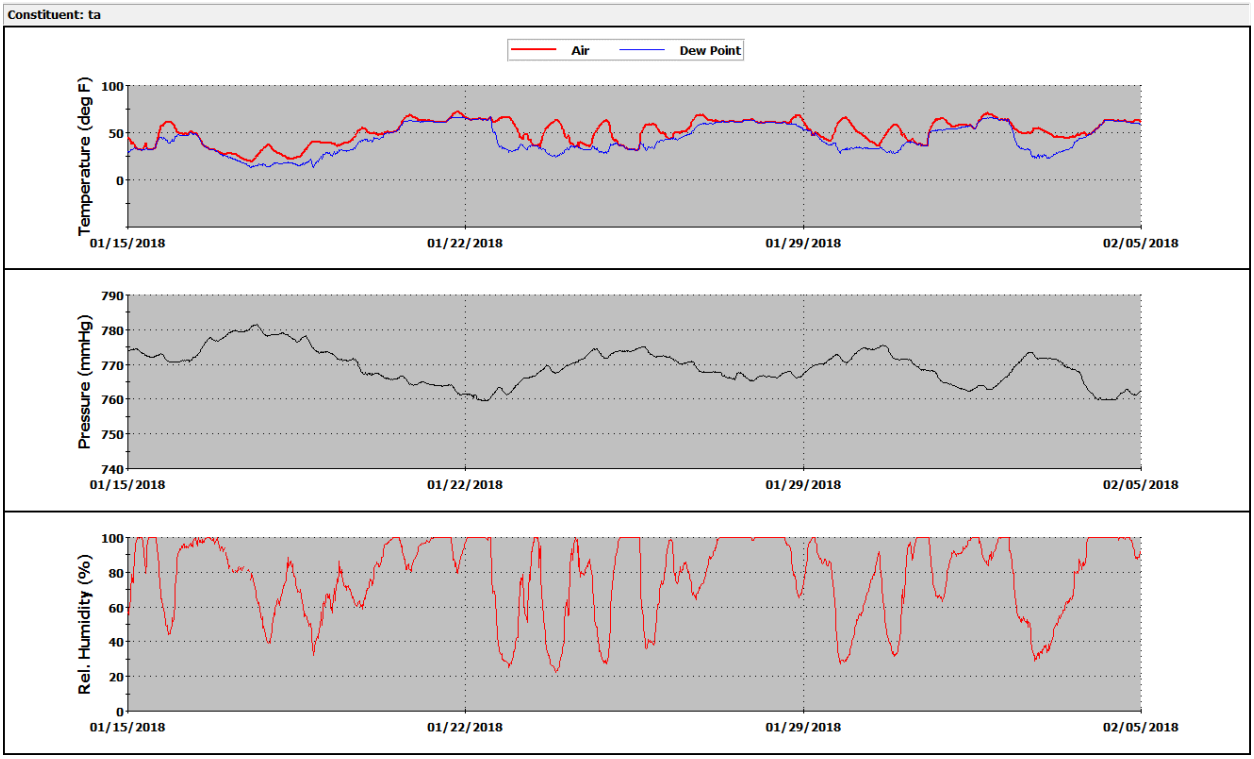


Figure 3-6: Winter Modeling Period Meteorological Data

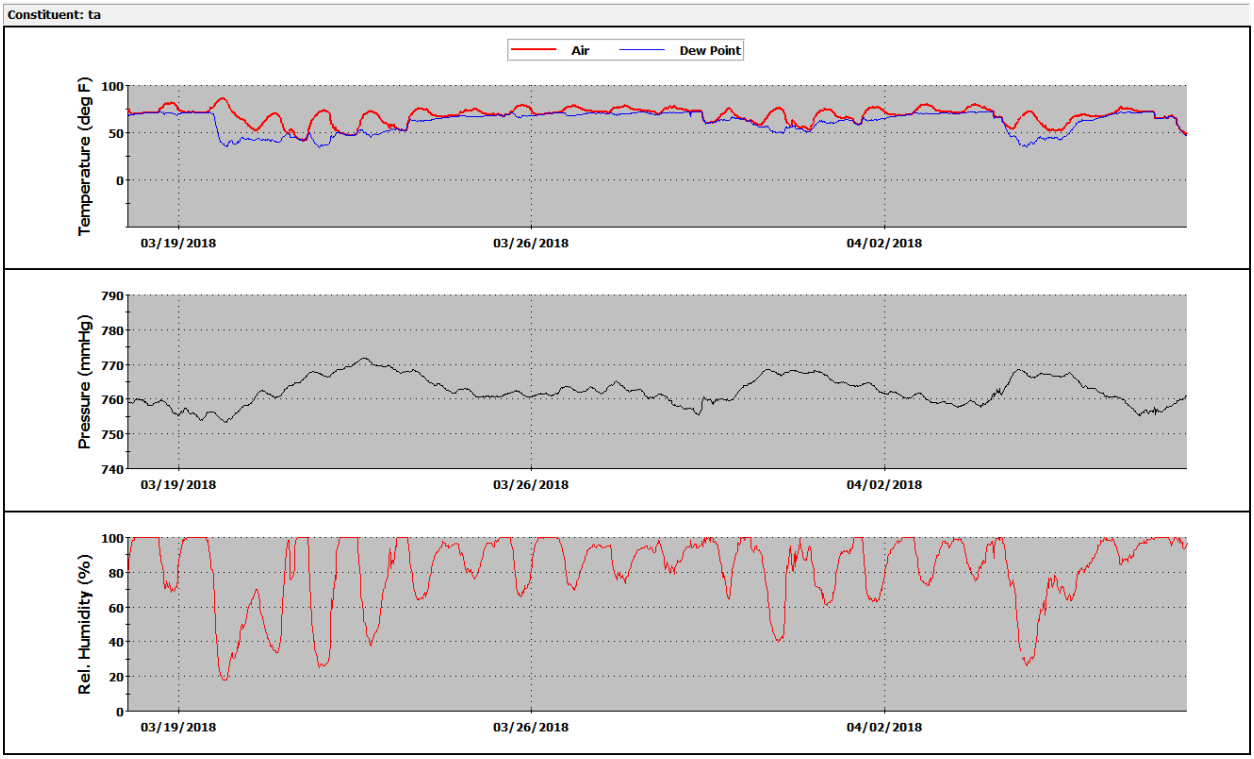


Figure 3-7: Spring Modeling Period Meteorological Data

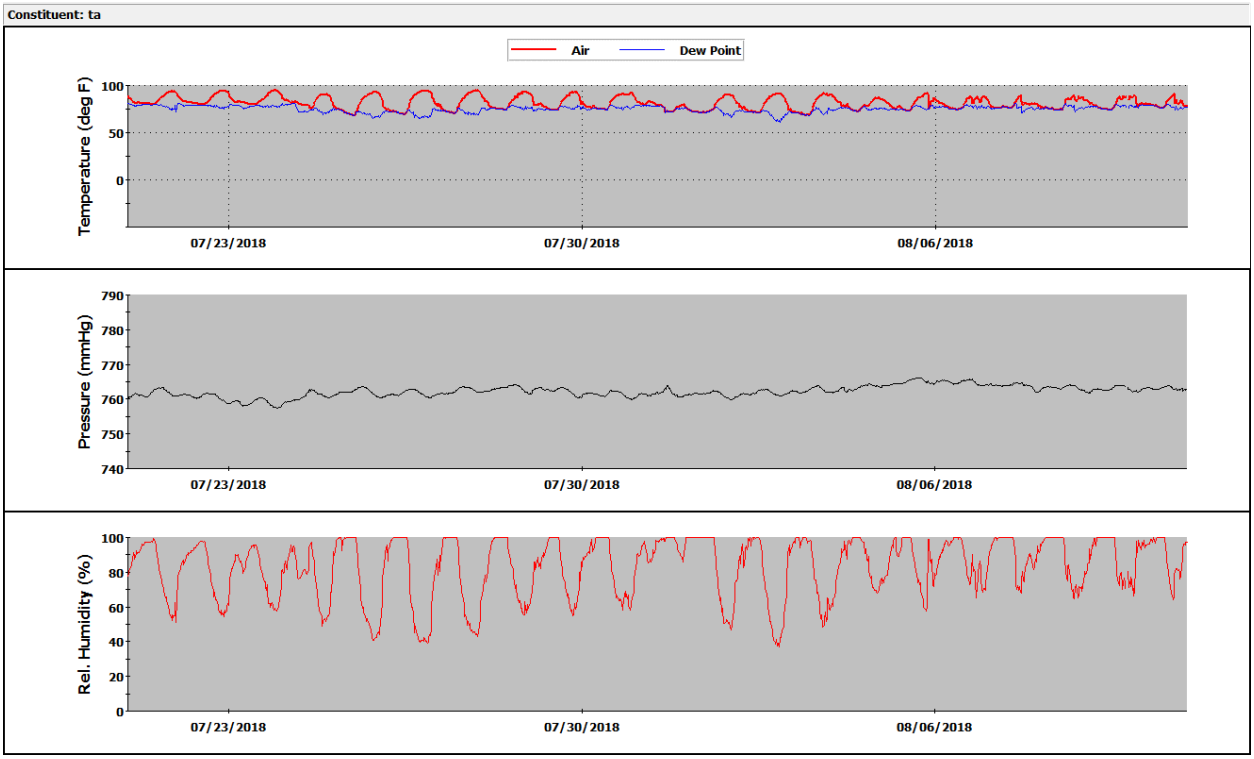


Figure 3-8: Summer Modeling Period Meteorological Data

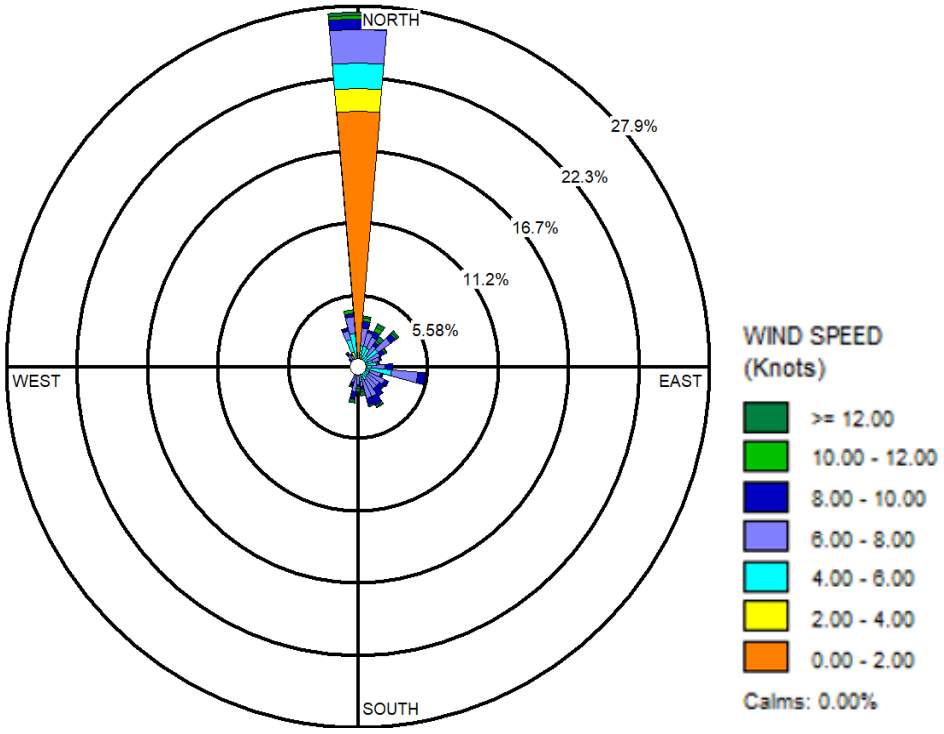


Figure 3-9: Winter Modeling Period Wind Rose

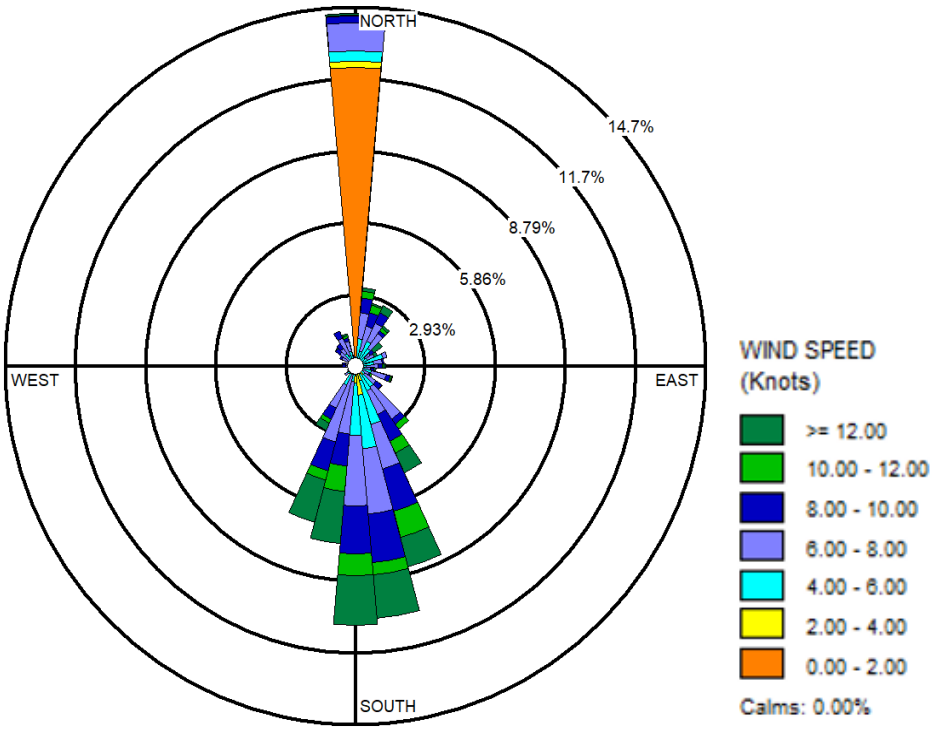


Figure 3-10: Spring Modeling Period Wind Rose

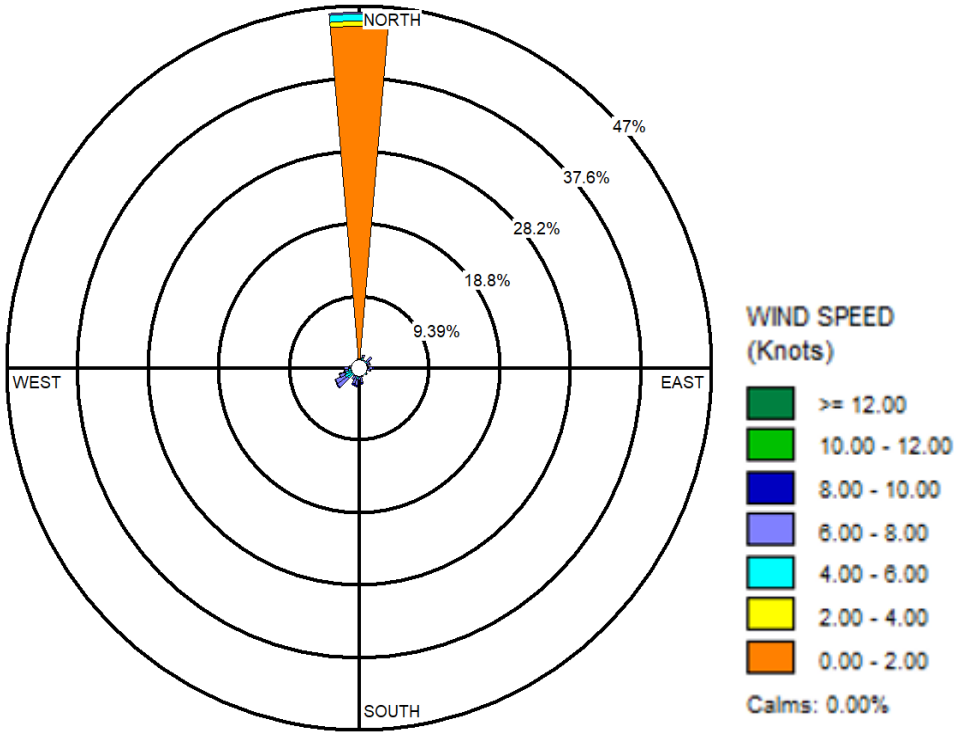


Figure 3-11: Summer Modeling Period Wind Rose

3.2 Model Grid

The 3-D hydrodynamic model requires a model grid that represents the waterbody being modeled. Bathymetric data and high resolution imagery were used to develop a model grid for the entire model domain. The grid resolution is finer near the discharge location as show in Figure 3-12. Near the discharge, the grid sizes are 20 by 20 m and the lowest resolution is near the end of the canal at 260 by 30 m. A total of 235 cells were used to develop the model grid. Vertical resolution of the grid was set at 1 ft.

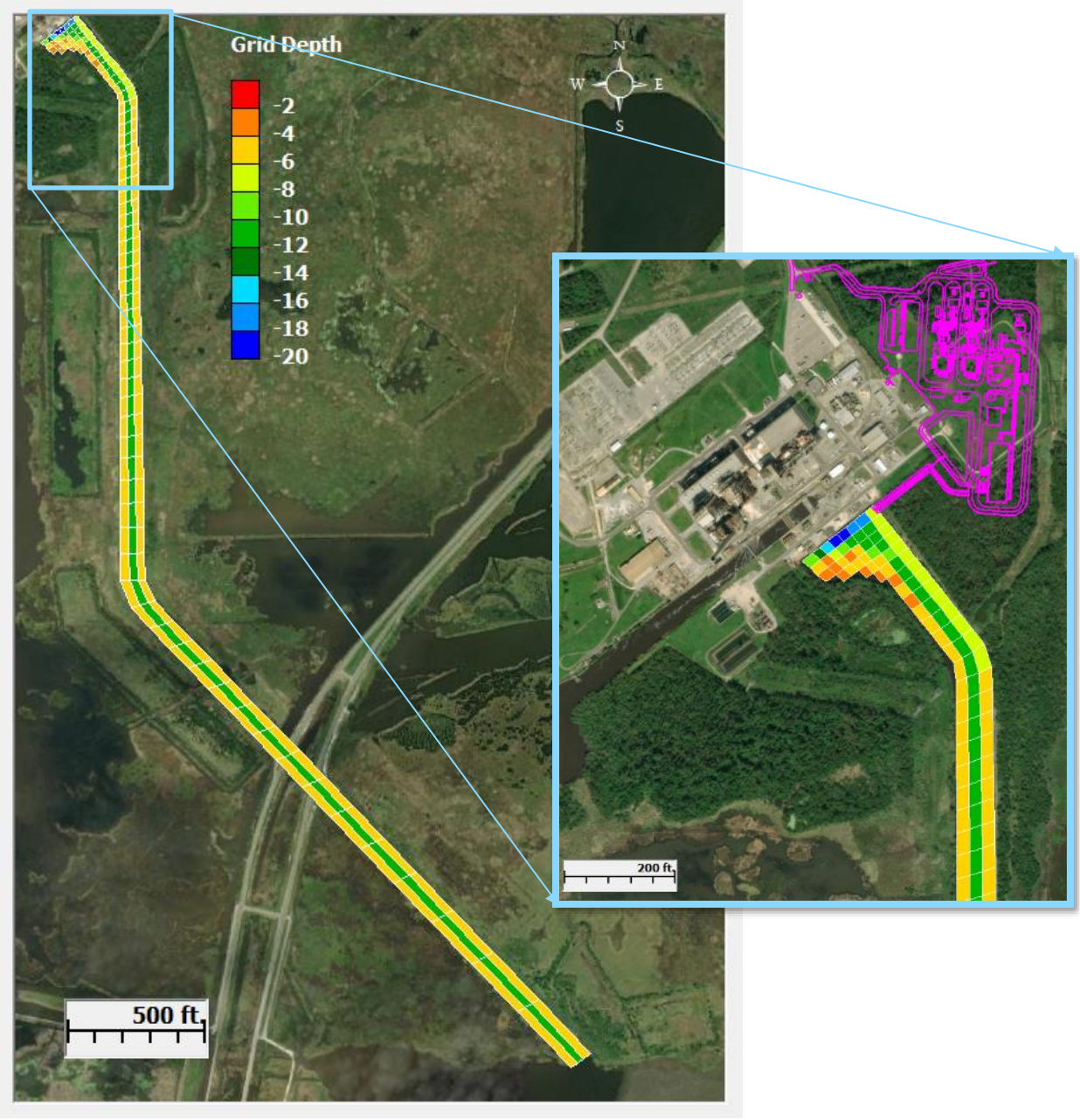


Figure 3-12: GEMSS Model Grid (Grid Depth in ft.)

4. MODEL SCENARIOS

4.1 GEMSS

The GEMSS model was developed for the entire length of the canal. Model scenarios consist of different temperature values (5th, 50th and 95th percentile ambient temperatures) to capture the range of the ambient conditions throughout the year. Naturally, the 5th percentile water temperature occurred during the winter and the 95th water temperature occurred during the summer so the respective extreme operational conditions for the discharge were applied. The 50th percentile water temperature occurred in the spring. The summer extreme operational conditions were applied to demonstrate the worst case under these spring temperature conditions. The model was run for these extreme summer and winter case operations for several tidal cycles. The 5th percentile and 95th percentile salinity extremes were also taken into consideration when developing the model scenarios. The various combinations of these ambient water temperature, operating case and ambient salinity were used to develop the six scenarios shown in Table 4-1.

Table 4-1: Model Scenarios

Scenario	Start Date	Flow Rate (gpm)	Season	Ambient Temp	Salinity	Salinity (ppt)	Discharge Temp (deg F)	Ambient Temp (deg F)	Excess Temp (deg F)
1	1/15/2018	422	Winter	5th Percentile	5th Percentile	0.12	99	50.6	48.4
2	1/15/2018	422	Winter	5th Percentile	95th Percentile	17.0	99	50.6	48.4
3	3/18/2018	730	Spring	50th Percentile	5th Percentile	0.12	118	70.6	47.4
4	3/18/2018	730	Spring	50th Percentile	95th Percentile	17.0	118	70.6	47.4
5	7/21/2018	730	Summer	95th Percentile	5th Percentile	0.12	118	88.2	29.8
6	7/21/2018	730	Summer	95th Percentile	95th Percentile	17.0	118	88.2	29.8

Note: Salinity and ambient temperatures were constant inputs to the model rather than time-varying. However, the surface heat exchange provided the diurnal variation in these temperatures.

5. MODEL RESULTS

The model results are presented as probability contour plots along with summary tables quantifying the extents visible (Additional plots are available in Appendix A). The probability plots were based on the regulatory criteria mentioned in Section 1.3. The probability contours were generated based on the water temperature and excess temperature values during the last two weeks of the 20-day model run. The first 6 days of the model run were excluded from this computation to avoid any biases from output during the spin-up period for the model. The model records the temperatures (or excess temperature) at each computational timestep during the 14-day probability period. Based on the value of these temperatures (or excess temperature) relative to the applied threshold (as applicable from Section 1.3), an exceedance is recorded if the value exceeds the threshold. An overall percentage of exceedance is then calculated at the end of the 14-day period. A location that shows 50% exceedance suggests that it exceeded the threshold for a total of 7 days (discreetly or continuously) over the entire 14-day analysis period. The model results are summarized in Table 5-1 and Table 5-2 with respect to the regulatory criteria.

Table 5-1: Model Results Summary: 95 deg F Exceedance at the Water Surface

Scenario	Season	Ambient Temp	Salinity	Area >50% Exceedance ($ft.^2$)	Area >95% Exceedance ($ft.^2$)	Downstream Distance 50% (ft.)	Downstream Distance 95% (ft.)
1	Winter	5th Percentile	5th Percentile	0	0	0	0
2	Winter	5th Percentile	95th Percentile	0	0	0	0
3	Spring	50th Percentile	5th Percentile	0	0	0	0
4	Spring	50th Percentile	95th Percentile	0	0	0	0
5	Summer	95th Percentile	5th Percentile	18,500	4,000	200	80
6	Summer	95th Percentile	95th Percentile	19,000	3,400	160	80

Note: The total area of the Sabine Intake Canal is 3,560,000 ft^2

Table 5-2: Model Results Summary: Excess Temperature Exceedance (4 deg F Summer and Winter, 1.5 deg F Summer) at the Water Surface

Scenario	Season	Ambient Temp	Salinity	Area >50% Exceedance ($ft.^2$)	Area >95% Exceedance ($ft.^2$)	Downstream Distance 50% (ft.)	Downstream Distance 95% (ft.)
1	Winter	5th Percentile	5th Percentile	14,500	2,500	140	70
2	Winter	5th Percentile	95th Percentile	42,500	3,100	300	60
3	Spring	50th Percentile	5th Percentile	59,000	8,000	260	90
4	Spring	50th Percentile	95th Percentile	70,500	11,600	330	120

Scenario	Season	Ambient Temp	Salinity	Area >50% Exceedance ($ft.^2$)	Area >95% Exceedance ($ft.^2$)	Downstream Distance 50% (ft.)	Downstream Distance 95% (ft.)
5	Summer	95th Percentile	5th Percentile	288,500	171,500	1,030	500
6	Summer	95th Percentile	95th Percentile	260,000	107,500	920	410

Note: The total area of the Sabine Intake Canal is 3,560,000 ft^2

5.1 Winter Probability Results

The model results in both 5th percentile and 95th percentile temperature scenario indicate that the 95 deg F is not a concern for the winter runs. Figure 5-1 and Figure 5-2 do not show any contours above the 5%, which is expected considering the colder water and air temperatures typical for the season. Figure 5-3 and Figure 5-4 indicate that the 4 deg F excess temperature exceedance occurs more than 50% of the time for an area of 14,500 $ft.^2$ in the low salinity scenario and 42,500 $ft.^2$ in the high salinity scenario. The exceedance occurs anywhere from 140 ft. to 300 ft. downstream for the 50% exceedance contour and 60 ft. to 70ft. downstream for the 95% exceedance contour. Figure 5-5 and Figure 5-6 show that there is not even a 5% exceedance of the excess temperature criteria in the bottom layer of the canal. This trend holds true for other model runs as well. The surface layer, understandably so, represents the worst case in terms of extent due to discharge being heated and introduced above the surface. Therefore, only the surface layer contours will be examined closely in this analysis. Example plots showing the excess temperature probability along different cross-sections of the canal are provided for the worst case winter scenario in Figure 5-7, Figure 5-8 and Figure 5-9. These plots show the vertical extent of these plumes and provide further insight into the spread of the plume, both horizontally (along the selected slice) and vertically. As can be seen in these figures, the plume does not cover the entire cross-section providing zones of passage, if needed.

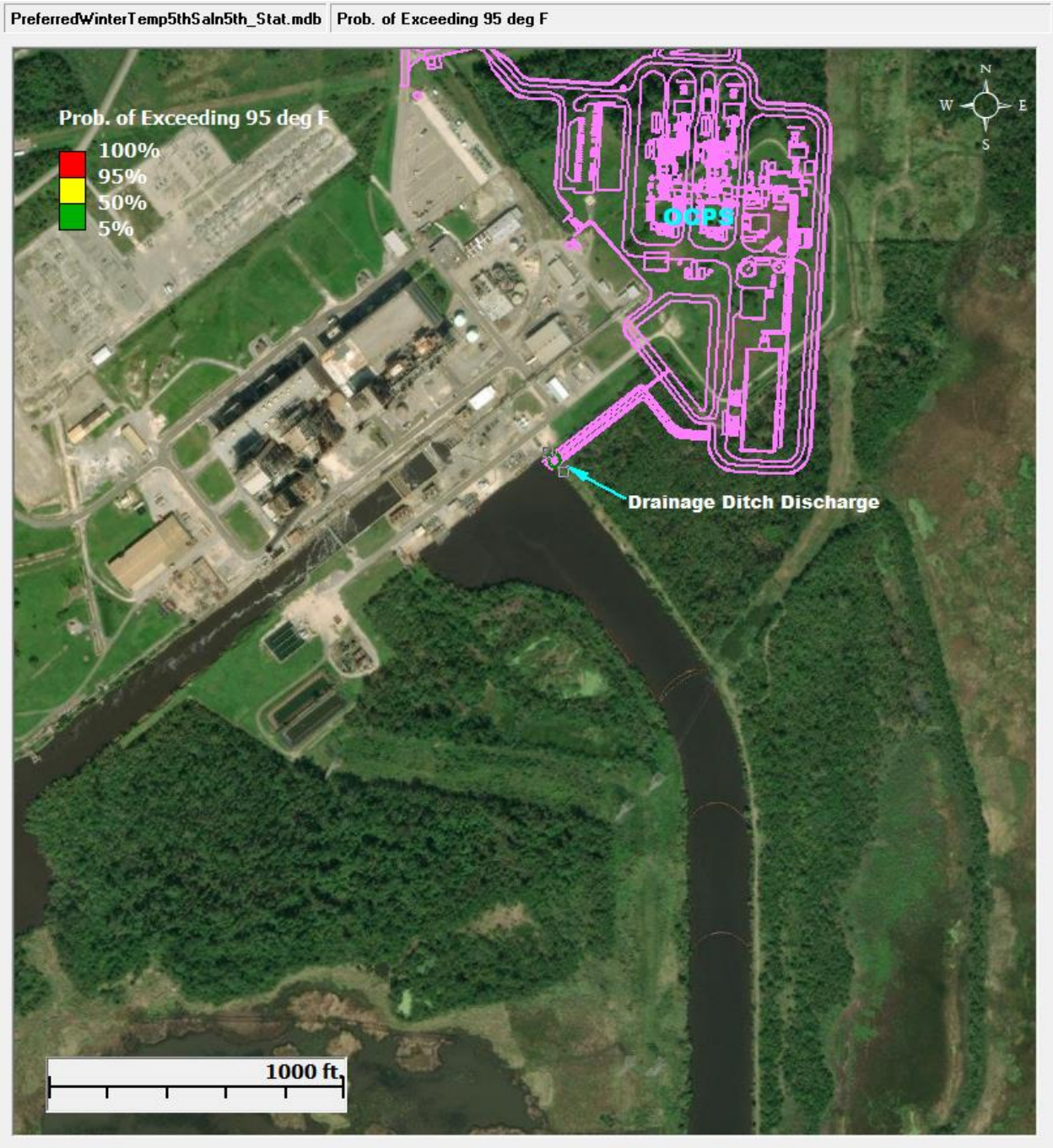


Figure 5-1: Winter (5th Percentile Salinity) 95 deg F Exceedance Probability at Water Surface

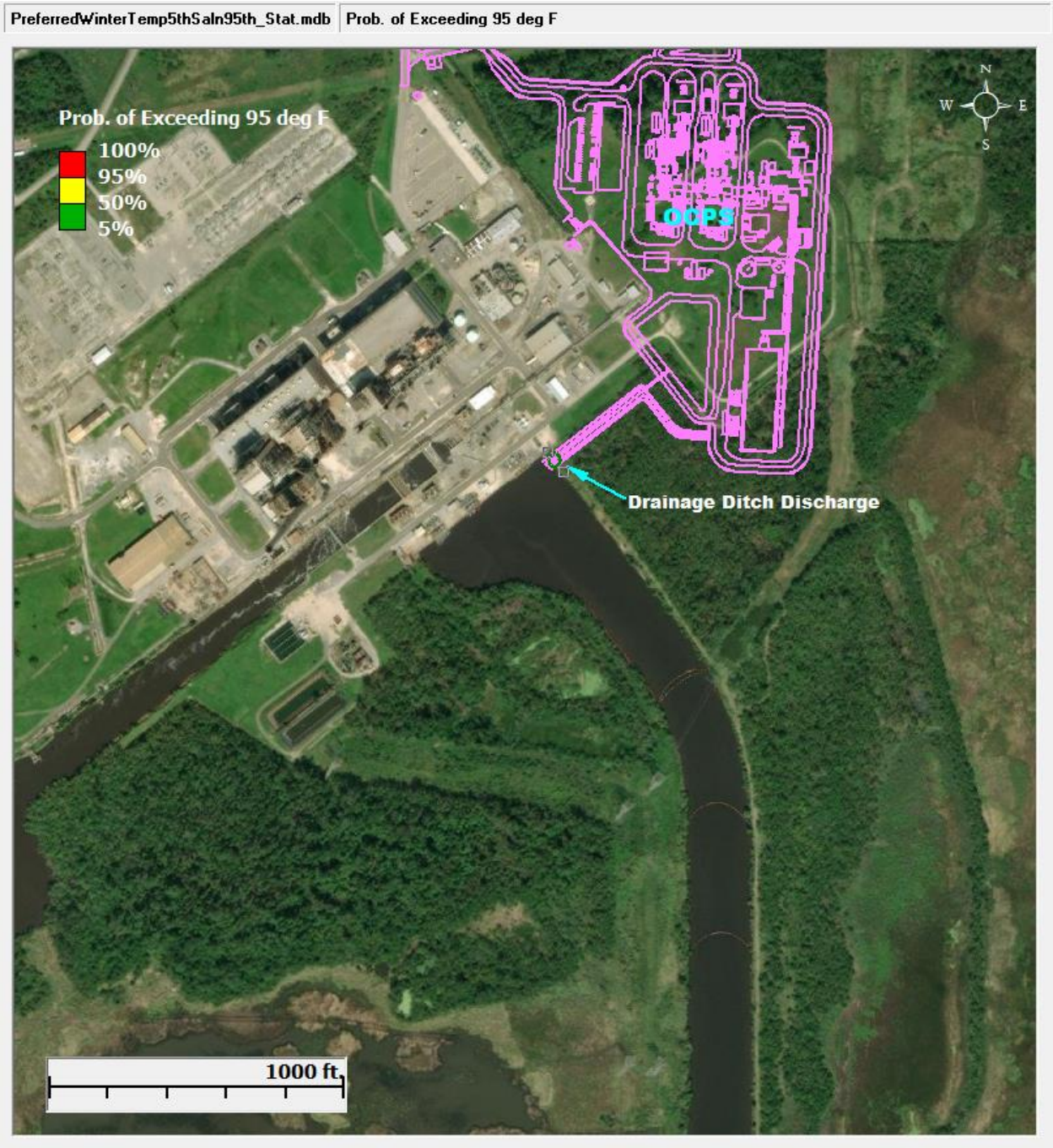


Figure 5-2: Winter (95th Percentile Salinity) 95 deg F Exceedance Probability at Water Surface

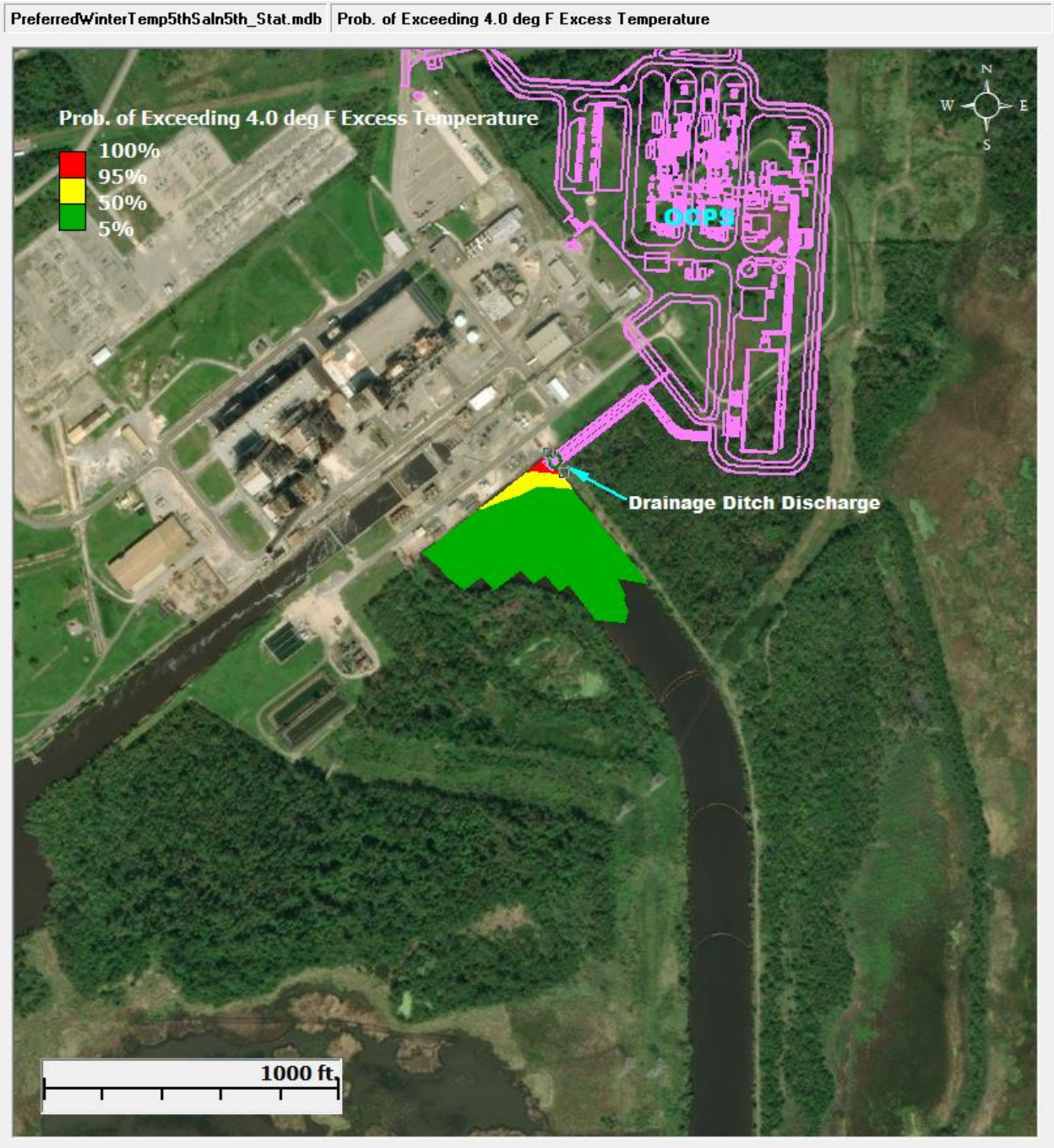


Figure 5-3: Winter (5th Percentile Salinity) 4 deg F Excess Temperature Exceedance Probability at Water Surface

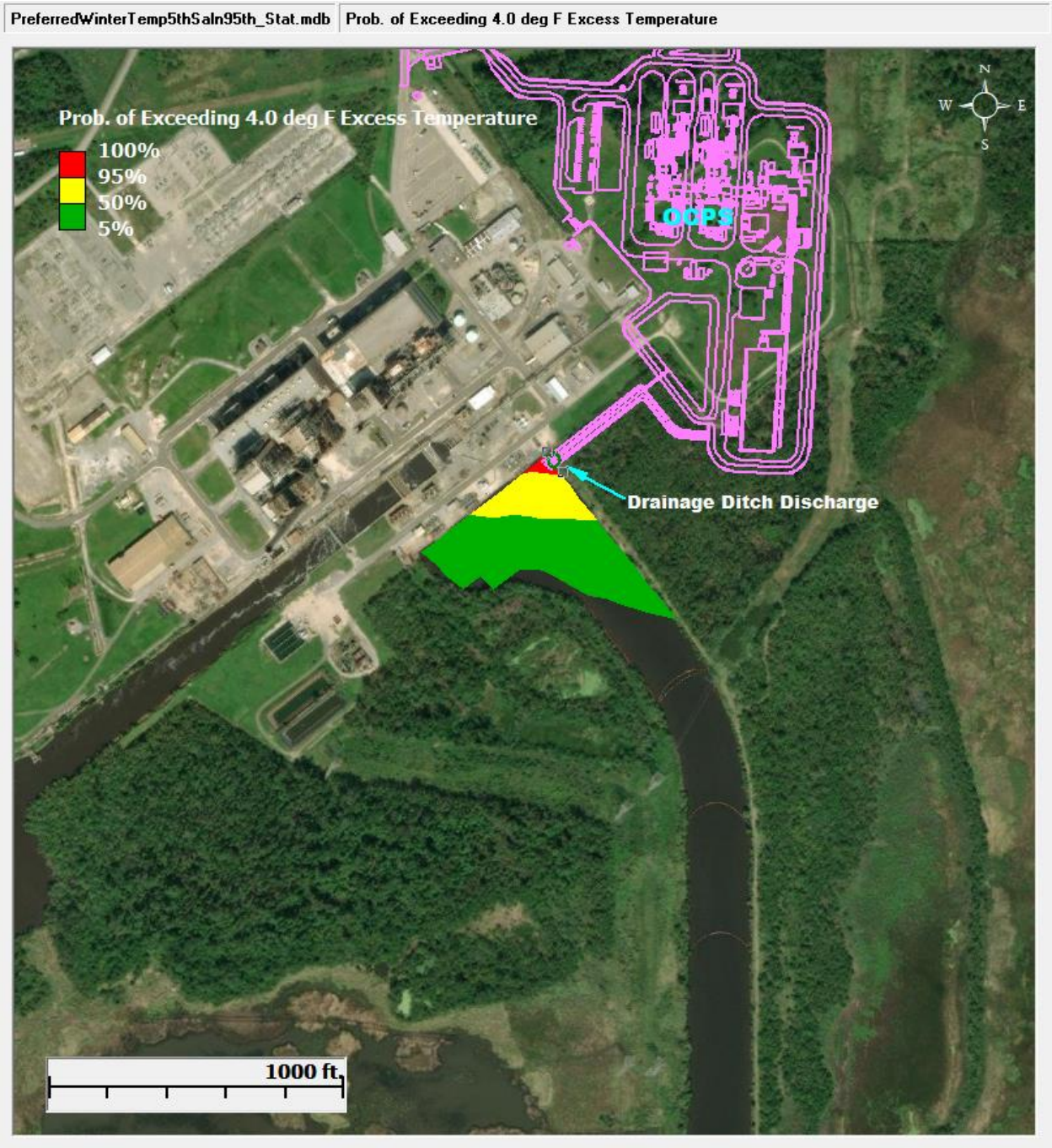


Figure 5-4: Winter (95th Percentile Salinity) 4 deg F Excess Temperature Exceedance Probability at Water Surface

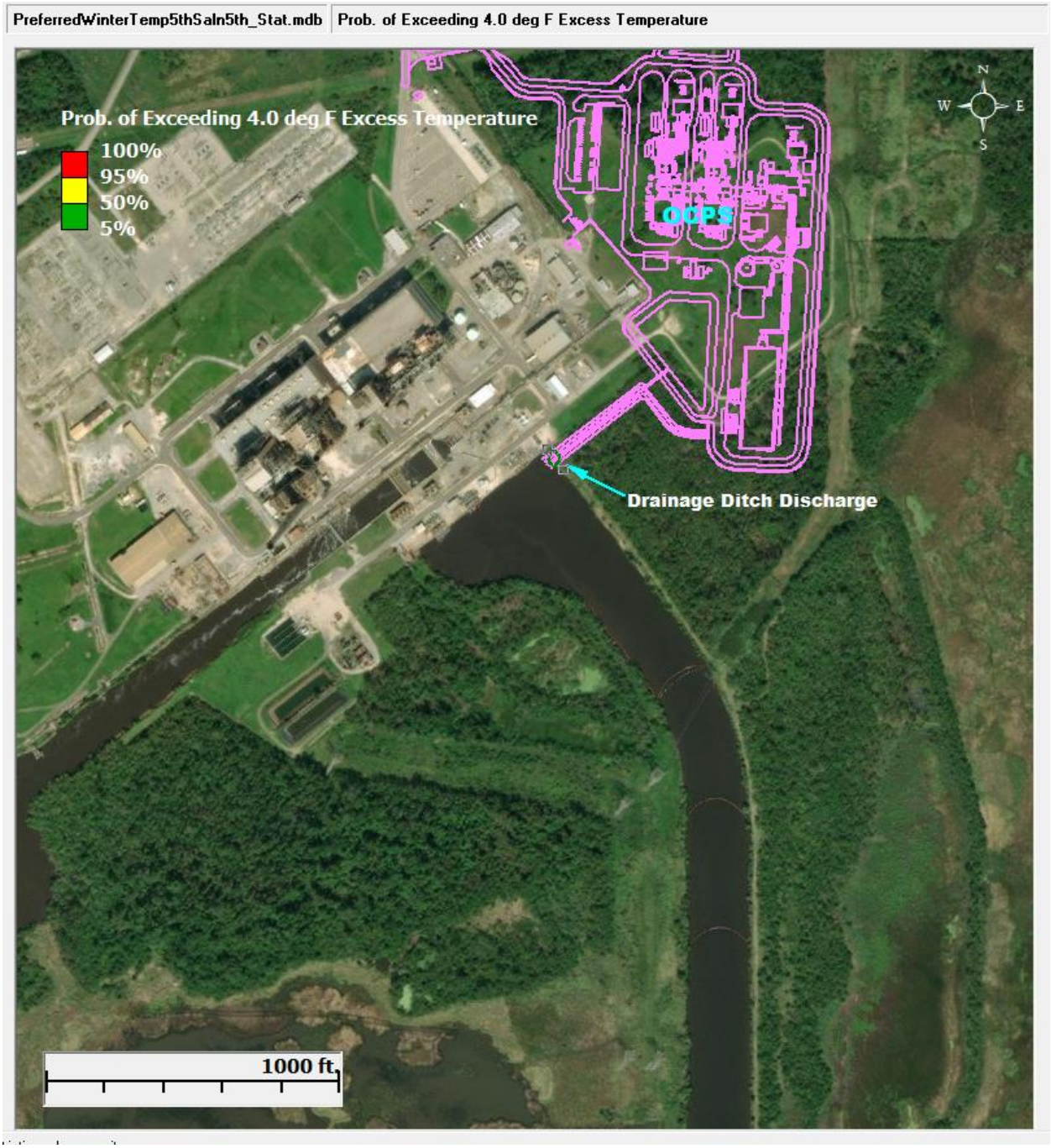


Figure 5-5: Winter (5th Percentile Salinity) 4 deg F Excess Temperature Exceedance Probability at Canal Bottom

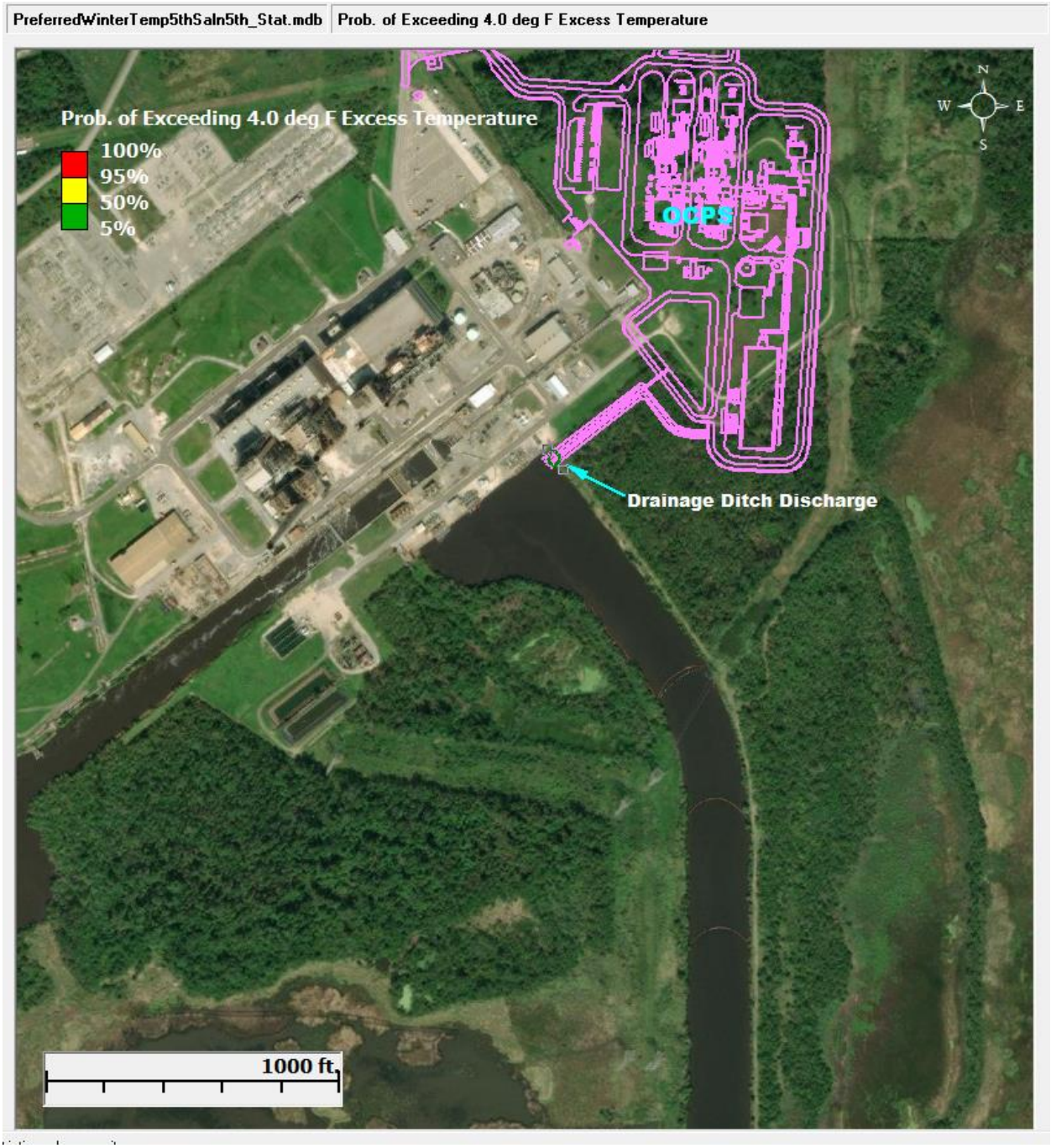


Figure 5-6: Winter (95th Percentile Salinity) 4 deg F Excess Temperature Exceedance Probability at Canal Bottom

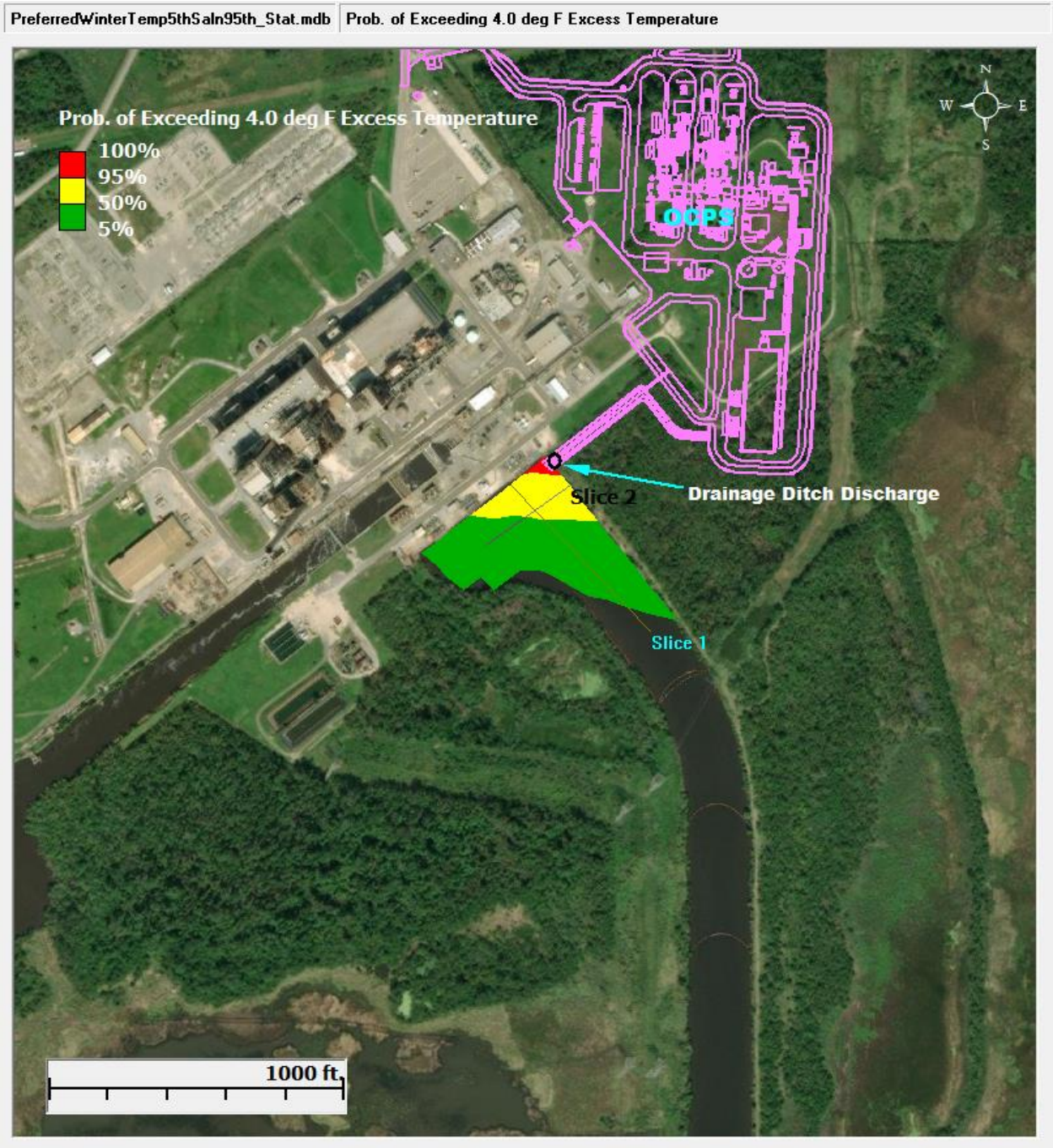
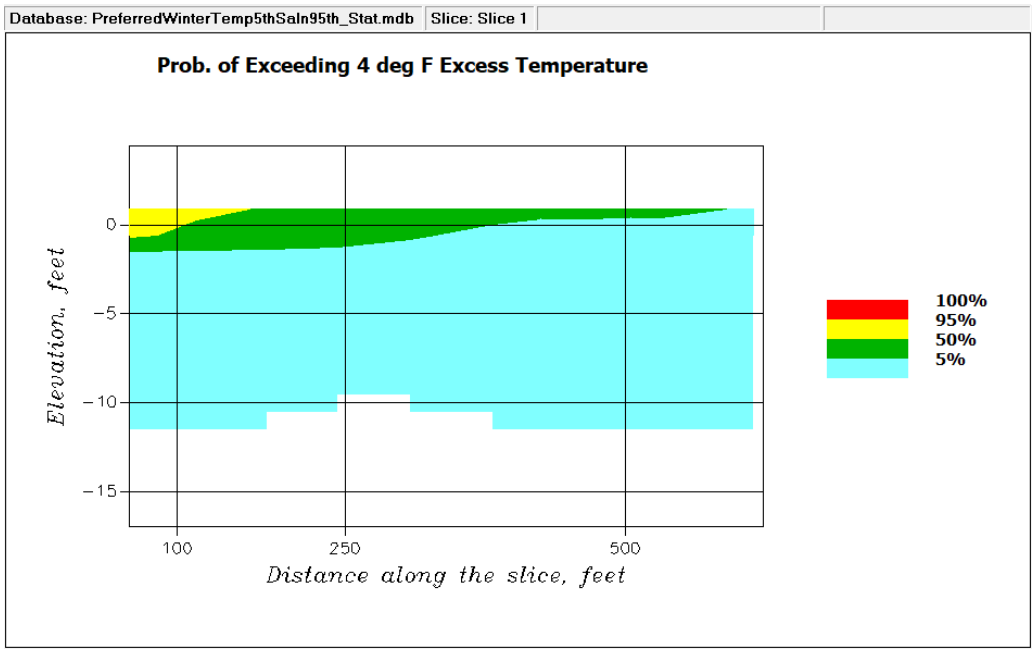
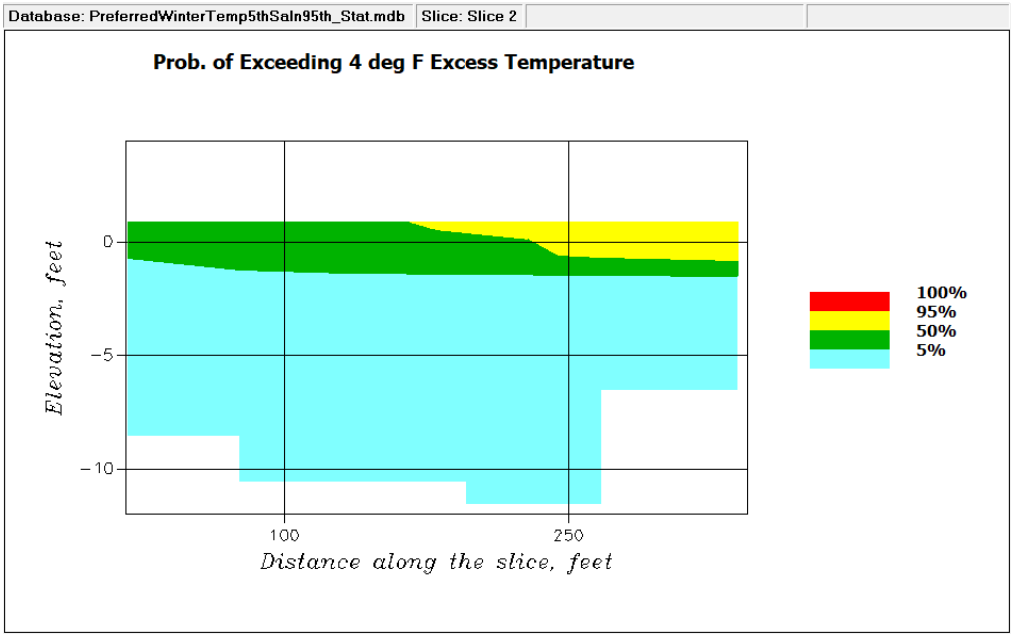


Figure 5-7: Winter (95th Percentile Salinity) 4 deg F Excess Temperature Exceedance Probability with Vertical Layer Slice Locations



Note: Light blue color depicts the actual cross-section along the selected slice.

Figure 5-8: Winter (95th Percentile Salinity) 4 deg F Excess Temperature Exceedance Probability at Vertical Layer Slice Location 1 (Lengthwise)



Note: Light blue color depicts the actual cross-section along the selected slice.

Figure 5-9: Winter (95th Percentile Salinity) 4 deg F Excess Temperature Exceedance Probability at Vertical Layer Slice Location 2 (Widthwise)

5.2 Spring Probability Results

The model results in both 5th percentile and 95th percentile temperature scenarios indicate that the 95 deg F is not a major concern for the spring runs. Figure 5-10 does not show any contours above the 5% while Figure 5-11 does not show any contours above the 50%. Figure 5-12 and Figure 5-13 indicate that the 4 deg F excess temperature exceedance occurs more than 50% of the time for an area of 59,000 ft.^{2} in the low salinity scenario and 70,500 ft.^{2} in the high salinity scenario. The exceedance occurs anywhere from 260 ft. to 330 ft. downstream for the 50% exceedance contour and 90 ft. to 120 ft. downstream for the 95% exceedance contour. Note that the summer discharge flow and discharge temperature were used for the spring scenarios. Therefore, the larger areas and downstream distances are expected when comparing with the winter seasonal scenarios. As in previous scenario, the plumes are largest at the surface. Example plots showing the excess temperature probability along different cross-sections of the canal are provided for the worst case spring scenario in Figure 5-14, Figure 5-15, and Figure 5-16. These plots show the vertical extent of these plumes and provide further insight into the spread of the plume, both horizontally (along the selected slice) and vertically. As can be seen in these figures, the plume does not cover the entire cross-section providing zones of passage, if needed.

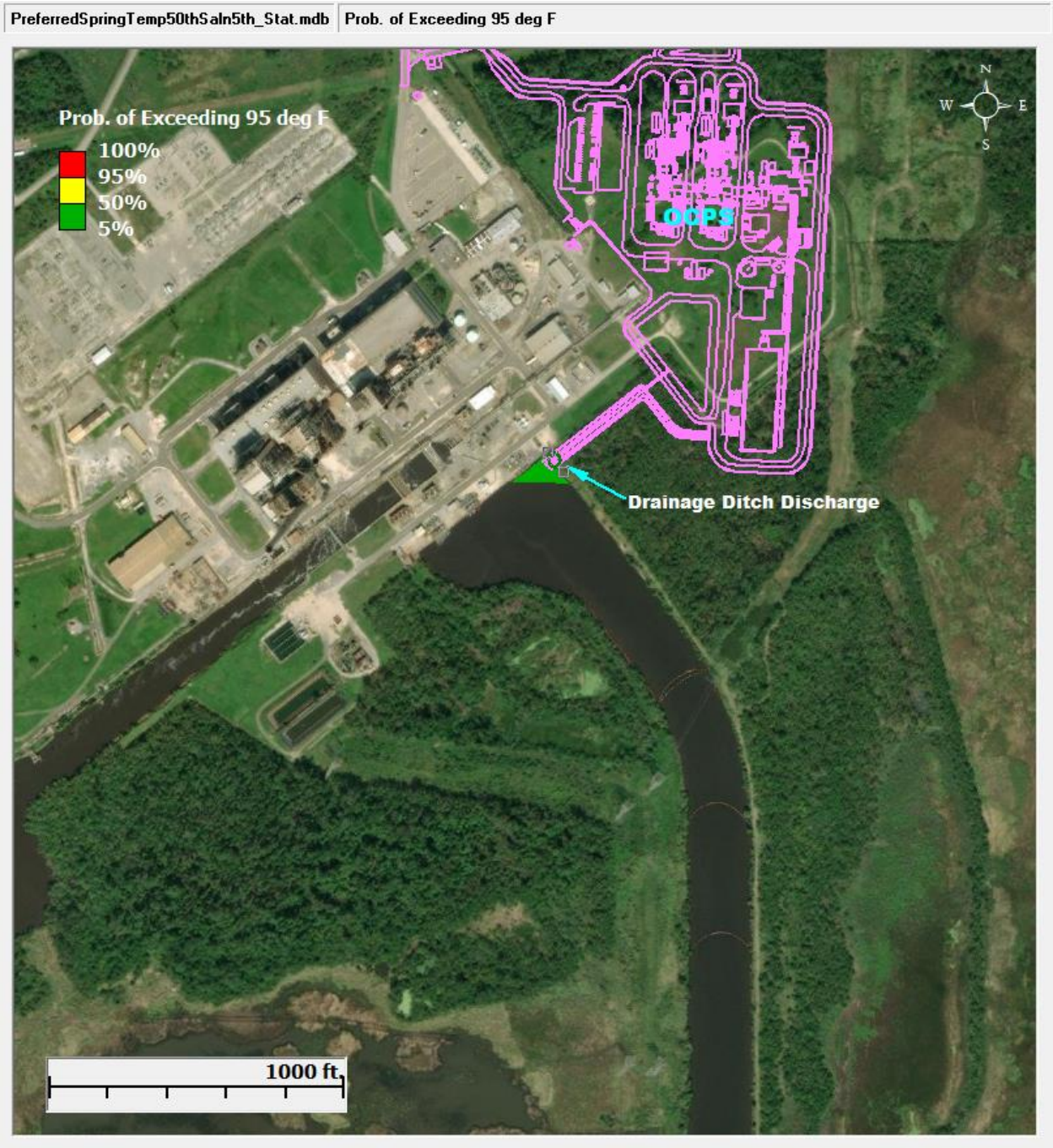


Figure 5-10: Spring (5th Percentile Salinity) 95 deg F Exceedance Probability at Water Surface

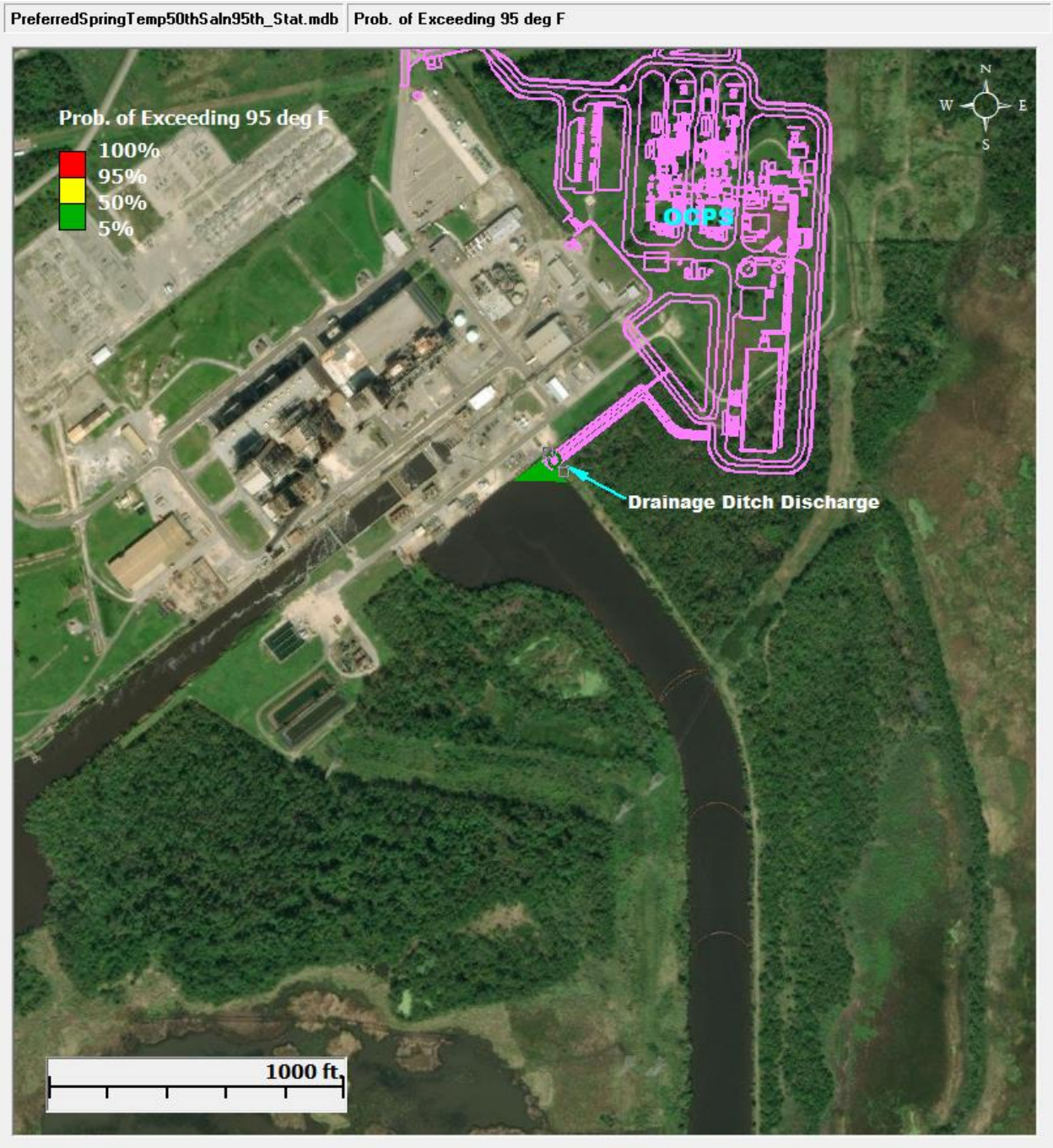


Figure 5-11: Spring (95th Percentile Salinity) 95 deg F Exceedance Probability at Water Surface

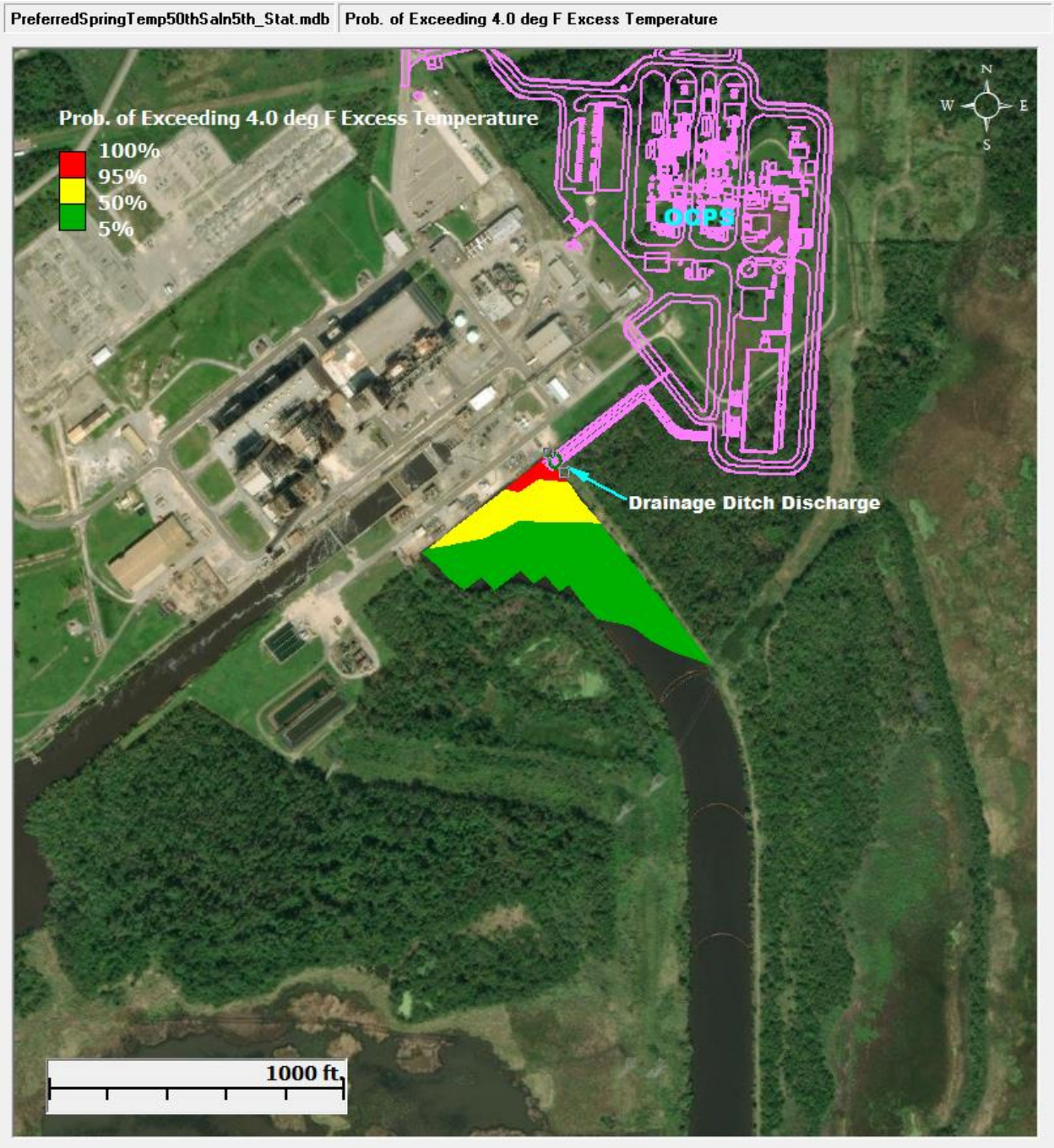


Figure 5-12: Spring (5th Percentile Salinity) 4 deg F Excess Temperature Exceedance Probability at Water Surface

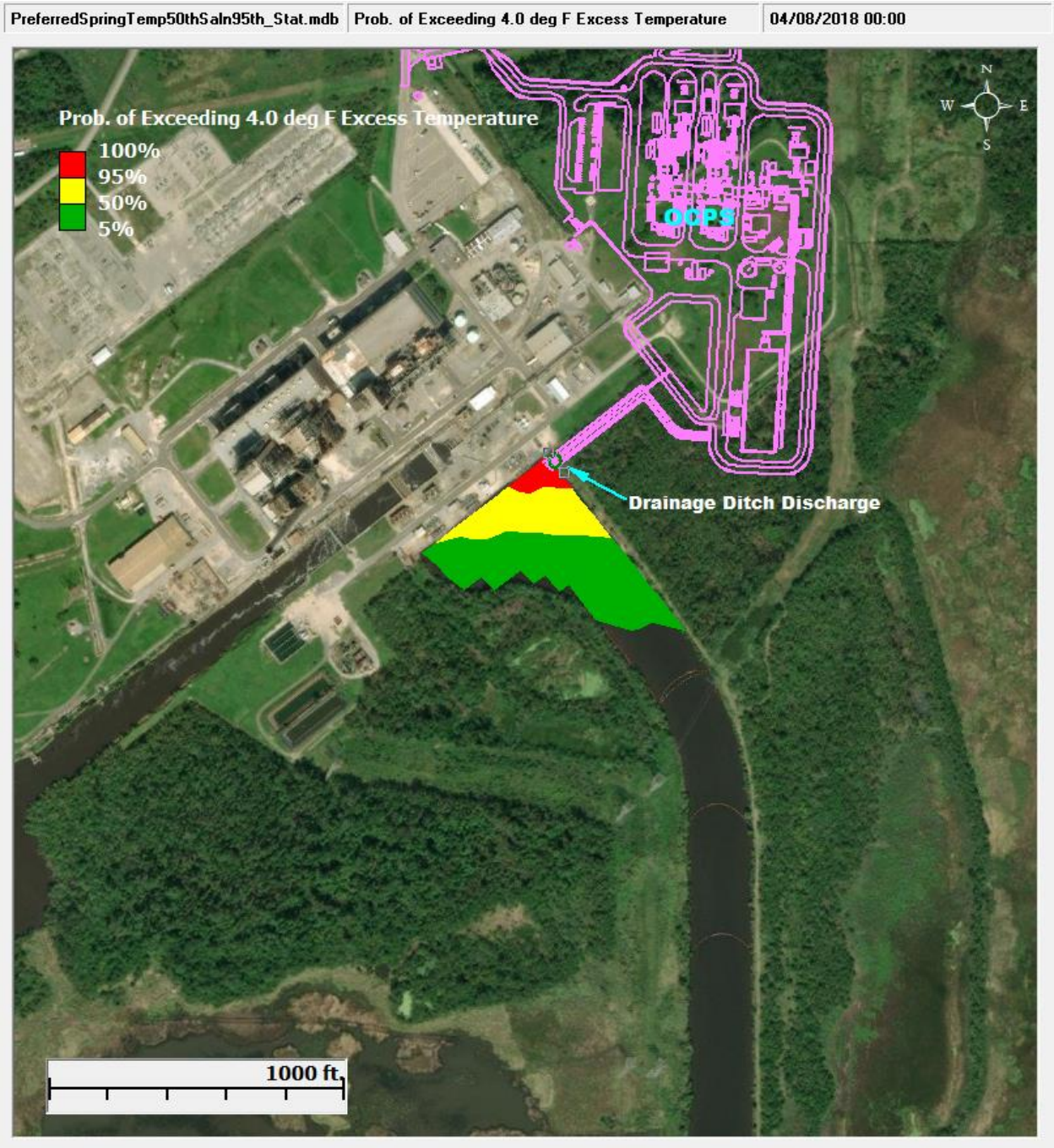


Figure 5-13: Spring (95th Percentile Salinity) 4 deg F Excess Temperature Exceedance Probability at Water Surface

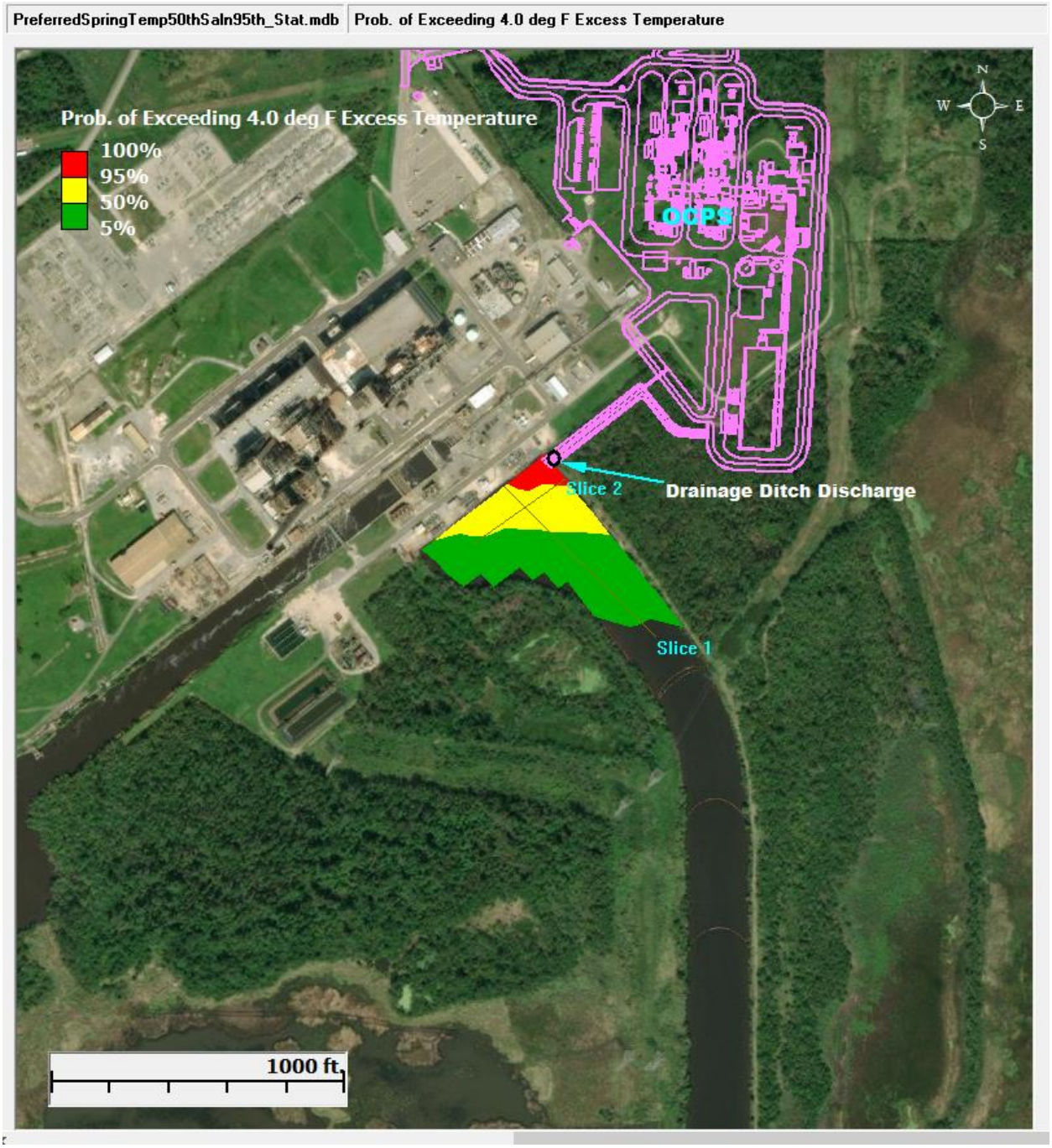
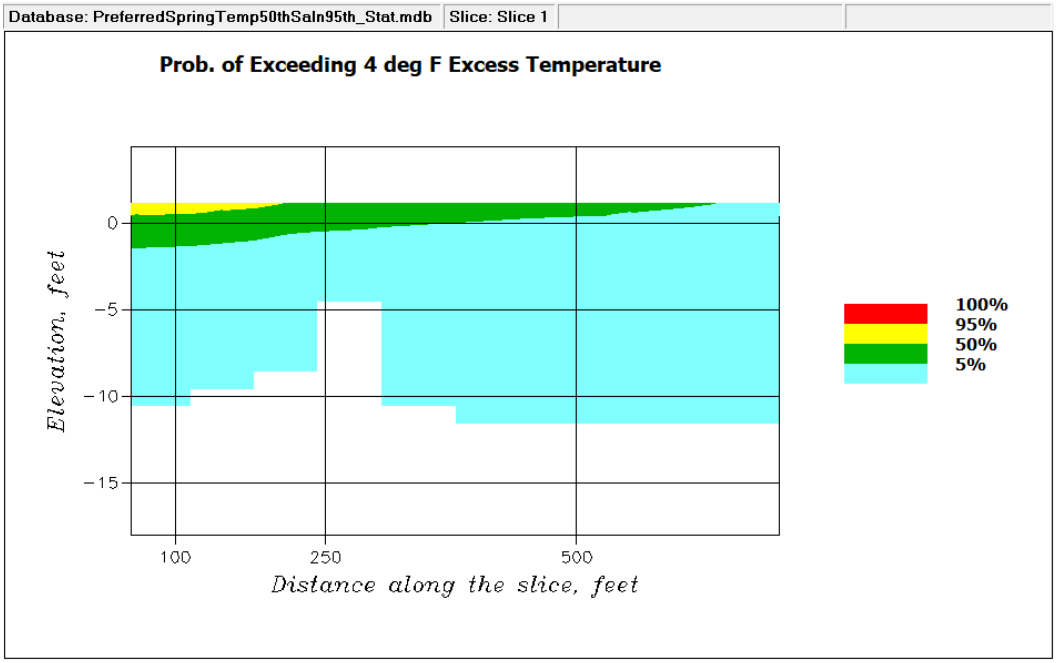
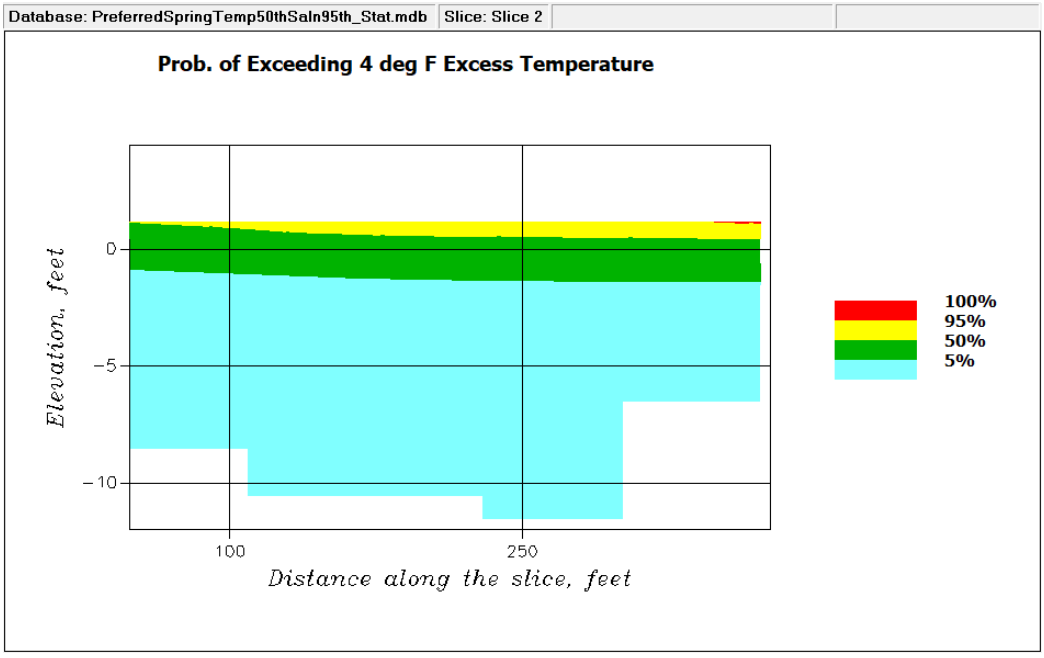


Figure 5-14: Spring (95th Percentile Salinity) 4 deg F Excess Temperature Exceedance Probability with Vertical Layer Slice Locations



Note: Light blue color depicts the actual cross-section along the selected slice.

Figure 5-15: Spring (95th Percentile Salinity) 4 deg F Excess Temperature Exceedance Probability at Vertical Layer Slice Location 1 (Lengthwise)



Note: Light blue color depicts the actual cross-section along the selected slice.

Figure 5-16: Spring (95th Percentile Salinity) 4 deg F Excess Temperature Exceedance Probability at Vertical Layer Slice Location 2 (Widthwise)

5.3 Summer Probability Results

The model results in both 5th percentile and 95th percentile temperature cases indicate that the 95 deg F is a more significant concern for the summer runs when comparing with the winter and spring runs. This is expected due to the higher discharge, ambient water and air temperature. Figure 5-17 and Figure 5-18 both show contours of 50% and 95% exceedance, however this impact is limited to a downstream distance of 80 to 200 ft. Figure 5-19 and Figure 5-20 indicate that the 1.5 deg F excess temperature exceedance occurs more than 50% of the time for an area of 260,000 ft.^{2} in the high salinity scenario to 288,500 ft.$^{2\ in}$ the low salinity scenario. The exceedance occurs anywhere from 920 ft. to 1,030 ft. downstream for the 50% exceedance contour and 410 ft. to 500 ft. downstream for the 95% exceedance contour. As in previous scenario, the plumes are largest at the surface. Example plots showing the excess temperature probability along different cross-sections of the canal are provided for the worst case summer scenario in Figure 5-21, Figure 5-22 and Figure 5-23. These plots show the vertical extent of these plumes and provide further insight into the spread of the plume, both horizontally (along the selected slice) and vertically. As can be seen in these figures, the plume does not cover the entire cross-section providing zones of passage, if needed.

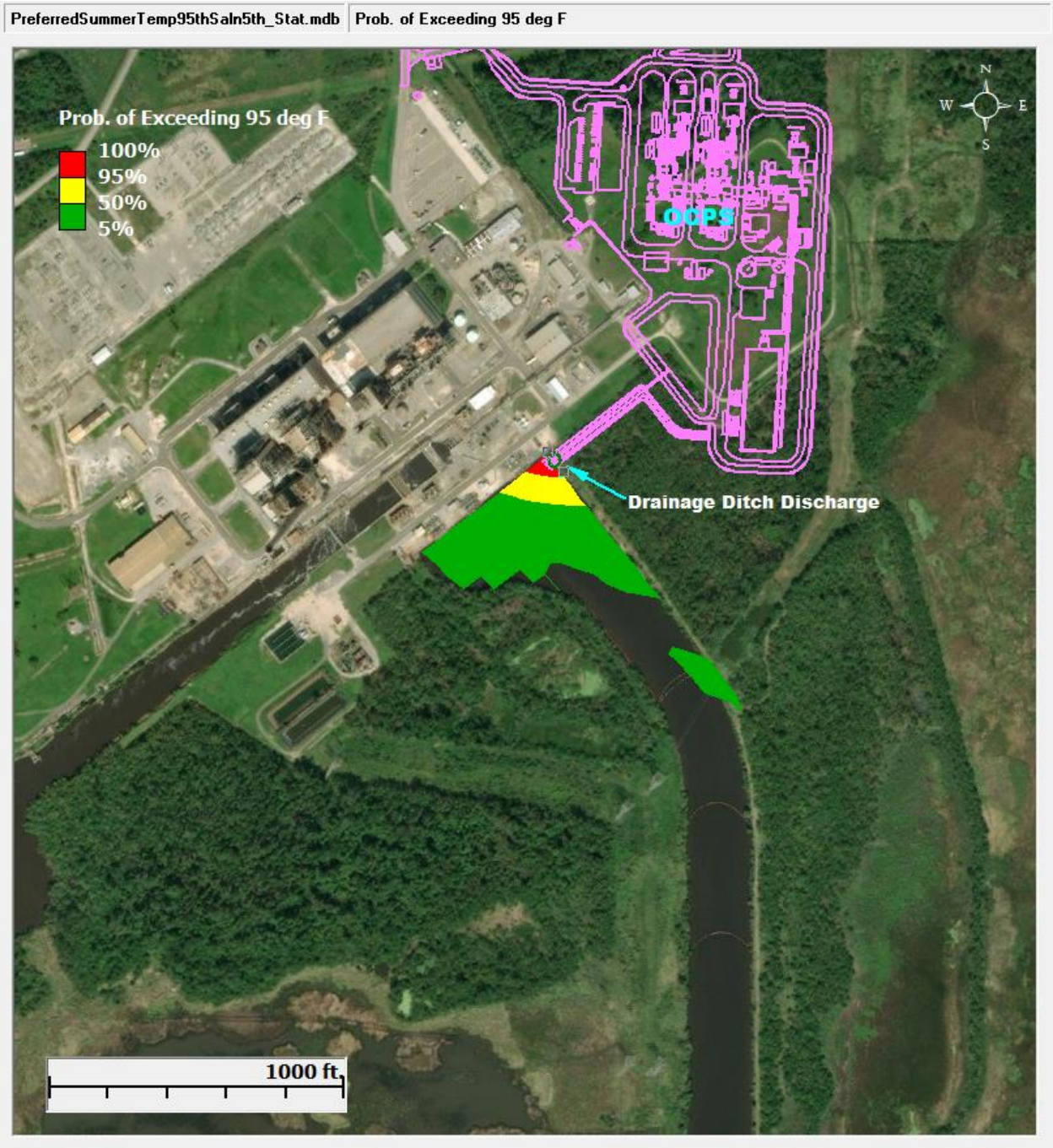


Figure 5-17: Summer (5th Percentile Salinity) 95 deg F Exceedance Probability at Water Surface

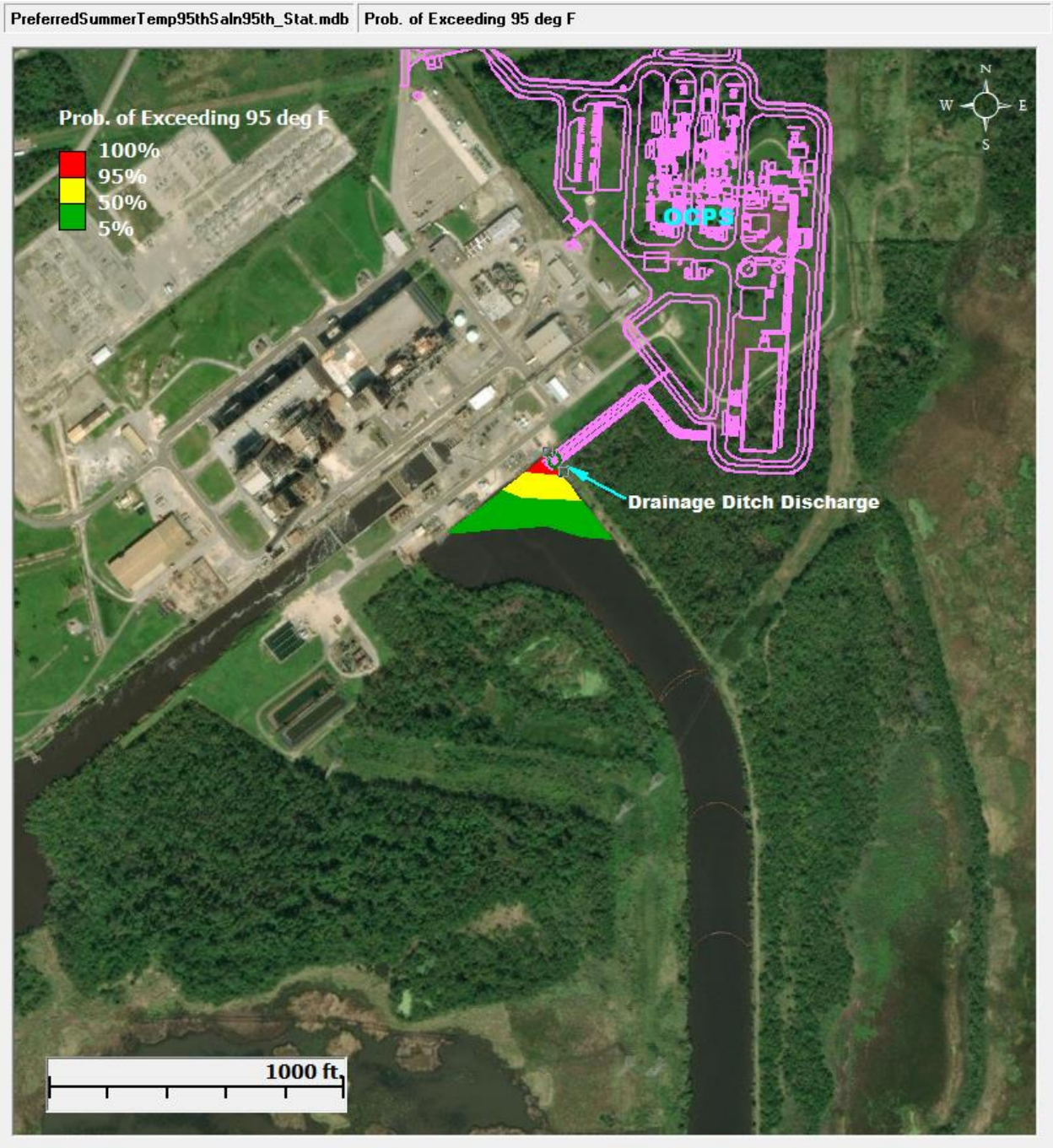


Figure 5-18: Summer (95th Percentile Salinity) 95 deg F Exceedance Probability at Water Surface

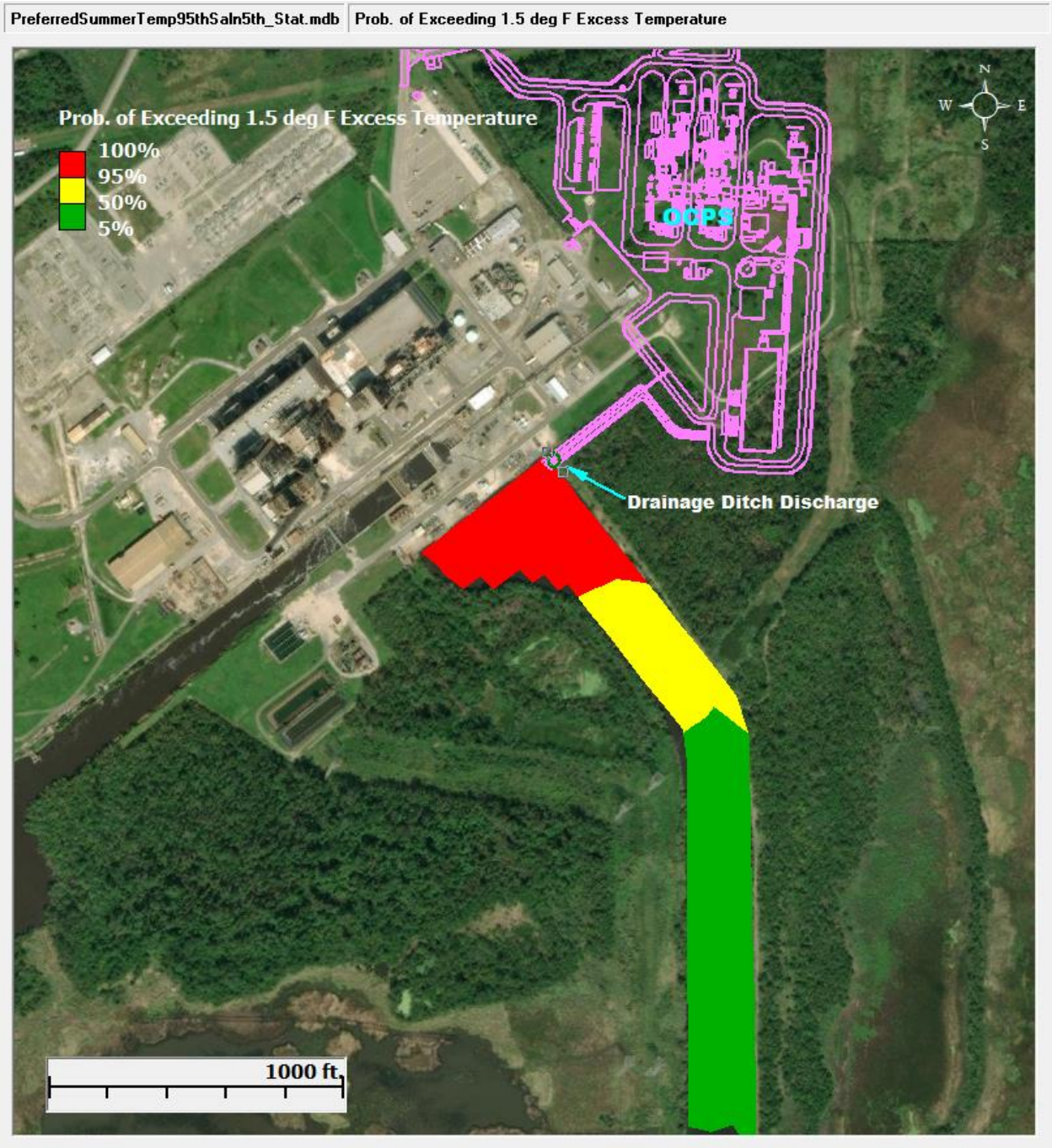


Figure 5-19: Summer (5th Percentile Salinity) 1.5 deg F Excess Temperature Exceedance Probability at Water Surface

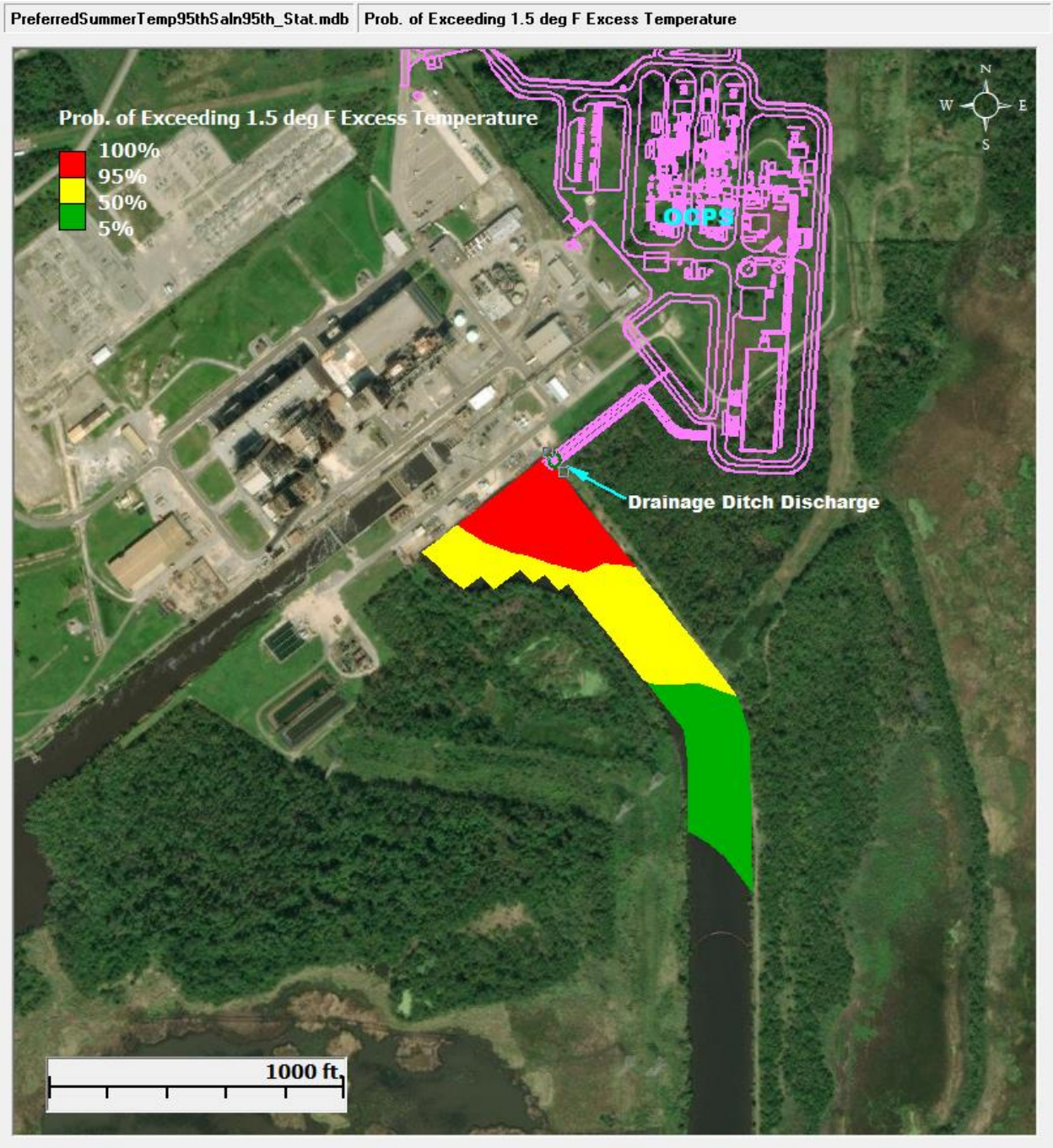


Figure 5-20: Summer (95th Percentile Salinity) 1.5 deg F Excess Temperature Exceedance Probability at Water Surface

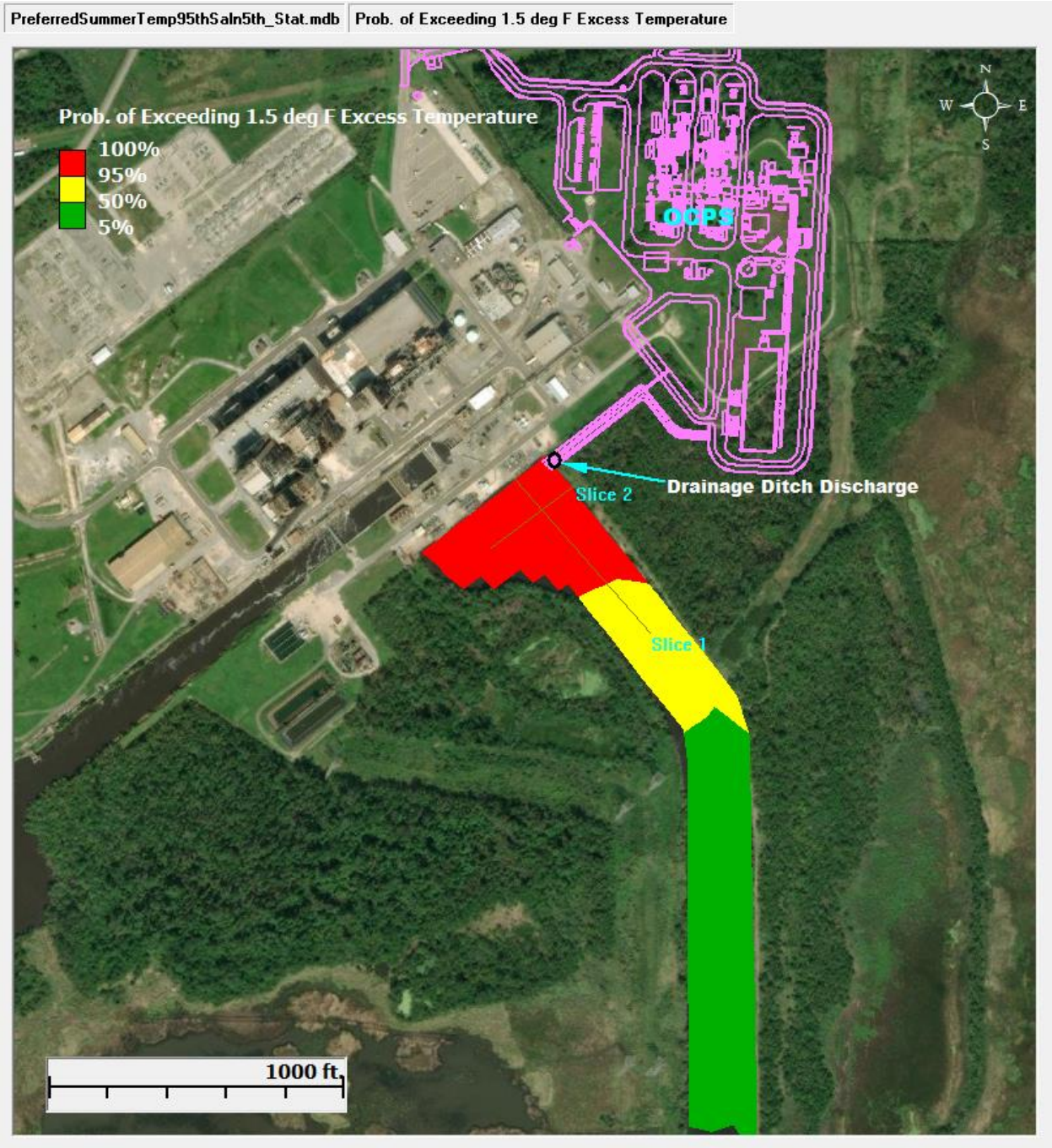
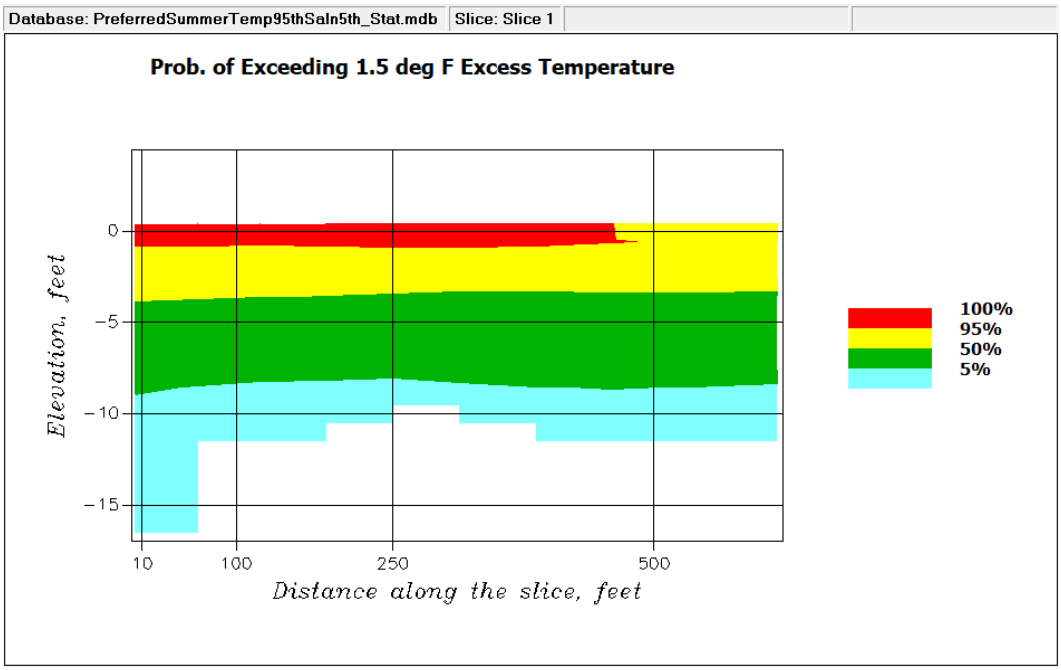
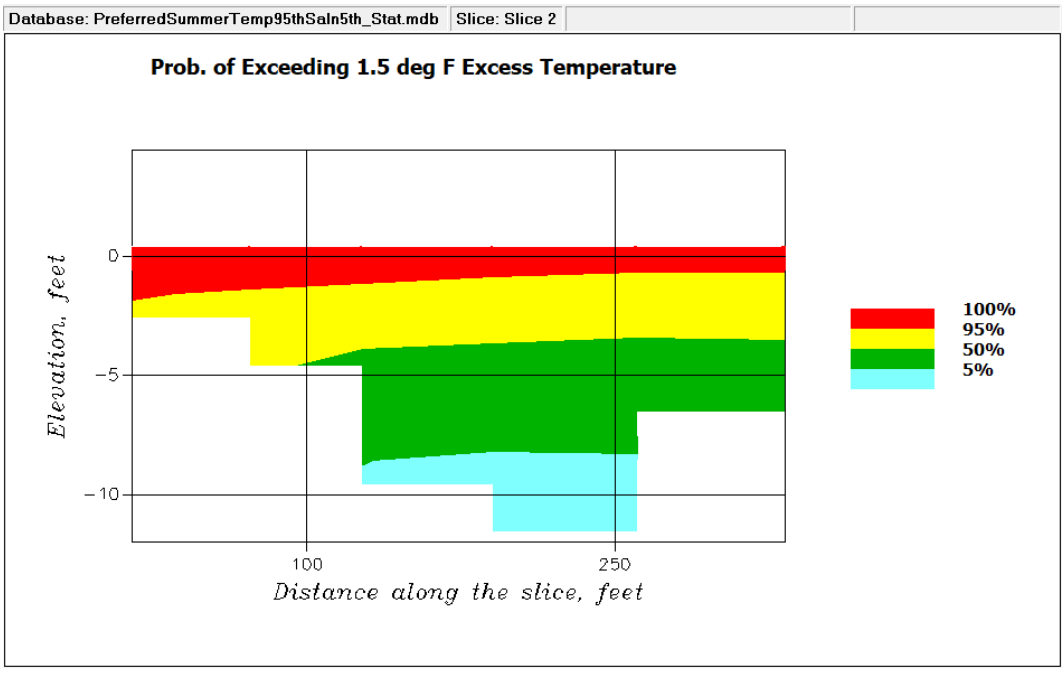


Figure 5-21: Summer (5th Percentile Salinity) 1.5 deg F Excess Temperature Exceedance Probability with Vertical Layer Slice Locations



Note: Light blue color depicts the actual cross-section along the selected slice.

Figure 5-22: Summer (5th Percentile Salinity) 1.5 deg F Excess Temperature Exceedance Probability at Vertical Layer Slice Location 1 (Lengthwise)



Note: Light blue color depicts the actual cross-section along the selected slice.

Figure 5-23: Summer (5th Percentile Salinity) 1.5 deg F Excess Temperature Exceedance Probability at Vertical Layer Slice Location 2 (Widthwise)

5.4 Temperature, Excess Temperature and Dilution Results

In addition to the probability contour plots, the model results were also plotted as statistical summaries for the same 14-day period. With respect to the regulatory standards, maximum and average contours were computed for each grid cell over time. A generic tracer concentration was also included in these plots in addition to the excess temperature and temperature to demonstrate dilution. The aforementioned plots, available for each modeling scenario, are included in Appendix A GEMMS® Additional Model Results.

6. CONCLUSIONS

A time-varying hydrothermal model was developed for the proposed OCPS discharge. The model was developed using the Generalized Environmental Modeling System for Surfacewaters (GEMSS) system. In this model, the following conservative assumptions were made:

- The maximum anticipated effluent temperature and maximum anticipated effluent flow are assumed to occur simultaneously for the proposed OCPS plant in all seasonal scenarios.
- There is no heat loss occurring to the discharge as it travels through the discharge ditch.
- The plume sizes computed and displayed in the contours plots represent the surface layer where the sizes are largest.
- The ambient conditions used to develop model scenarios capture the extremes in a given year.

Water temperature and excess temperature into the Sabine Intake Canal were modeled under three seasonal scenarios with two salinity extremes. The model simulation length of 20 days ensured that several tidal cycles were captured so capture the effects of potential heat load buildup and stagnation. The impacts of the thermal discharge are most extensive on the surface layer, with the size of the plume decreasing with depth. The worst location, which is the surface layer, was used for the demonstration of the thermal plume sizes. As expected, the 95 deg F temperature limit was not a concern for the winter scenarios. In the spring scenarios, the probability of exceeding 95 deg F was less than 50% with a very limited spatial extent within which the 5% exceedance occurs. In the summer scenarios, the area of 50% exceedance was 19,000 $ft.^2$ and 4,000$ft.^2$ with downstream distances only being 200ft. and 80ft. for the two extremes of salinity conditions considered respectively. This outcome is expected during the summer season under elevated ambient water and air temperatures combined with higher discharge temperatures.

The excess temperature thresholds are 4 deg F for winter and spring and 1.5 deg F for summer.

The 50% probability of exceedance of the 4.0°F isotherm extends between 300 ft. downstream in the winter and 330 ft. downstream in the spring. These distances are relatively small in comparison to the length of the Sabine Intake Canal (~14,000ft.). In addition, vertical cross-section plots show that the plume is limited to the first few feet of the entire cross-section providing zones of passage, if needed.

The 50% probability of exceedance of the 1.5°F isotherm extends 1,030 ft. downstream in the summer while covering an area up to 288,500 $ft.^2$. The large area is due to the entire width of the canal being affected by the plume for the downstream distance. For perspective, the 1.5°F isotherm distance is roughly 7.5% the size of the Sabine Intake Canal under the largest modeled plume. In addition, vertical cross-section plots show that the plume does not cover the entire cross-section providing zones of passage, if needed.

7. FINDINGS

A thermal plume characterization was performed to estimate the size and configuration of new thermal plumes in the Sabine Intake Canal using GEMSS.
The primary findings of this study are

- The thermal plume calculated by GEMSS shows that the 1.5°F isotherm for summer scenario can reach up to 1,030ft. downstream while the 4.0°F isotherm for winter and spring can reach up to 330ft. downstream more than 50% of the time. The largest plume distance is 7.5% of the total length of the Sabine Intake Canal. The plume's spatial extent is largest on the water surface due to the nature of the discharge configuration.
- In winter and spring scenario, the 95 deg F temperature limit is not a major concern due to the probability of exceedance being less than 5% aside from a relatively small area (7,800 $ft.^2$) near discharge location. In the summer scenario, the probability of 50% exceedance covers a spatial extent up to 19,000 $ft.^2$, due to elevated ambient water, ambient air and discharge temperature. Vertical cross-section plots show that the plume is limited to the first few feet of the entire cross-section providing zones of passage, if needed.
- When comparing the orders of magnitude of the results, the summer scenario provides the largest thermal plumes compared to winter or spring scenarios, both in terms of temperature and excess temperature. The likely buildup and stagnation of the plume causes it to occupy the width of the canal at times. However, these effects are limited to approximately the 1,100 ft. of the canal. Vertical cross-section plots show that the plume does not cover the entire cross-section providing zones of passage, if needed.

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World Imagery - Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.

APPENDIX A GEMSS® ADDITIONAL MODEL RESULTS

July 2021

Scenario 1: Winter 5th Percentile Salinity Statistical Summary Plots

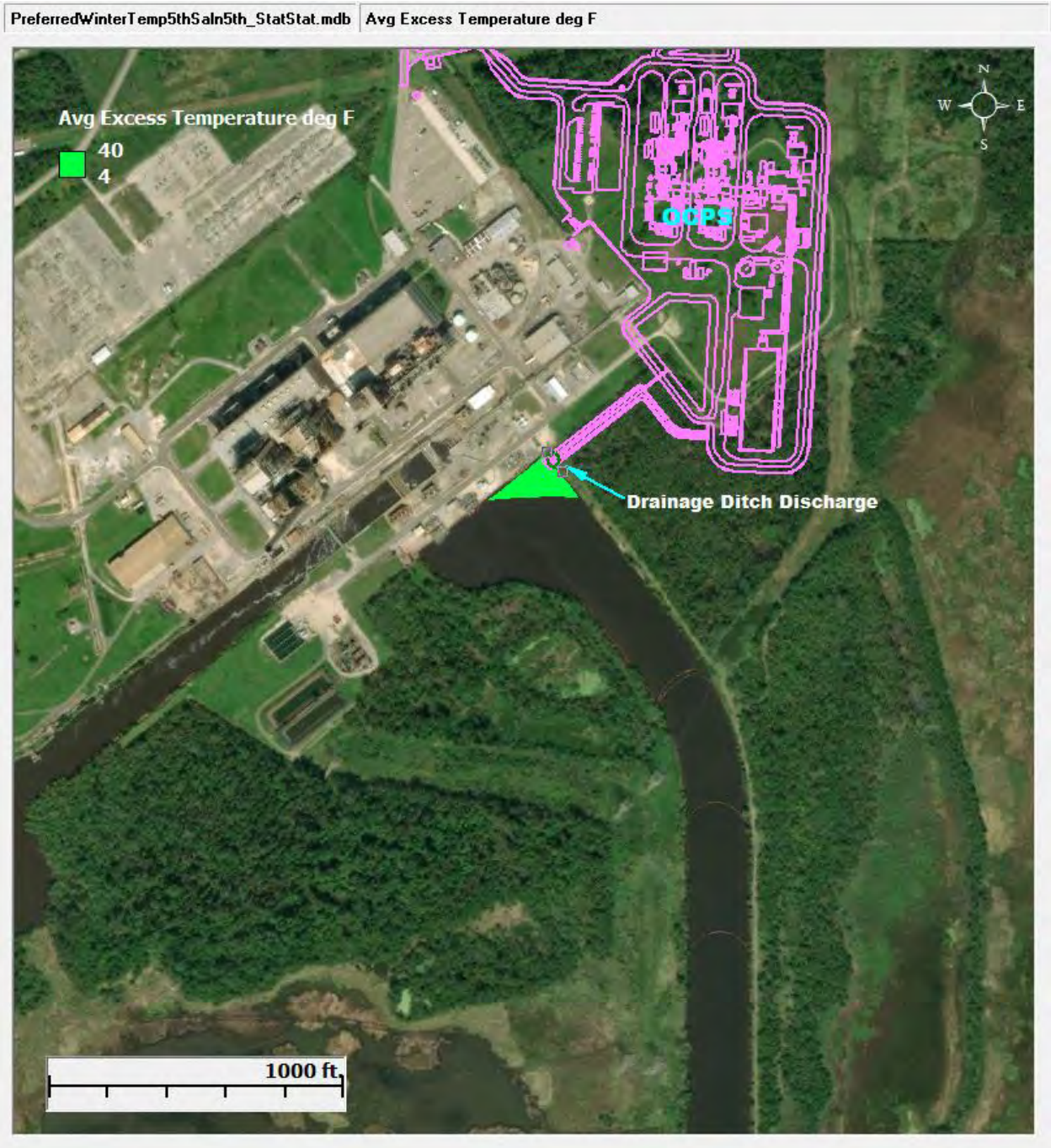

Figure A-1: Winter (5th Percentile Salinity) Average Excess Temperature deg F Exceedance

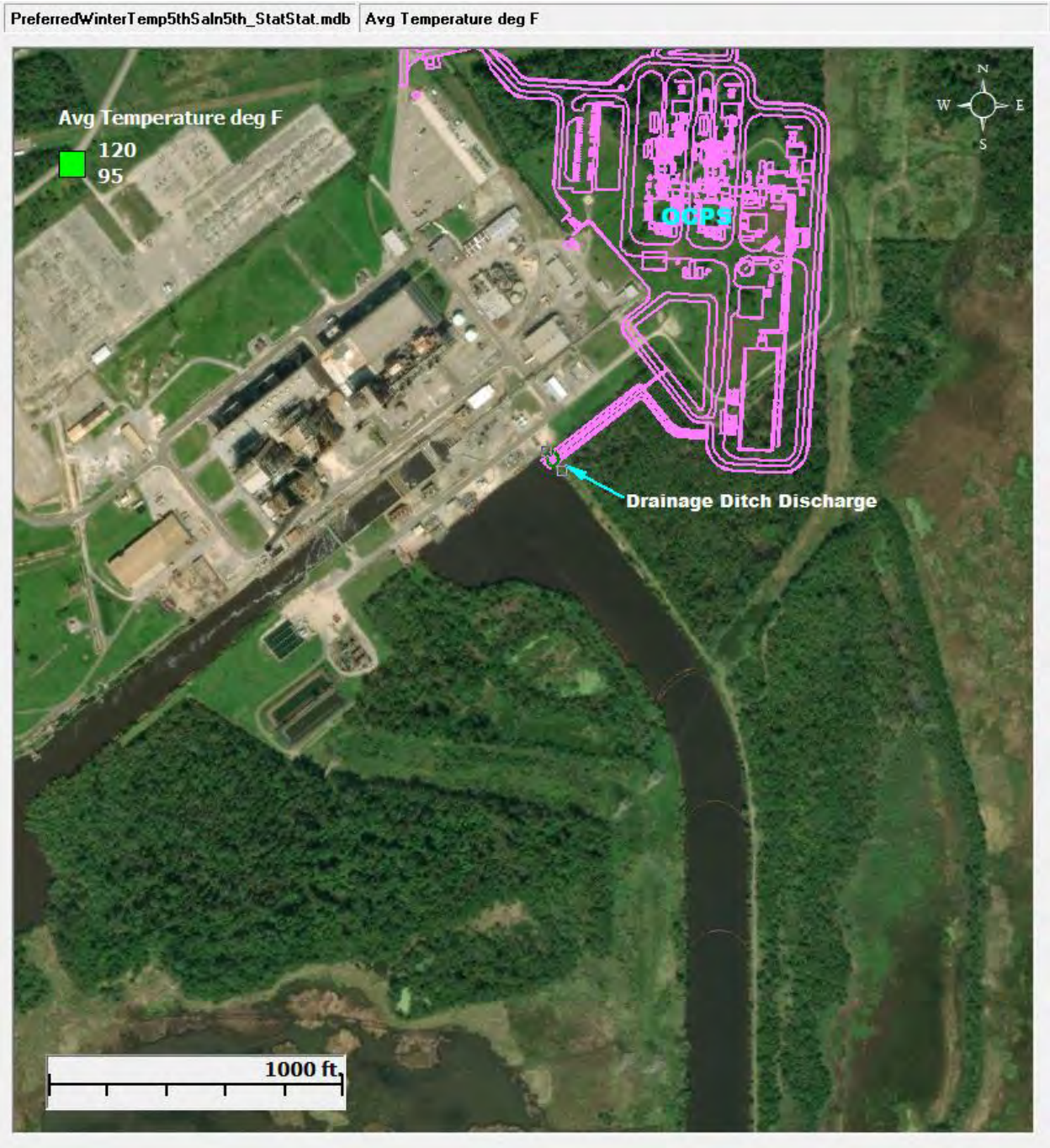

Figure A-2: Winter (5th Percentile Salinity) Average Temperature deg F Exceedance

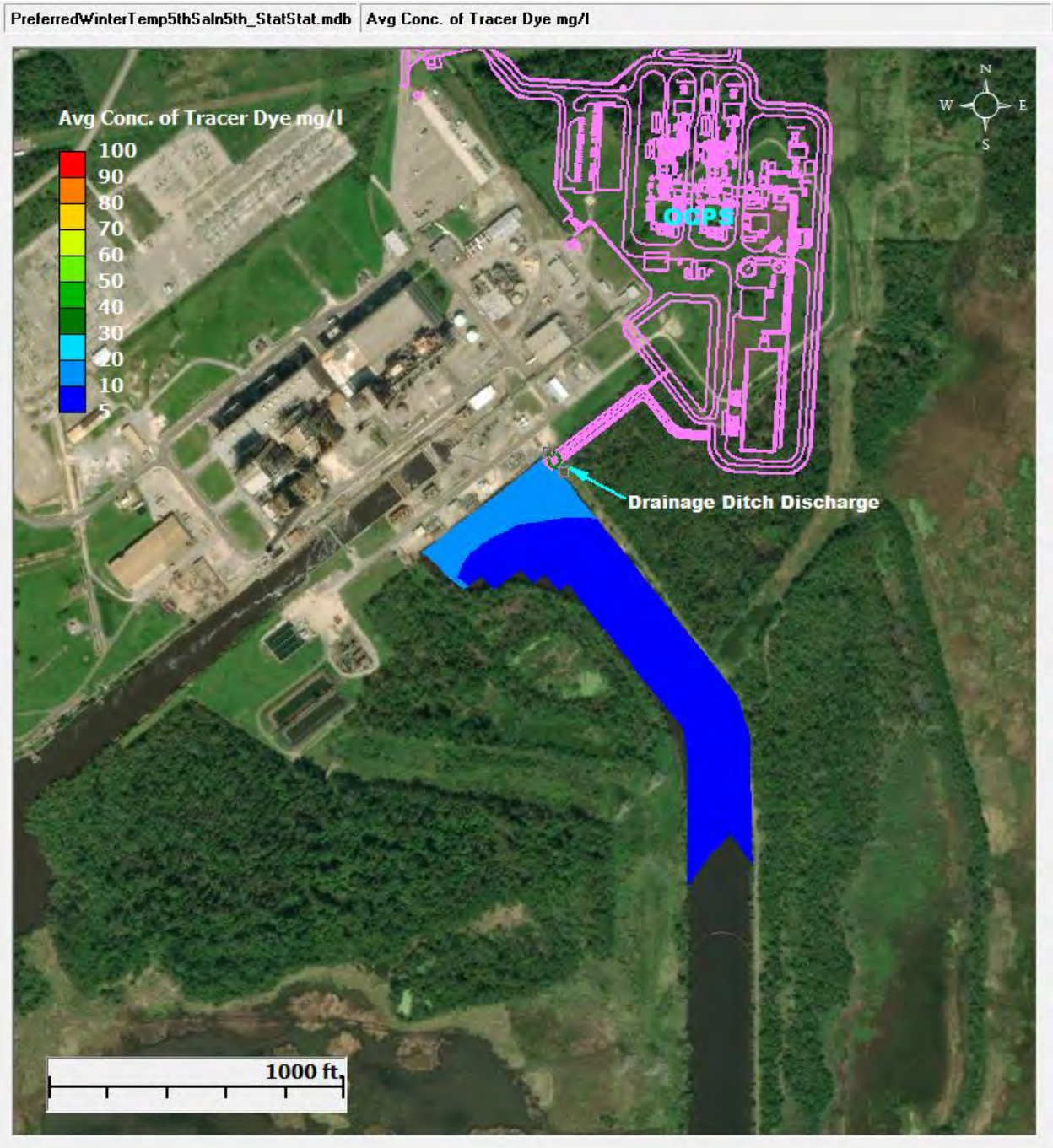

Figure A-3: Winter (5th Percentile Salinity) Average Conc. of Tracer Dye mg/L for Initial Conc. of 100 mg/L

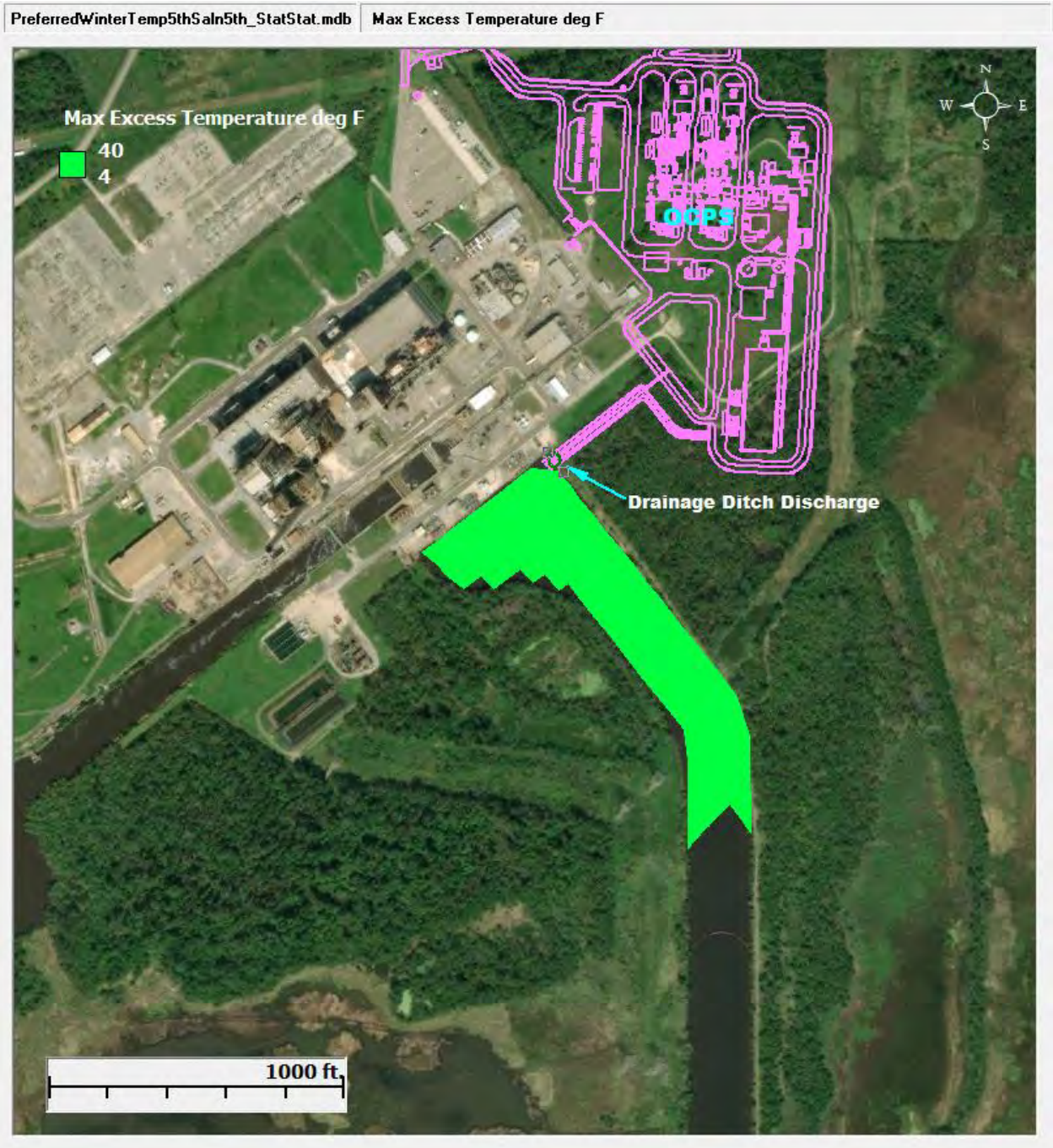

Figure A-4: Winter (5th Percentile Salinity) Maximum Excess Temperature deg F Exceedance

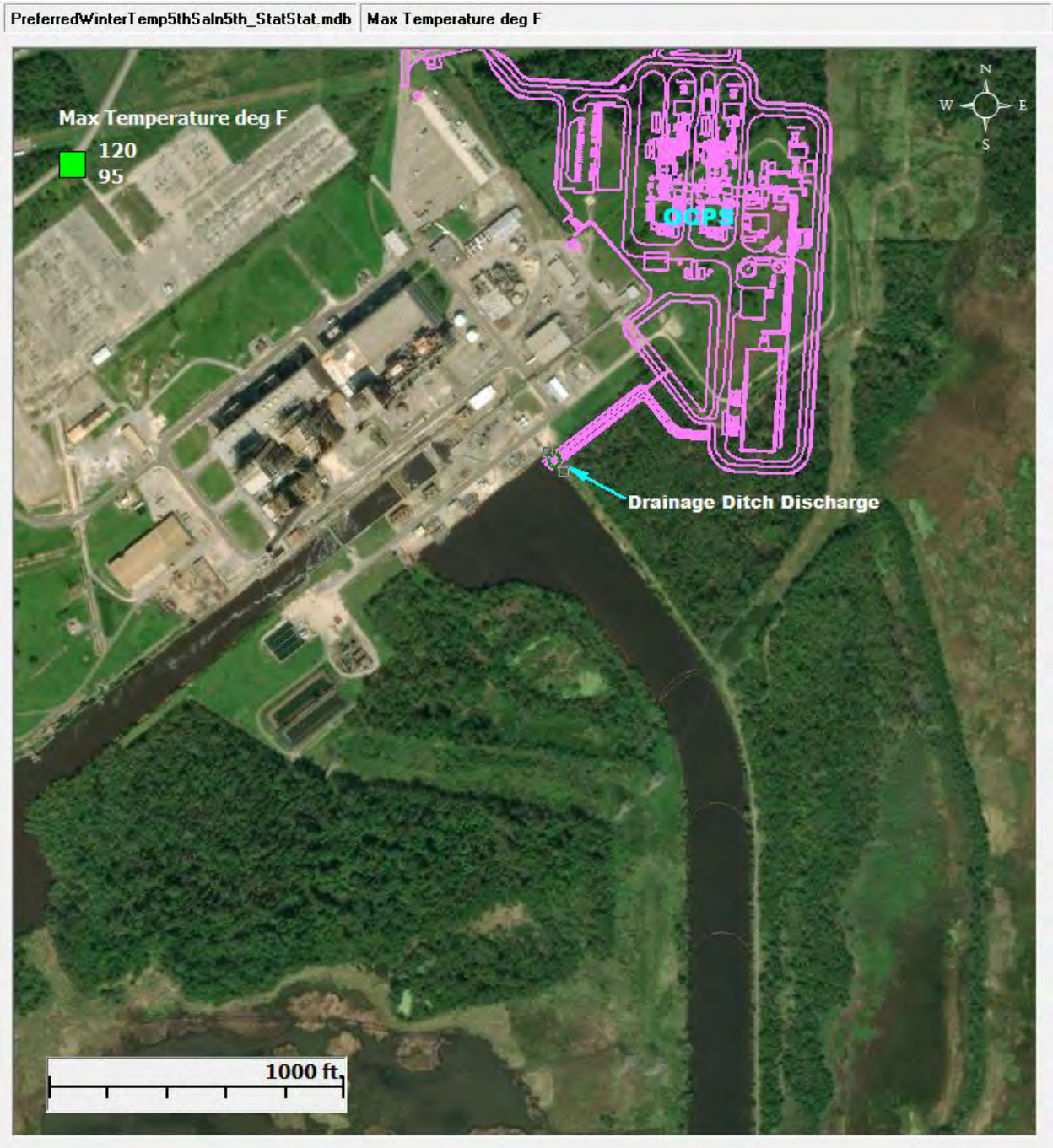

Figure A-5: Winter (5th Percentile Salinity) Maximum Temperature deg F Exceedance

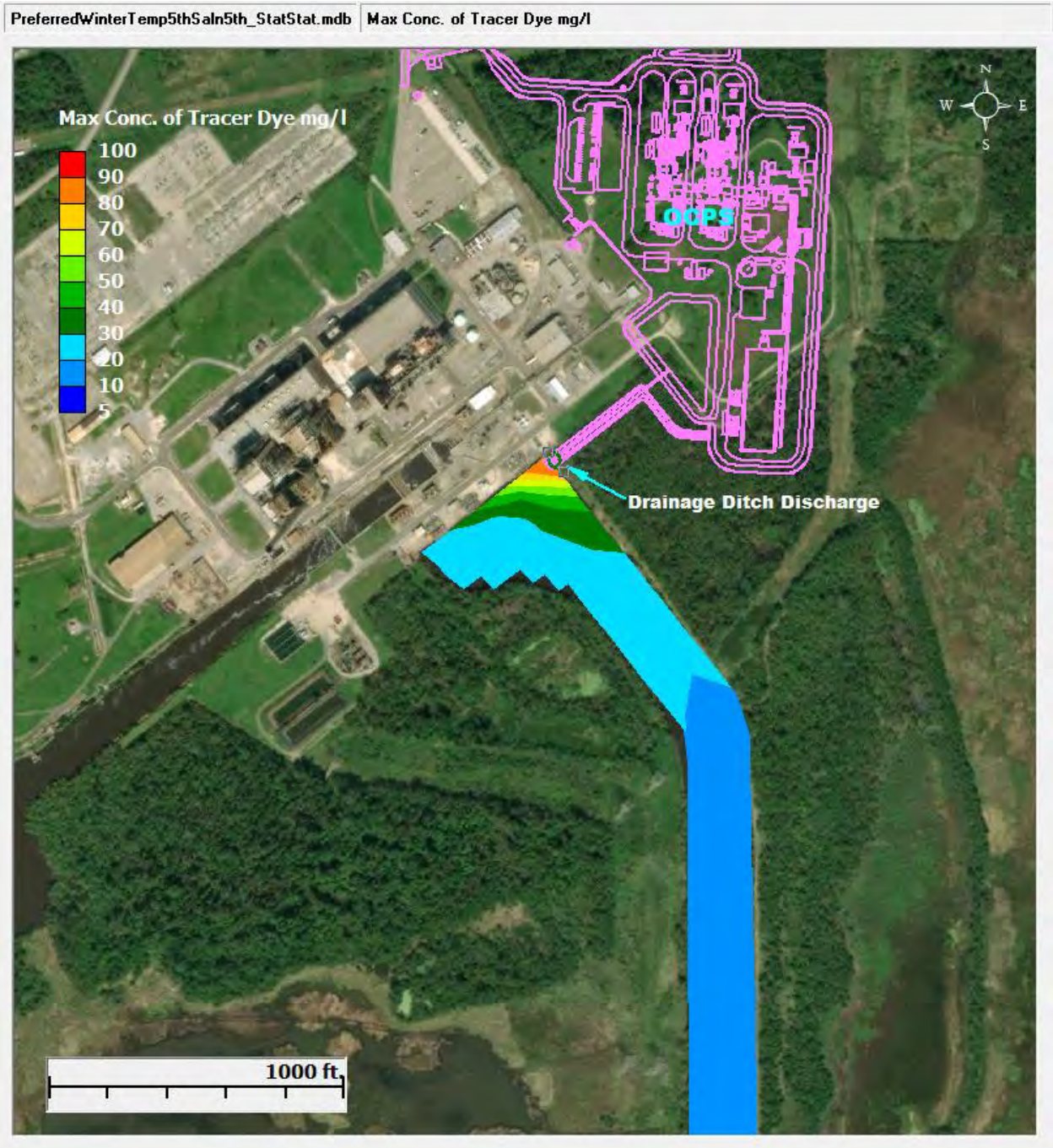

Figure A-6: Winter (5th Percentile Salinity) Maximum Conc. of Tracer Dye mg/L for Initial Conc. of 100 mg/L

Scenario 2: Winter 95th Percentile Salinity Statistical Summary Plots

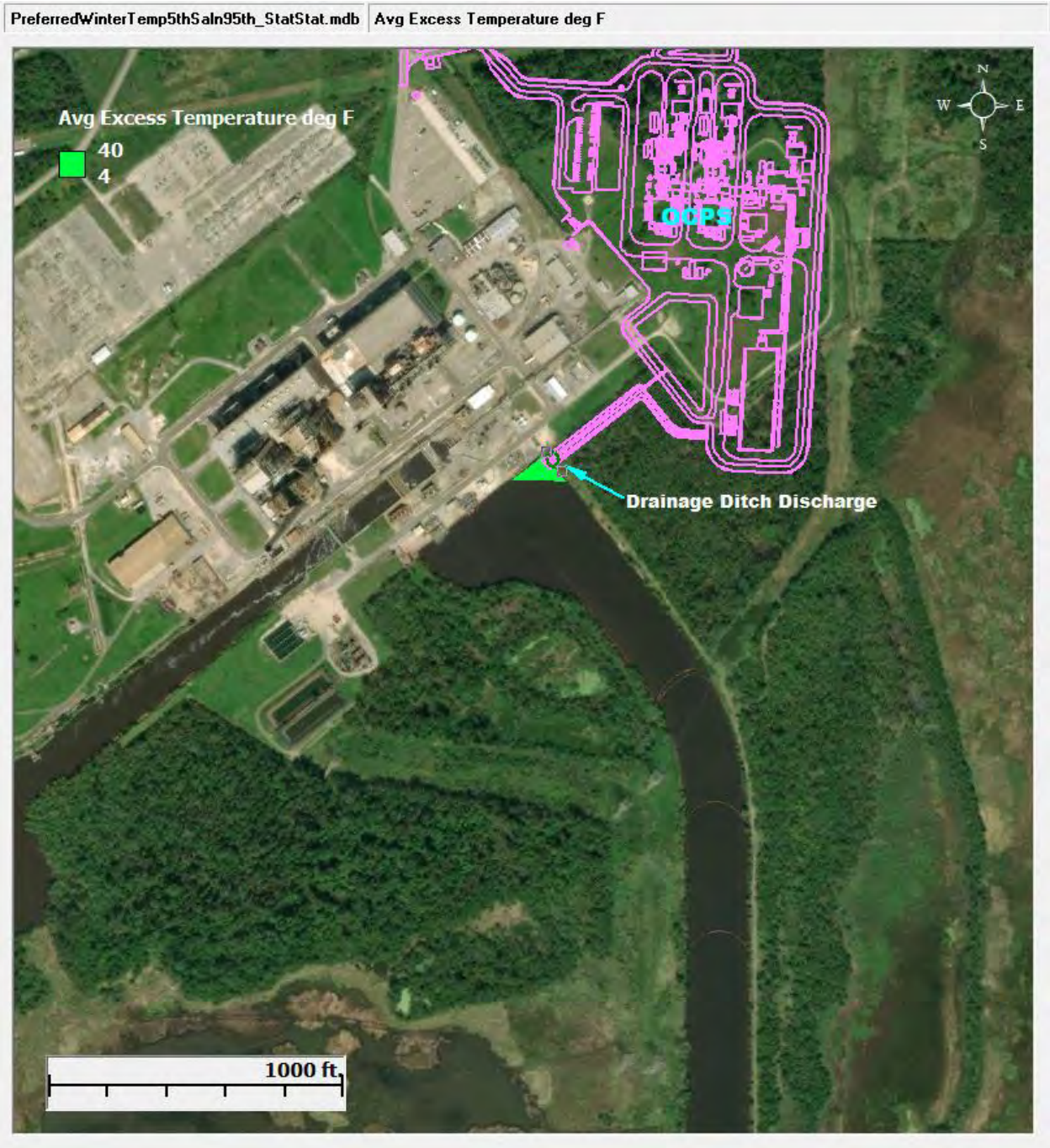

Figure A-7: Winter (95th Percentile Salinity) Average Excess Temperature deg F Exceedance

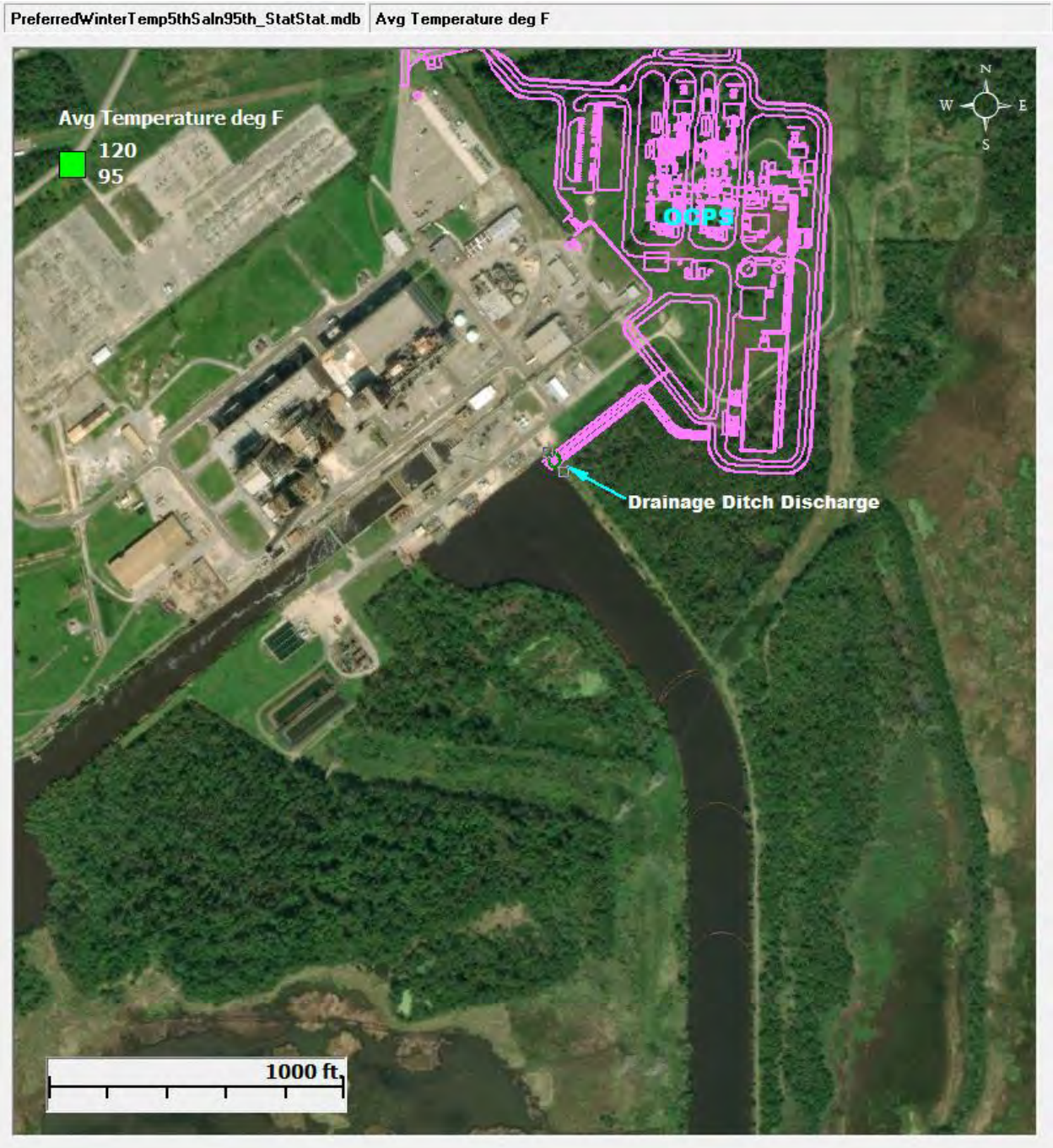

Figure A-8: Winter (95th Percentile Salinity) Average Temperature deg F Exceedance

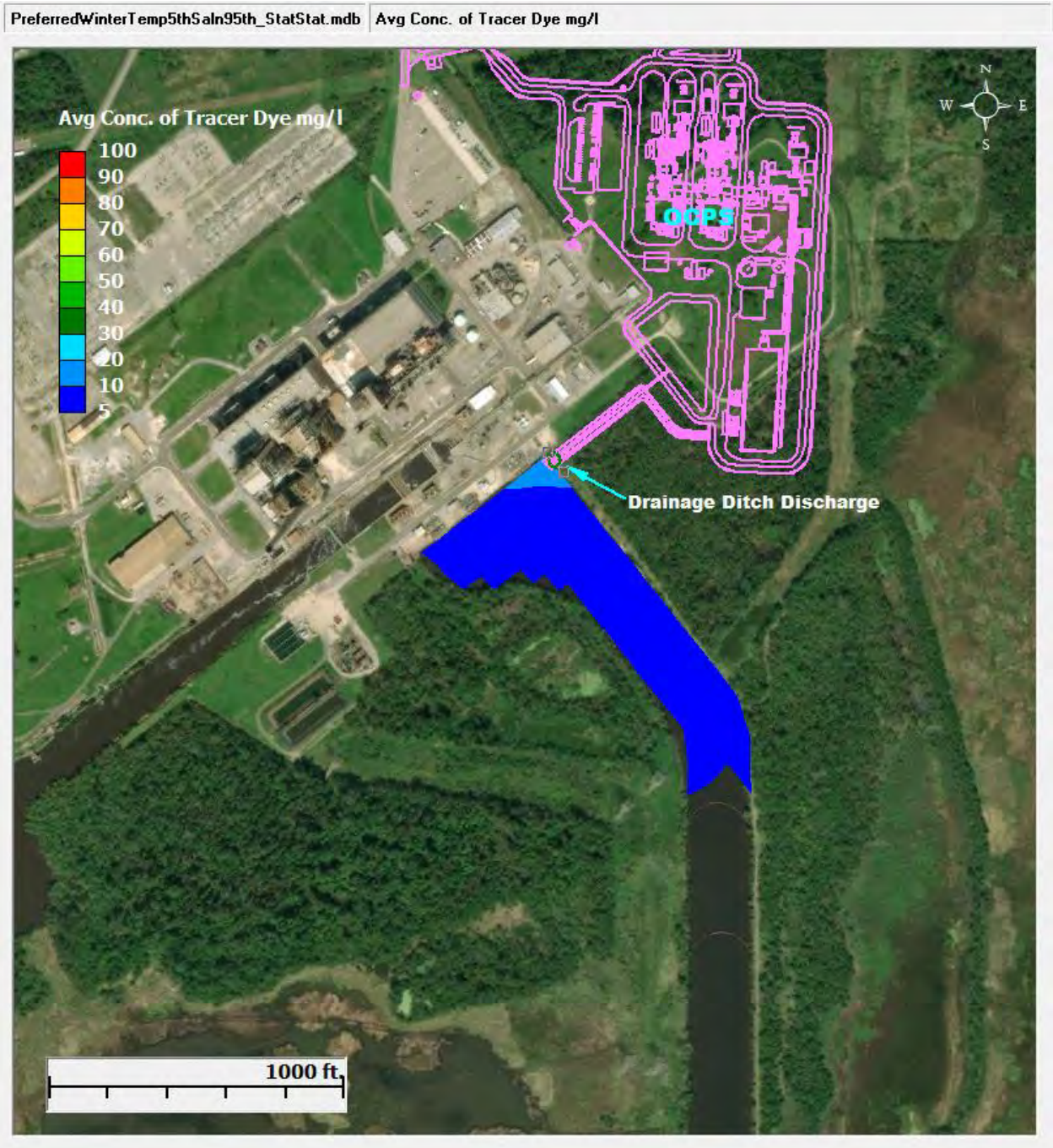

Figure A-9: Winter (95th Percentile Salinity) Average Conc. of Tracer Dye mg/L for Initial Conc. of 100 mg/L

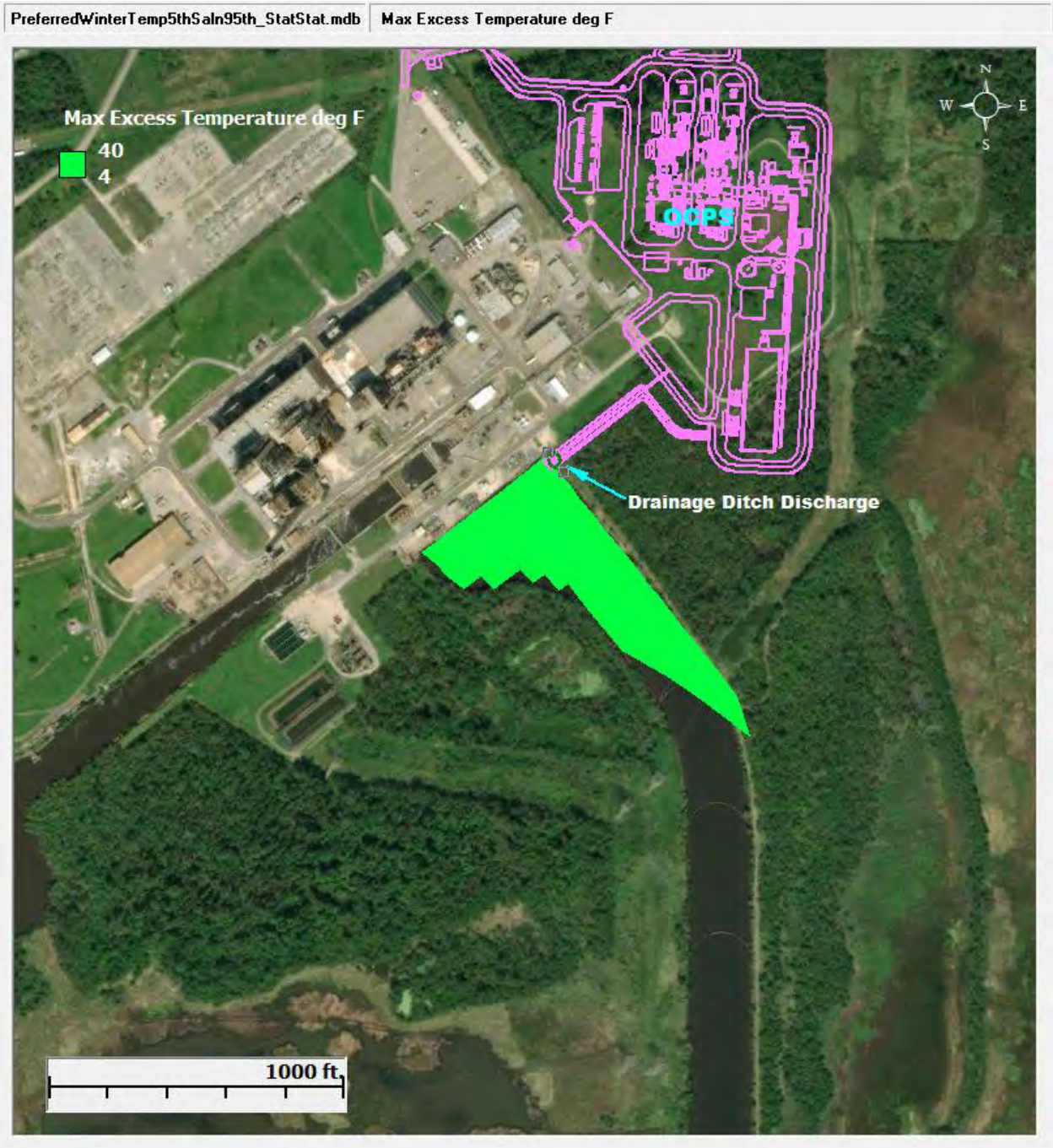

Figure A-10: Winter (95th Percentile Salinity) Maximum Excess Temperature deg F Exceedance

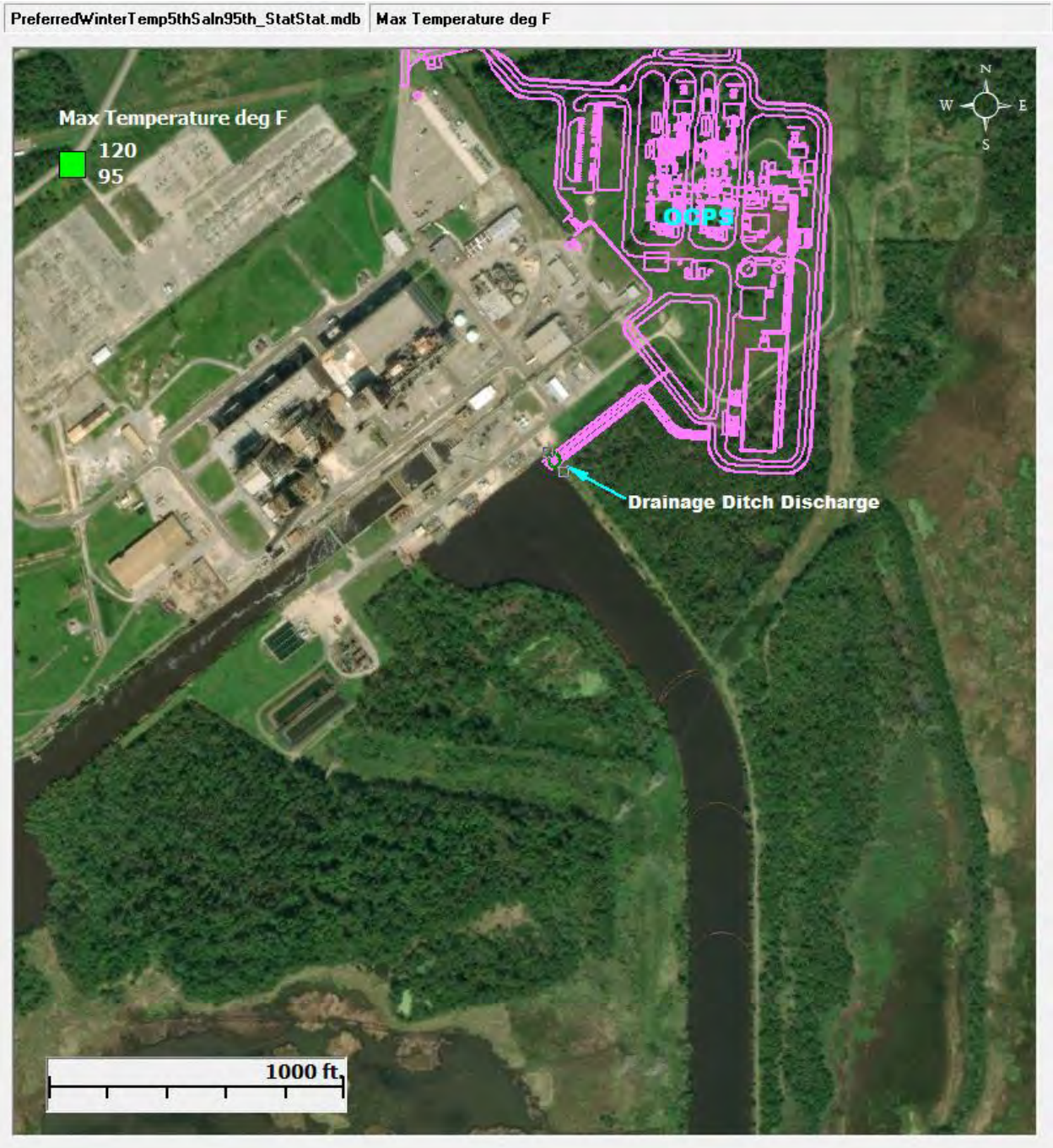

Figure A-11: Winter (95th Percentile Salinity) Maximum Temperature deg F Exceedance

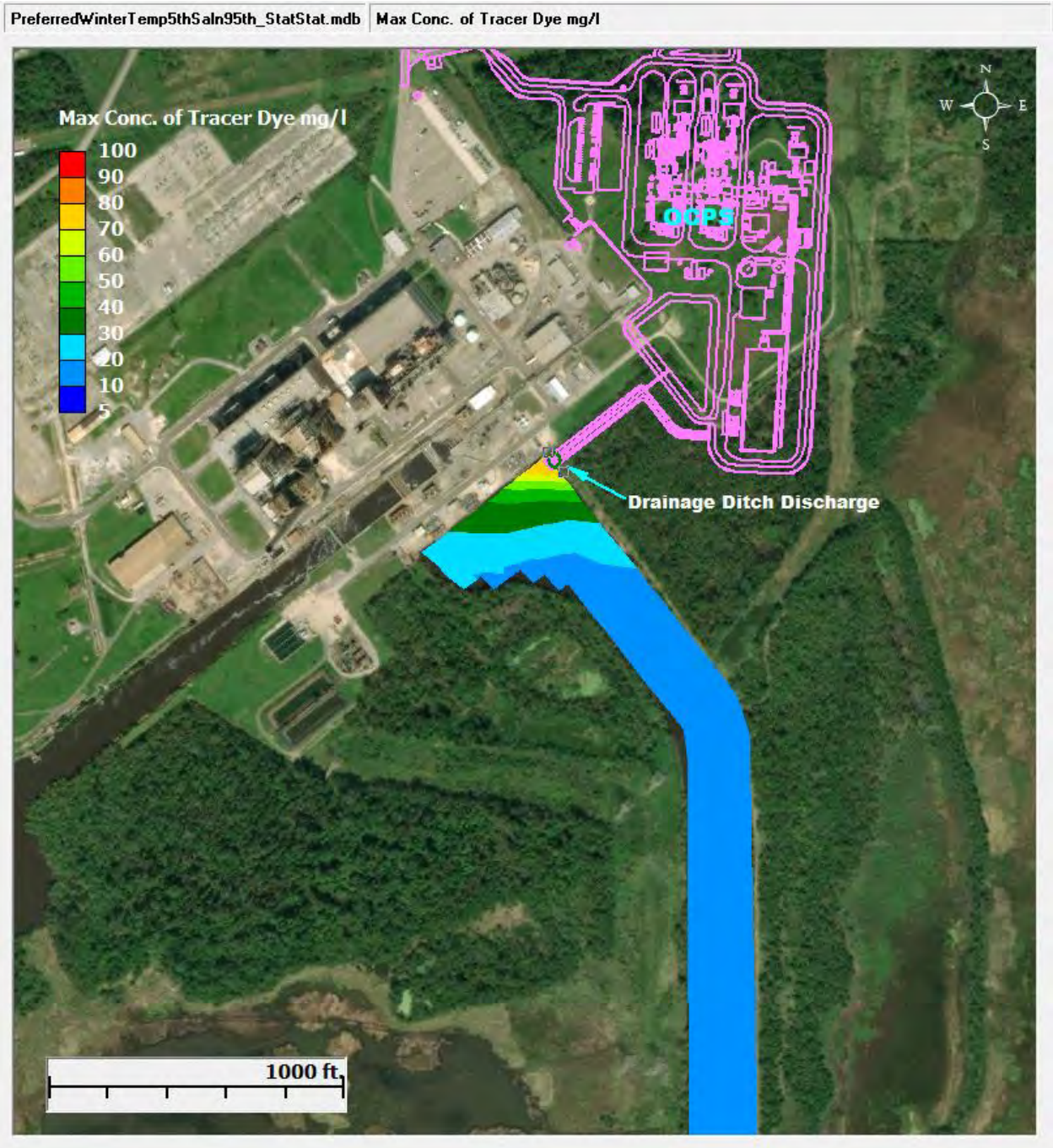

Figure A-12: Winter (95th Percentile Salinity) Maximum Conc. of Tracer Dye mg/L for Initial Conc. of 100 mg/L

Scenario 3: Spring 5th Percentile Salinity Statistical Summary Plots

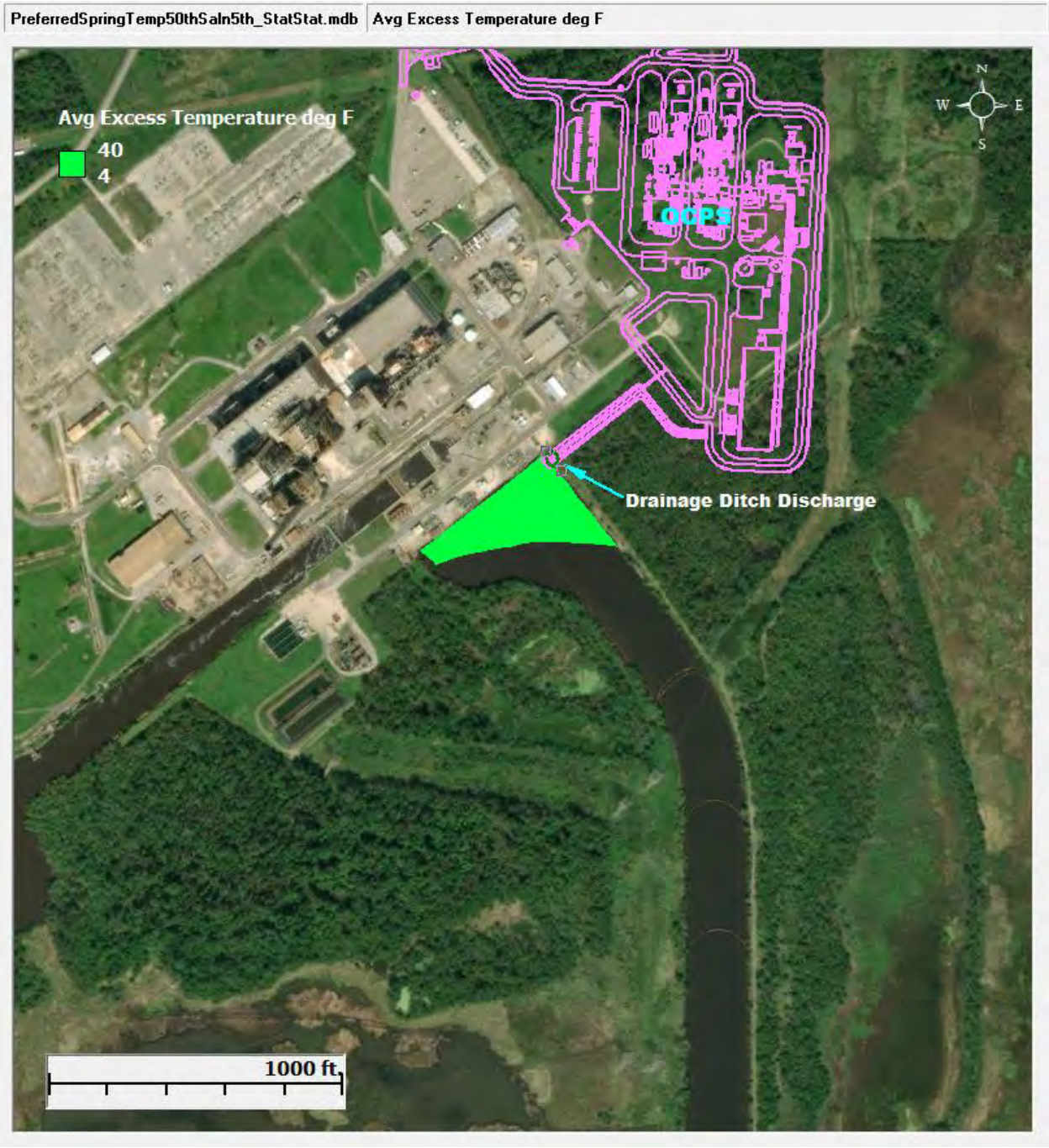

Figure A-13: Spring (5th Percentile Salinity) Average Excess Temperature deg F Exceedance

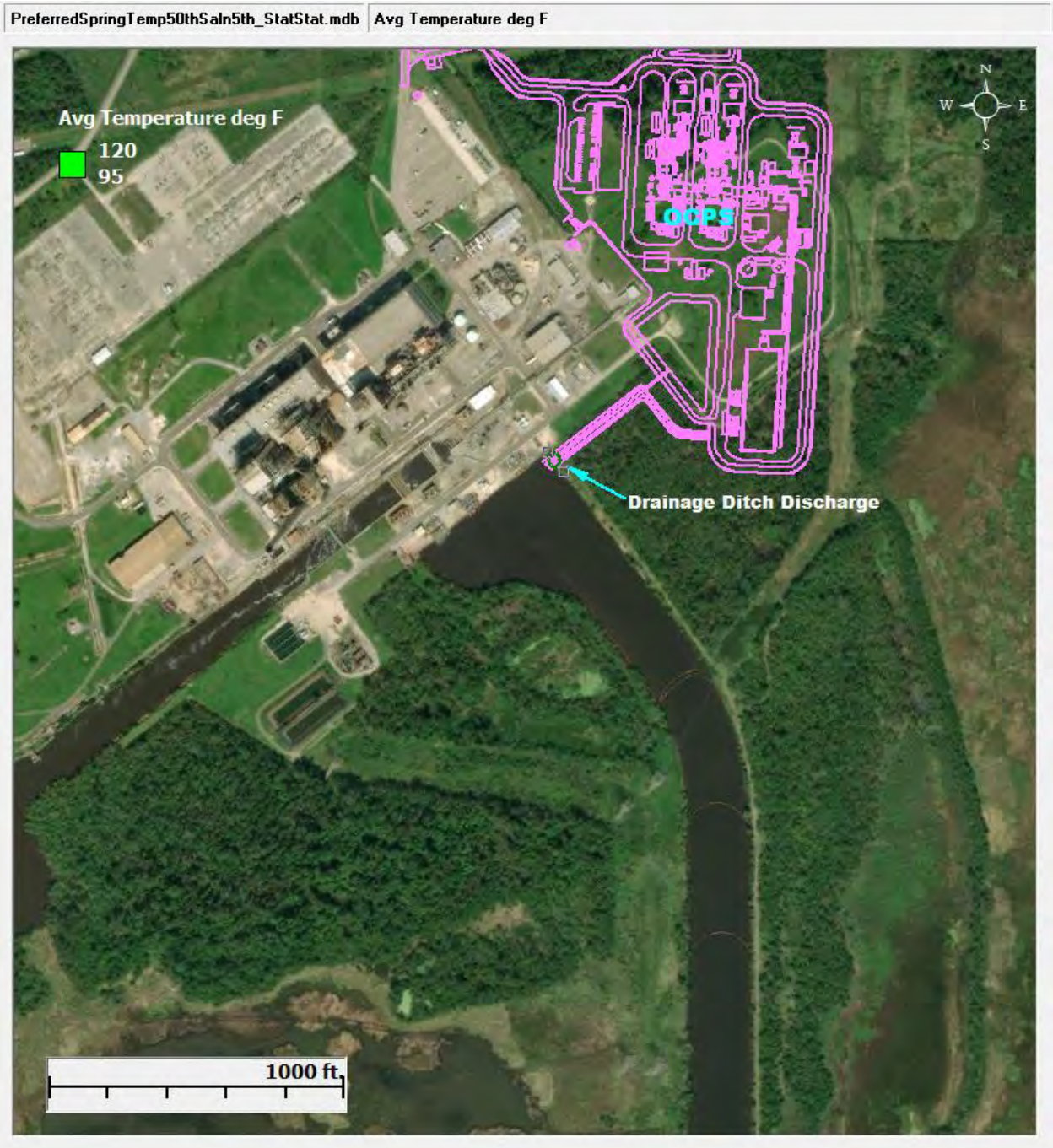

Figure A-14: Spring (5th Percentile Salinity) Average Temperature deg F Exceedance

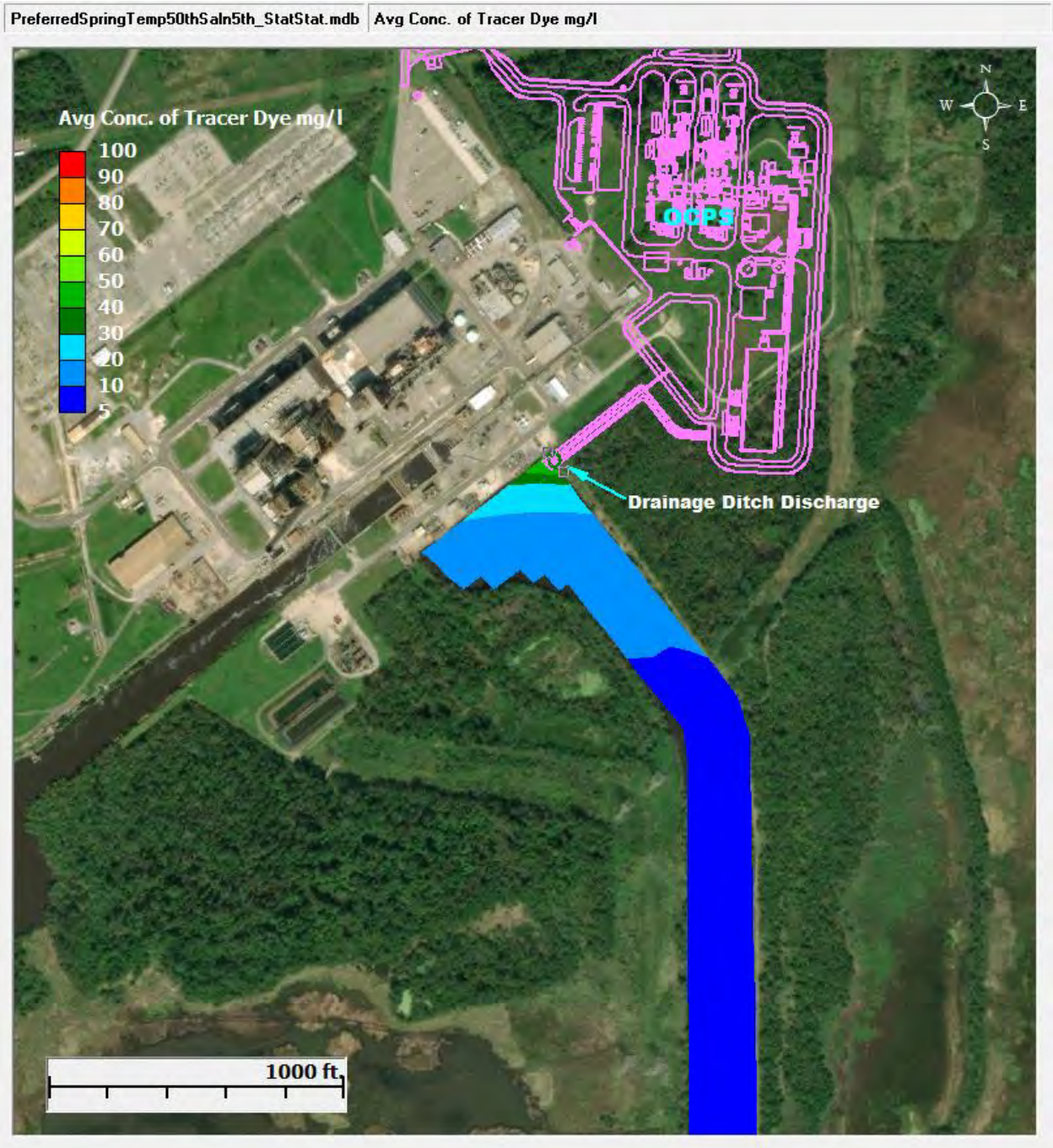

Figure A-15: Spring (5th Percentile Salinity) Average Conc. of Tracer Dye mg/L for Initial Conc. of 100 mg/L

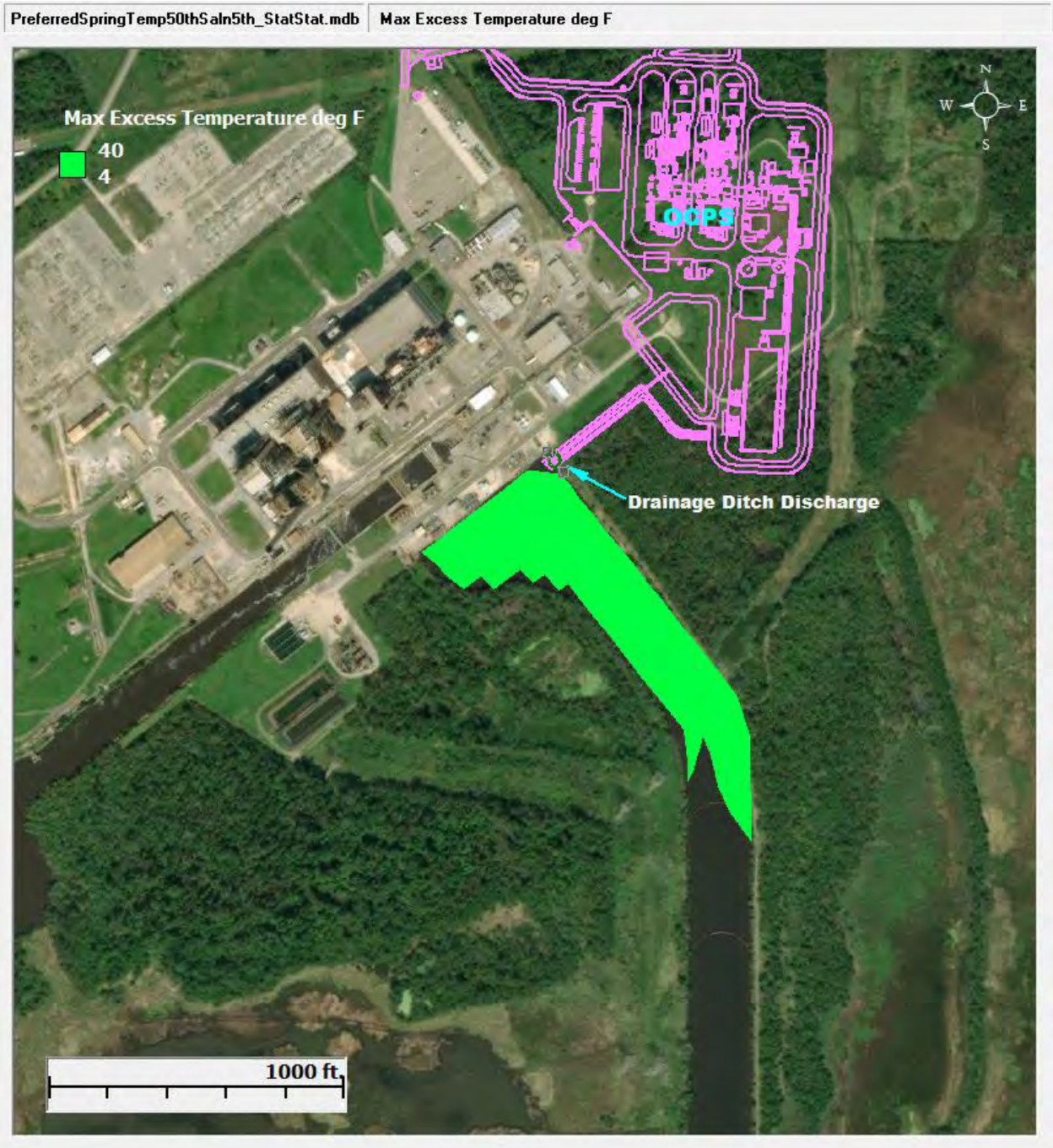

Figure A-16: Spring (5th Percentile Salinity) Maximum Excess Temperature deg F Exceedance

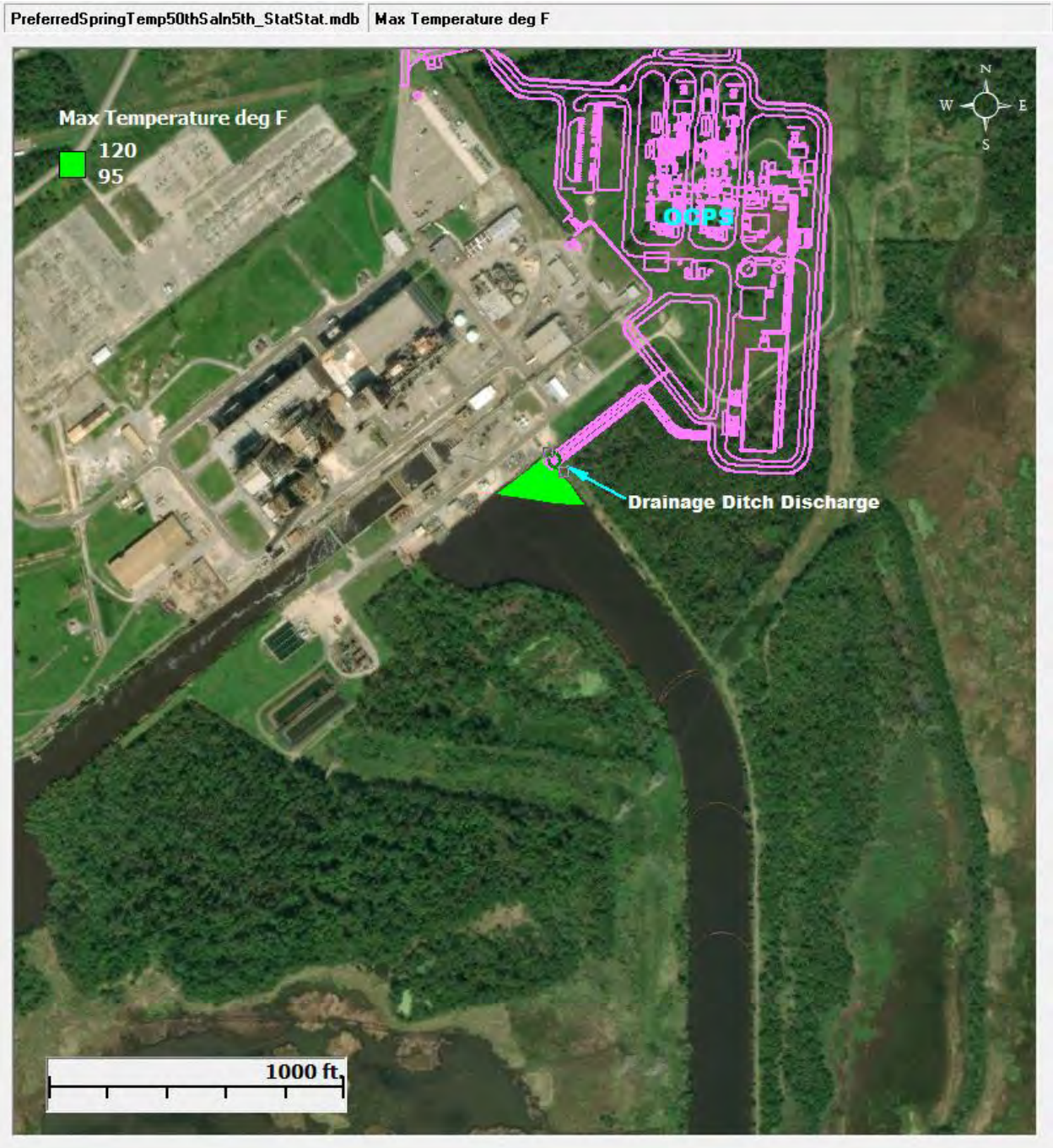

Figure A-17: Spring (5th Percentile Salinity) Maximum Temperature deg F Exceedance

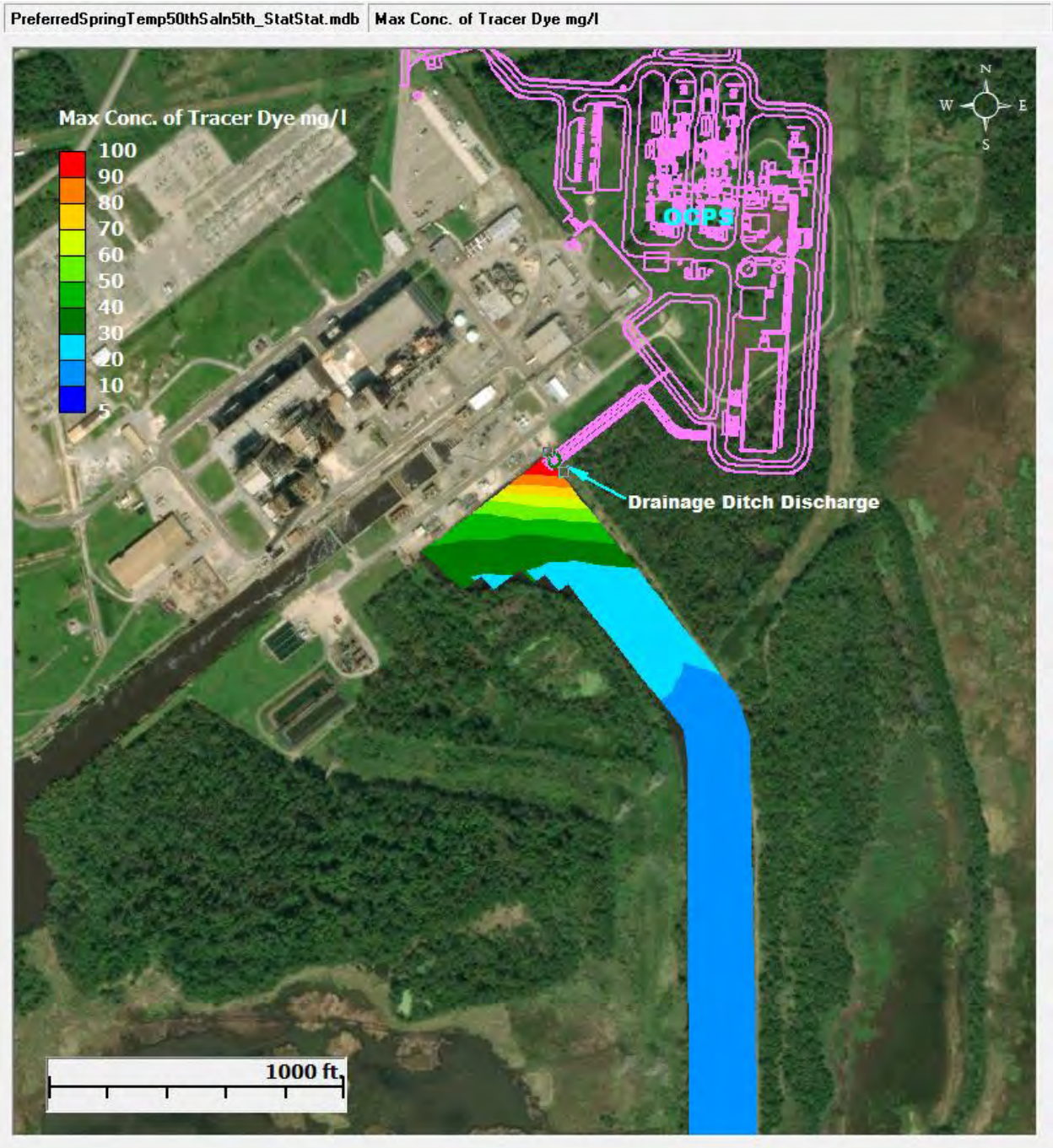

Figure A-18: Spring (5th Percentile Salinity) Maximum Conc. of Tracer Dye mg/L for Initial Conc. of 100 mg/L

Scenario 4: Spring 95th Percentile Salinity Statistical Summary Plots

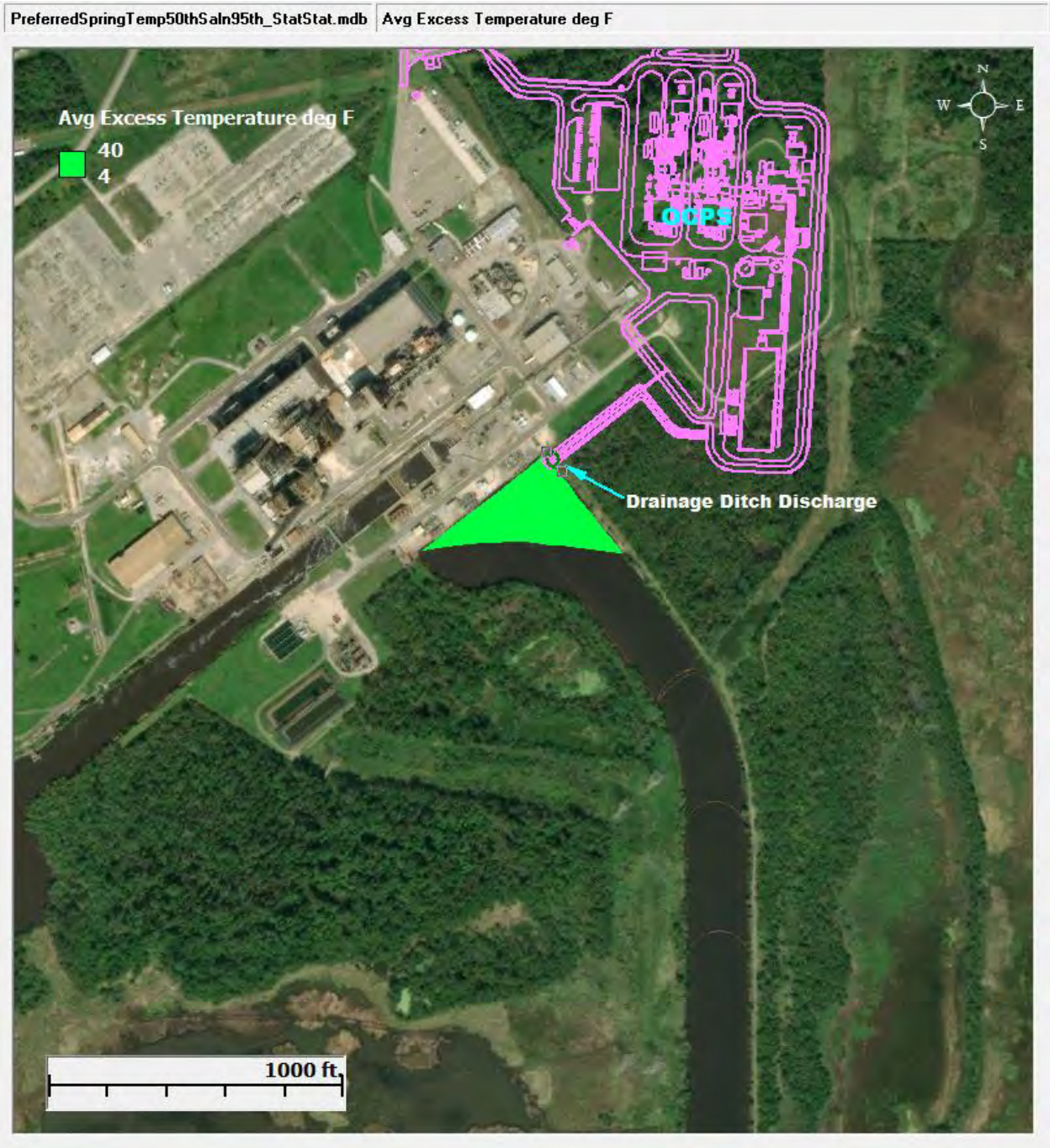

Figure A-19: Spring (95th Percentile Salinity) Average Excess Temperature deg F Exceedance

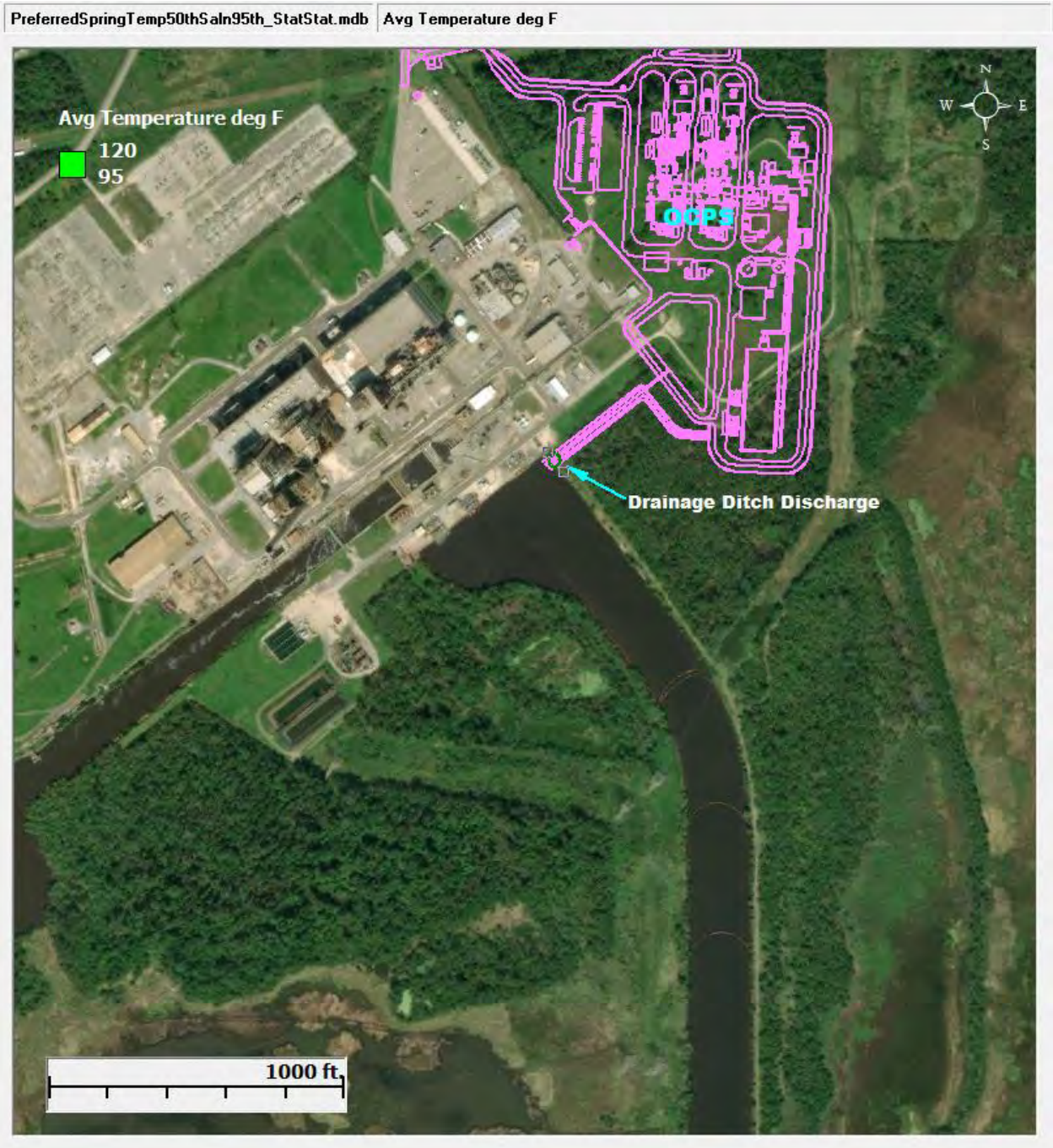

Figure A-20: Spring (95th Percentile Salinity) Average Temperature deg F Exceedance

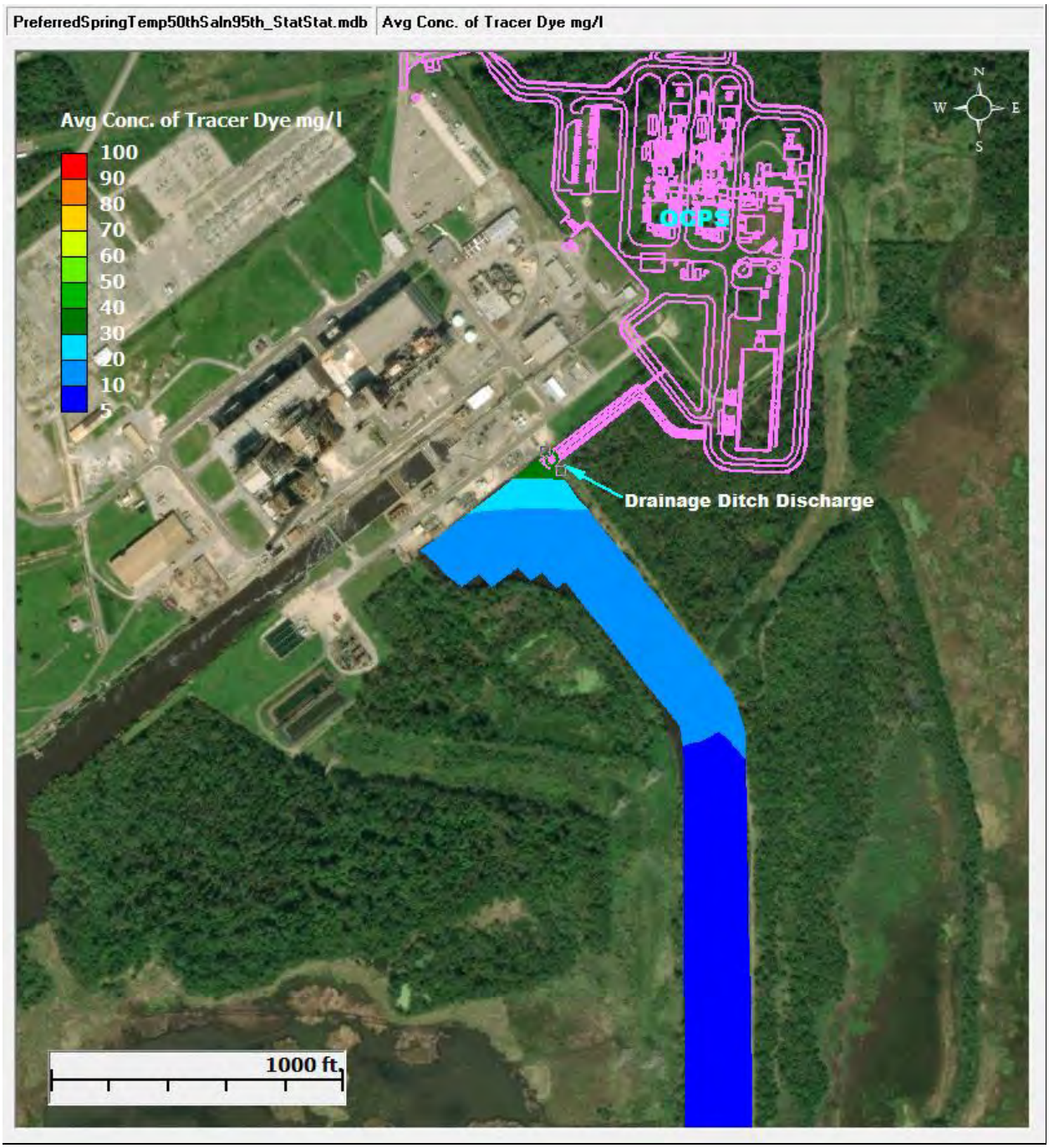

Figure A-21: Spring (95th Percentile Salinity) Average Conc. of Tracer Dye mg/L for Initial Conc. of 100 mg/L

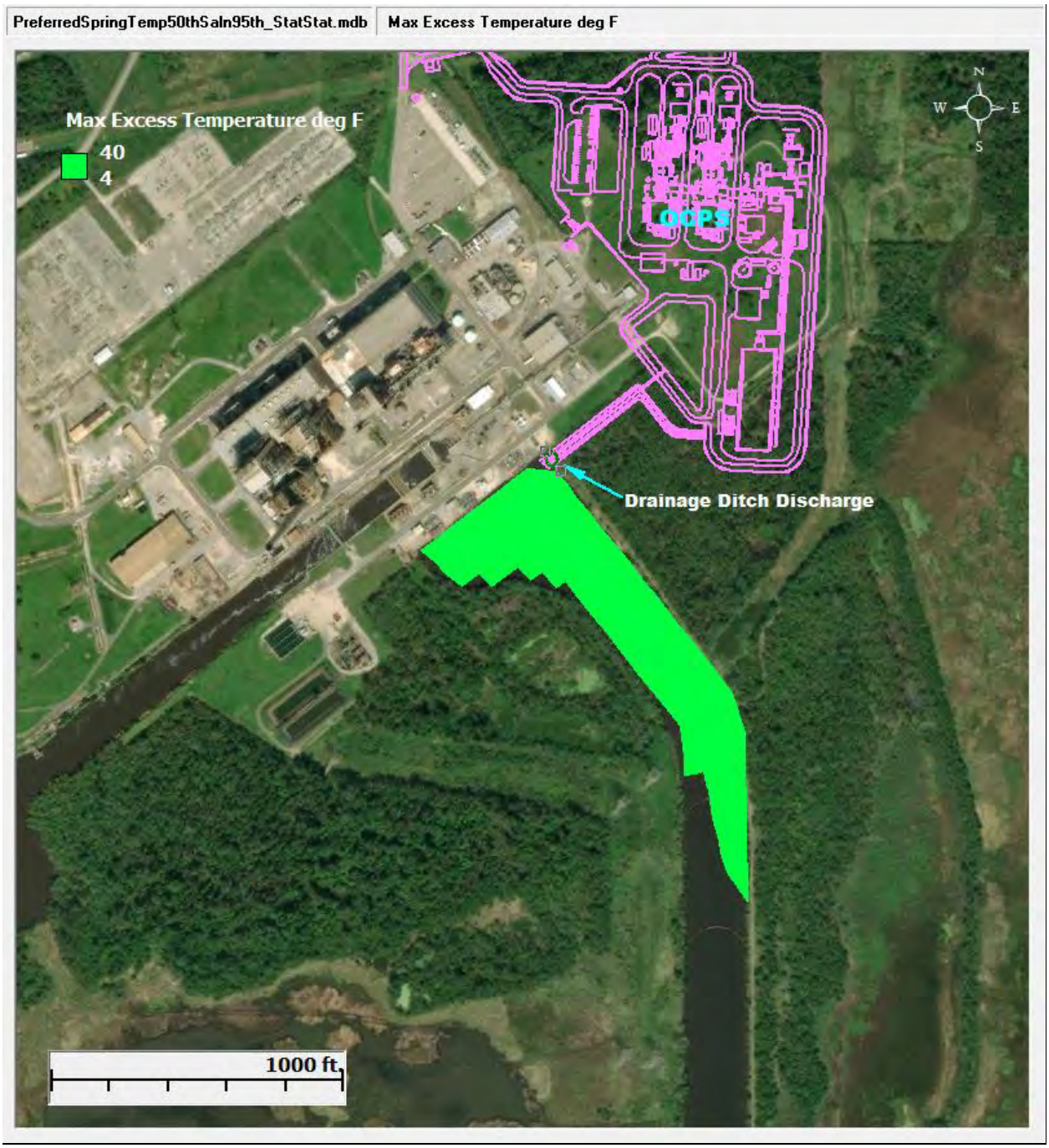

Figure A-22: Spring (95th Percentile Salinity) Maximum Excess Temperature deg F Exceedance

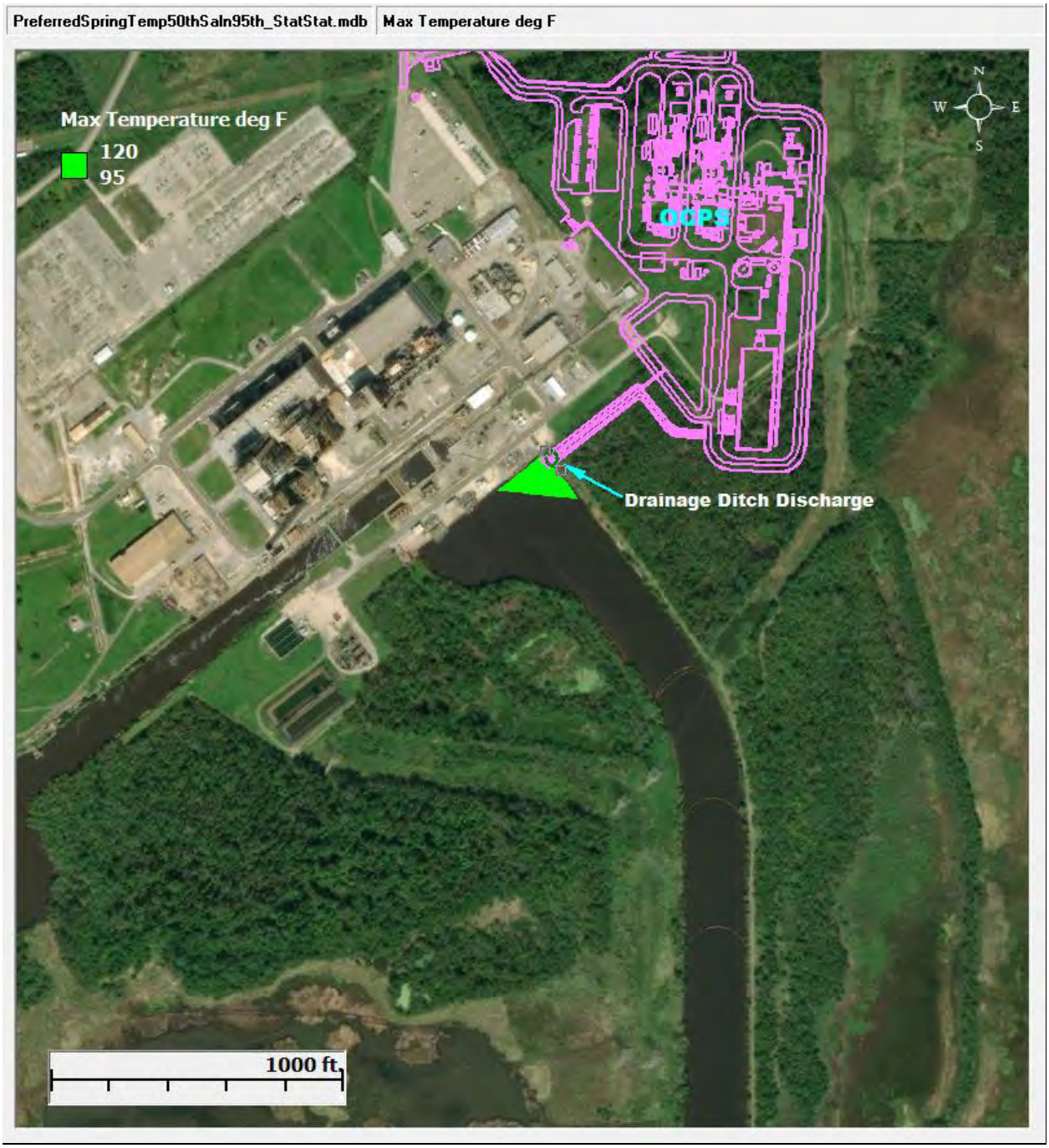

Figure A-23: Spring (95th Percentile Salinity) Maximum Temperature deg F Exceedance

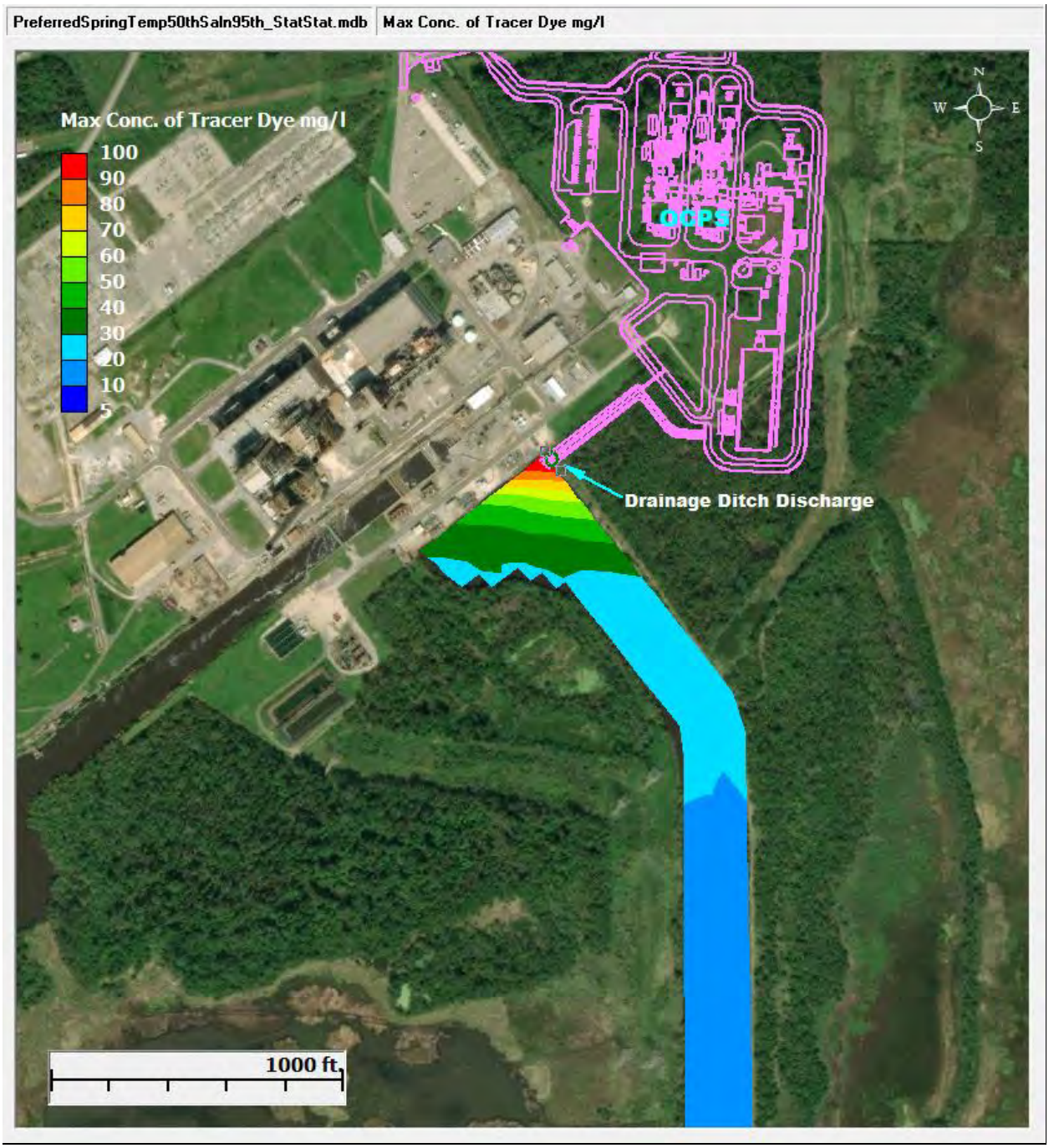

Figure A-24: Spring (95th Percentile Salinity) Maximum Conc. of Tracer Dye mg/L for Initial Conc. of 100 mg/L

Scenario 5: Summer 5th Percentile Salinity Statistical Summary Plots

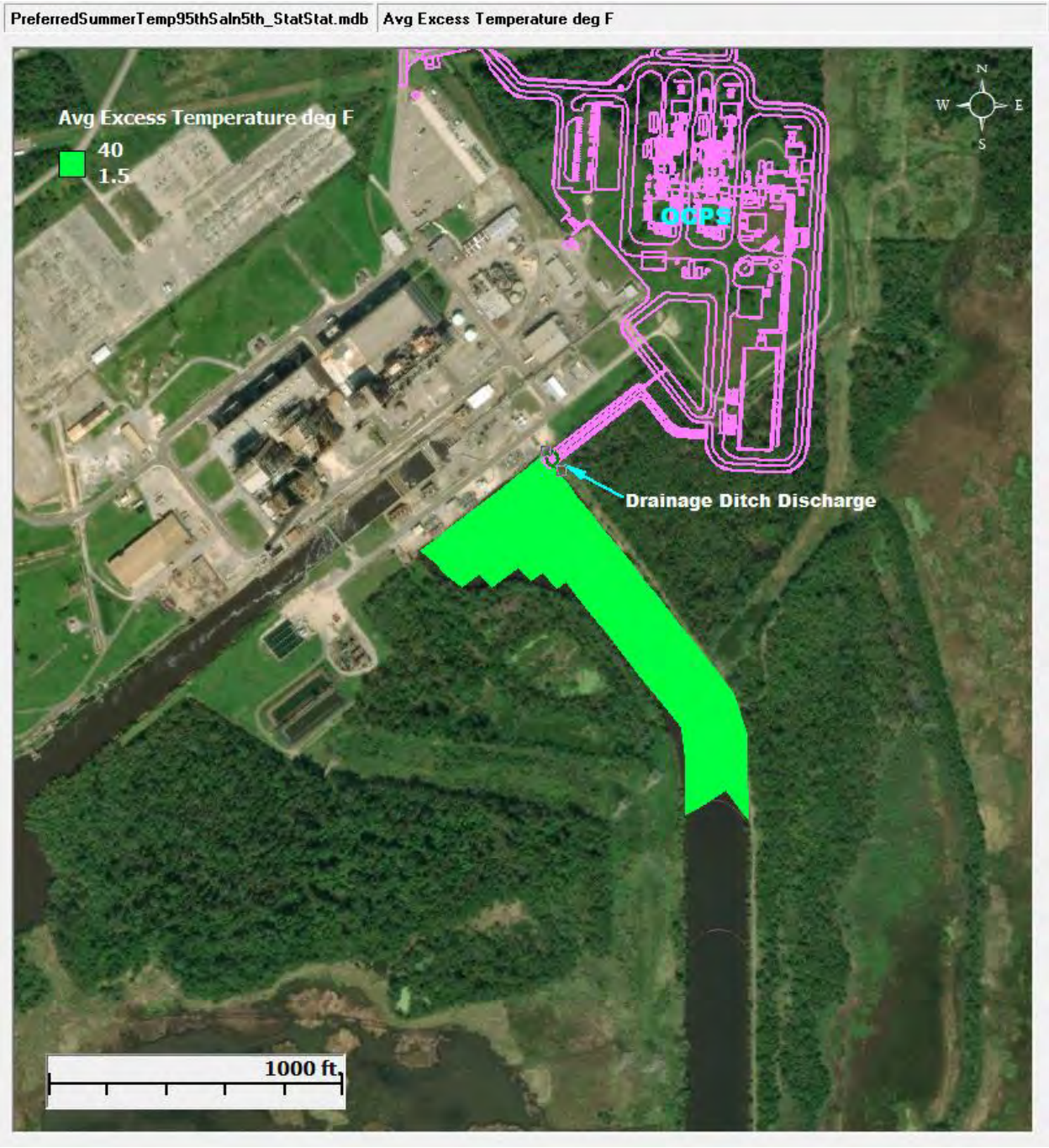

Figure A-25: Summer (5th Percentile Salinity) Average Excess Temperature deg F Exceedance

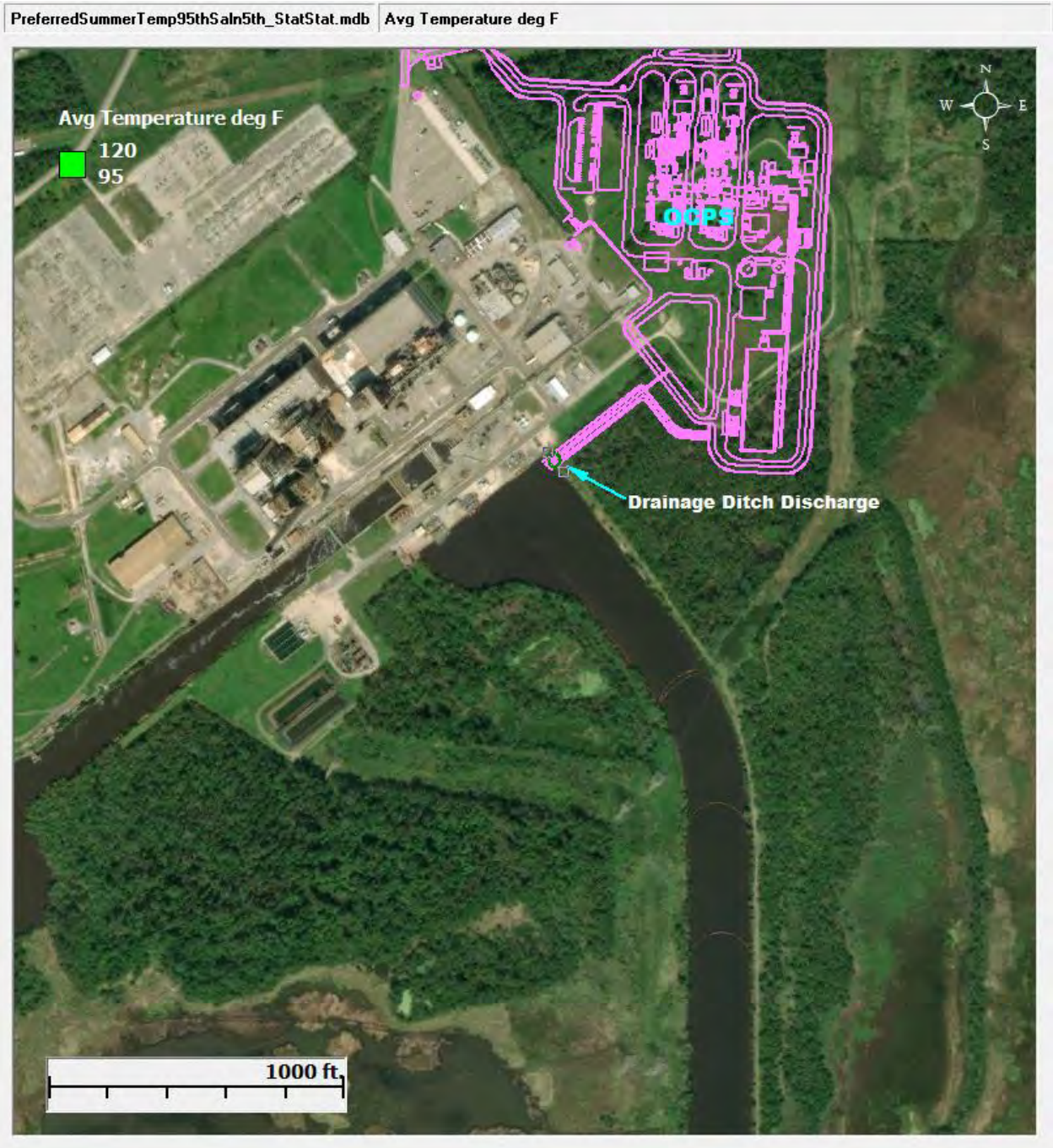

Figure A-26: Summer (5th Percentile Salinity) Average Temperature deg F Exceedance

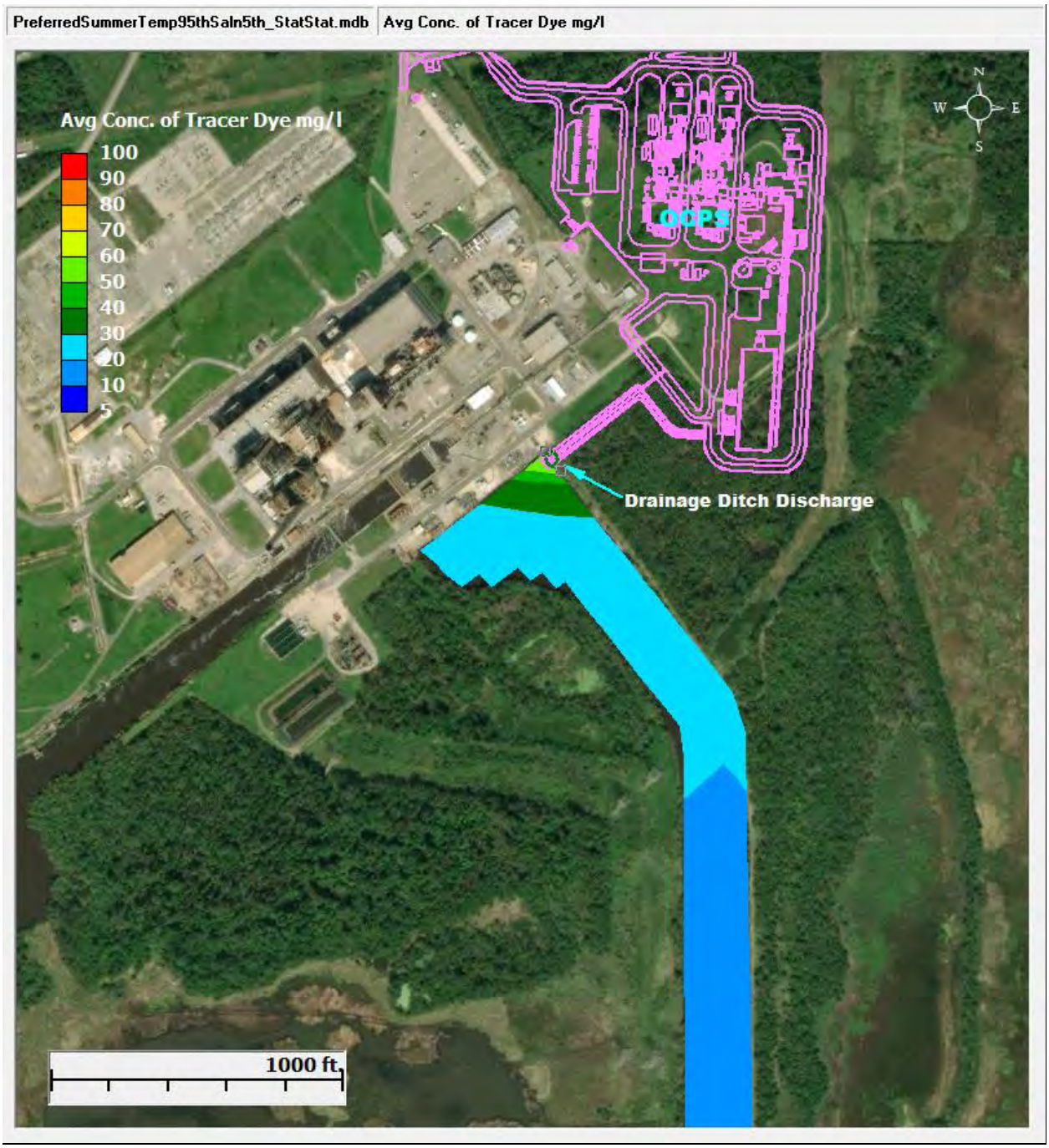

Figure A-27: Summer (5th Percentile Salinity) Average Conc. of Tracer Dye mg/L for Initial Conc. of 100 mg/L

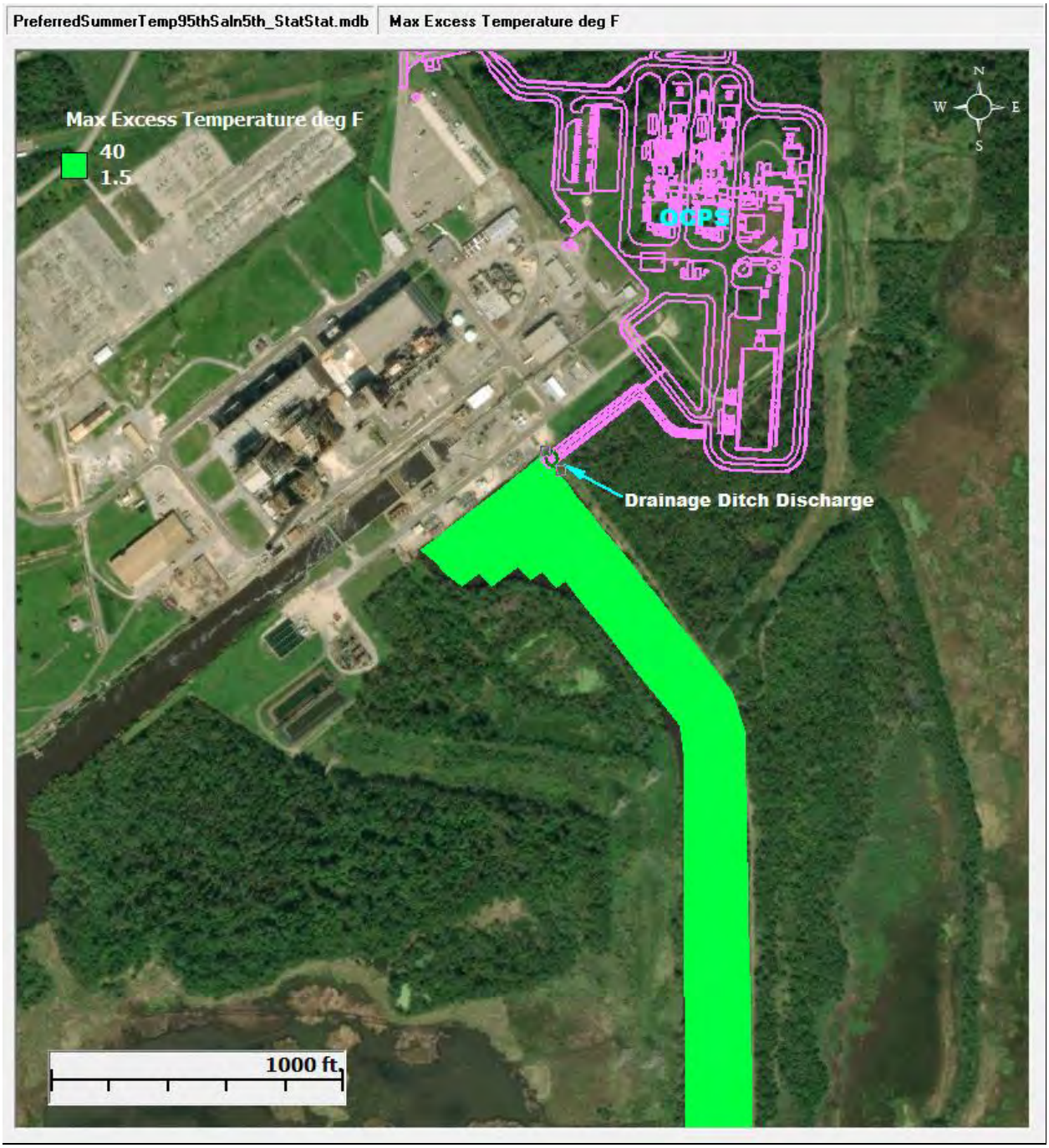

Figure A-28: Summer (5th Percentile Salinity) Maximum Excess Temperature deg F Exceedance

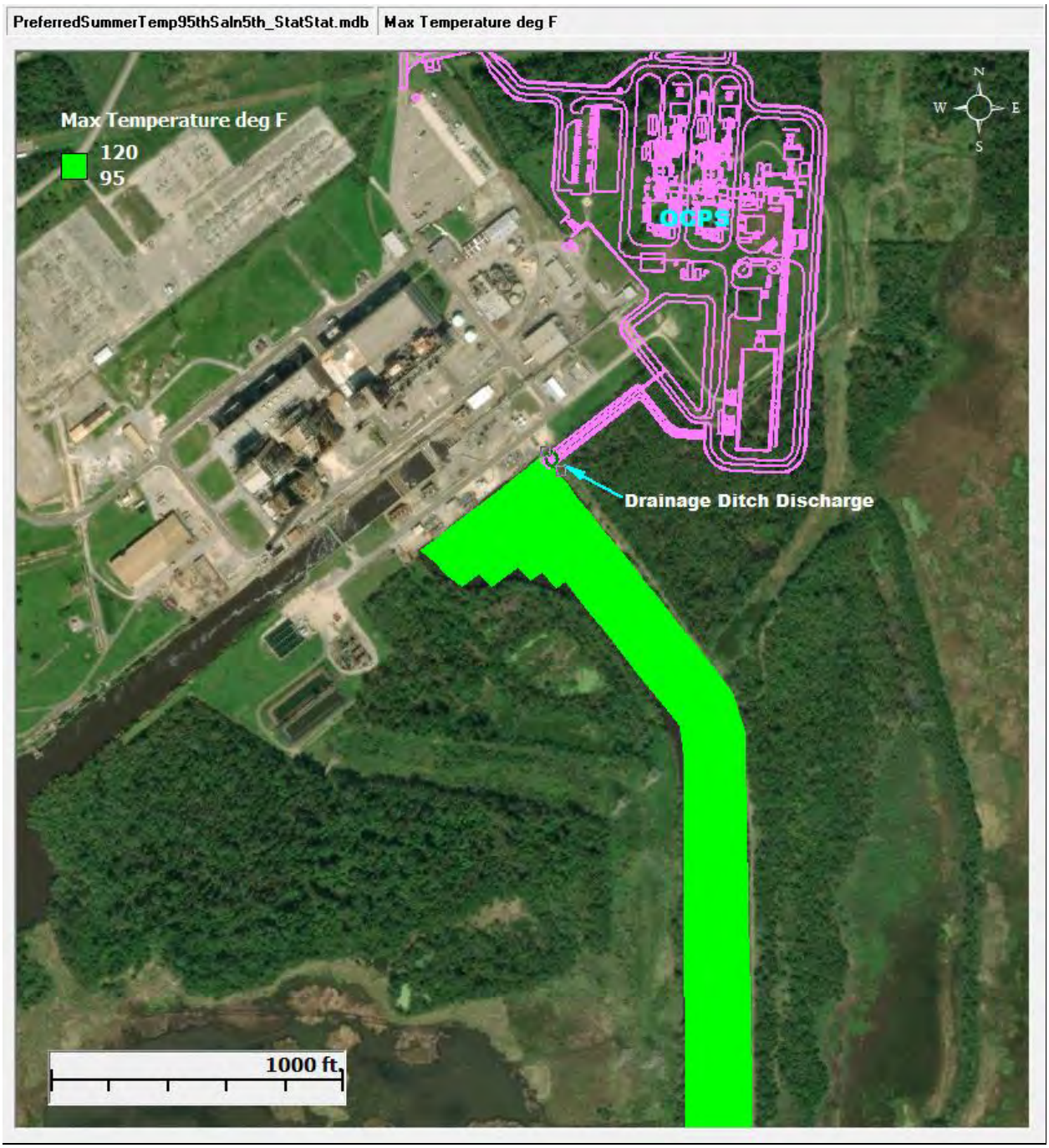

Figure A-29: Summer (5th Percentile Salinity) Maximum Temperature deg F Exceedance

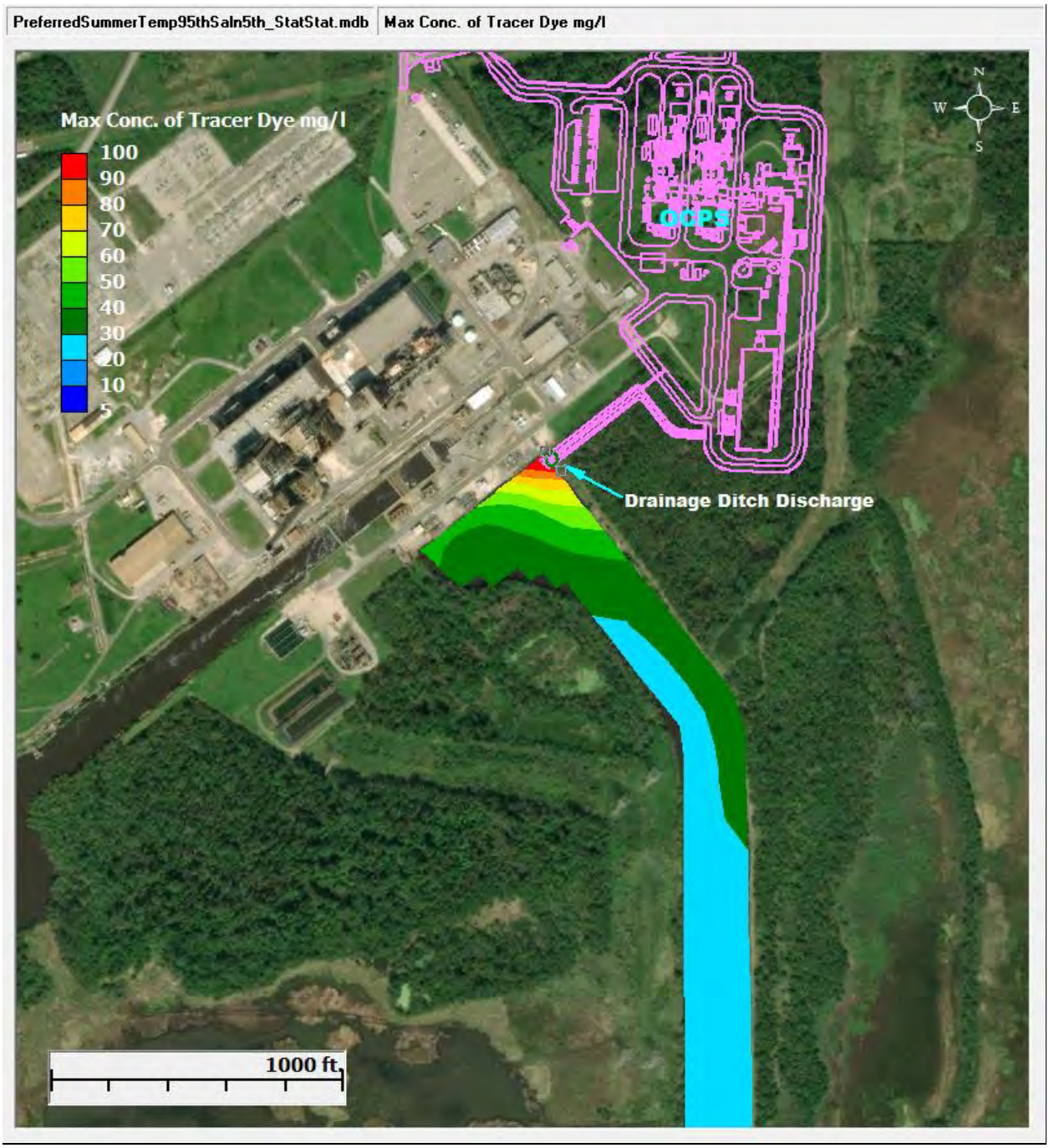

Figure A-30: Summer (5th Percentile Salinity) Maximum Conc. of Tracer Dye mg/L for Initial Conc. of 100 mg/L

Scenario 6: Summer 95th Percentile Salinity Statistical Summary Plots

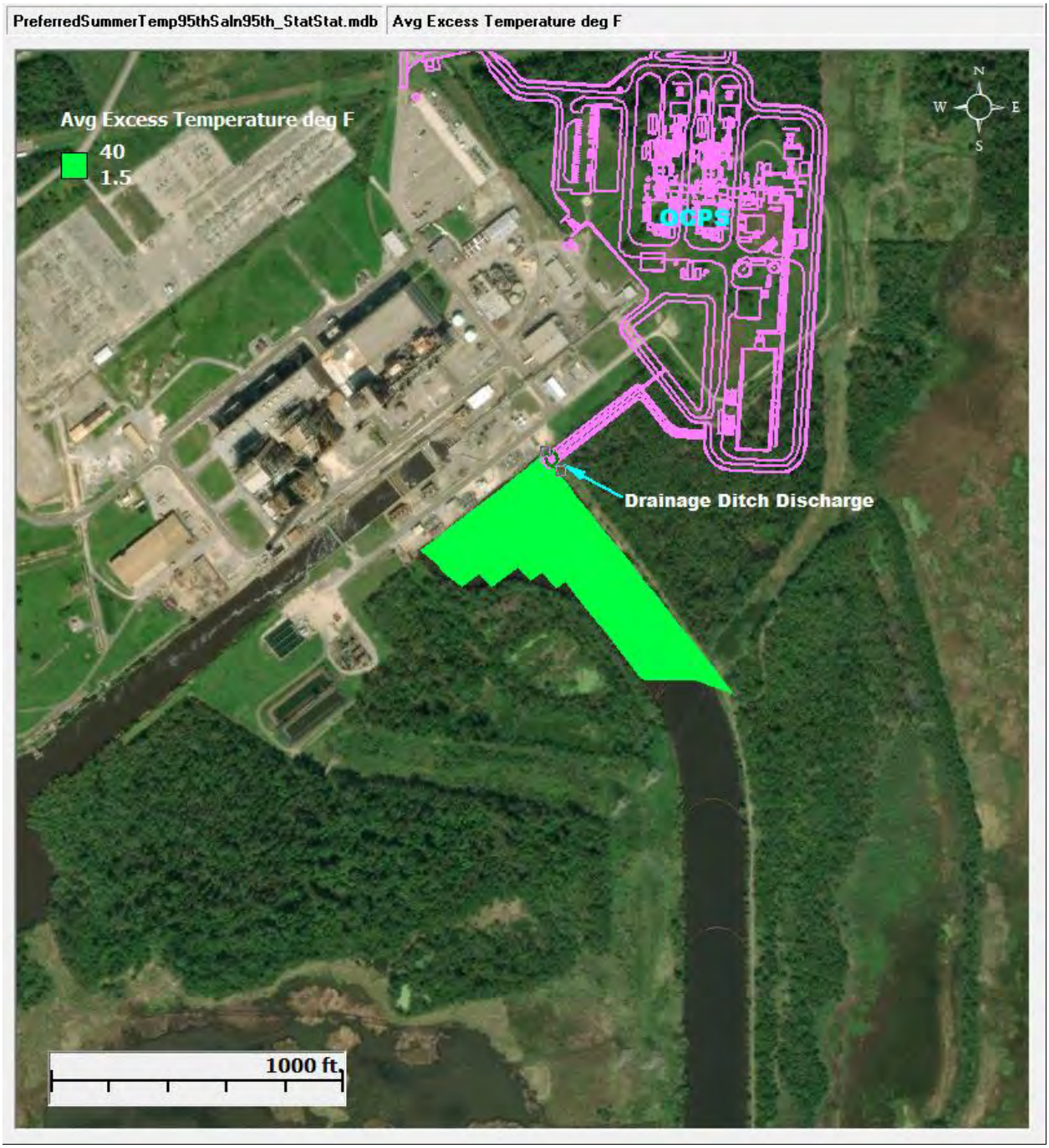

Figure A-31: Summer (95th Percentile Salinity) Average Excess Temperature deg F Exceedance

Figure A-32: Summer (95th Percentile Salinity) Average Temperature deg F Exceedance

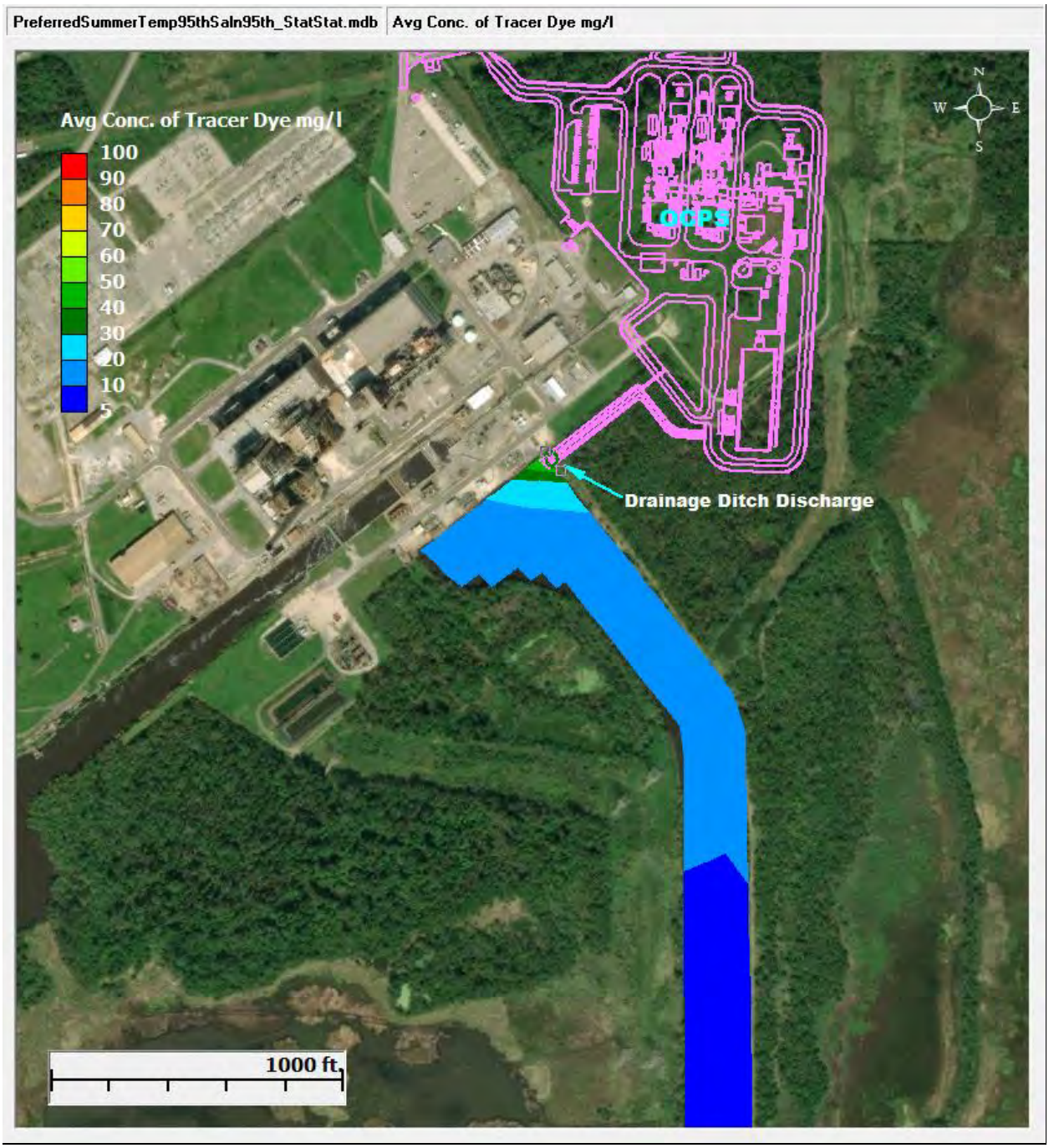

Figure A-33: Summer (95th Percentile Salinity) Average Conc. of Tracer Dye mg/L for Initial Conc. of 100 mg/L

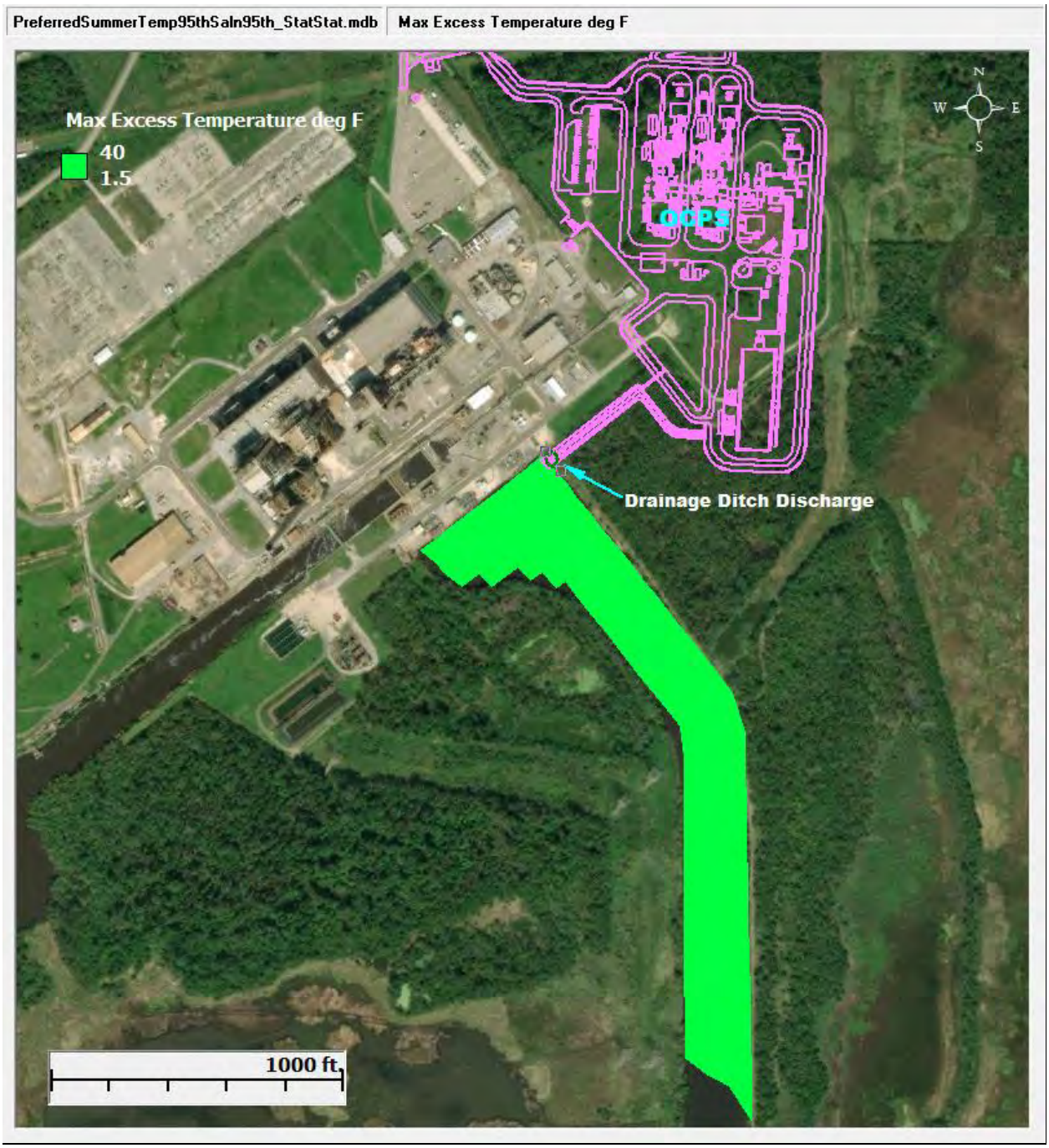

Figure A-34: Summer (95th Percentile Salinity) Maximum Excess Temperature deg F Exceedance

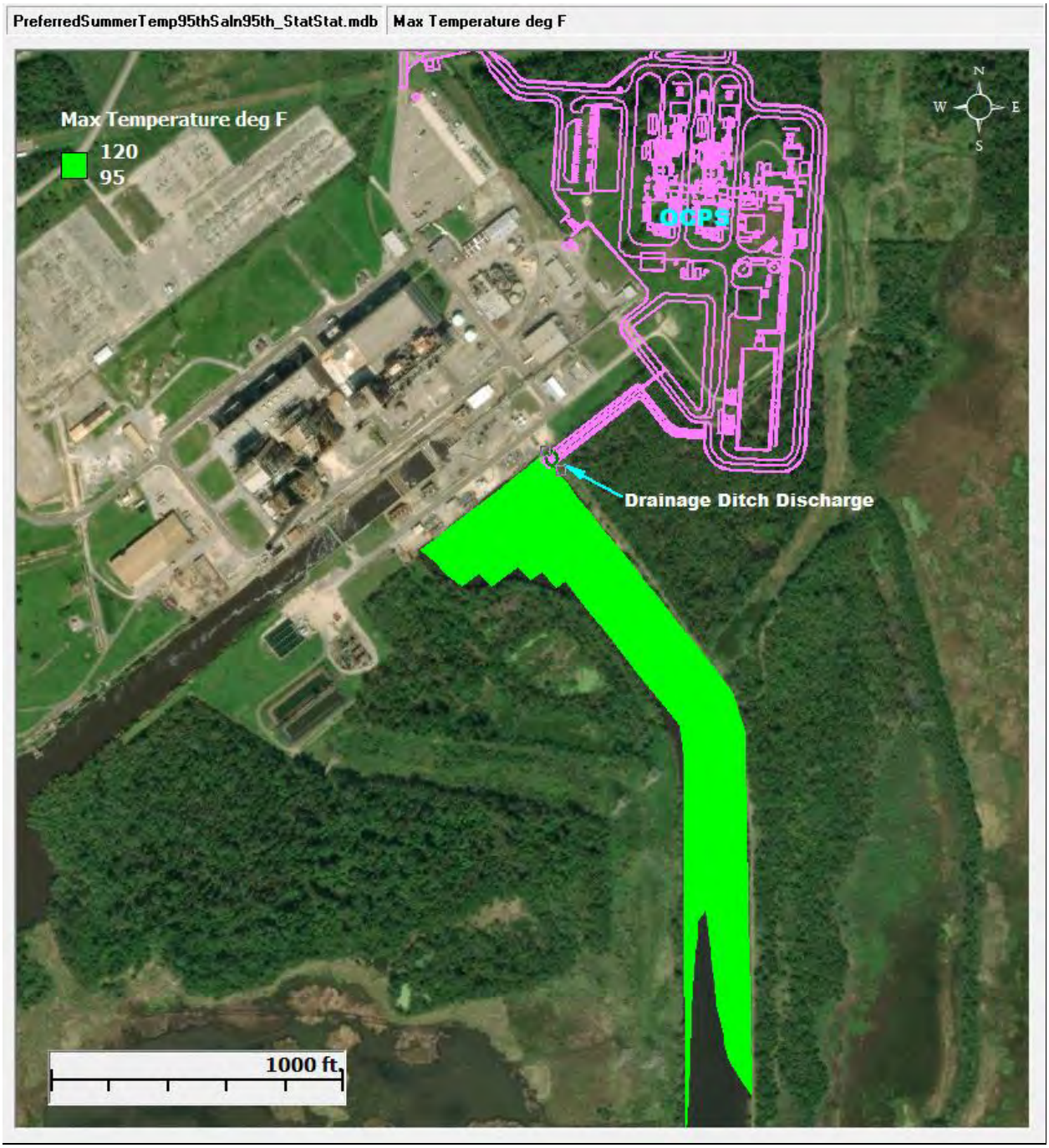

Figure A-35: Summer (95th Percentile Salinity) Maximum Temperature deg F Exceedance

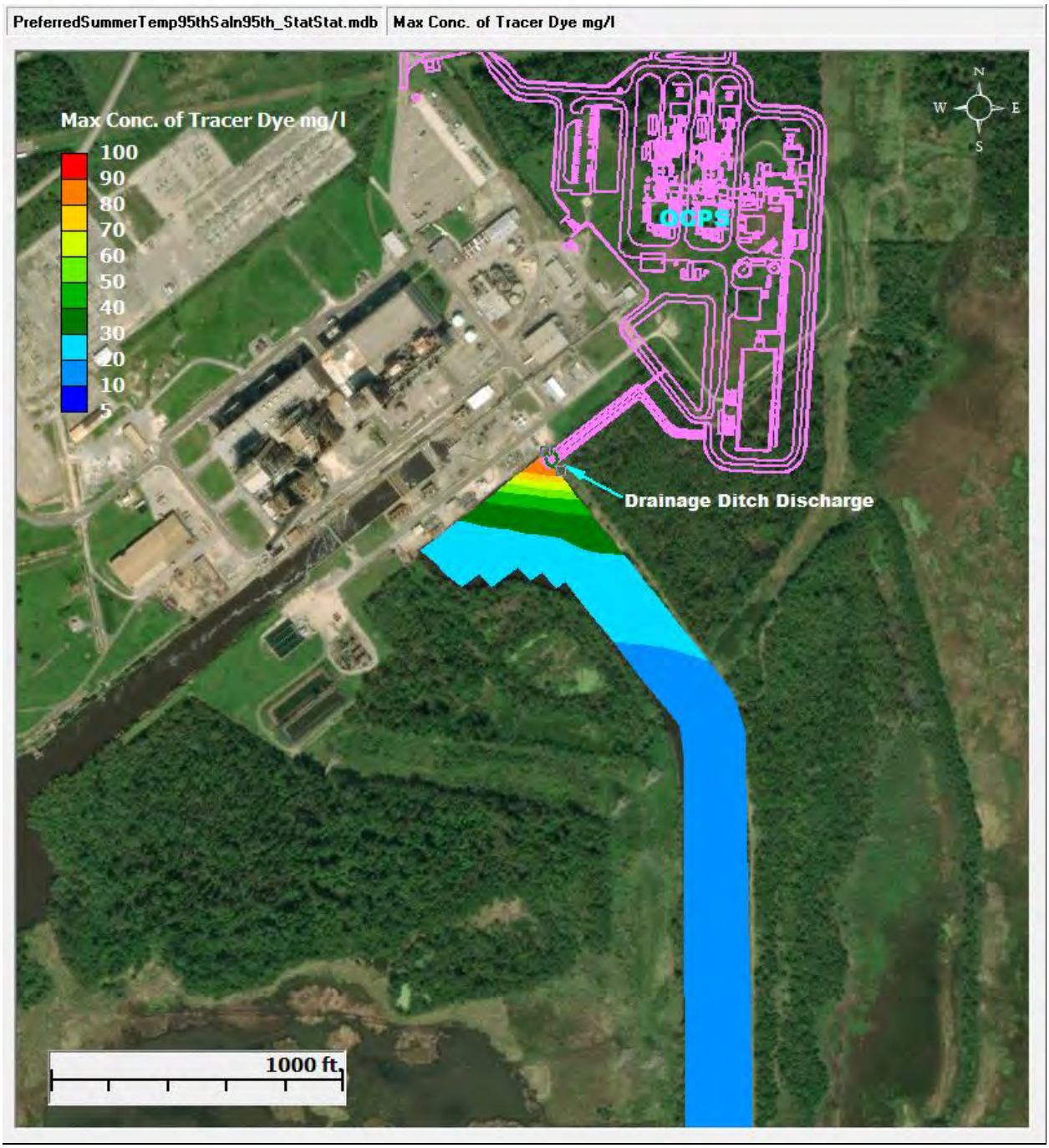

Figure A-36: Summer (95th Percentile Salinity) Maximum Conc. of Tracer Dye mg/L for Initial Conc. of 100 mg/L

APPENDIX C OCPS EVALUATION OF AQUATIC RESOURCES IN THE RECEIVING WATER

July 2021

OCPS Evaluation of Aquatic Resources in the Receiving Water

TPDES Permit #WQ0000336000

15 July 2021

Project No.: 0574234

The business of sustainability

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15 July 2021

OCPS Evaluation of Aquatic Resources in the Receiving Water

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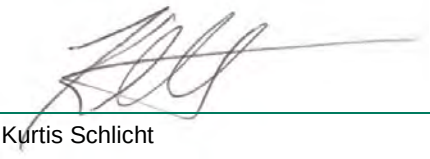

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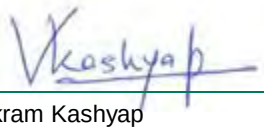

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Acronyms and Abbreviations

Name	Description
amsl	above mean sea level
CCP	Combined Cycle Plant
CWA	Clean Water Act
CWIS	Cooling Water Intake Structure
DBPs	brominated disinfection by-products
EPA	Environmental Protection Agency
ft.	feet
gpm	gallons per minute
GEMSS	Generalized Environmental Modeling System for Surface Waters
HAAs	haloacetic acids
MW	megawatt
NPDES	National Pollutant Discharge Elimination System
OCPS	Orange County Advanced Power Station
ppt	parts per thousand
TDS	total dissolved solids
TCEQ	Texas Commission on Environmental Quality
THMs	trihalomethanes
TPDES	Texas Pollutant Discharge Elimination System
TPWD	Texas Parks and Wildlife Department

1. INTRODUCTION

1.1 Background

Sabine Plant, located in Bridge City, Texas, is owned by Entergy Texas, Inc. (Entergy) and consists of four operating units capable of generating approximately 1,500 megawatts (MW). Entergy is proposing a Combined Cycle Plant (CCP) referred to as the Orange County Advanced Power Station (OCPS) adjacent to the existing Sabine Plant (Figure 1-1).

This assessment examines a future scenario where the once-through units at the Sabine Plant no longer withdraw cooling water from the Sabine Intake Canal and the canal is instead used as a discharge canal for OCPS. Under this scenario, the flow in the canal will be reversed so that water in the canal will flow northwest to southeast from OCPS to Old River Cove/Sabine Lake. Discharges from OCPS will include cooling tower blowdown, low-volume wastes, chemical cleaning wastes, and stormwater.

The Sabine Intake Canal is a manmade canal with an approximate length of 4.1 miles and approximate width of 200 ft. The average depth of the canal ranges from 10 to 20 ft. The Sabine Intake Canal has a northern terminus at the Sabine Plant and a southern terminus within Sabine Lake which also receives water from the Sabine River and Neches River. The Sabine Intake Canal and Sabine Lake as well as the lower Neches and Sabine Rivers are tidally influenced.

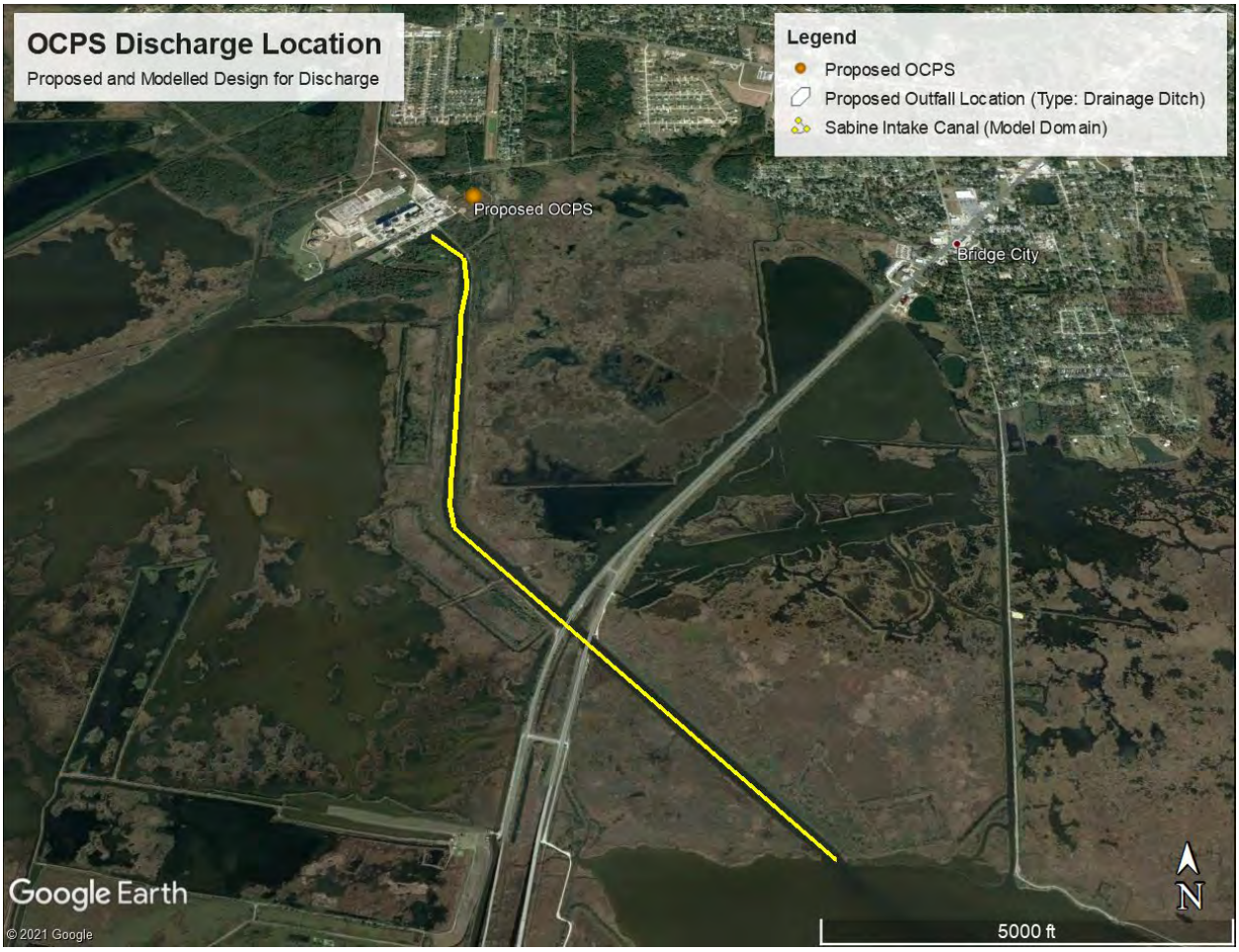


Figure 1-1: OCPS Discharge Location

1.2 Study Objectives

The goal of the receiving water evaluation is to evaluate potential changes in the water quality dynamics and potential impacts to aquatic resources within the Sabine Intake Canal due to the discharge from the proposed OCPS facility. As such, the scope of the evaluation includes:

- A characterization of baseline water quality within the Sabine Intake Canal;
- A characterization of baseline aquatic resources present within the Sabine Intake Canal;
- A discussion of expected discharge effluent temperatures and constituents resulting from OCPS; and
- A demonstration of how the OCPS discharge temperatures and constituents are protective of the aquatic resources that occur within the canal and Sabine Lake.

The evaluation used datasets from previous studies at Sabine, studies from other estuarine power facilities, as well as current OCPS discharge modeling results including time periods of extreme ambient conditions.

1.3 Regulatory Context

1.3.1 Clean Water Act Section 316(a)

Section 316(a) of the Clean Water Act (CWA) applies to point sources with thermal discharges. It authorizes the National Pollutant Discharge Elimination System (NPDES) permitting authority to impose alternative effluent limitations for the control of the thermal component of a discharge in lieu of the effluent limits that would otherwise be required under sections 301 or 306 of the CWA. The allowable Texas Commission on Environmental Quality (TCEQ) maximum temperature differentials (rise over ambient) except for "industrial cooling impoundments, temperature elevations due to discharges of treated domestic (sanitary) effluent, and temperature elevations within designated mixing zones or industrial cooling water areas"[1] are:

(1) freshwater streams: 5 degrees Fahrenheit (degrees F);
(2) freshwater lakes and impoundments: 3 degrees F; and
(3) tidal river reaches, bay, and gulf waters: 4 degrees F in fall, winter, and spring, and 1.5 degrees F in summer (June, July, and August).

1.3.2 Clean Water Act Section 316(b)

In October of 2014 the Environmental Protection Agency (EPA) implemented the new Phase II 316(b) rules for existing facilities operating a cooling water intake structure (CWIS). Sabine received its renewed Texas Pollutant Discharge Elimination System (TPDES) permit (WQ0000336000) on December 11, 2019. As part of the renewal application for 316(b), Sabine utilized historical impingement and entrainment data and supplemented that data with new, more current data on the aquatic resources located within Sabine Lake from the Texas Parks and Wildlife Department (TPWD) Coastal Fisheries. Entergy contacted the TPWD and requested bag seine sampling data from 2006-2017 to compare with the data from the historical studies. Combination of this data with the previous TPWD data referenced in the historical studies provided over 40 years of data on Sabine Lake. The data analysis indicated the current biological characterization of Sabine Lake is very similar to that of the historical studies, and that the majority of fish species are slightly increasing in abundance. The analysis found the Sabine Lake fishery has consistently been productive throughout the operation of the Sabine Plant. The Sabine 316(b) study concluded that

[1] Texas Commission on Environmental Quality, 30 Texas Administrative Code (TAC) Chapter 307 - Texas Surface Water Quality Standards, at 30 TAC Section 307.4(f).

the operation of the Sabine Plant and the CWIS has not resulted in an adverse environmental impact to the aquatic resources of Sabine Lake.

1.3.3 TCEQ Surface Water Quality Standards and Antidegradation Policy

The Sabine Intake Canal provides hydrological connectivity between the Sabine Plant and Sabine Lake (Segment 2412) which is classified as a tidal estuary that fully supports high aquatic life use, oyster waters use, recreational use, and general use, but is not supporting fish consumption use due to the presence of PCBs in edible tissue. The water quality standards for this segment include:

- dissolved oxygen criteria of 4.0 mg/L,
- pH range of 6.5-9.0 SU,
- indicator bacteria (Enterococci/fecal coliform) of 35/14 (respectively) per 100 ml, and
- a specified temperature limit of 95 degrees Fahrenheit for this segment.

TPDES permits for authorized wastewater discharges must be consistent with the TCEQ's antidegradation policy (30 TAC §307.5), which states that existing designated uses and water quality sufficient to protect those existing uses must be maintained.

2. RECEIVING WATER QUALITY

OCPS proposes to use the Sabine Intake Canal, Old River Cove, and ultimately Sabine Lake as the receiving water for wastewater discharges associated with the project.

2.1 General Receiving Water Information

The proposed discharge location for OCPS is located in a small embayment at the northwest end of the Sabine Intake Canal. The Sabine Intake Canal is approximately 4.1 miles long and 200 ft. wide that extends from northwest to southeast into Old River Cove in the northwestern portion of Sabine Lake. The canal extends 2.7 miles as an earthen canal and then approximately 1.4 miles into Old River Cove as a channel dredged into the bottom of the bay. The water depth in the Sabine Intake Canal typically ranges from 10 to 20 feet. The intake canal has an embayment at the Sabine CWIS approximately 500 ft. across and has been dredged to -18 feet above mean sea level (amsl) in front of Units 1&2, and -22 feet amsl in front of Units 3&4. The proposed OCPS discharge outfall will be located near the intakes for Units 1&2.

Old River Cove maintains a depth of approximately one meter at low tide, and has a daily tidal prism estimated at 835 MGD. Old River Cove is typically less than two meters deep and is estimated to have an average flow of 0.12 feet per second.

Sabine Lake is formed by the confluence of the Neches and Sabine rivers, is fourteen miles long by seven miles wide with a surface area of approximately 90,000 acres, and has a drainage area of approximately 50,000 square miles. Sabine Lake water levels vary based upon freshwater inflows from the Sabine and Neches Rivers. Depth across the lake averages less than 10 feet with maximum depths reaching approximately 40 feet within the channels.

2.2 Receiving Water Quality Information

Entergy has measured water quality within the Sabine Intake Canal, including parameters such as water temperature, salinity, conductivity, and pH. Entergy measures these parameters at a sampling location between the cooling water intake structures at the northern terminus of the Sabine Intake Canal. This

sampling location is located approximately 350 feet southwest of the proposed outfall location as depicted in Figure 2-1.

Figure 2-1: Water Quality Sampling Location

Analysis of three years of water quality data from the intake canal provides a comprehensive summary of typical water quality at the proposed OCPS discharge location.

Table 2-1: 2018-2020 Water Quality Data from Sabine Intake Canal

	Water Temp (°F)	Salinity (ppt)	Conductivity (µmhos)	pH
Maximum	90.00	17.50	28,170.00	8.60
Minimum	40.00	0.00	12.70	6.28
Average	76.54	4.19	7,434.63	7.42

The Sabine Intake Canal is tidally influenced and experiences a “flushing” effect from the incoming and outgoing tides. Although water quality parameters (especially salinity and conductivity) may fluctuate based on this tidal flow regime, it is expected that the water quality throughout the canal will be similar both spatially and temporally with that of Old River Cove and Sabine Lake.

3. RECEIVING WATER AQUATIC RESOURCES

There is an abundance of historical data regarding the aquatic resources present within the Old River Cove, Sabine Lake, and the CWIS located on the Sabine Intake Canal. Additionally, similar data exists for other power facilities situated on Galveston Bay, which is considered estuarine like Sabine Lake. Entergy completed a detailed evaluation of Sabine Lake and Galveston Bay aquatic communities in 2006 (ENSR 2006) in an effort to describe and characterize fish assemblages related to impingement and entrainment. The results of that study indicated that species richness and species characterizations were very similar between power plants on Galveston Bay and with those identified at Sabine Lake. In 2019, Entergy supplemented the 2006 study with more recent TPWD data specific to current fish assemblages in Sabine Lake and the current operation of the Sabine CWIS. As a result of these two efforts, an extensive biological dataset has been compiled by Entergy to support 316(a) and (b) compliance at the Sabine Plant, including historical 316(b) demonstration studies specific to the Sabine Plant, impingement and entrainment studies from other estuarine power facilities in Texas, and TPWD annual sampling of Sabine Lake and Galveston Bay covering more than 30 years of data.

3.1 Aquatic Resources Data

Historical impingement studies at Sabine were conducted in 1974-1975 that provide data on many fish species present within the Sabine Intake Canal. Data from the 316(b) Demonstration indicate the most frequently impinged species at the Sabine included white shrimp, blue crab, Atlantic croaker, Gulf menhaden, brown shrimp, sand seatrout, bay anchovy, threadfin shad, striped mullet, and bay whiff (Figure 3-1).

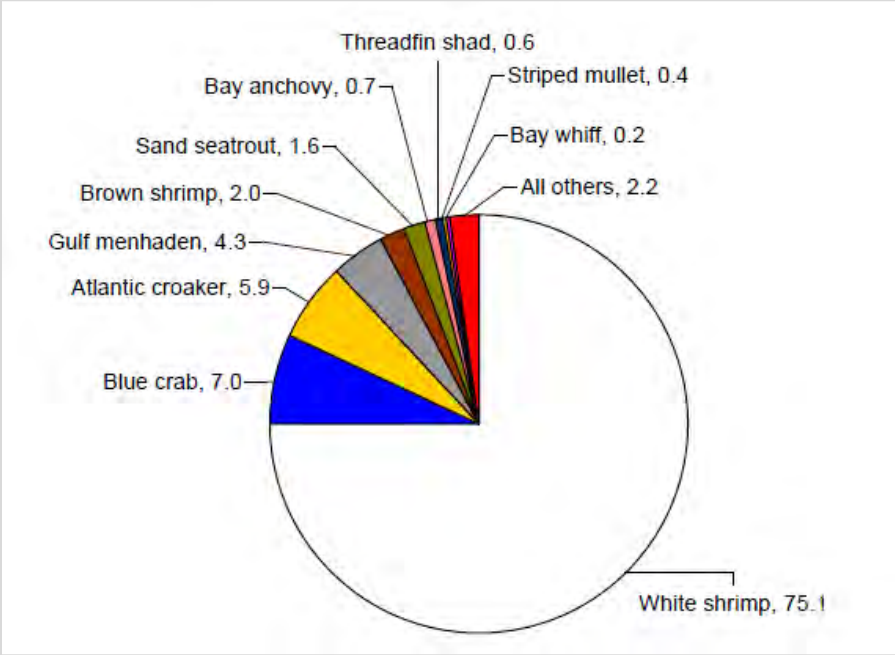


Figure 3-1: Impinged Species at Sabine Plant in 1974-1975

Additional historic impingement data from Galveston Bay facilities was also examined, and indicated that eight species comprised the majority of impingement, including: Gulf menhaden, Atlantic croaker, white

shrimp, brown shrimp, blue crab, bay anchovy, sand seatrout, and striped mullet. These species are all similar to those reported at the Sabine Plant (Table 3-1). Each of these species are considered to common and abundant within the Sabine Intake Canal or Sabine Lake.

Table 3-1: Impinged Species at Texas Estuarine Power Plants

Plant	Impinged Species[1]																	
	Eight Dominant Species									Other Commonly Impinged Species[2]								
	Gulf Menhaden	Atlantic Croaker	White Shrimp	Brown Shrimp	Blue Crab	Bay Anchovy	Sand Trout	Striped Mullet[3]	% of Impingement of Eight Dominants	Bay Whiff	Spot	Atlantic Cutlassfish	Grass Shrimp	Gulf Butterfish	Least Puffer	Star drum	Sheepshead minnow	Threadfin shad
Sabine	4.3	5.9	75.1	2.0	7.0	0.7	1.6	0.40	97.0	0.20	<1	<1	<1	<1	<1	<1	<1	0.60
Cedar Bayou	52.8	8.2	5.8	5.3	3.2	1.4	1.3	5.82	83.9	<1	<1	5.80	3.70	<1	<1	<1	<1	<1
Sam Berton	49.1	13.2	10.1	6.3	2.8	3.0	2.7	0.56	87.8	<1	4.20	<1	<1	<1	<1	<1	<1	<1
PH Robinson	16.0	15.0	24.0	14.0	8.0	5.0	2.0	0.29	84.3	0.20	1.90	2.00	0.80	1.20	1.10	0.03	0.17	0.43
Webster	28.0	19.0	18.0	19.0	10.0	1.0	1.0	0.61	96.6	0.00	0.53	0.02	0.43	0.09	0.13	0.03	0.05	0.11
Deepwater	5.4	30.3	14.2	1.4	22.9	6.9	6.8	0.01	87.9	0.08	0.20	0.01	0.28	0.43	0.18	1.70	1.20	0.29
Average	25.9	15.3	24.5	8.0	9.0	3.0	2.6	1.28	89.6	0.11	1.17	1.34	0.90	0.34	0.29	0.34	0.29	0.27
Minimum	4.3	5.9	5.8	1.4	2.8	0.7	1.0	0.01	83.9	0.00	0.10	0.01	0.10	0.09	0.10	0.03	0.05	0.10
Maximum	52.8	30.3	75.1	19.0	22.9	6.9	6.8	5.8	97.0	0.20	4.20	5.80	3.70	1.20	1.10	1.70	1.20	0.60

Notes:
1. All numbers are percent of total number impinged.
2. In the absence of a specific value in the original study, a value of 0.1% was used in calculating statistics for those species listed as <1%.
3 Striped mullet was selected over Atlantic Cutlassfish as a dominant species due to its relatively frequent occurance in TPWD bag seine data.

Historical entrainment studies at Sabine were also conducted in 1974-1975 that provide data on many fish species present within the Sabine Intake Canal. The studies indicated a total of 407,500 organisms were collected in monthly diurnal entrainment samples from August 1974 to July 1975. These entrainment samples were dominated by copepods, but also included macro-crustacea such as barnacle nauplii, crab zoea, and shrimp larvae, as well as cladocerans (water fleas), rotifers, and annelid worms (Figure 3-2).

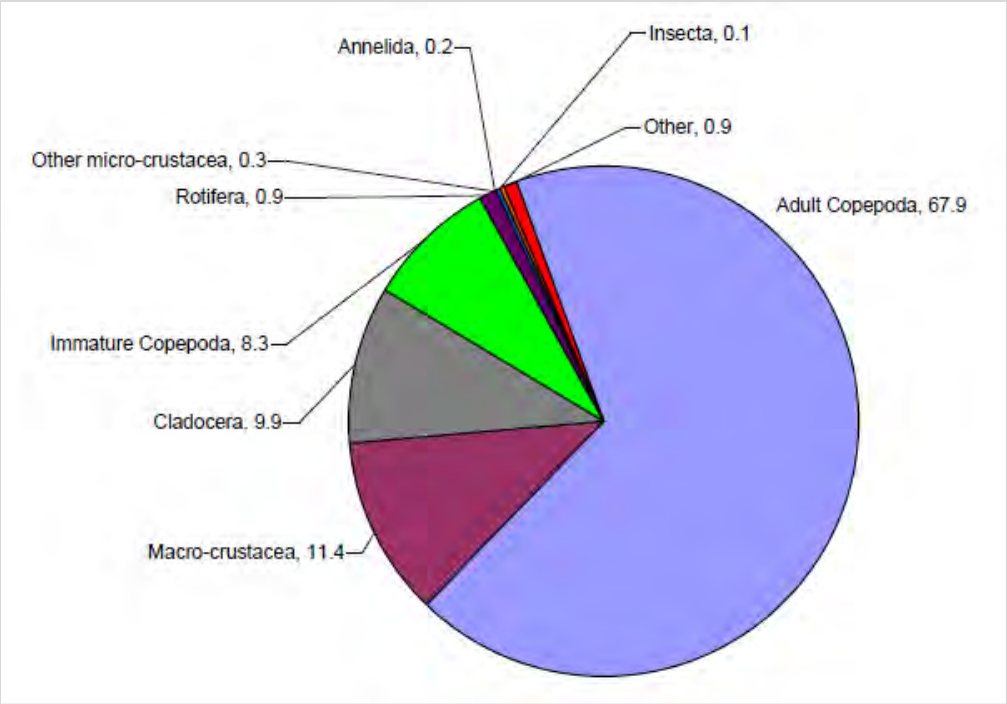


Figure 3-2: Entrained Species at Sabine Plant in 1974-1975

Additional entrainment sampling was conducted at Sabine in 2007. Data from the 2008 ENSR Sampling Final Report indicate a total of 65,008 organisms were collected in monthly diurnal entrainment samples from March 2007 to October 2007. These entrainment samples were also dominated by copepods, and also included macro-crustacea such as crabs (primarily mud crabs), amphipods, and shrimp (primarily grass shrimp and mysid shrimp), as well as very small numbers of ichthyoplankton including Atlantic croaker, bay anchovy, and a single red drum (Figure 3-3)

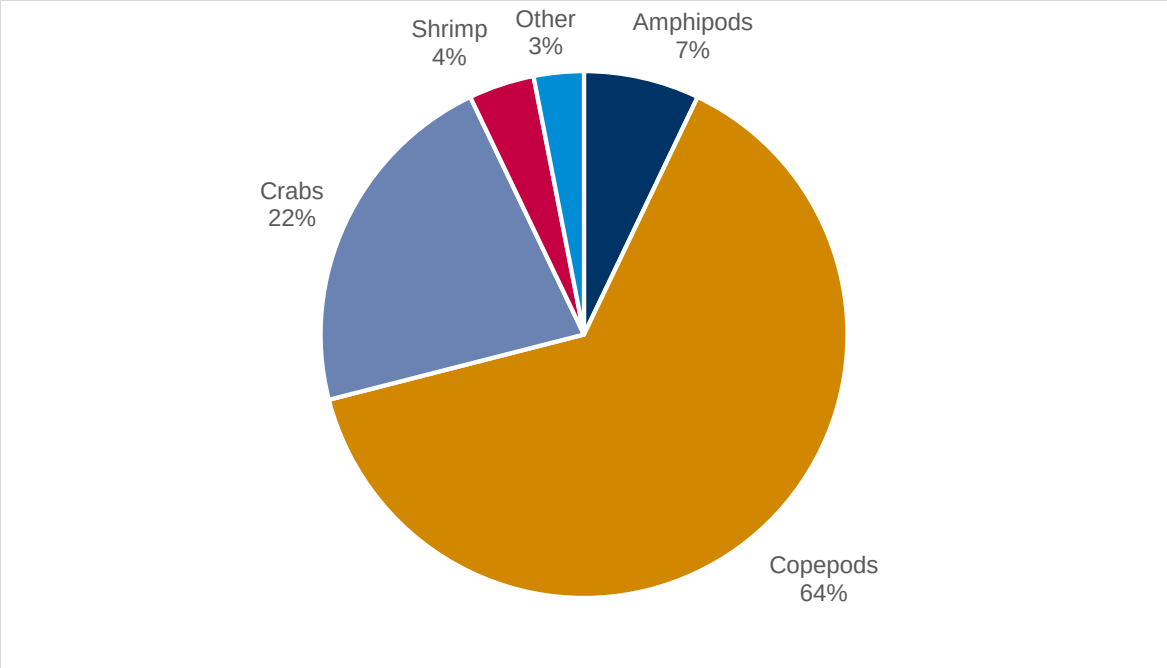


Figure 3-3: Entrained Species at Sabine Plant in 2007

In addition to the impingement and entrainment data, Entergy obtained TPWD bag seine sampling data from 2006-2017 to compare with the data from the historical studies. Bag seine data is most appropriate as it utilizes sampling gear that targets the nearshore species most similar to those which may occur in the Sabine Intake Canal. Combination of this data with the previous TPWD data referenced in the historical studies provides over 40 years of data on Sabine Lake. Analysis of trends in this data can provide insights into the stability of the ecosystem and to determine any similarities and differences between current and historical conditions. The Sabine Lake bag seine sampling data conducted by TPWD from 2006-2017 provided species composition and/or relative abundance of 190 different taxa/species potentially associated with the Sabine Intake Canal. There were 26 species that comprised 99% of the total abundance as detailed in Table 3-2 and Figure 3-4 below.

Table 3-2: Composition of TPWD Bag Seine Data for Sabine Lake 2006-2017

Common Name	Scientific Name	Number Collected	Percentage of Total
Gulf menhaden	*Brevoortia patronus*	617,162	63.95%
White shrimp	*Litopenaeus setiferus*	130,605	13.53%
Brown shrimp	*Farfantepenaeus aztecus*	64,806	6.72%
Atlantic croaker	*Micropogonius undulatus*	42,050	4.36%
Bay anchovy	*Anchoa mitchilli*	22,019	2.28%
Striped mullet	*Mugil cephalus*	9,749	1.01%
Spot	*Leiostomus xanthurus*	9,541	0.99%
Blue crab	*Callinectes sapidus*	9,285	0.96%
Inland silverside	*Menidia beryllina*	7,846	0.81%
Grass shrimp-unidentified	*Palaemonetes sp.*	7,721	0.80%
White mullet	*Mugil curema*	5,560	0.58%
Pinfish	*Lagodon rhomboides*	5,306	0.55%
Grass shrimp	*Palaemonetes pugio*	4941	0.51%
Sand seatrout	*Cynoscion arenarius*	2,939	0.30%
Red drum	*Sciaenops occelatus*	1,878	0.19%
Sheepshead minnow	*Cyprinodon variegatus*	1,864	0.19%
Atlantic rangia	*Rangia cuneata*	1,647	0.17%
Threadfin shad	*Dorosoma petenense*	1,612	0.17%
Eastern oyster	*Crassostrea virginica*	1,597	0.17%
Gulf killifish	*Fundulis grandis*	1,364	0.14%
Hardhead catfish	*Ariopsis felis*	1,282	0.13%
Bay whiff	*Citharichthys spilopterus*	1,140	0.12%
Rough silverside	*Membras martinica*	1,010	0.10%
Silverside-unidentified	*Menidia sp.*	963	0.10%
Southern flounder	*Paralichthys lethostigma*	890	0.09%
Scaled sardine	*Harengula jaguana*	697	0.07%
Other	-	9,529	0.99%
Total	-	**965,003**	**100.00%**

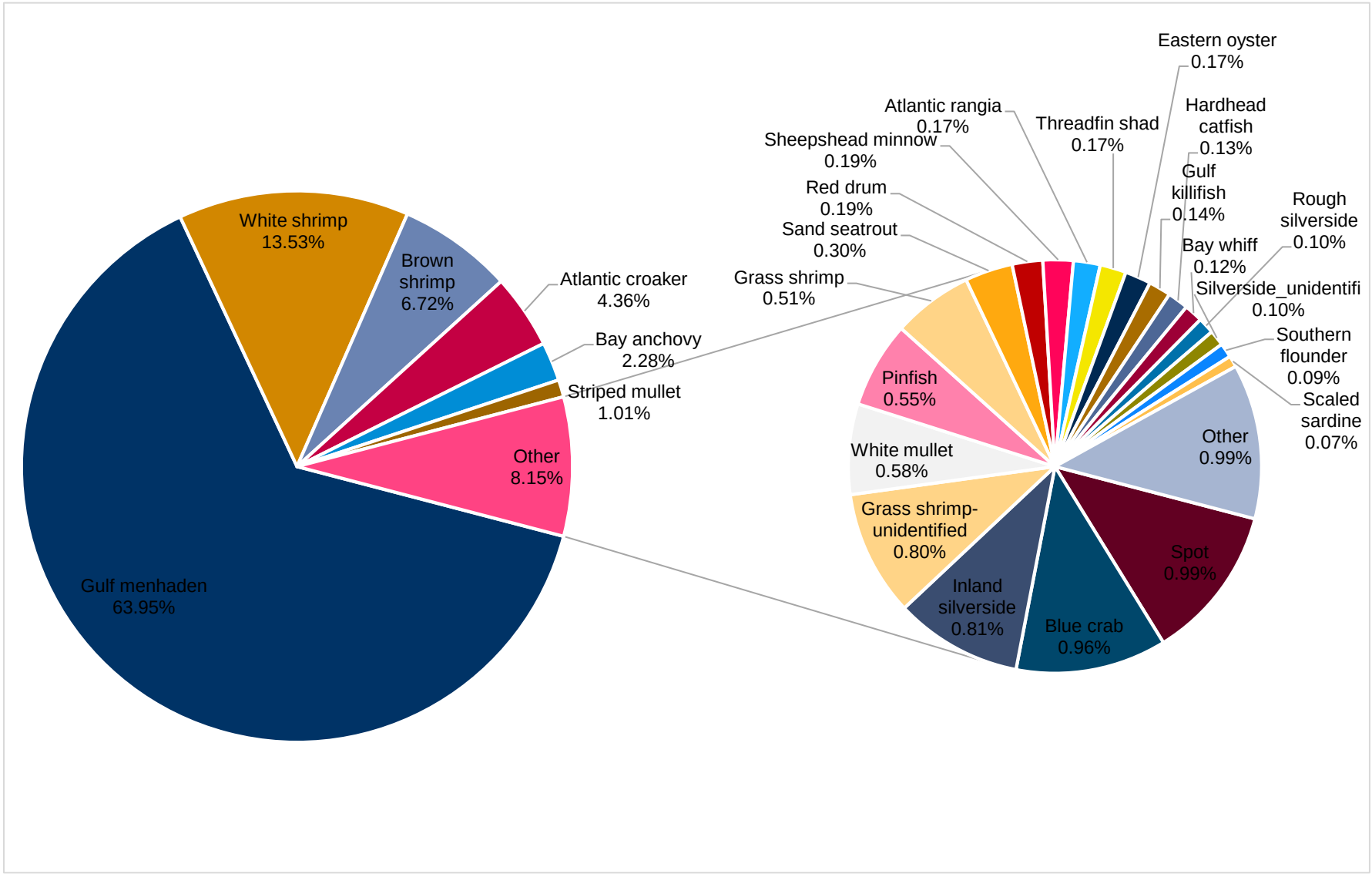


Figure 3-4: Composition of TPWD Bag Seine Data for Sabine Lake 2006-2017

3.2 Potential Aquatic Resources in the Receiving Water

Based on the data above, it is expected that a combination of the Sabine impingement data, Sabine entrainment data, and Sabine Lake bag seine data from TPWD would provide the most accurate representation of the aquatic resources present within the Sabine Intake Canal and Old River Cove/Sabine Lake. Table 3-3 below includes the most abundant of the species identified within these various studies, and is expected to be representative of the species assemblage likely to be present within the receiving water.

Table 3-3: Species Most Expected to Occur in Receiving Water

Common Name	Scientific Name
Gulf menhaden	*Brevoortia patronus*
White shrimp	*Litopenaeus setiferus*
Brown shrimp	*Farfantepenaeus aztecus*
Atlantic croaker	*Micropogonius undulatus*
Bay anchovy	*Anchoa mitchilli*
Striped mullet	*Mugil cephalus*
Spot	*Leiostomus xanthurus*
Blue crab	*Callinectes sapidus*
Inland silverside	*Menidia beryllina*
White mullet	*Mugil curema*
Pinfish	*Lagodon rhomboides*
Grass shrimp	*Palaemonetes pugio*
Sand seatrout	*Cynoscion arenarius*
Red drum	*Sciaenops occelatus*
Sheepshead minnow	*Cyprinodon variegatus*
Atlantic rangia	*Rangia cuneata*
Threadfin shad	*Dorosoma petenense*
Eastern oyster	*Crassostrea virginica*
Gulf killifish	*Fundulis grandis*
Hardhead catfish	*Ariopsis felis*
Bay whiff	*Citharichthys spilopterus*
Copepods	*Copepod sp.*
Amphipods	*Amphipod sp.*
Mud crabs	*Rhithropanopeus sp.*
Grass shrimp	*Paleomonetes sp.*
Mysid shrimp	*Mysid sp.*

3.3 Trends in Abundance of Aquatic Resources in the Receiving Water

Examination of catch rates on an annual basis provides insights into potential trends regarding the overall productivity of Sabine Lake and/or trends in the productivity of a specific species. Because the data covers a long period of time, it is expected there would be variability observed across the years. This variability may be attributed to a number of environmental and anthropogenic factors such as freshwater inflows, nutrient loading, sedimentation, pollution, or fishing pressure. The important measure to consider with the long-term trend data is the overall trend which provides an indication as to whether the species is showing growth or a decline. Total Annual Mean Catch Rate among all species was available from 1986-2017, which is presented in Figure 3-5 below.

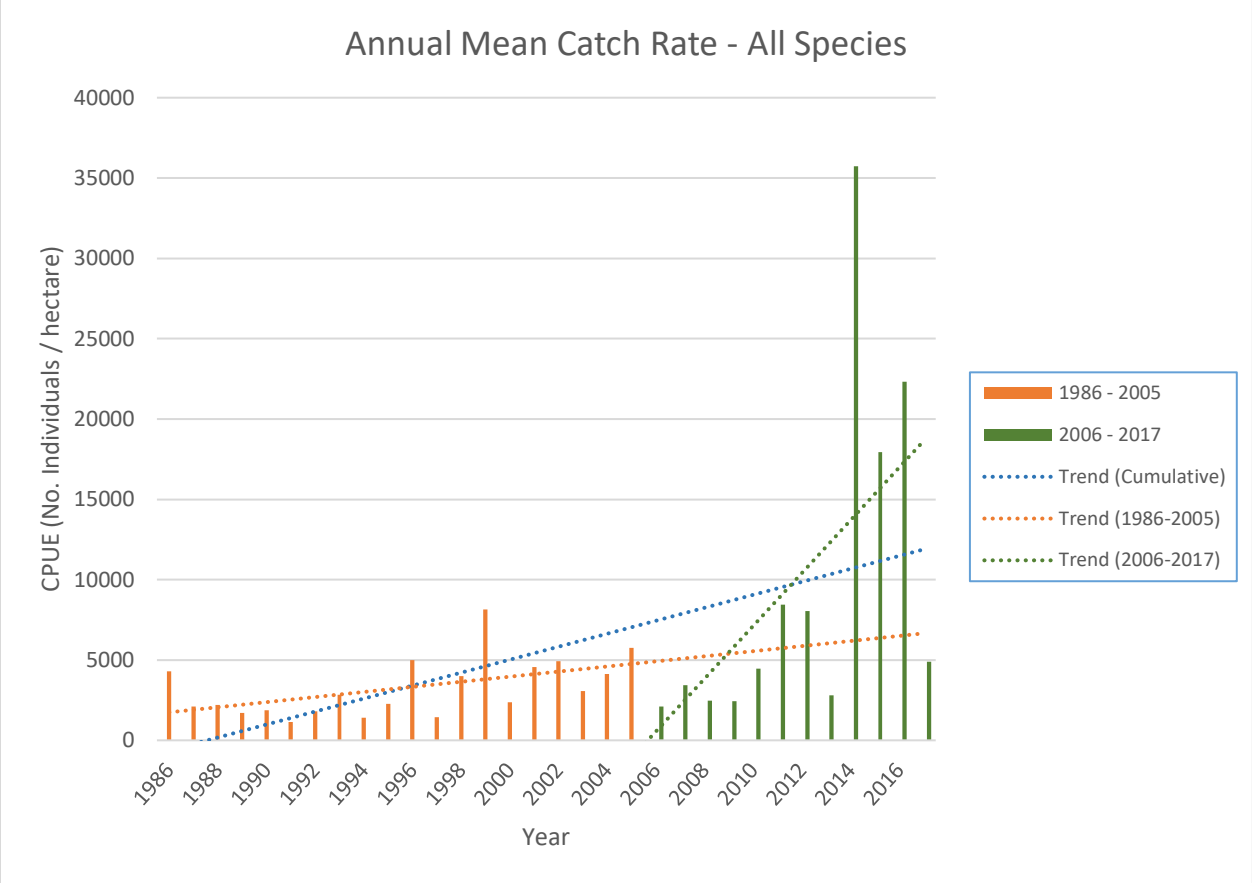


Figure 3-5: Total Annual Mean Catch Rate among All Species from TPWD Bag Seine Samples between 1986 and 2017 (TPWD 2018)

Based on the TPWD catch rate data, the productivity of Sabine Lake appears to have been stable to increasing over the last 40 years. Overall, the data indicates the dominant species from the 1986-2005 are nearly identical to that of 2006-2017 dataset. However, the catch rate of gulf menhaden has significantly increased recently, and the majority of the other species sampled have also exhibited slight to moderate increases in catch rate.

4. POTENTIAL IMPACTS FROM THE PROPOSED OCPS EFFLUENT

The proposed wastewater discharge from OCPS may result in impacts to the receiving water quality, including increased temperatures, decreased dissolved oxygen, changes in pH, and increases in concentration of constituents of concern (i.e. bacteria, metals, nutrients). Changes to these water quality parameters may also result in impacts to the aquatic resources within the receiving waters, including seasonal distribution, habitat availability, and habitat suitability. Discharges into the Sabine Intake Canal from OCPS are expected to attenuate as distances from the discharge outfall point increases as reflected in the current modeling report (ERM 2021).

4.1 Temperature, Dissolved Oxygen, and pH

The proposed wastewater discharges for OCPS are expected to contain cooling tower blowdown that will have elevated temperatures (118° F) when compared to the ambient temperature of the Sabine Intake Canal. Temperature affects many physical properties of water including density, viscosity, vapor pressure, and solubility of dissolved gases. Both density, viscosity, and solubility decrease with increased temperature that may contribute to stratification of the Sabine Intake Canal, inhibiting vertical mixing and oxygen transfer across the water column. The proposed wastewater will be discharged at the surface in the Sabine Intake Canal and the thermal modeling indicates the thermal plume will reside near the surface of the canal under most scenarios and some stratification of the water column is expected near the discharge outfall and down the canal for approximately 1,000 ft. However, as discharges move down the canal it is anticipated the discharge volumes and the daily tidal influences will allow for proper mixing and stratification will be limited. Minimal to no effects are expected in Old River Cove or Sabine Lake.

Increased temperatures near the discharge outfall may result in both beneficial and detrimental effects on aquatic resources in the Sabine Intake Canal, especially related to seasonal distribution. During the winter months, the increased temperatures may attract aquatic resources and provide refuge from lower water temperatures. During the summer months, elevated temperatures may attract species of warm water fish while repelling cold water species. Under most circumstances, most fish are able to adjust to or avoid temperature changes if they are gradual. It is anticipated that the initial changes in temperature will be more rapid or abrupt; however, over time as the facility continues to operate the temperature changes from season to season will become more gradual and fish will be able to avoid and minimize their exposure to the temperature increases. Furthermore, estuarine species are normally more tolerant of temperature fluctuations than sublittoral or littoral species since temperatures fluctuate more in estuary environments (Craddock, 1976).

Long term increases in temperatures could lead to localized alteration of habitat suitability for aquatic resources within the Sabine Intake Canal. Increased temperatures can result in changes in oxygen and nutrient levels that could alter habitats such as oyster reefs, clam beds, sea grass beds and spawning areas. Sessile or less mobile creatures such as oysters, fish eggs, and larvae may experience mortality if they were to occur in areas subjected to water temperatures above their tolerance range. (Craddock, 1976). While no formal habitat assessments have been conducted in the Sabine Intake Canal, general observations along the canal indicate there are no clam beds or sea grass beds present. While some oysters have been observed on some hard structures (e.g. piles, rip-rap, intake walls etc.) along the canal, no established oyster reefs are present or have been documented in the canal. The Sabine Intake Canal does make up a component of the Sabine Lake estuary system and has been shown to have eggs and larval species present. However, the Sabine Intake Canal is not considered typical spawning areas for most estuarine species. The biological life cycle of most estuarine dependent species in the Gulf of Mexico typically spawn in or near the pass entrances or nearshore Gulf and then move to the estuaries during the post larvae stage. The eggs and larvae move either by tides and winds or by swimming.

Sufficient dissolved oxygen in the water is a requirement for most aquatic organisms. The solubility of oxygen decreases with increasing temperature and may result in lower oxygen levels in the proposed discharge when compared to ambient surface water. Stratification may also inhibit oxygen transfer from surface waters to deeper waters, resulting in decreased dissolved oxygen levels in the deeper waters. The increased temperature of the discharge may also lead to increased biochemical oxygen demand from bacteria that break down organic matter, which can further deplete the oxygen supply within the water (Huang, 2019).

Estuaries are dynamic environments that undergo natural fluctuations in acidity (pH) over a variety of time scales. The pH of water is critical to the survival of most aquatic plants and animals. Many species have trouble surviving if pH levels drop under 5.0 or rise above 9.0. The pH in water is affected by the minerals dissolved in the water, aerosols and dust from the air, and human-made wastes as well as by plants and animals through photosynthesis and respiration. Human activities that cause significant, short-term fluctuations in pH or long-term acidification of a waterbody may result in negative impacts to aquatic resources. For instance, algal blooms that are often initiated by an overload of nutrients can cause pH to fluctuate dramatically over a few hour period, greatly stressing local organisms (NOAA, 2009). Wastewater discharges outside the neutral pH range could have impacts on the aquatic resources of the Sabine Intake Canal.

4.2 Constituents of Concern

Industrial wastewater discharges may contain a variety of constituents of concern that have the potential to impact water quality and aquatic resources within the receiving waters. Pollutants such as metals, nutrients, and total dissolved solids (TDS), including chloride and bromides, are the common pollutants found in steam electric power plant wastewater that have been associated with documented environmental impacts or could have the potential to cause environmental impacts based on the loadings and concentrations present in the evaluated waste streams. Potential discharged constituents of concern typically monitored in wastewater from natural gas-fired power plants include:

- Total dissolved solids / Total suspended solids;
- Sulfates;
- Zinc;
- Copper;
- Chromium;
- Phosphate;
- Ammonia;
- Oil and grease;
- Total residual chlorine; and
- Other metals (i.e. iron, magnesium, manganese).

Discharges of cooling tower blowdown and metal cleaning wastes may result in discharge of metals that can be toxic due to their bioaccumulative properties. The EPA has addressed cooling tower blowdown in Effluent Limitations Guidelines, with zinc and chromium being two constituents of focus. Environmental conditions influence the tendency of a dissolved pollutant to remain in solution or precipitate out of solution, sorb to either organic or inorganic suspended matter in the water column, or sorb to the mixture of materials (e.g., clays and humic matter) found in sediments [U.S. EPA, 2007a]. Pollutants that precipitate out of solution can become concentrated in the sediments of a waterbody. Aquatic organisms may bioaccumulate pollutants either by consuming pollutant-enriched sediments and suspended particles, and/or by filtering ambient water containing dissolved pollutants. In high concentrations, metals can change behavior, inhibit growth, reduce oxygen supply, and impair reproduction in aquatic organisms. (EPA, 2015).

Nutrients such as nitrogen and phosphorous may be present in wastewater discharges depending on the fuel composition and air pollution controls used in the plant's combustion process. Nutrients are essential

components for plants and animals to grow and develop; however, increased nutrient concentrations can upset the delicate balance of nutrient supply and demand required to maintain aquatic life in surface waters. For example, excess nutrients can cause low oxygen in surface waters (hypoxia) and harmful algal blooms.

TDS is a measure of the amount of dissolved matter in water such as inorganic salts, dissolved metals, and organic matter. TDS concentrations in wastewater may include contributions from dissolved metals, chlorides, and bromides. Although dissolved metals are unlikely to result in short-term, acute effects to aquatic resources, there are potential chronic effects upon growth, reproduction, and long-term survival, as well as potential bioaccumulation in fish tissues. Sublethal effects from exposure to pollutants in power plant wastewater can include changes to morphology (e.g., fin erosion, oral deformities), behavior (e.g., swimming ability, ability to catch prey, ability to escape from predators), and metabolism that can negatively affect long-term survival. Both chlorides and TDS levels affect the availability and toxicity of other wastewater constituents, including the amounts of metals that dissolve due to solubility characteristics. High chloride levels in wastewater discharges may also adversely affect biological wastewater treatment processes. Bromide is commonly found in nature, with a low degree of toxicity. While bromide itself is not thought to be toxic at levels present in the environment, its reaction with other constituents in water may form brominated disinfection by-products (DBPs) when plants use certain processes including chlorination and ozonation to disinfect the incoming source water. Bromide can react with the ozone, forming bromates, or with chlorine or chlorine-based disinfectants to form brominated and mixed chloro-bromo DBPs, such as trihalomethanes (THMs) or haloacetic acids (HAAs) that have been characterized as likely carcinogenic compounds (EPA, 2015).

5. MODELING RESULTS AND ANALYSIS

5.1 Effluent Data Modeling

ERM completed a Generalized Environmental Modeling System for Surface Waters (GEMSS) assessment for the Sabine Intake Canal (ERM, 2021). The assessment utilized proposed effluent data from OCPS, receiving waterbody quality data, bathymetry data, and meteorological data to create a hydrodynamic model of the proposed discharge. The effluent was characterized by the water balances for seasonal extreme scenarios. The discharge structure in this case will be a discharge ditch emptying into the mouth of the Sabine Intake Canal. The Sabine Intake Canal (receiving waterbody) was characterized by its width and depth. The hydrodynamic model was set up using the available tidal data, temperatures, salinity, and meteorological data from publically available sources. The discharge rate and temperature vary based on the seasonal extremes as shown in Table 5-1. The effluent will be freshwater, therefore the salinity is assumed to be zero.

Table 5-1: Effluent Characteristics under Extreme Cases of Operation

Seasonal Extreme	Discharge Rate (gpm)	Maximum Discharge Temperature (deg F)
Winter	430	99
Summer	722	118

Source: OCPS Extreme Case Water Balances

5.2 Model Grid

The 3-D hydrodynamic model requires a model grid that represents the waterbody being modeled. Bathymetric data and high resolution imagery were used to develop a model grid for the entire model domain. The grid resolution is finer near the discharge location. Near the discharge, the grid sizes are 20 by 20 m and the lowest resolution is near the end of the canal at 260 by 30 m. A total of 235 cells were used to develop the model grid. Vertical resolution of the grid was set at 1 m.

Model scenarios consist of different temperature values (5th, 50th and 95th percentile ambient temperatures) to capture the range of the ambient conditions throughout the year. Naturally, the 5th percentile water temperature occurred during the winter and the 95th water temperature occurred during the summer so the respective extreme operational conditions for the discharge were applied. The 50th percentile water temperature occurred in the spring. The summer extreme operational conditions were applied to demonstrate the worst case under these spring temperature conditions. The model was run for these extreme summer and winter case operations for several tidal cycles. The 5th percentile and 95th percentile salinity extremes were also taken into consideration when developing the model scenarios. The various combinations of these ambient water temperature, operating case and ambient salinity were used to develop the six scenarios shown in Table 5-2.

Table 5-2: Model Scenarios

Scenario	Start Date	Flow Rate (gpm)	Season	Ambient Temp	Salinity	Salinity (ppt)	Discharge Temp (deg F)	Ambient Temp (deg F)	Excess Temp (deg F)
1	1/15/2018	422	Winter	5th Percentile	5th Percentile	0.12	99	50.6	48.4
2	1/15/2018	422	Winter	5th Percentile	95th Percentile	17.0	99	50.6	48.4
3	3/18/2018	730	Spring	50th Percentile	5th Percentile	0.12	118	70.6	47.4
4	3/18/2018	730	Spring	50th Percentile	95th Percentile	17.0	118	70.6	47.4
5	7/21/2018	730	Summer	95th Percentile	5th Percentile	0.12	118	88.2	29.8
6	7/21/2018	730	Summer	95th Percentile	95th Percentile	17.0	118	88.2	29.8

Note: Salinity and ambient temperatures were constant inputs to the model rather than time-varying. However, the surface heat exchange provided the diurnal variation in these temperatures.

5.3 Model Results

The model results are presented as probability contour plots along with summary tables quantifying the extents visible. The probability plots were based on the regulatory criteria mentioned in Section 1.3. The probability contours were generated based on the water temperature and excess temperature values during the last two weeks of the 20-day model run. The model results are summarized in Table 5-3 and Table 5-4 with respect to the regulatory criteria.

Table 5-3: Model Results Summary: 95 deg F Exceedance at the Water Surface

Scenario	Season	Ambient Temp	Salinity	Area >50% Exceedance ($ft.^2$)	Area >95% Exceedance ($ft.^2$)	Downstream Distance 50% (ft.)	Downstream Distance 95% (ft.)
1	Winter	5th Percentile	5th Percentile	0	0	0	0
2	Winter	5th Percentile	95th Percentile	0	0	0	0
3	Spring	50th Percentile	5th Percentile	0	0	0	0
4	Spring	50th Percentile	95th Percentile	0	0	0	0
5	Summer	95th Percentile	5th Percentile	18,500	4,000	200	80
6	Summer	95th Percentile	95th Percentile	19,000	3,400	160	80

Note: The total area of the Sabine Intake Canal is 3,560,000 $ft.^2$

Table 5-4: Model Results Summary: Excess Temperature Exceedance (4 deg F Summer and Winter, 1.5 deg F Summer) at the Water Surface

Scenario	Season	Ambient Temp	Salinity	Area >50% Exceedance ($ft.^2$)	Area >95% Exceedance ($ft.^2$)	Downstream Distance 50% (ft.)	Downstream Distance 95% (ft.)
1	Winter	5th Percentile	5th Percentile	14,500	2,500	140	70
2	Winter	5th Percentile	95th Percentile	42,500	3,100	300	60
3	Spring	50th Percentile	5th Percentile	59,000	8,000	260	90
4	Spring	50th Percentile	95th Percentile	70,500	11,600	330	120
5	Summer	95th Percentile	5th Percentile	288,500	171,500	1,030	500
6	Summer	95th Percentile	95th Percentile	260,000	107,500	920	410

Note: The total area of the Sabine Intake Canal is 3,560,000 $ft.^2$

5.4 Winter Probability Results

The model results in both 5th percentile and 95th percentile temperature scenario indicate that the 95 deg F is not a concern for the winter runs. Figure 5-1 and Figure 5-2 do not show any contours above the 5%, which is expected considering the colder water and air temperatures typical for the season. Figure 5-3 and Figure 5-4 indicate that the 4 deg F excess temperature exceedance occurs more than 50% of the time for an area of 14,500 $ft.^2$ in the low salinity scenario and 42,500 $ft.^2$ in the high salinity scenario. The exceedance occurs anywhere from 140 ft. to 300 ft. downstream for the 50% exceedance contour and 60 ft. to 70 ft. downstream for the 95% exceedance contour. Figure 5-5 and Figure 5-6 show that there is

not even a 5% exceedance of the excess temperature criteria in the bottom layer of the canal. This trend holds true for other model runs as well. The surface layer, understandably so, represents the worst case in terms of extent due to discharge being heated and introduced above the surface. Therefore, only the surface layer contours will be examined closely in this analysis. Example plots showing the excess temperature probability along different cross-sections of the canal are provided for the worst case winter scenario in Figure 5-7, Figure 5-8 and Figure 5-9. These plots show the vertical extent of these plumes and provide further insight into the spread of the plume, both horizontally (along the selected slice) and vertically. As can be seen in these figures, the plume does not cover the entire cross-section providing zones of passage for aquatic resources, if needed.

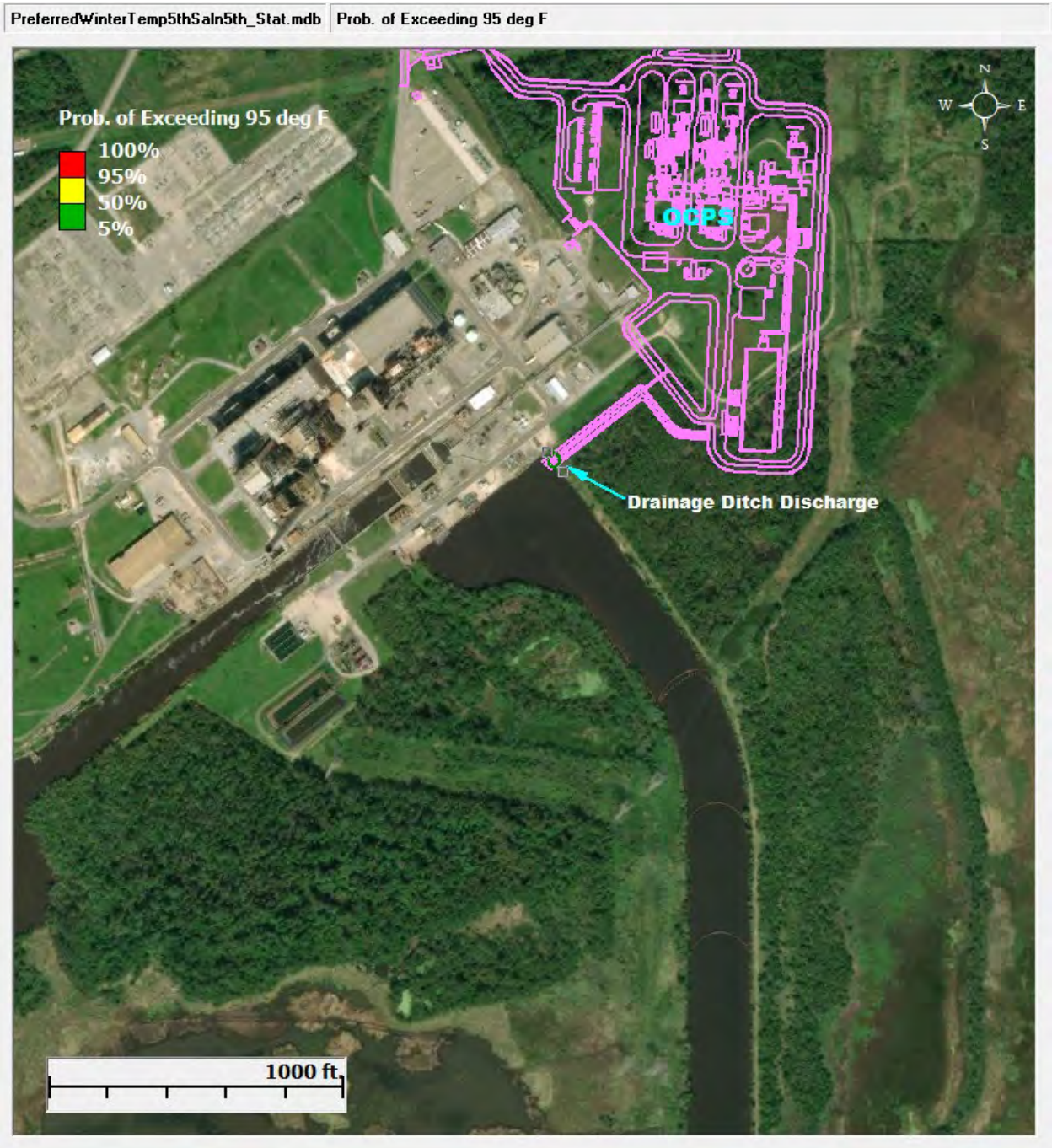


Figure 5-1: Winter (5th Percentile Salinity) 95 deg F Exceedance Probability at Water Surface

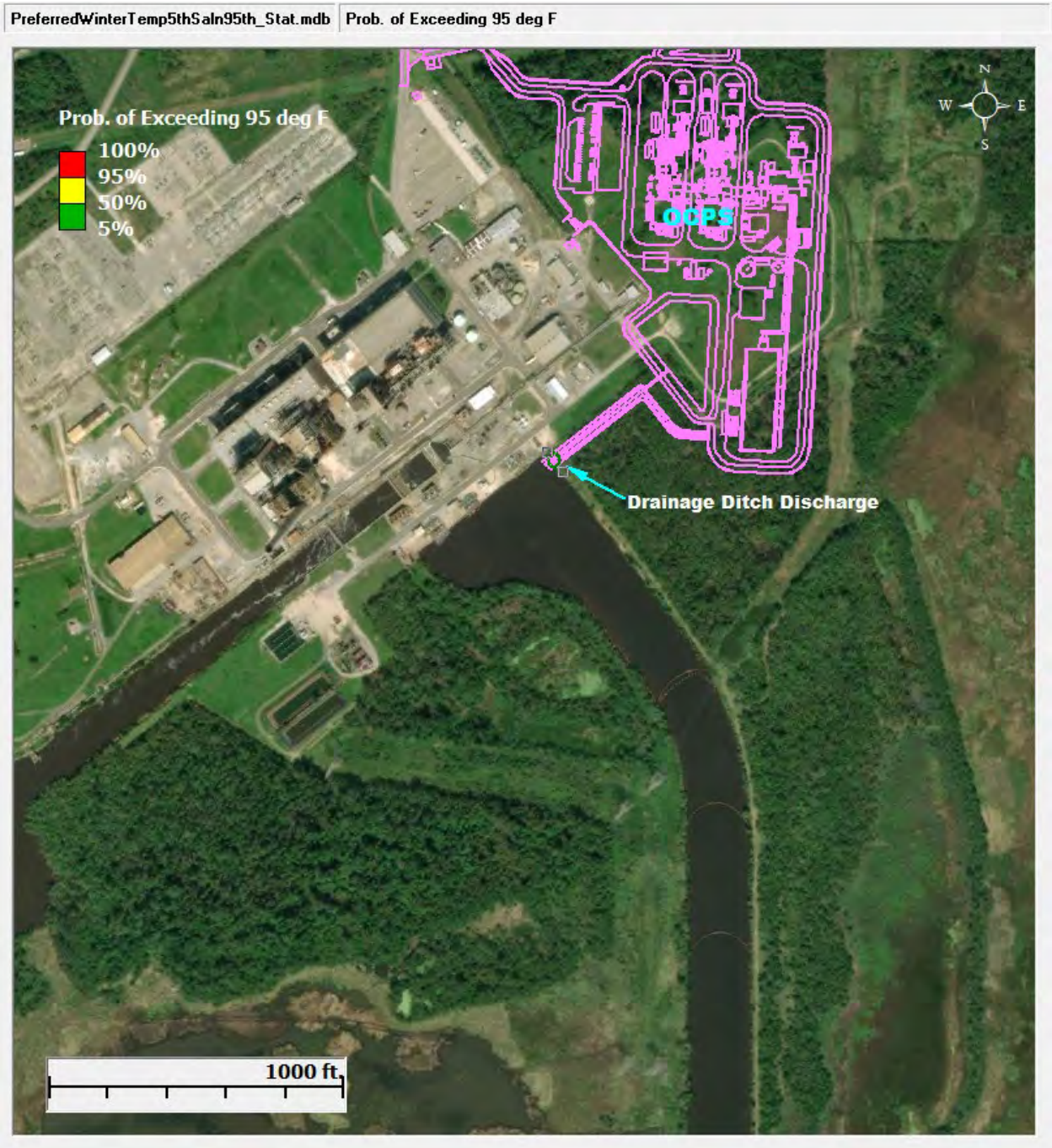


Figure 5-2: Winter (95th Percentile Salinity) 95 deg F Exceedance Probability at Water Surface

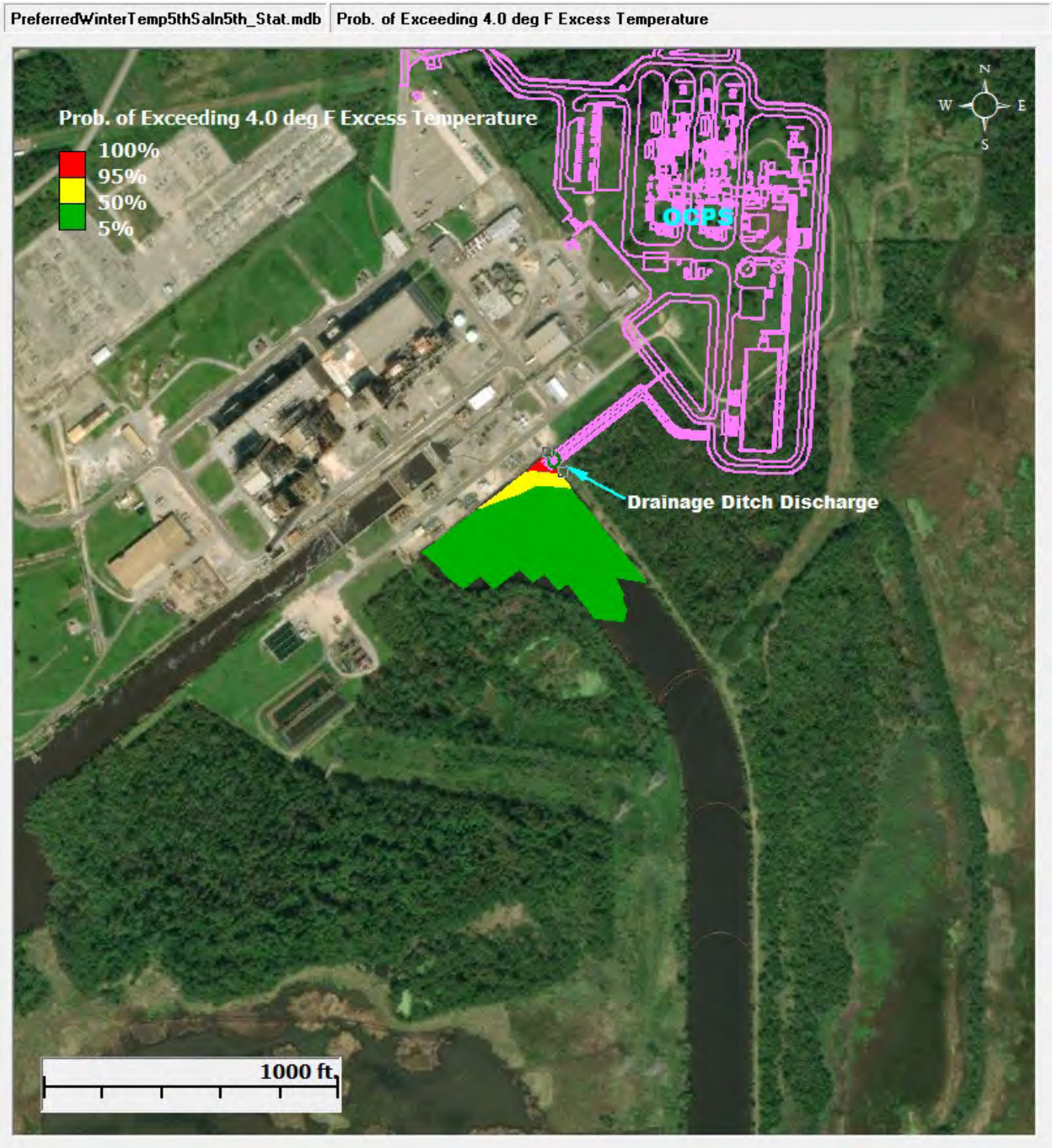


Figure 5-3: Winter (5th Percentile Salinity) 4 deg F Excess Temperature Exceedance Probability at Water Surface

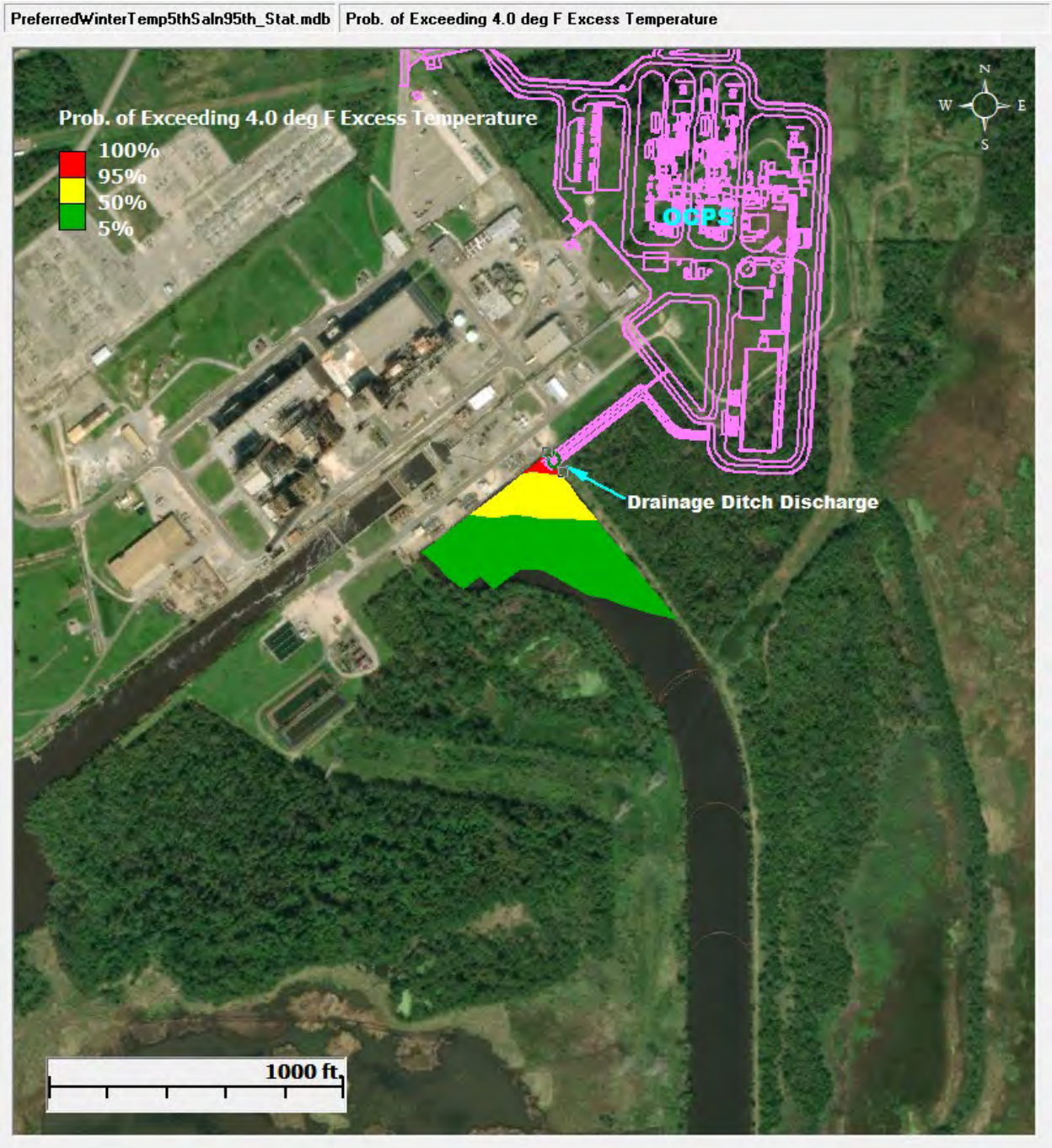


Figure 5-4: Winter (95th Percentile Salinity) 4 deg F Excess Temperature Exceedance Probability at Water Surface

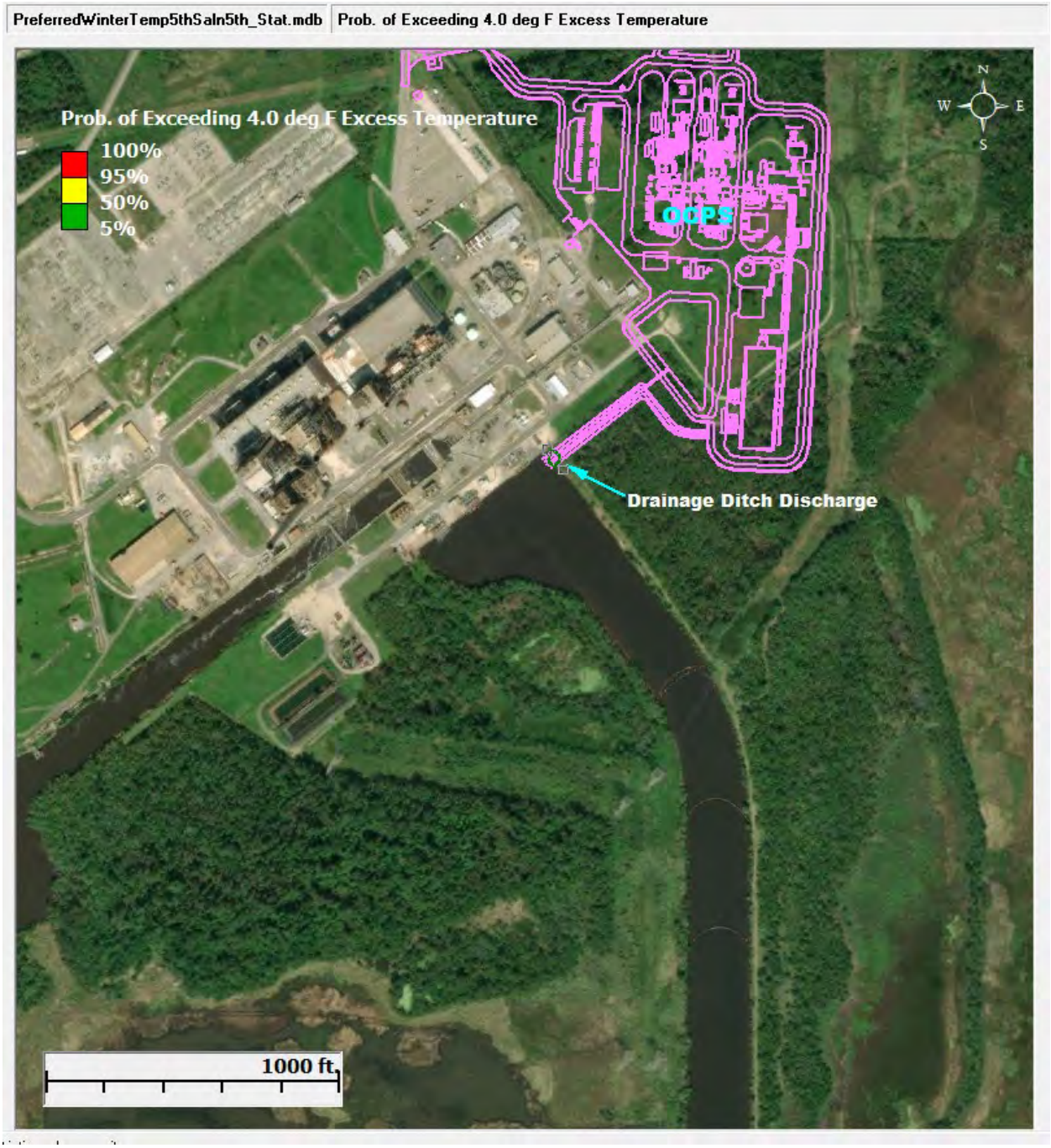


Figure 5-5: Winter (5th Percentile Salinity) 4 deg F Excess Temperature Exceedance Probability at Canal Bottom

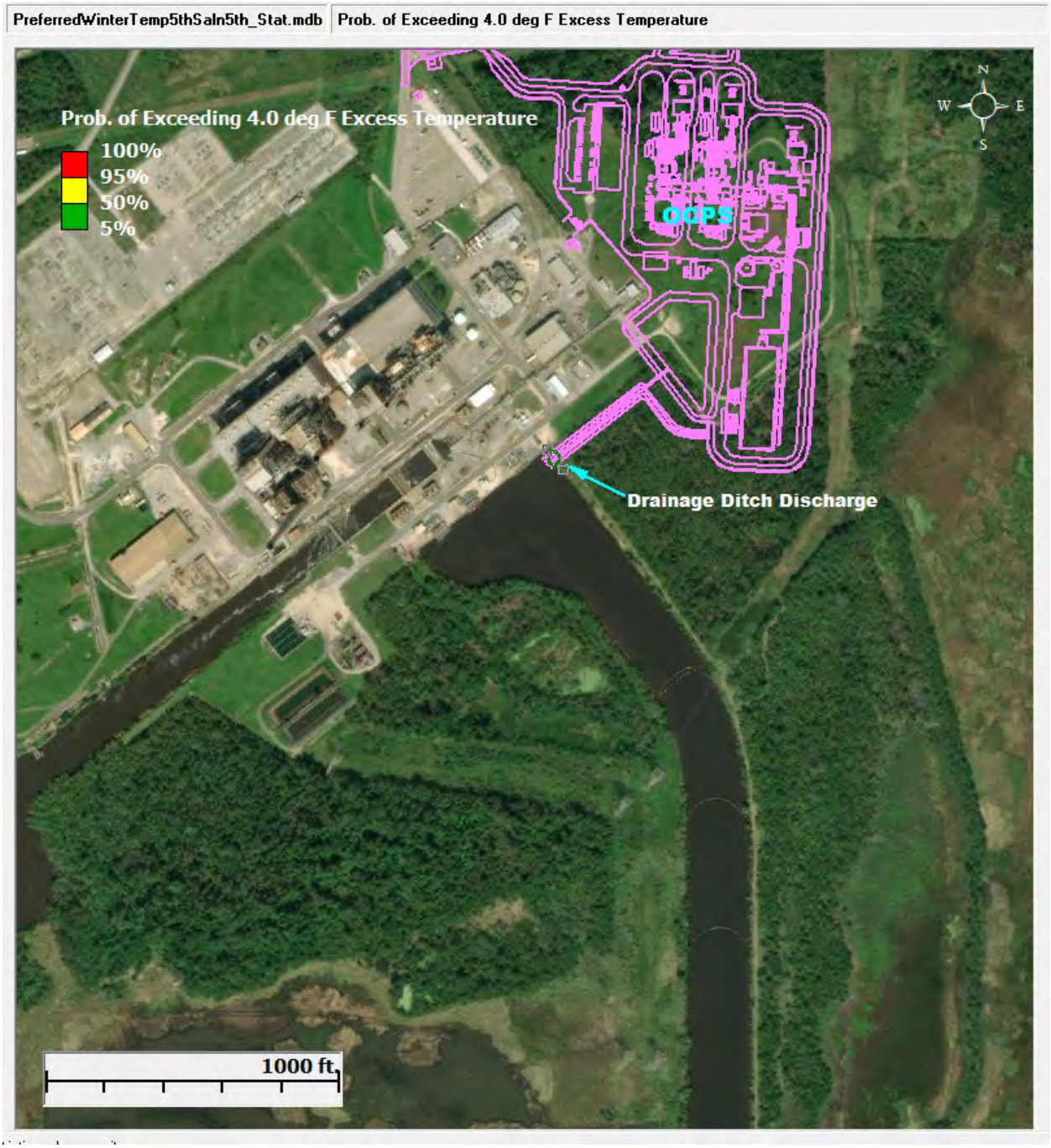


Figure 5-6: Winter (95th Percentile Salinity) 4 deg F Excess Temperature Exceedance Probability at Canal Bottom

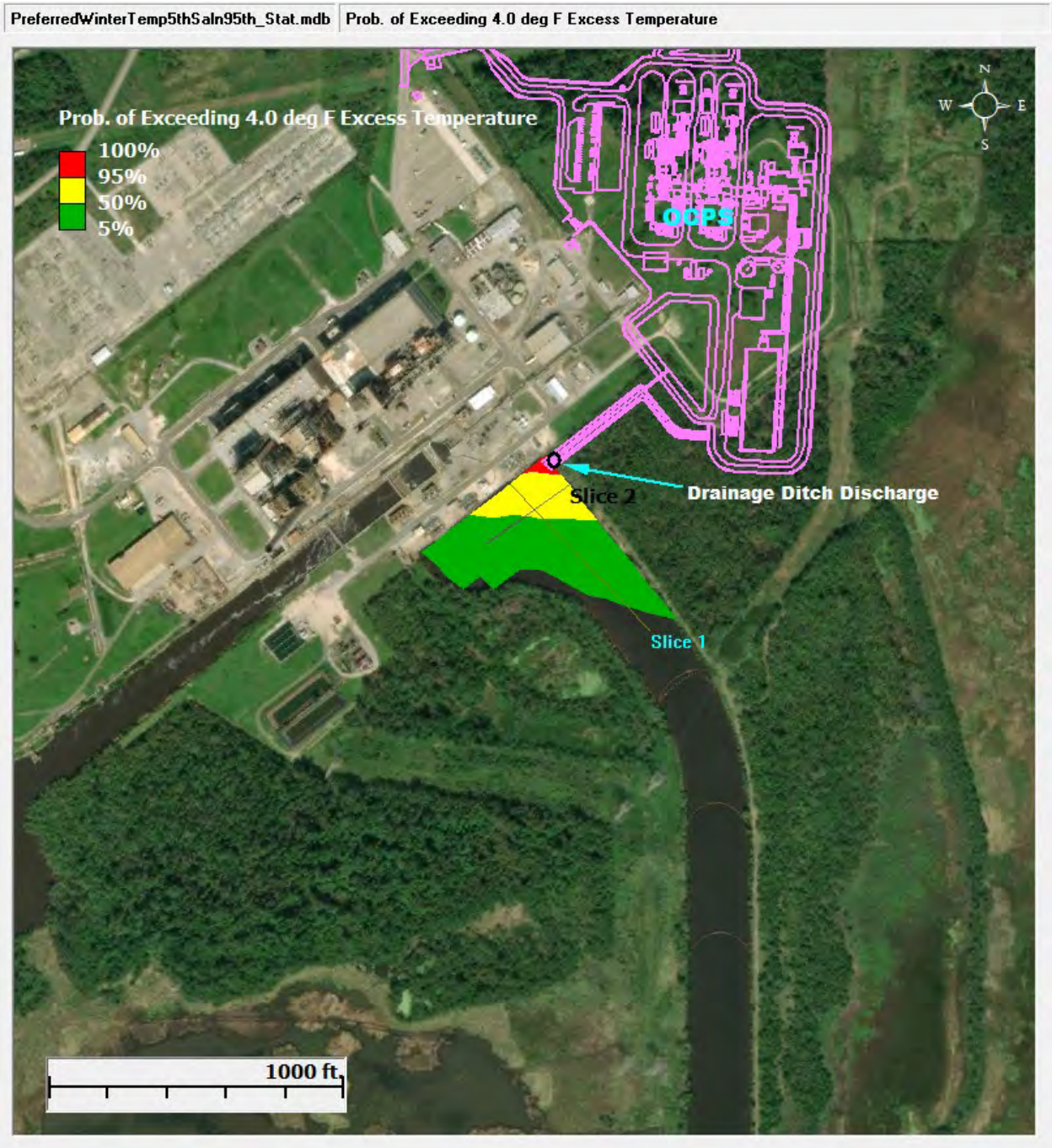
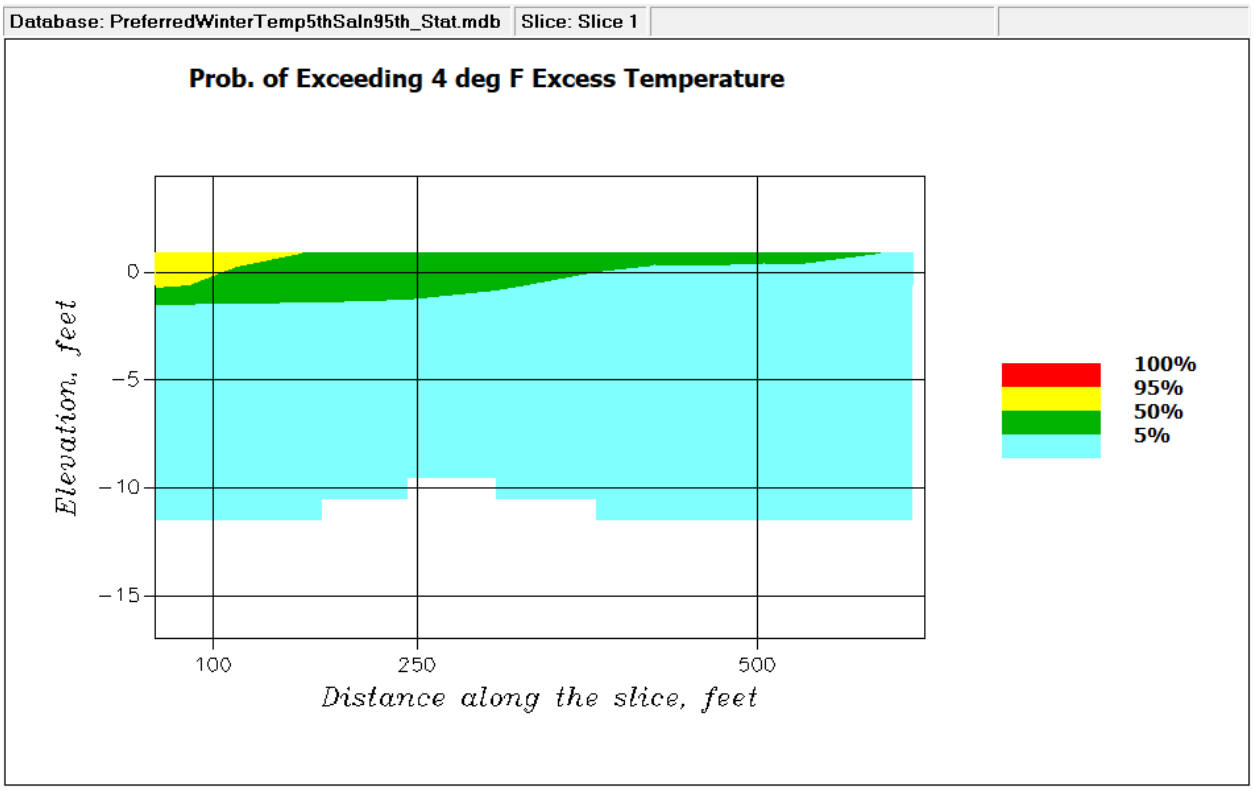
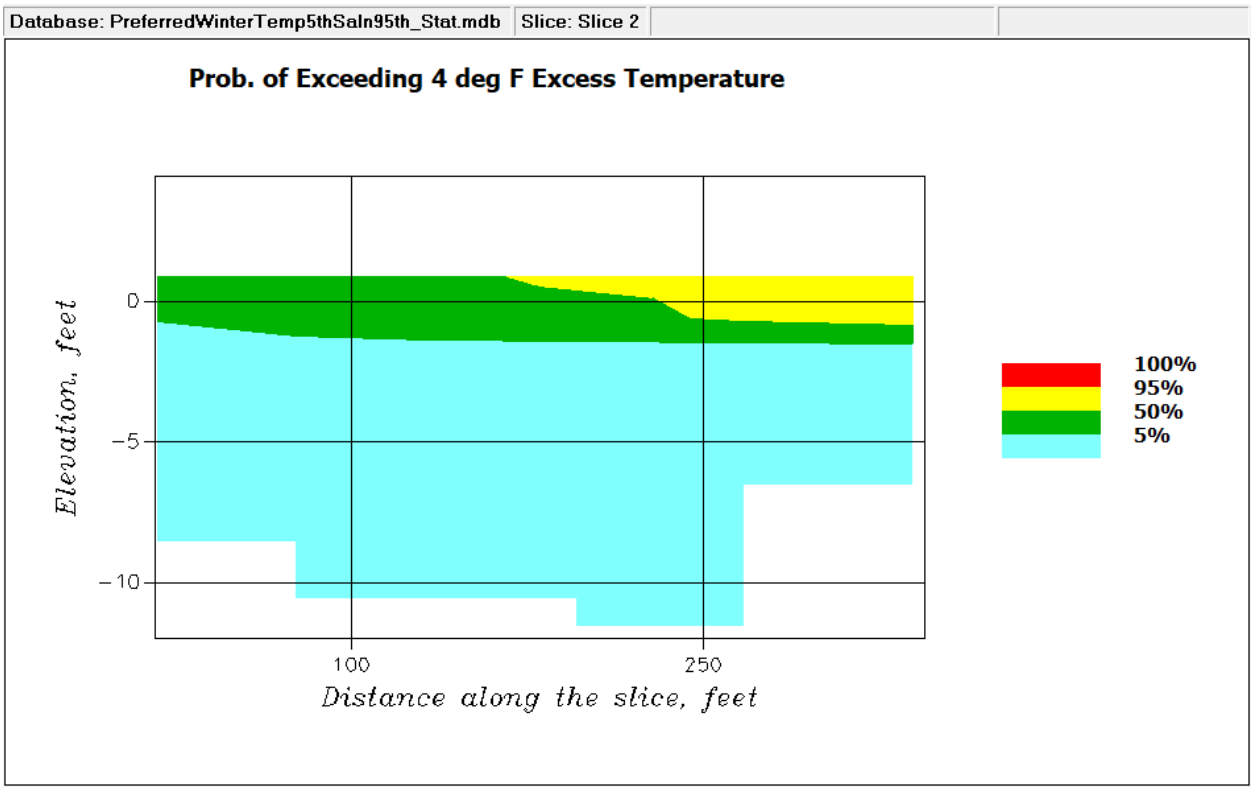


Figure 5-7: Winter (95th Percentile Salinity) 4 deg F Excess Temperature Exceedance Probability with Vertical Layer Slice Locations



Note: Light blue color depicts the actual cross-section along the selected slice.

Figure 5-8: Winter (95th Percentile Salinity) 4 deg F Excess Temperature Exceedance Probability at Vertical Layer Slice Location 1 (Lengthwise)



Note: Light blue color depicts the actual cross-section along the selected slice.

Figure 5-9: Winter (95th Percentile Salinity) 4 deg F Excess Temperature Exceedance Probability at Vertical Layer Slice Location 2 (Widthwise)

5.5 Summer Probability Results

The model results in both 5th percentile and 95th percentile temperature cases indicate that the 95 deg F is a more significant concern for the summer runs when comparing with the winter and spring runs. This is expected due to the higher discharge, ambient water and air temperature. Figure 5-10 and Figure 5-11 both show contours of 50% and 95% exceedance, however this impact is limited to a downstream distance of 80 to 200 ft. Figure 5-12 and Figure 5-13 indicate that the 1.5 deg F excess temperature exceedance occurs more than 50% of the time for an area of 260,000 ft.^{2} in the high salinity scenario to 288,500 ft.^{2} in the low salinity scenario. The exceedance occurs anywhere from 920 ft. to 1,030 ft. downstream for the 50% exceedance contour and 410 ft. to 500 ft. downstream for the 95% exceedance contour. As in previous scenario, the plumes are largest at the surface. Example plots showing the excess temperature probability along different cross-sections of the canal are provided for the worst case summer scenario in Figure 5-14, Figure 5-15 and Figure 5-16. These plots show the vertical extent of these plumes and provide further insight into the spread of the plume, both horizontally (along the selected slice) and vertically. As can be seen in these figures, the plume does not cover the entire cross-section providing zones of passage for aquatic resources, if needed.

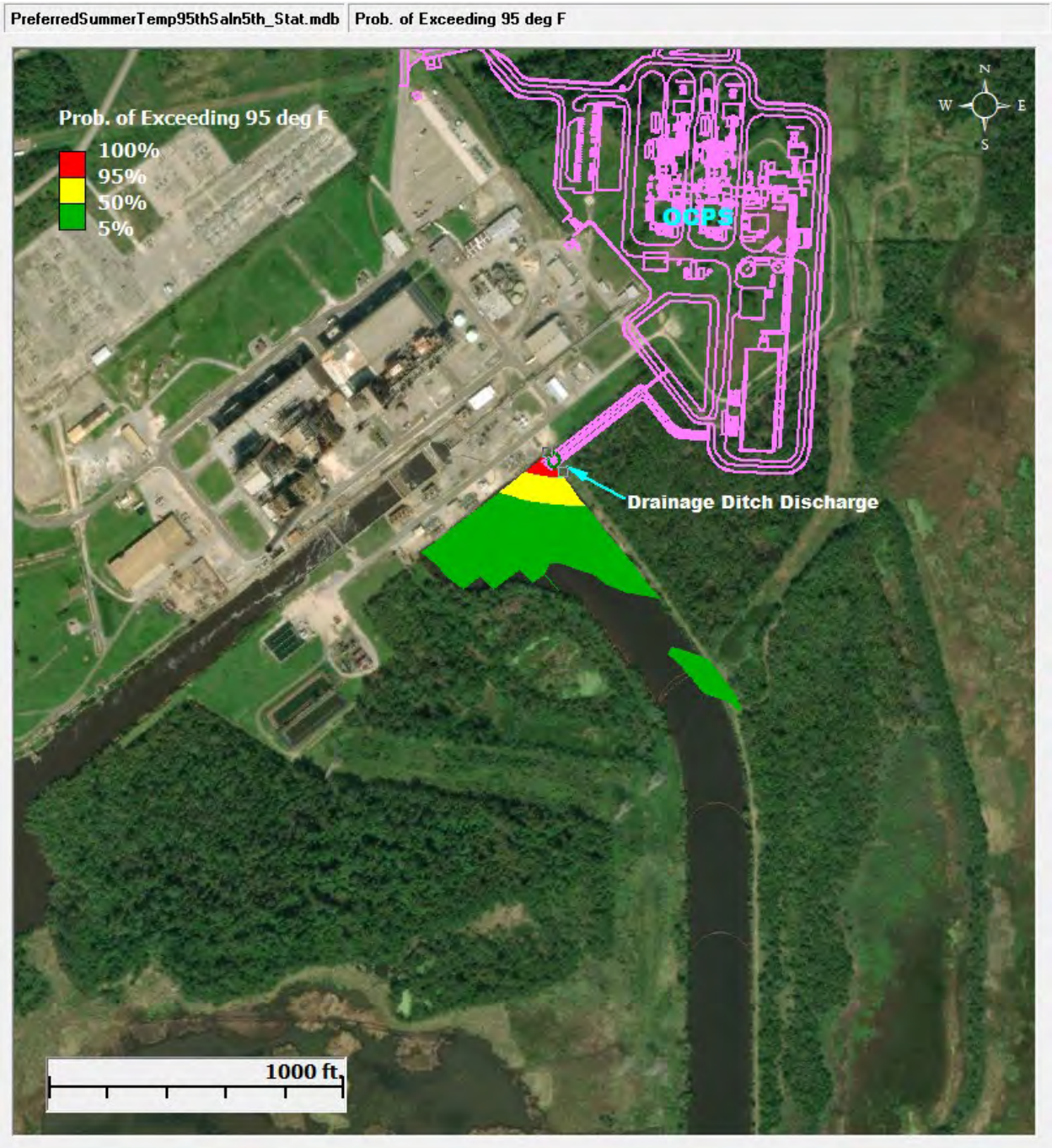


Figure 5-10: Summer (5th Percentile Salinity) 95 deg F Exceedance Probability at Water Surface

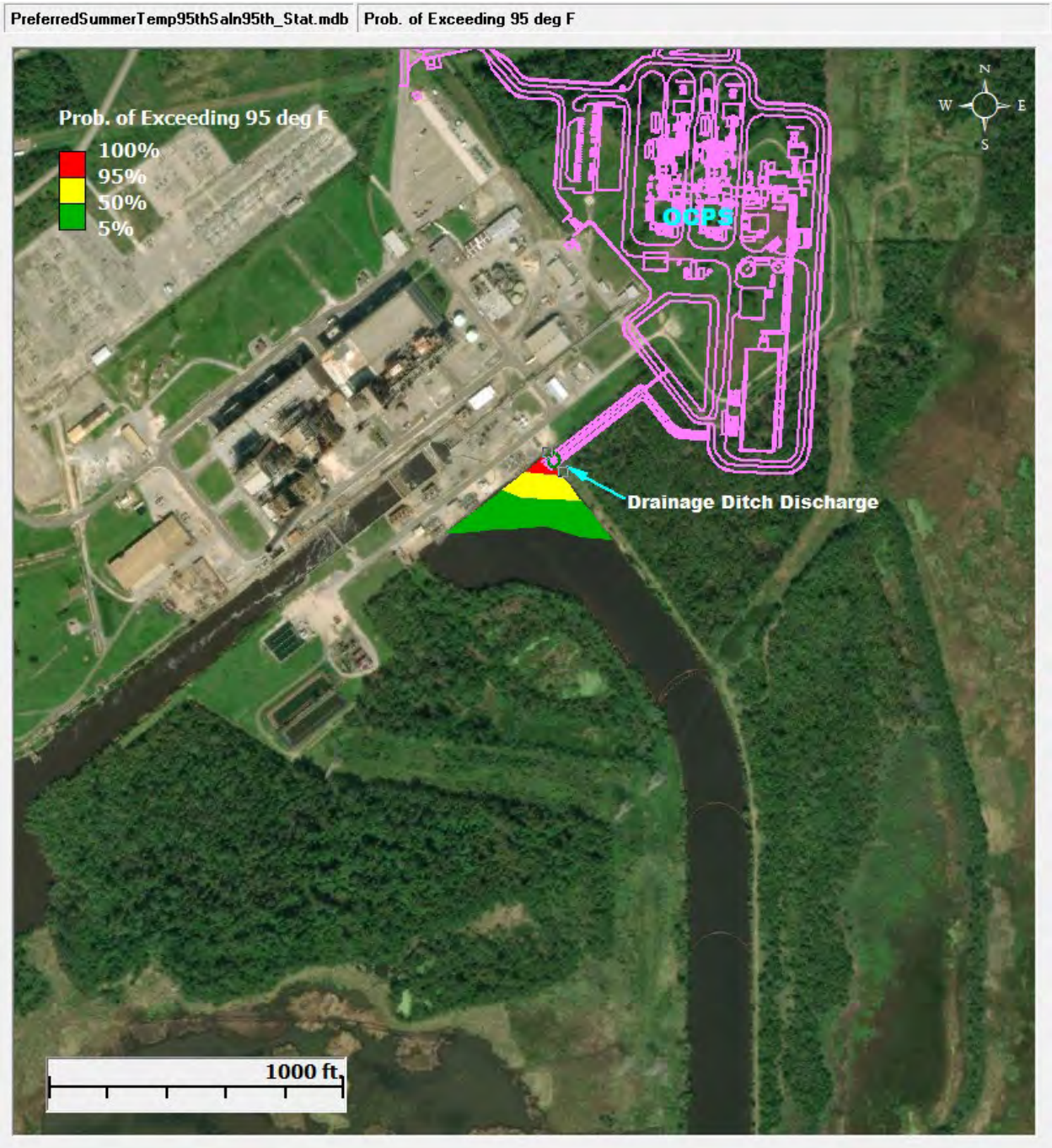


Figure 5-11: Summer (95th Percentile Salinity) 95 deg F Exceedance Probability at Water Surface

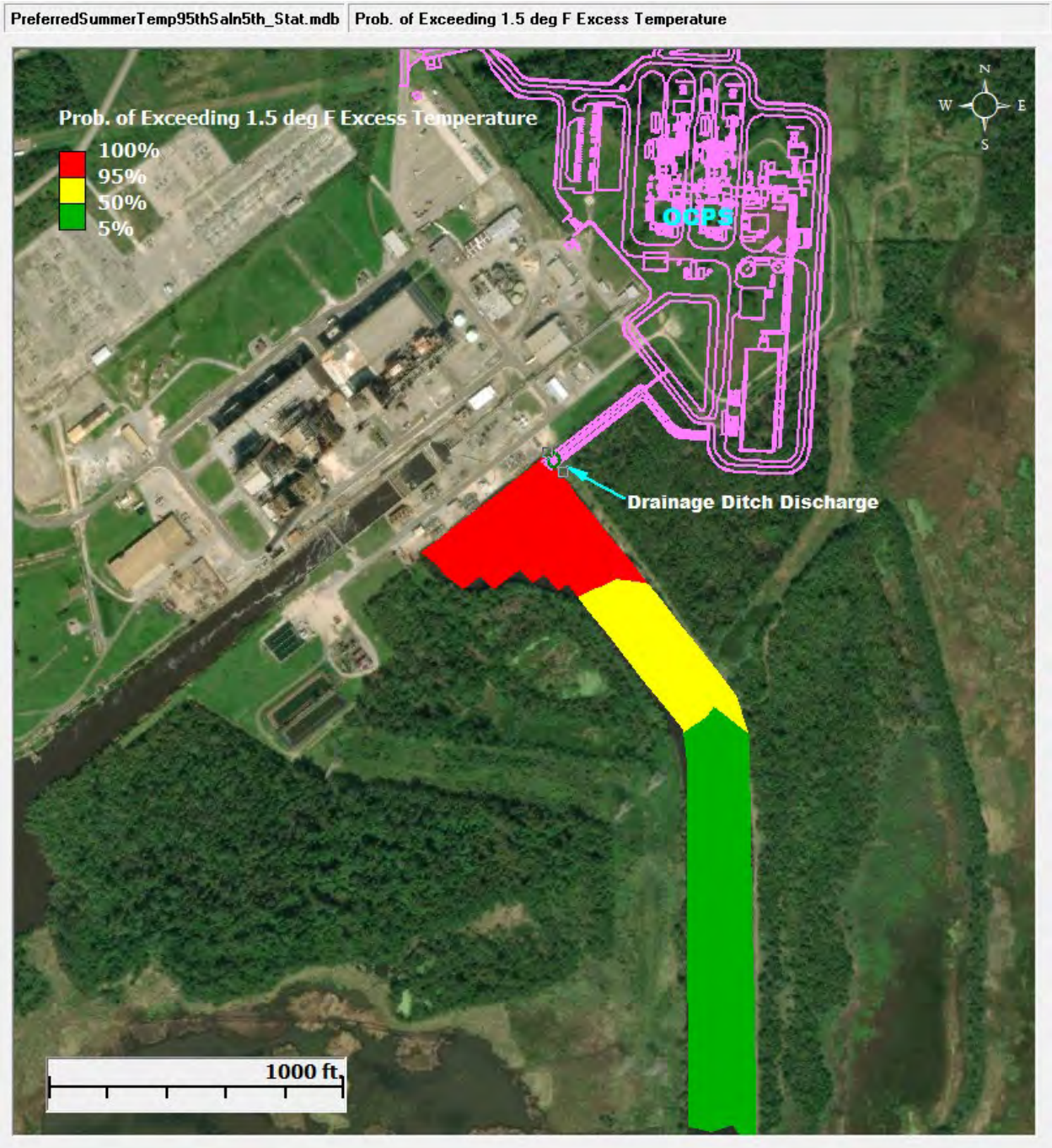


Figure 5-12: Summer (5th Percentile Salinity) 1.5 deg F Excess Temperature Exceedance Probability at Water Surface

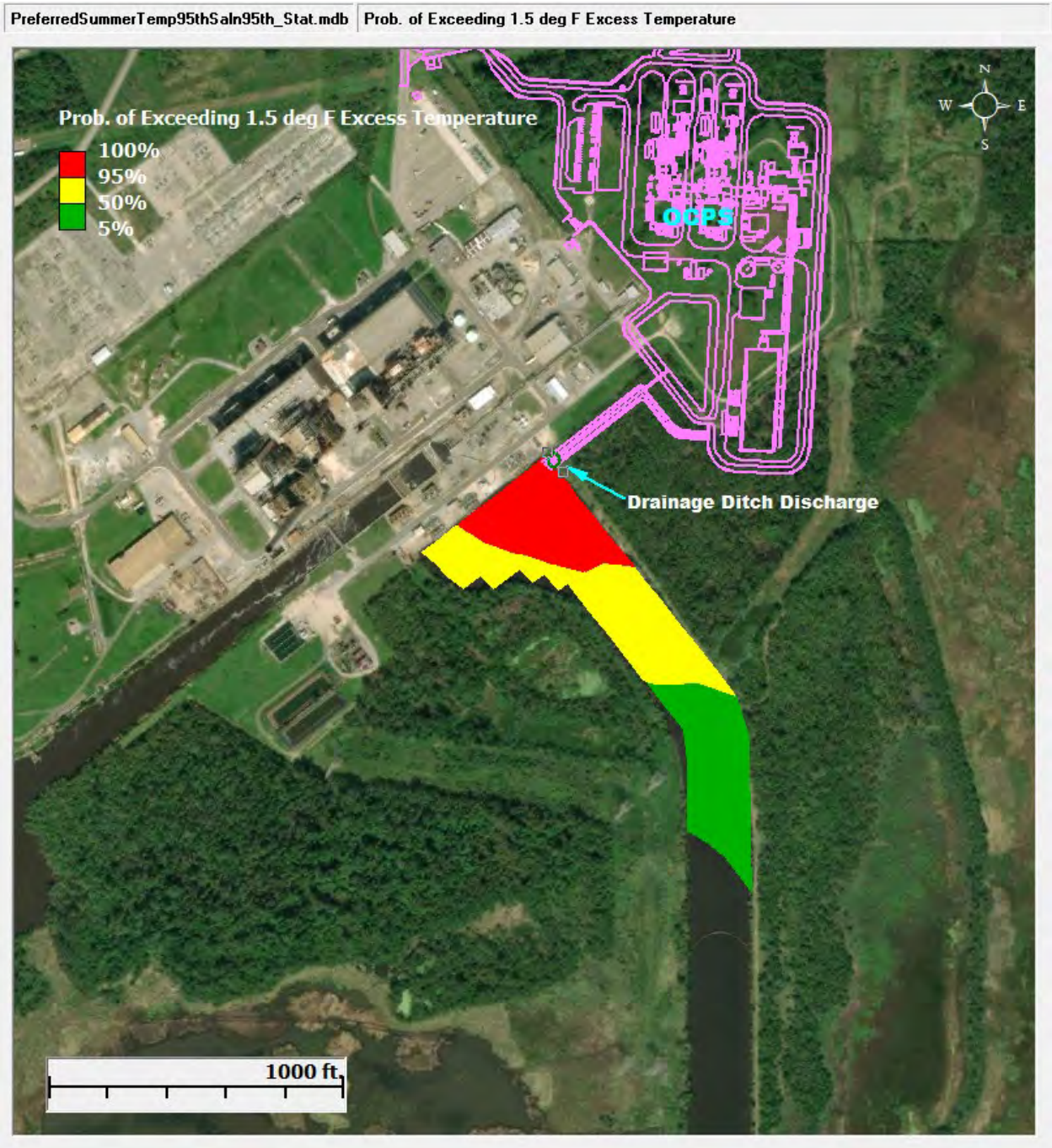


Figure 5-13: Summer (95th Percentile Salinity) 1.5 deg F Excess Temperature Exceedance Probability at Water Surface

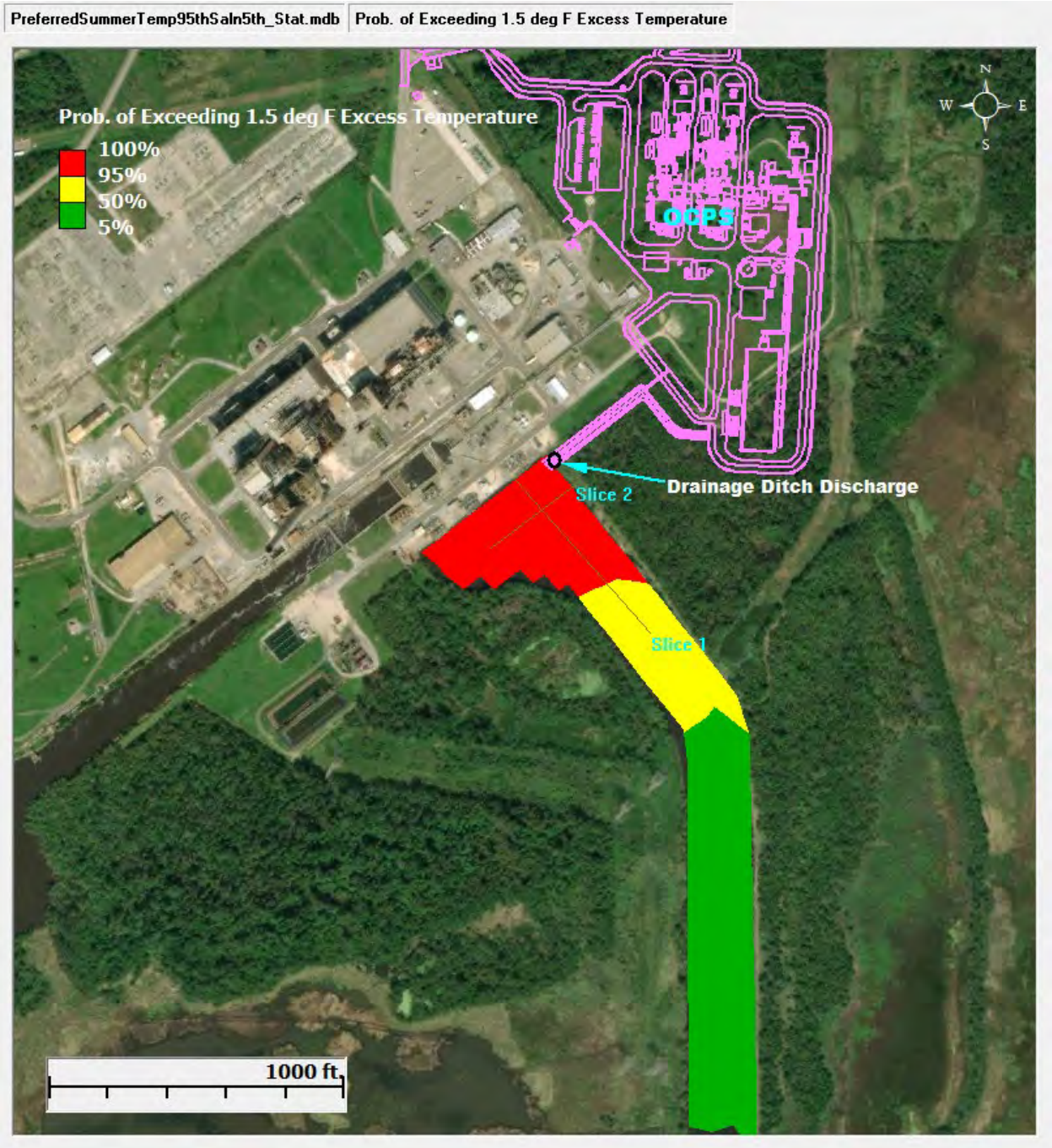
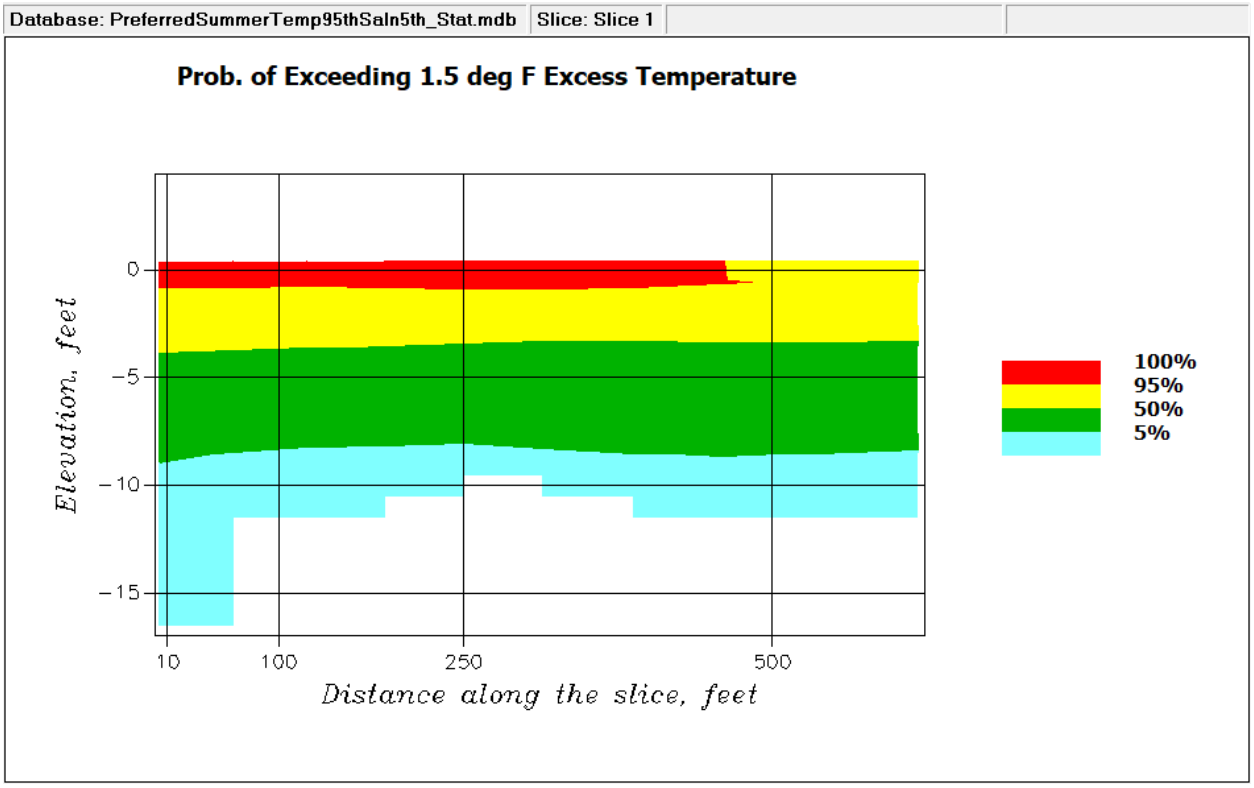
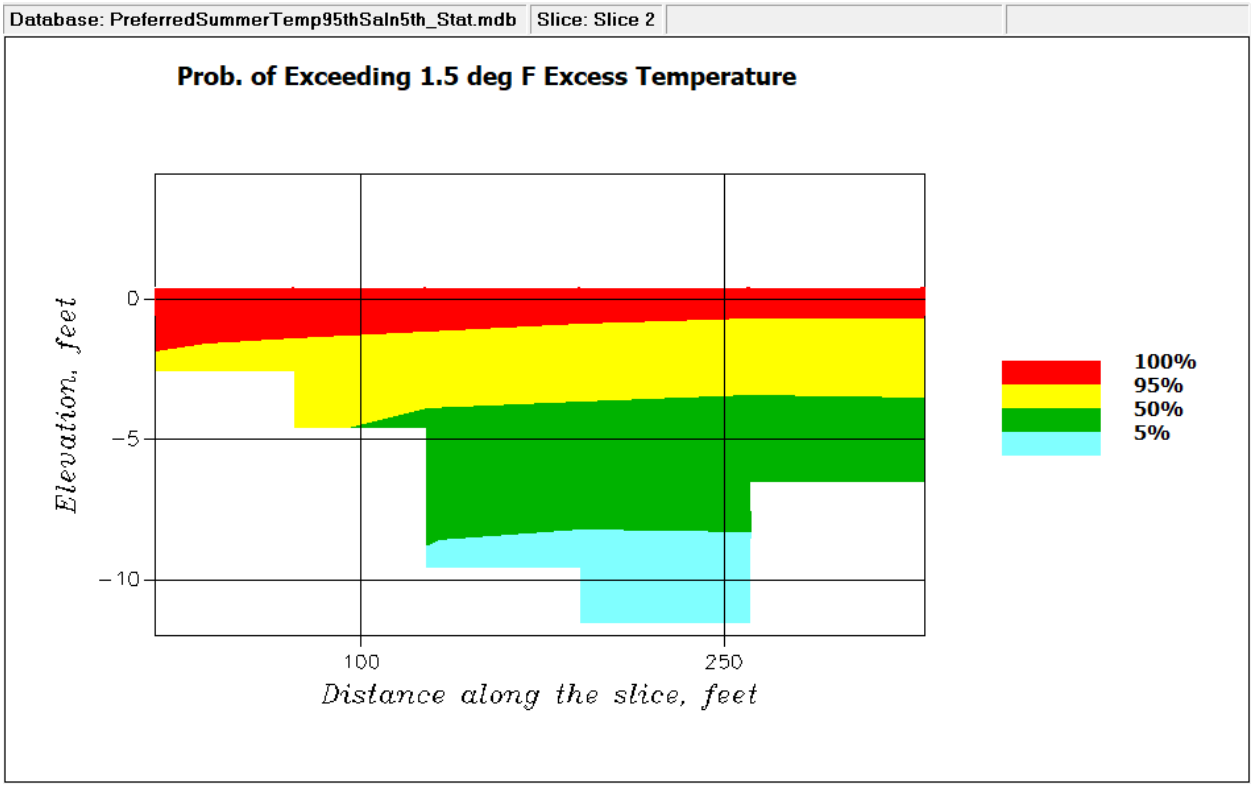


Figure 5-14: Summer (5th Percentile Salinity) 1.5 deg F Excess Temperature Exceedance Probability with Vertical Layer Slice Locations



Note: Light blue color depicts the actual cross-section along the selected slice.

Figure 5-15: Summer (5th Percentile Salinity) 1.5 deg F Excess Temperature Exceedance Probability at Vertical Layer Slice Location 1 (Lengthwise)



Note: Light blue color depicts the actual cross-section along the selected slice.

Figure 5-16: Summer (5th Percentile Salinity) 1.5 deg F Excess Temperature Exceedance Probability at Vertical Layer Slice Location 2 (Widthwise)

5.6 Modeling Conclusions

Modeling indicated the impacts of the thermal discharge are most extensive on the surface layer, with the size of the plume decreasing with depth. The most impacted location, which is the surface layer, was used for the demonstration of the thermal plume sizes. The primary findings of the modeling study are

- The thermal plume calculated by GEMSS shows that the 1.5°F isotherm for summer scenario can reach up to 1,030 ft. downstream while the 4.0°F isotherm for winter and spring can reach up to 330 ft. downstream more than 50% of the time. The largest plume distance is 7.5% of the total length of the Sabine Intake Canal. The plume's spatial extent is largest on the water surface due to the nature of the discharge configuration.
- In winter and spring scenario, the 95 deg F temperature limit is not a major concern due to the probability of exceedance being less than 5% aside from a relatively small area (7,800 ft.^{2}) near discharge location. In the summer scenario, the probability of 50% exceedance covers a spatial extent up to 19,000 ft.^{2}, due to elevated ambient water, ambient air and discharge temperature. Vertical cross-section plots show that the plume is limited to the first few feet of the entire cross-section providing zones of passage, if needed.
- When comparing the orders of magnitude of the results, the summer scenario provides the largest thermal plumes compared to winter or spring scenarios, both in terms of temperature and excess temperature. The likely buildup and stagnation of the plume causes it to occupy the width of the canal at times. However, these effects are limited to approximately the 1,100 ft. of the canal. Vertical cross-

section plots show that the plume does not cover the entire cross-section providing zones of passage, if needed.

6. DISCUSSION

The OCPS wastewater discharge is not expected to result in significant adverse impacts to the aquatic resources in the Sabine Intake Canal and is expected to have no significant effect on aquatic resources within Old River Cove and Sabine Lake.

Thermal discharge modeling indicates that even in the worst-case scenario, effects of the thermal plume from the OCPS discharge are expected to be limited to 1,100 feet from the discharge point, which represents less than 1/10th of the length of the portion of the Sabine Intake Canal upstream of Old River Cove. Additionally, the plume does not reach the canal bottom for the majority of this 1,100 feet, providing cooler water refuge or passage areas for mobile aquatic organisms. As aquatic resources acclimate to the discharge, species with lower thermal tolerances will avoid the discharge plume area during the summer and would utilize the abundance of other nearby suitable habitat within the canal, Old River Cove, or Sabine Lake. The Sabine Intake Canal will continue to be used as an industrial canal. It is expected that more than 90% of the habitat in the Sabine Intake Canal would meet TCEQ temperature criteria even during the worst-case scenario summer periods, therefore adverse effects to aquatic resources within the Sabine Intake Canal are expected to be minimal. The modeling indicates the elevated temperature plume would not extend an additional 2.5 miles to Old River Cove or Sabine Lake; therefore, no thermal impacts to aquatic resources or degradation of these habitats are expected to occur due to the temperature of the OCPS discharge.

Increased temperatures and stratification of the canal could result in lower dissolved oxygen levels in portions of the canal, however, these effects are expected to be limited to the initial 1,100 feet from the proposed discharge. Similar to temperature, the areas of lower dissolved oxygen will not extend throughout the entirety (i.e. depth) of the affected canal area; therefore, areas with higher oxygen levels will be available providing refuge areas for aquatic resources. Additionally, the Sabine Intake Canal experiences a daily tidal “flushing” effect that results in water coming in from Sabine Lake and mixing with the discharged wastewater in the canal to reduce the potential for depressed levels of dissolved oxygen within the canal. The modeling indicates the elevated temperature plume would not extend an additional 2.5 miles to Old River Cove or Sabine Lake; therefore, no degradation of these habitats or impacts to aquatic resources from lower levels of dissolved oxygen are expected to occur due to the OCPS wastewater discharge.

The pH of the OCPS discharge is expected to remain in the neutral range. Although the discharge may contain metal cleaning wastes, these wastes would be buffered prior to discharge to comply with the neutral pH range specified within the TPDES permit. As the OCPS wastewater discharge is not expected to result in significant changes in the pH of the water in the Sabine Intake Canal, Old River Cove, or Sabine Lake, no degradation of these habitats or impacts to aquatic resources from changes in pH are expected to occur.

The OCPS wastewater discharge will result in the introduction of low levels of some COCs to the Sabine Intake Canal. However, the discharge of these constituents will be monitored to remain in compliance with the discharge limits established by the TCEQ as part of the TPDES process that is designed to be protective of aquatic resources. Tidal flushing throughout the 4.1 mile-long Sabine Intake Canal will further dilute these COCs to significantly lower concentrations than that of the discharged effluent. It is not expected that COCs will result in degradation of habitats or impacts to aquatic resources in Old River Cove and Sabine Lake.

The Entergy Sabine Plant has been operating in the vicinity of Sabine Lake for nearly 60 years and has been discharging wastewater into the Neches River and Sabine Lake System with similar characteristics as the proposed OCPS discharges. Analysis of TPWD data indicates the productivity of aquatic resources, primarily fish and shellfish, in Sabine Lake has increased throughout recent decades, indicating that current wastewater discharges from Sabine have not had any adverse effects on Sabine Lake. The OCPS wastewater discharge is expected to be of similar or higher water quality and less volume of water when compared to that of the previously permitted Sabine Plant discharges. As the Sabine Plant discharge has not resulted in adverse impacts, similarly the OCPS discharge is not expected to result in adverse impacts to aquatic resources or degradation of habitats within Sabine Lake.

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