Appendix A

Notice of Preparation and
Scoping Comments

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Notice of Preparation

CITY OF LATHROP
NOTICE OF PREPARATION
OF AN ENVIRONMENTAL IMPACT REPORT
AND NOTICE OF PUBLIC SCOPING MEETING
FOR THE
LATHROP CONSOLIDATED TREATMENT FACILITY
SURFACE WATER DISCHARGE PROJECT

Date: November 14, 2019

To: Responsible Agencies, Trustee Agencies, and Interested Persons

Re: Notice of Preparation of a Draft Environmental Impact Report for the Lathrop Consolidated Treatment Facility Surface Water Discharge Project

Lead Agency: City of Lathrop

Contact: Glenn Gebhardt, City Engineer
390 Towne Centre Drive
Lathrop, CA 95330
(209) 941-7200
ggebhardt@ci.lathrop.ca.us

Comment Period: November 18, 2019 to December 17, 2019

In accordance with the provisions of the California Environmental Quality Act (CEQA), the City of Lathrop (City) has determined that the proposed Lathrop Consolidated Treatment Facility (CTF) Surface Water Discharge Project will require preparation of an Environmental Impact Report (EIR). The purpose of this Notice of Preparation (NOP) is to provide sufficient information describing the proposed project and the potential environmental effects to enable meaningful input related to the scope and content of information to be included in the EIR.

This NOP initiates the CEQA scoping process. The City will be the lead agency for preparation of the EIR. The State Water Resources Control Board may also use this EIR for issuance of State Revolving Funds (SRF) under an EPA-funded grant program. If the City seeks SRF funding, this EIR will also be prepared under the requirements for SRF funding, which means the EIR will also be used by federal agencies for their permitting process and will cover many of the issues needed to meet the requirements of the National Environmental Policy Act (NEPA).

Documents related to the EIR will be available for review on the City's website at https://www.ci.lathrop.ca.us/com-dev/page/public-review-documents.

PUBLIC REVIEW PERIOD

This NOP is being circulated for public review and comment for a period of 30 days beginning November 18, 2019. The City will hold a public scoping meeting to inform interested parties about the proposed project and to provide agencies and the public with an opportunity to provide comments on the scope and content of the EIR. The public scoping meeting will be held at Lathrop City Hall as follows:

Scoping Meeting:
Wednesday, December 4, 2019
2:00 p.m. to 3:00 p.m.
Lathrop City Hall, Council Chambers
390 Towne Centre Drive
Lathrop, CA 95330

Copies of the full Notice of Preparation may be reviewed online and in person at the following locations:

- Stockton-San Joaquin County Public Library–Lathrop Branch Library, 450 Spartan Way, Lathrop, CA 95330, during library hours;

- Lathrop City Hall, Front Counter in the Lobby; 390 Towne Centre Drive, Lathrop, CA 95330 between 8:00 a.m. and 6:00 p.m. Monday through Thursday or 8:00 a.m. and 5:00 p.m. on Friday; or

- Online at: https://www.ci.lathrop.ca.us/com-dev/page/public-review-documents.

Your views and comments on how the project may affect the environment are welcomed. Please contact Mr. Gebhardt if you have any questions about the environmental review process for the Lathrop CTF Surface Water Discharge Project.

PROVIDING COMMENTS ON THIS NOTICE OF PREPARATION

Written and/or email comments on the NOP should be provided at the earliest possible date, but must be received by no later than 5:00 p.m. on Tuesday, December 17, 2019. Please send all comments on the NOP to:

City of Lathrop
Attn: Glenn Gebhardt, City Engineer
390 Towne Centre Drive
Lathrop, CA 95330
Email: website_pwk@ci.lathrop.ca.us

If you are from an agency that will need to consider the EIR when deciding whether to issue permits or other approvals for the project, please provide the name of a contact person. Comments provided by email should include the name and mailing address (e-mail or physical) of the commenter in the body of the email.

Focus of Input

The City relies on responsible and trustee agencies to provide information relevant to the analysis of resources falling within its jurisdiction. The City encourages input for the proposed EIR, with a focus on the following topics:

Scope of Environmental Analysis. Guidance on the scope of analysis for this EIR, including identification of specific issues that will require closer study due to the location, scale, and character of the Lathrop CTF Surface Water Discharge Project;

Mitigation Measures. Ideas for feasible mitigation that could potentially be imposed by the City to avoid, eliminate, or reduce potentially significant or significant impacts;

Alternatives. Suggestions for alternatives to the Lathrop CTF Surface Water Discharge Project that could potentially reduce or avoid potentially significant or significant impacts; and

Interested Parties. Identification of public agencies, public and private groups, and individuals that the City should notice regarding this Lathrop CTF Surface Water Discharge Project and the accompanying EIR.

PROJECT LOCATION

Lathrop is located within the Interstate 5 (I-5) corridor, within an approximately 50-minute drive (or less) of the cities of Tracy, Manteca, Stockton, Lodi, Modesto, Livermore, and Pleasanton (Figure 1). Lathrop has an estimated population of approximately 23,000[1] and is considered one of northern California's fastest growing master planned communities.

Elements of the project would be constructed: (1) at the City's existing CTF, located on 54 acres of City-owned land at 18800 Christopher Way, Lathrop, CA; (2) along the right bank or bottom of the San Joaquin River approximately 0.6 mile downstream of the I-5 overcrossing; and (3) along roadways in Lathrop between the CTF and the San Joaquin River, potentially including, Tesla Drive, Harlan Road, Manthey Road, Sadler Oak, and Inland Passage Way.

BACKGROUND AND NEED

Wastewater from the City is treated at two separate facilities, the City of Manteca (Manteca) Water Quality Control Facility (WQCF) and the City's CTF. Treated wastewater effluent from the Manteca WQCF is primarily disposed of via discharge to the San Joaquin River at river mile 57. Treated wastewater effluent from the CTF is currently stored in ponds and used for urban and agricultural irrigation.

Currently, the City has 10 storage ponds, one percolation pond and approximately 297 acres of urban and agricultural irrigation area for storage and use of treated effluent. However, all this land is designated under the City General Plan for some form of urban development and keeping this land for effluent storage and disposal precludes the ability of the City to fulfill its General Plan land use vision. Therefore, the City is seeking to discharge treated effluent to the San Joaquin River. The CTF produces treated effluent that meets the requirements for disinfected tertiary recycled water in accordance with Title 22 of the California Code of Regulations, and the City plans to use CTF recycled water for landscape irrigation as the City is developed. The majority of CTF effluent would be discharged to the San Joaquin River during the winter, non-irrigation period (when river flow is relatively high) and less would be discharged in the irrigation season, during which CTF recycled water would be used for landscape irrigation. This would allow land designated under the General Plan for urban uses to be developed as such.

PROJECT DESCRIPTION

The proposed project would repurpose approximately 1.1 miles of existing recycled water pipeline or construct approximately 1.7 miles of new effluent pipeline within City rights-of-way, and install a new river side-bank or bottom-diffuser outfall to discharge excess tertiary-treated, disinfected, and dechlorinated effluent from the CTF to the San Joaquin River during periods when demand for recycled water is low or zero. The City would continue to send East Lathrop wastewater to the Manteca WQCF for treatment and disposal. Construction of the proposed project is expected to begin in Spring 2021 and be completed within approximately 24 to 30 months.

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[1] U.S. Census Bureau. 2019. Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2018. Released by the U.S. Census Bureau, Population Division, May 2019. Available: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF. Accessed November 4, 2019.

Source: Prepared by Ascent Environmental in 2019

Figure 1 Project Location and Vicinity

RESPONSIBLE AGENCIES

For the purposes of CEQA, the term "Responsible Agency" includes all public agencies (other than federal agencies) other than the Lead Agency that have discretionary approval power over the project (CEQA Guidelines Section 15381). Discretionary approval power may include such actions as issuance of a permit, authorization, or easement needed to complete some aspect of the proposed project. Responsible agencies may include, but are not limited to, the following:

- California Department of Transportation (Caltrans) – Encroachment permit for placement of encroachments within, under, or over the State highway rights-of-way
- California State Water Resources Control Board (SWRCB) ¬ Potential approval of Clean Water State Revolving Fund loan
- California Department of Fish and Wildlife (CDFW) ¬ Section 1602 Streambed Alteration Agreement; California Endangered Species Act incidental take permit authorizations
- Central Valley Flood Protection Board – Encroachment permit for work in the floodway
- Central Valley Regional Water Quality Control Board (CVRWQCB) – Clean Water Act Section 401 water quality certification; and Clean Water Act Section 402 National Pollutant Discharge Elimination System permit
- Reclamation District (RD) 17 – District Permit Agreement for construction and maintenance of facilities affecting the RD 17 levee system
- San Joaquin Valley Air Pollution Control District (SJVAPCD) – Authority to Construct/Permit to Operate
- Union Pacific Railroad (UPRR) – Encroachment permit for placement of encroachments within, under, or over the UPRR rights-of-way

In addition, the following federal agencies may use this EIR for consideration of permits and approvals:

- National Marine Fisheries Service (NMFS) – Endangered Species Act (ESA) Section 7 consultation; Magnuson-Stevens Fisheries Conservation Management Act Section 305(b) consultation
- U.S. Army Corps of Engineers (USACE) – Clean Water Act Section 404 permit for discharge of fill to Waters of the U.S.; Rivers and Harbors Act Section 10 Permit for construction in navigable waterways; and 33 USC Section 408 authorization or categorical permission for alteration of a Federal Project levee
- U.S. Fish and Wildlife Service (USFWS) – Endangered Species Act (ESA) Section 7 consultation

POTENTIAL ENVIRONMENTAL EFFECTS

The City has determined that the proposed Project may have a significant effect on the environmental, and therefore, an EIR should be prepared. As required by CEQA, the EIR will describe existing conditions and evaluate the potential environmental effects of the proposed project and a reasonable range of alternatives, including the no-project alternative. It will address direct, indirect, and cumulative effects. The EIR will also discuss potential growth-inducing impacts and summarize significant and unavoidable environmental effects. The EIR will identify feasible mitigation measures, if available, to reduce potentially significant impacts. The EIR will focus on the potentially significant environmental impacts of the project. At this time, the City has identified a potential for environmental effects in the areas identified below.

Air Quality. The analysis will address short-term construction-related and long-term operations-related increases in criteria air pollutants and precursors (e.g., reactive organic gases [ROG], oxides of nitrogen [NOX], respirable particulate matter [PM10], and fine particulate matter [PM2.5]). The analysis will also assess the potential for construction- and operations-related toxic air contaminants (TACs) to result in levels of health risk exposure at off-site sensitive receptors. This analysis will focus on diesel particulate emitted by heavy equipment during project construction, and any additional trucks serving the project during operations. The potential for off-site receptors to be exposed to odors from pump stations will also be evaluated.

Biological Resources. The analysis will evaluate potential direct and indirect impacts on biological resources, including riparian habitat, special-status fish, and other terrestrial and aquatic resources, that could result from implementation of the proposed project. The analysis will include modeling of effluent discharge into the San Joaquin River, and the effect of discharge on river temperature and water quality.

Cultural Resources and Tribal Cultural Resources. A record search will be conducted at the Central California Information Center and pedestrian surveys of areas proposed for ground disturbance will be conducted by a qualified archaeologist. Any tribal or other cultural resources that are known or have the potential to occur on the project site will be assessed, and the potential impacts that may occur to known and unanticipated resources because of project implementation will be evaluated. The EIR will also document the results of required consultation and any agreements on mitigation measures for California Tribal Cultural Resources.

Energy. The levels of electricity, natural gas, propane, gasoline, and diesel consumed in the construction and operation of the project will be estimated, and whether the project would result in the wasteful use of energy will be determined.

Paleontological Resources. The analysis will assess the potential for unique paleontological resources to occur on the project site, and the potential for project-related construction or operations to impact these resources.

Greenhouse Gases and Climate Change. The analysis will evaluate the project's consistency with California's GHG reduction goals and related regulations and policies, and will determine whether project-generated GHG emissions would be a cumulatively considerable contribution to the global impact of climate change.

Hazards and Hazardous Materials. The analysis will address the potential for project-related construction and operations to create a significant hazard to the public or the environment through use of hazardous materials, or cause reasonably foreseeable upset and accident conditions involving the release of hazardous materials.

Hydrology and Water Quality. The analysis will describe the existing drainage and water quality conditions of the site, provide a description of the applicable regulatory environment, and evaluate the project's hydrology and water quality impacts including: short-term construction-related effects; permanent stormwater changes; impacts to surface water quality; impacts to groundwater quality and quantity; and cumulative on- and off-site impacts. The analysis will also evaluate any effects on flows in the San Joaquin River, including from installation of any in-river facilities. The analysis will also evaluate the potential effects on beneficial uses of the San Joaquin River, including for drinking water, associated with discharge of treated effluent.

Noise and Vibration. The analysis will include information on the location of existing sensitive receptors, ambient noise levels, and natural factors that relate to the attenuation thereof. Noise and vibration impacts that would be anticipated to occur with construction and operational activities associated with the proposed project will be assessed.

Transportation. The analysis will not affect any long-term traffic as it would not add substantial trips on roadways surrounding the CTF. The analysis will qualitatively address vehicle miles traveled associated with construction activities.

Utilities and Service Systems. The EIR will discuss the potential need for electric utility improvements/extensions at/near the project site as a result of project implementation based on review of project plans. No other utilities would be affected by the project and the EIR will not include analysis of any other utility issues.

Growth-Inducement. The project would remove the need to dedicate farmland used for sprayfields, and would allow planned and approved urban development on those lands. The EIR will evaluate the effects of the removal of this barrier to growth, including whether it would facilitate unplanned growth and its effects.

ISSUES TO BE SCOPED OUT OF THE ANALYSIS IN THE EIR

The City anticipates that the following environmental issues would result in less-than-significant or no impacts and will not be discussed in the EIR for the reasons discussed below.

Aesthetics. All project facilities, except minor infrastructure such as pump stations, would be constructed below ground. Pump stations would be located in areas that are already planned for development. The effluent discharge location is already the site of a stormwater discharge pipe. Therefore, no significant effects to visual resources would be expected and this issue will not be discussed in the EIR.

Agriculture and Forestry Resources. No important farmland, Williamson Act contract lands, forest land, or timberland exists on the Project site. Therefore, the project would not directly remove agriculture or forestry resources, and this issue will not be discussed in the EIR. The project would remove an existing impediment to planned growth because the surface water discharge would provide an alternative method of disposal of treated effluent that would otherwise require application to agricultural land. Consequently, the project may result in the indirect conversion of agricultural land to nonagricultural use. However, this land is designated in the Lathrop General Plan for urban development, and this impact was previously addressed in the River Islands at Lathrop Project Subsequent EIR[2], which is incorporated herein by reference. That EIR was certified and the City of Lathrop accepted the impacts to agricultural resources in its approval of the subject project.

Geology and Soils. The proposed project would be designed and constructed to meet California Building Code requirements to avoid potentially significant impacts related to seismic events and soil stability. Also, the Project would not involve the construction or use of septic tanks or alternative wastewater disposal systems. Therefore, issues related to geology and soils will not be discussed in the EIR.

Landslides. Based on the topography (relatively flat) of the project area, there would be no impact related to landslides. Therefore, this impact will not be discussed in the EIR.

Land Use. Project implementation would not affect any land use designations and would not physically divide a community. In fact, the project would remove physical barriers (storage ponds and sprayfield areas) to a cohesive community. Therefore, this issue will not be discussed in the EIR.

Mineral Resources. The Project site is not used for mineral extraction, nor is it designated as an important mineral recovery site. Therefore, the project would not have the potential to impact mineral resources, and this issue will not be discussed in the EIR.

Population and Housing. The Project would not contribute to unplanned growth and would not displace existing people or housing. Therefore, the project would have no impact on population and housing, and this issue will not be discussed in the EIR.

Public Services. The Project would not cause the need for or result in the addition of new government facilities or physically alter existing government facilities such that service ratios, response times, or other performance objectives for fire protection, police protection, schools, parks or other public facilities would be impacted. Therefore, this issue will not be discussed in the EIR.

Recreation. The Project would not contribute to unplanned growth and would not include new housing that would increase the use of existing recreational facilities or demand for new recreational facilities that would

[2] City of Lathrop. 2003. *River Islands at Lathrop Project Subsequent EIR.* State Clearinghouse No. 1993112027. Lathrop, CA. Prepared by Ascent Environmental, Inc., Sacramento, CA.

adversely affect the environment. Therefore, the project would have no impact on recreation, and this issue will not be discussed in the EIR.

Wildfire. The Project site is not located in or near a state responsibility area or lands classified as a very high fire hazard severity zone. Therefore, there would be no impact related to wildfire, and this issue will not be discussed in the EIR.

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Scoping Comments

Lathrop Surface Water Discharge Oral Scoping Meeting Comments

1. Did the General Plan EIR consider loss of agricultural land currently used for storage and land application with implementation of a surface water discharge? If not, this should be addressed in this EIR.
2. The 2045 buildout projections in the Regionalization Report use a 2045 planning horizon. If the Regionalization Study planning horizon is used and is different than the planning horizon for the General Plan, consider appropriateness of relying on General Plan EIR for CEQA coverage.
3. Consider water rights implications. The City may want to reduce the surface discharge in the future to maximize water reuse.
4. Address how the discharge may affect flood stage. Will the discharge be restricted when the river is at flood stage?

NATIVE AMERICAN HERITAGE COMMISSION
Cultural and Environmental Department
1550 Harbor Blvd., Suite 100
West Sacramento, CA 95691 Phone: (916) 373-3710
Email: nahc@nahc.ca.gov
Website: http://www.nahc.ca.gov

November 18, 2019

Glenn Gebhardt
Lathrop, City of
390 Towne Centre Drive
Lathrop, CA 95330

RE: SCH# 2019110339, Lathrop Consolidated Treatment Facility Surface Water Discharge Project, San Joaquin County

Dear Mr. Gebhardt:

The Native American Heritage Commission (NAHC) has received the Notice of Preparation (NOP), Draft Environmental Impact Report (DEIR) or Early Consultation for the project referenced above. The California Environmental Quality Act (CEQA) (Pub. Resources Code §21000 et seq.), specifically Public Resources Code §21084.1, states that a project that may cause a substantial adverse change in the significance of a historical resource, is a project that may have a significant effect on the environment. (Pub. Resources Code § 21084.1; Cal. Code Regs., tit.14, §15064.5 (b) (CEQA Guidelines §15064.5 (b)). If there is substantial evidence, in light of the whole record before a lead agency, that a project may have a significant effect on the environment, an Environmental Impact Report (EIR) shall be prepared. (Pub. Resources Code §21080 (d); Cal. Code Regs., tit. 14, § 5064 subd.(a)(1) (CEQA Guidelines §15064 (a)(1)). In order to determine whether a project will cause a substantial adverse change in the significance of a historical resource, a lead agency will need to determine whether there are historical resources within the area of potential effect (APE).

CEQA was amended significantly in 2014. Assembly Bill 52 (Gatto, Chapter 532, Statutes of 2014) (AB 52) amended CEQA to create a separate category of cultural resources, "tribal cultural resources" (Pub. Resources Code §21074) and provides that a project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment. (Pub. Resources Code §21084.2). Public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource. (Pub. Resources Code §21084.3 (a)). **AB 52 applies to any project for which a notice of preparation, a notice of negative declaration, or a mitigated negative declaration is filed on or after July 1, 2015.** If your project involves the adoption of or amendment to a general plan or a specific plan, or the designation or proposed designation of open space, on or after March 1, 2005, it may also be subject to Senate Bill 18 (Burton, Chapter 905, Statutes of 2004) (SB 18). **Both SB 18 and AB 52 have tribal consultation requirements**. If your project is also subject to the federal National Environmental Policy Act (42 U.S.C. § 4321 et seq.) (NEPA), the tribal consultation requirements of Section 106 of the National Historic Preservation Act of 1966 (154 U.S.C. 300101, 36 C.F.R. §800 et seq.) may also apply.

The NAHC recommends consultation with California Native American tribes that are traditionally and culturally affiliated with the geographic area of your proposed project as early as possible in order to avoid inadvertent discoveries of Native American human remains and best protect tribal cultural resources. Below is a brief summary of portions of AB 52 and SB 18 as well as the NAHC's recommendations for conducting cultural resources assessments.

Consult your legal counsel about compliance with AB 52 and SB 18 as well as compliance with any other applicable laws.

AB 52

AB 52 has added to CEQA the additional requirements listed below, along with many other requirements:

1. Fourteen Day Period to Provide Notice of Completion of an Application/Decision to Undertake a Project: Within fourteen (14) days of determining that an application for a project is complete or of a decision by a public agency to undertake a project, a lead agency shall provide formal notification to a designated contact of, or tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice, to be accomplished by at least one written notice that includes:
   a. A brief description of the project.
   b. The lead agency contact information.
   c. Notification that the California Native American tribe has 30 days to request consultation. (Pub. Resources Code §21080.3.1 (d)).
   d. A "California Native American tribe" is defined as a Native American tribe located in California that is on the contact list maintained by the NAHC for the purposes of Chapter 905 of Statutes of 2004 (SB 18). (Pub. Resources Code §21073).

2. Begin Consultation Within 30 Days of Receiving a Tribe's Request for Consultation and Before Releasing a Negative Declaration, Mitigated Negative Declaration, or Environmental Impact Report: A lead agency shall begin the consultation process within 30 days of receiving a request for consultation from a California Native American tribe that is traditionally and culturally affiliated with the geographic area of the proposed project. (Pub. Resources Code §21080.3.1, subds. (d) and (e)) and prior to the release of a negative declaration, mitigated negative declaration or Environmental Impact Report. (Pub. Resources Code §21080.3.1(b)).
   a. For purposes of AB 52, "consultation shall have the same meaning as provided in Gov. Code §65352.4 (SB 18). (Pub. Resources Code §21080.3.1 (b)).

3. Mandatory Topics of Consultation If Requested by a Tribe: The following topics of consultation, if a tribe requests to discuss them, are mandatory topics of consultation:
   a. Alternatives to the project.
   b. Recommended mitigation measures.
   c. Significant effects. (Pub. Resources Code §21080.3.2 (a)).

4. Discretionary Topics of Consultation: The following topics are discretionary topics of consultation:
   a. Type of environmental review necessary.
   b. Significance of the tribal cultural resources.
   c. Significance of the project's impacts on tribal cultural resources.
   d. If necessary, project alternatives or appropriate measures for preservation or mitigation that the tribe may recommend to the lead agency. (Pub. Resources Code §21080.3.2 (a)).

5. Confidentiality of Information Submitted by a Tribe During the Environmental Review Process: With some exceptions, any information, including but not limited to, the location, description, and use of tribal cultural resources submitted by a California Native American tribe during the environmental review process shall not be included in the environmental document or otherwise disclosed by the lead agency or any other public agency to the public, consistent with Government Code §6254 (r) and §6254.10. Any information submitted by a California Native American tribe during the consultation or environmental review process shall be published in a confidential appendix to the environmental document unless the tribe that provided the information consents, in writing, to the disclosure of some or all of the information to the public. (Pub. Resources Code §21082.3 (c)(1)).

6. Discussion of Impacts to Tribal Cultural Resources in the Environmental Document: If a project may have a significant impact on a tribal cultural resource, the lead agency's environmental document shall discuss both of the following:
   a. Whether the proposed project has a significant impact on an identified tribal cultural resource.
   b. Whether feasible alternatives or mitigation measures, including those measures that may be agreed to pursuant to Public Resources Code §21082.3, subdivision (a), avoid or substantially lessen the impact on the identified tribal cultural resource. (Pub. Resources Code §21082.3 (b)).

7. Conclusion of Consultation: Consultation with a tribe shall be considered concluded when either of the following occurs:
   a. The parties agree to measures to mitigate or avoid a significant effect, if a significant effect exists, on a tribal cultural resource; or
   b. A party, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached. (Pub. Resources Code §21080.3.2 (b)).

8. Recommending Mitigation Measures Agreed Upon in Consultation in the Environmental Document: Any mitigation measures agreed upon in the consultation conducted pursuant to Public Resources Code §21080.3.2 shall be recommended for inclusion in the environmental document and in an adopted mitigation monitoring and reporting program, if determined to avoid or lessen the impact pursuant to Public Resources Code §21082.3, subdivision (b), paragraph 2, and shall be fully enforceable. (Pub. Resources Code §21082.3 (a)).

9. Required Consideration of Feasible Mitigation: If mitigation measures recommended by the staff of the lead agency as a result of the consultation process are not included in the environmental document or if there are no agreed upon mitigation measures at the conclusion of consultation, or if consultation does not occur, and if substantial evidence demonstrates that a project will cause a significant effect to a tribal cultural resource, the lead agency shall consider feasible mitigation pursuant to Public Resources Code §21084.3 (b). (Pub. Resources Code §21082.3 (e)).

10. Examples of Mitigation Measures That, If Feasible, May Be Considered to Avoid or Minimize Significant Adverse Impacts to Tribal Cultural Resources:
    a. Avoidance and preservation of the resources in place, including, but not limited to:
       i. Planning and construction to avoid the resources and protect the cultural and natural context.
       ii. Planning greenspace, parks, or other open space, to incorporate the resources with culturally appropriate protection and management criteria.
    b. Treating the resource with culturally appropriate dignity, taking into account the tribal cultural values and meaning of the resource, including, but not limited to, the following:
       i. Protecting the cultural character and integrity of the resource.
       ii. Protecting the traditional use of the resource.
       iii. Protecting the confidentiality of the resource.
    c. Permanent conservation easements or other interests in real property, with culturally appropriate management criteria for the purposes of preserving or utilizing the resources or places.
    d. Protecting the resource. (Pub. Resource Code §21084.3 (b)).
    e. Please note that a federally recognized California Native American tribe or a non-federally recognized California Native American tribe that is on the contact list maintained by the NAHC to protect a California prehistoric, archaeological, cultural, spiritual, or ceremonial place may acquire and hold conservation easements if the conservation easement is voluntarily conveyed. (Civ. Code §815.3 (c)).
    f. Please note that it is the policy of the state that Native American remains and associated grave artifacts shall be repatriated. (Pub. Resources Code §5097.991).

11. Prerequisites for Certifying an Environmental Impact Report or Adopting a Mitigated Negative Declaration or Negative Declaration with a Significant Impact on an Identified Tribal Cultural Resource: An Environmental Impact Report may not be certified, nor may a mitigated negative declaration or a negative declaration be adopted unless one of the following occurs:
    a. The consultation process between the tribes and the lead agency has occurred as provided in Public Resources Code §21080.3.1 and §21080.3.2 and concluded pursuant to Public Resources Code §21080.3.2.
    b. The tribe that requested consultation failed to provide comments to the lead agency or otherwise failed to engage in the consultation process.
    c. The lead agency provided notice of the project to the tribe in compliance with Public Resources Code §21080.3.1 (d) and the tribe failed to request consultation within 30 days. (Pub. Resources Code §21082.3 (d)).

The NAHC's PowerPoint presentation titled, "Tribal Consultation Under AB 52: Requirements and Best Practices" may be found online at: http://nahc.ca.gov/wp-content/uploads/2015/10/AB52TribalConsultation_CalEPAPDF.pdf

SB 18

SB 18 applies to local governments and requires local governments to contact, provide notice to, refer plans to, and consult with tribes prior to the adoption or amendment of a general plan or a specific plan, or the designation of open space. (Gov. Code §65352.3). Local governments should consult the Governor's Office of Planning and Research's "Tribal Consultation Guidelines," which can be found online at: https://www.opr.ca.gov/docs/09_14_05_Updated_Guidelines_922.pdf

Some of SB 18's provisions include:

1. Tribal Consultation: If a local government considers a proposal to adopt or amend a general plan or a specific plan, or to designate open space it is required to contact the appropriate tribes identified by the NAHC by requesting a "Tribal Consultation List." If a tribe, once contacted, requests consultation the local government must consult with the tribe on the plan proposal. **A tribe has 90 days from the date of receipt of notification to request consultation unless a shorter timeframe has been agreed to by the tribe.** (Gov. Code §65352.3 (a)(2)).
2. No Statutory Time Limit on SB 18 Tribal Consultation. There is no statutory time limit on SB 18 tribal consultation.
3. Confidentiality: Consistent with the guidelines developed and adopted by the Office of Planning and Research pursuant to Gov. Code §65040.2, the city or county shall protect the confidentiality of the information concerning the specific identity, location, character, and use of places, features and objects described in Public Resources Code §5097.9 and §5097.993 that are within the city's or county's jurisdiction. (Gov. Code §65352.3 (b)).
4. Conclusion of SB 18 Tribal Consultation: Consultation should be concluded at the point in which:
   a. The parties to the consultation come to a mutual agreement concerning the appropriate measures for preservation or mitigation; or
   b. Either the local government or the tribe, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached concerning the appropriate measures of preservation or mitigation. (Tribal Consultation Guidelines, Governor's Office of Planning and Research (2005) at p. 18).

Agencies should be aware that neither AB 52 nor SB 18 precludes agencies from initiating tribal consultation with tribes that are traditionally and culturally affiliated with their jurisdictions before the timeframes provided in AB 52 and SB 18. For that reason, we urge you to continue to request Native American Tribal Contact Lists and "Sacred Lands File" searches from the NAHC. The request forms can be found online at: http://nahc.ca.gov/resources/forms/

NAHC Recommendations for Cultural Resources Assessments

To adequately assess the existence and significance of tribal cultural resources and plan for avoidance, preservation in place, or barring both, mitigation of project-related impacts to tribal cultural resources, the NAHC recommends the following actions:

1. Contact the appropriate regional California Historical Research Information System (CHRIS) Center (http://ohp.parks.ca.gov/?page_id=1068) for an archaeological records search. The records search will determine:
   a. If part or all of the APE has been previously surveyed for cultural resources.
   b. If any known cultural resources have already been recorded on or adjacent to the APE.
   c. If the probability is low, moderate, or high that cultural resources are located in the APE.
   d. If a survey is required to determine whether previously unrecorded cultural resources are present.

2. If an archaeological inventory survey is required, the final stage is the preparation of a professional report detailing the findings and recommendations of the records search and field survey.
   a. The final report containing site forms, site significance, and mitigation measures should be submitted immediately to the planning department. All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum and not be made available for public disclosure.
   b. The final written report should be submitted within 3 months after work has been completed to the appropriate regional CHRIS center.

3. Contact the NAHC for:
   a. A Sacred Lands File search. Remember that tribes do not always record their sacred sites in the Sacred Lands File, nor are they required to do so. A Sacred Lands File search is not a substitute for consultation with tribes that are traditionally and culturally affiliated with the geographic area of the project's APE.
   b. A Native American Tribal Consultation List of appropriate tribes for consultation concerning the project site and to assist in planning for avoidance, preservation in place, or, failing both, mitigation measures.

4. Remember that the lack of surface evidence of archaeological resources (including tribal cultural resources) does not preclude their subsurface existence.
   a. Lead agencies should include in their mitigation and monitoring reporting program plan provisions for the identification and evaluation of inadvertently discovered archaeological resources per Cal. Code Regs., tit. 14, §15064.5(f) (CEQA Guidelines §15064.5(f)). In areas of identified archaeological sensitivity, a certified archaeologist and a culturally affiliated Native American with knowledge of cultural resources should monitor all ground-disturbing activities.
   b. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the disposition of recovered cultural items that are not burial associated in consultation with culturally affiliated Native Americans.
   c. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the treatment and disposition of inadvertently discovered Native American human remains. Health and Safety Code §7050.5, Public Resources Code §5097.98, and Cal. Code Regs., tit. 14, §15064.5, subdivisions (d) and (e) (CEQA Guidelines §15064.5, subds. (d) and (e)) address the processes to be followed in the event of an inadvertent discovery of any Native American human remains and associated grave goods in a location other than a dedicated cemetery.

If you have any questions or need additional information, please contact me at my email address: Nancy.Gonzalez-Lopez@nahc.ca.gov.

Sincerely,

Nancy Gonzalez-Lopez
Staff Services Analyst

cc: State Clearinghouse

Pacific Gas and Electric Company

Plan Review Team
Land Management

PGEPlanReview@pge.com

6111 Bollinger Canyon Road 3370A
San Ramon, CA 94583

November 18, 2019

Glenn Gebhardt
City of Lathrop
390 Towne Centre Dr
Lathrop, CA 95330

Ref: Gas and Electric Transmission and Distribution

Dear Glenn Gebhardt,

Thank you for submitting the 18800 Christopher Way plans for our review. PG&E will review the submitted plans in relationship to any existing Gas and Electric facilities within the project area. If the proposed project is adjacent/or within PG&E owned property and/or easements, we will be working with you to ensure compatible uses and activities near our facilities.

Attached you will find information and requirements as it relates to Gas facilities (Attachment 1) and Electric facilities (Attachment 2). Please review these in detail, as it is critical to ensure your safety and to protect PG&E's facilities and its existing rights.

Below is additional information for your review:

1. This plan review process does not replace the application process for PG&E gas or electric service your project may require. For these requests, please continue to work with PG&E Service Planning: https://www.pge.com/en_US/business/services/building-and-renovation/overview/overview.page.

2. If the project being submitted is part of a larger project, please include the entire scope of your project, and not just a portion of it. PG&E's facilities are to be incorporated within any CEQA document. PG&E needs to verify that the CEQA document will identify any required future PG&E services.

3. An engineering deposit may be required to review plans for a project depending on the size, scope, and location of the project and as it relates to any rearrangement or new installation of PG&E facilities.

Any proposed uses within the PG&E fee strip and/or easement, may include a California Public Utility Commission (CPUC) Section 851 filing. This requires the CPUC to render approval for a conveyance of rights for specific uses on PG&E's fee strip or easement. PG&E will advise if the necessity to incorporate a CPUC Section 851filing is required.

This letter does not constitute PG&E's consent to use any portion of its easement for any purpose not previously conveyed. PG&E will provide a project specific response as required.

Sincerely,

Plan Review Team
Land Management

Attachment 1 – Gas Facilities

There could be gas transmission pipelines in this area which would be considered critical facilities for PG&E and a high priority subsurface installation under California law. Care must be taken to ensure safety and accessibility. So, please ensure that if PG&E approves work near gas transmission pipelines it is done in adherence with the below stipulations. Additionally, the following link provides additional information regarding legal requirements under California excavation laws: http://usanorth811.org/wp-content/uploads/2017/05/CA-LAW-English.pdf

1. Standby Inspection: A PG&E Gas Transmission Standby Inspector must be present during any demolition or construction activity that comes within 10 feet of the gas pipeline. This includes all grading, trenching, substructure depth verifications (potholes), asphalt or concrete demolition/removal, removal of trees, signs, light poles, etc. This inspection can be coordinated through the Underground Service Alert (USA) service at 811. A minimum notice of 48 hours is required. Ensure the USA markings and notifications are maintained throughout the duration of your work.

2. Access: At any time, PG&E may need to access, excavate, and perform work on the gas pipeline. Any construction equipment, materials, or spoils may need to be removed upon notice. Any temporary construction fencing installed within PG&E's easement would also need to be capable of being removed at any time upon notice. Any plans to cut temporary slopes exceeding a 1:4 grade within 10 feet of a gas transmission pipeline need to be approved by PG&E Pipeline Services in writing PRIOR to performing the work.

3. Wheel Loads: To prevent damage to the buried gas pipeline, there are weight limits that must be enforced whenever any equipment gets within 10 feet of traversing the pipe.

Ensure a list of the axle weights of all equipment being used is available for PG&E's Standby Inspector. To confirm the depth of cover, the pipeline may need to be potholed by hand in a few areas.

Due to the complex variability of tracked equipment, vibratory compaction equipment, and cranes, PG&E must evaluate those items on a case-by-case basis prior to use over the gas pipeline (provide a list of any proposed equipment of this type noting model numbers and specific attachments).

No equipment may be set up over the gas pipeline while operating. Ensure crane outriggers are at least 10 feet from the centerline of the gas pipeline. Transport trucks must not be parked over the gas pipeline while being loaded or unloaded.

4. Grading: PG&E requires a minimum of 36 inches of cover over gas pipelines (or existing grade if less) and a maximum of 7 feet of cover at all locations. The graded surface cannot exceed a cross slope of 1:4.

5. Excavating: Any digging within 2 feet of a gas pipeline must be dug by hand. Note that while the minimum clearance is only 12 inches, any excavation work within 24 inches of the edge of a pipeline must be done with hand tools. So to avoid having to dig a trench entirely with hand tools, the edge of the trench must be over 24 inches away. (Doing the math for a 24 inch wide trench being dug along a 36 inch pipeline, the centerline of the trench would need to be at least 54 inches [24/2 + 24 + 36/2 = 54] away, or be entirely dug by hand.)

Water jetting to assist vacuum excavating must be limited to 1000 psig and directed at a 40° angle to the pipe. All pile driving must be kept a minimum of 3 feet away.

Any plans to expose and support a PG&E gas transmission pipeline across an open excavation need to be approved by PG&E Pipeline Services in writing PRIOR to performing the work.

6. Boring/Trenchless Installations: PG&E Pipeline Services must review and approve all plans to bore across or parallel to (within 10 feet) a gas transmission pipeline. There are stringent criteria to pothole the gas transmission facility at regular intervals for all parallel bore installations.

For bore paths that cross gas transmission pipelines perpendicularly, the pipeline must be potholed a minimum of 2 feet in the horizontal direction of the bore path and a minimum of 12 inches in the vertical direction from the bottom of the pipe with minimum clearances measured from the edge of the pipe in both directions. Standby personnel must watch the locator trace (and every ream pass) the path of the bore as it approaches the pipeline and visually monitor the pothole (with the exposed transmission pipe) as the bore traverses the pipeline to ensure adequate clearance with the pipeline. The pothole width must account for the inaccuracy of the locating equipment.

7. Substructures: All utility crossings of a gas pipeline should be made as close to perpendicular as feasible (90° +/- 15°). All utility lines crossing the gas pipeline must have a minimum of 12 inches of separation from the gas pipeline. Parallel utilities, pole bases, water line ‘kicker blocks’, storm drain inlets, water meters, valves, back pressure devices or other utility substructures are not allowed in the PG&E gas pipeline easement.

If previously retired PG&E facilities are in conflict with proposed substructures, PG&E must verify they are safe prior to removal. This includes verification testing of the contents of the facilities, as well as environmental testing of the coating and internal surfaces. Timelines for PG&E completion of this verification will vary depending on the type and location of facilities in conflict.

8. Structures: No structures are to be built within the PG&E gas pipeline easement. This includes buildings, retaining walls, fences, decks, patios, carports, septic tanks, storage sheds, tanks, loading ramps, or any structure that could limit PG&E’s ability to access its facilities.

9. Fencing: Permanent fencing is not allowed within PG&E easements except for perpendicular crossings which must include a 16 foot wide gate for vehicular access. Gates will be secured with PG&E corporation locks.

10. Landscaping: Landscaping must be designed to allow PG&E to access the pipeline for maintenance and not interfere with pipeline coatings or other cathodic protection systems. No trees, shrubs, brush, vines, and other vegetation may be planted within the easement area. Only those plants, ground covers, grasses, flowers, and low-growing plants that grow unsupported to a maximum of four feet (4’) in height at maturity may be planted within the easement area.

11. Cathodic Protection: PG&E pipelines are protected from corrosion with an “Impressed Current” cathodic protection system. Any proposed facilities, such as metal conduit, pipes,

service lines, ground rods, anodes, wires, etc. that might affect the pipeline cathodic protection system must be reviewed and approved by PG&E Corrosion Engineering.

12. Pipeline Marker Signs: PG&E needs to maintain pipeline marker signs for gas transmission pipelines in order to ensure public awareness of the presence of the pipelines. With prior written approval from PG&E Pipeline Services, an existing PG&E pipeline marker sign that is in direct conflict with proposed developments may be temporarily relocated to accommodate construction work. The pipeline marker must be moved back once construction is complete.

13. PG&E is also the provider of distribution facilities throughout many of the areas within the state of California. Therefore, any plans that impact PG&E's facilities must be reviewed and approved by PG&E to ensure that no impact occurs which may endanger the safe operation of its facilities.

Attachment 2 – Electric Facilities

It is PG&E's policy to permit certain uses on a case by case basis within its electric transmission fee strip(s) and/or easement(s) provided such uses and manner in which they are exercised, will not interfere with PG&E's rights or endanger its facilities. Some examples/restrictions are as follows:

1. Buildings and Other Structures: No buildings or other structures including the foot print and eave of any buildings, swimming pools, wells or similar structures will be permitted within fee strip(s) and/or easement(s) areas. PG&E's transmission easement shall be designated on subdivision/parcel maps as "**RESTRICTED USE AREA – NO BUILDING."**

2. Grading: Cuts, trenches or excavations may not be made within 25 feet of our towers. Developers must submit grading plans and site development plans (including geotechnical reports if applicable), signed and dated, for PG&E's review. PG&E engineers must review grade changes in the vicinity of our towers. No fills will be allowed which would impair ground-to-conductor clearances. Towers shall not be left on mounds without adequate road access to base of tower or structure.

3. Fences: Walls, fences, and other structures must be installed at locations that do not affect the safe operation of PG&'s facilities. Heavy equipment access to our facilities must be maintained at all times. Metal fences are to be grounded to PG&E specifications. No wall, fence or other like structure is to be installed within 10 feet of tower footings and unrestricted access must be maintained from a tower structure to the nearest street. Walls, fences and other structures proposed along or within the fee strip(s) and/or easement(s) will require PG&E review; submit plans to PG&E Centralized Review Team for review and comment.

4. Landscaping: Vegetation may be allowed; subject to review of plans. On overhead electric transmission fee strip(s) and/or easement(s), trees and shrubs are limited to those varieties that do not exceed 15 feet in height at maturity. PG&E must have access to its facilities at all times, including access by heavy equipment. No planting is to occur within the footprint of the tower legs. Greenbelts are encouraged.

5. Reservoirs, Sumps, Drainage Basins, and Ponds: Prohibited within PG&E's fee strip(s) and/or easement(s) for electric transmission lines.

6. Automobile Parking: Short term parking of movable passenger vehicles and light trucks (pickups, vans, etc.) is allowed. The lighting within these parking areas will need to be reviewed by PG&E; approval will be on a case by case basis. Heavy equipment access to PG&E facilities is to be maintained at all times. Parking is to clear PG&E structures by at least 10 feet. Protection of PG&E facilities from vehicular traffic is to be provided at developer's expense AND to PG&E specifications. Blocked-up vehicles are not allowed. Carports, canopies, or awnings are not allowed.

7. Storage of Flammable, Explosive or Corrosive Materials: There shall be no storage of fuel or combustibles and no fueling of vehicles within PG&E's easement. No trash bins or incinerators are allowed.

8. Streets and Roads: Access to facilities must be maintained at all times. Street lights may be allowed in the fee strip(s) and/or easement(s) but in all cases must be reviewed by PG&E for

proper clearance. Roads and utilities should cross the transmission easement as nearly at right angles as possible. Road intersections will not be allowed within the transmission easement.

9. Pipelines: Pipelines may be allowed provided crossings are held to a minimum and to be as nearly perpendicular as possible. Pipelines within 25 feet of PG&E structures require review by PG&E. Sprinklers systems may be allowed; subject to review. Leach fields and septic tanks are not allowed. Construction plans must be submitted to PG&E for review and approval prior to the commencement of any construction.

10. Signs: Signs are not allowed except in rare cases subject to individual review by PG&E.

11. Recreation Areas: Playgrounds, parks, tennis courts, basketball courts, barbecue and light trucks (pickups, vans, etc.) may be allowed; subject to review of plans. Heavy equipment access to PG&E facilities is to be maintained at all times. Parking is to clear PG&E structures by at least 10 feet. Protection of PG&E facilities from vehicular traffic is to be provided at developer's expense AND to PG&E specifications.

12. Construction Activity: Since construction activity will take place near PG&E's overhead electric lines, please be advised it is the contractor's responsibility to be aware of, and observe the minimum clearances for both workers and equipment operating near high voltage electric lines set out in the High-Voltage Electrical Safety Orders of the California Division of Industrial Safety (https://www.dir.ca.gov/Title8/sb5g2.html), as well as any other safety regulations. Contractors shall comply with California Public Utilities Commission General Order 95 (http://www.cpuc.ca.gov/gos/GO95/go_95_startup_page.html) and all other safety rules. No construction may occur within 25 feet of PG&E's towers. All excavation activities may only commence after 811 protocols has been followed.

Contractor shall ensure the protection of PG&E's towers and poles from vehicular damage by (installing protective barriers) Plans for protection barriers must be approved by PG&E prior to construction.

13. PG&E is also the owner of distribution facilities throughout many of the areas within the state of California. Therefore, any plans that impact PG&E's facilities must be reviewed and approved by PG&E to ensure that no impact occurs that may endanger the safe and reliable operation of its facilities.

STATE OF CALIFORNIA
Governor's Office of Planning and Research
State Clearinghouse and Planning Unit

Gavin Newsom
Governor

Kate Gordon
Director

Notice of Preparation

RECEIVED
NOV 25 2019
CITY OF LATHROP
PUBLIC WORKS

November 18, 2019

To: Reviewing Agencies

Re: Lathrop Consolidated Treatment Facility Surface Water Discharge Project
SCH# 2019110339

Attached for your review and comment is the Notice of Preparation (NOP) for the Lathrop Consolidated Treatment Facility Surface Water Discharge Project draft Environmental Impact Report (EIR).

Responsible agencies must transmit their comments on the scope and content of the NOP, focusing on specific information related to their own statutory responsibility, within 30 days of receipt of the NOP from the Lead Agency. This is a courtesy notice provided by the State Clearinghouse with a reminder for you to comment in a timely manner. We encourage other agencies to also respond to this notice and express their concerns early in the environmental review process.

Please direct your comments to:

Glenn Gebhardt
Lathrop, City of
390 Towne Centre Drive
Lathrop, CA 95330

with a copy to the State Clearinghouse in the Office of Planning and Research at state.clearinghouse@opr.ca.gov . Please refer to the SCH number noted above in all correspondence concerning this project on our website: https://ceqanet.opr.ca.gov/2019110339/2.

If you have any questions about the environmental document review process, please call the State Clearinghouse at (916) 445-0613.

Sincerely,

Scott Morgan
Director, State Clearinghouse

cc: Lead Agency

Notice of Completion & Environmental Document Transmittal

Mail to: State Clearinghouse, P.O. Box 3044, Sacramento, CA 95812-3044 (916) 445-0613
For Hand Delivery/Street Address: 1400 Tenth Street, Sacramento, CA 95814

SCH # 2019110339

Project Title: Lathrop Consolidated Treatment Facility Surface Water Discharge Project

Lead Agency: City of Lathrop — Contact Person: Glenn Gebhardt
Mailing Address: 390 Towne Centre Drive — Phone: (209) 941-7200
City: Lathrop — Zip: 95330 — County: San Joaquin County

Project Location: County: San Joaquin County — City/Nearest Community: Lathrop/Mossdale Village
Cross Streets: Tesla Drive and Christopher Way; Sadler Oak and Inland Passage Way — Zip Code: 95330
Longitude/Latitude (degrees, minutes and seconds): 37 ° 47 ′ 37.6 ″ N / 121 ° 18 ′ 22.7 ″ W Total Acres: 2-5
Assessor's Parcel No.: 198-130-19, -20, -21, -22, -35, -36, -45, -46, -47, and -48 — Section: 35/2 — Twp.: S1S/S2S — Range: 6E/6E — Base: MDB&M
Within 2 Miles: State Hwy #: SR120, I-5, I-205 — Waterways: San Joaquin River
Airports: None — Railways: UPRR, ACE — Schools: Mossdale, Lathrop, & Stella Brockman Elem; Sierra HS

Document Type:

CEQA: ☒ NOP ☐ Early Cons ☐ Neg Dec ☐ Mit Neg Dec ☐ Draft EIR ☐ Supplement/Subsequent EIR (Prior SCH No.) ______ Other: ______
NEPA: ☐ NOI ☐ EA ☐ Draft EIS ☐ FONSI
Other: ☐ Joint Document ☐ Final Document ☐ Other: ______

Governor's Office of Planning & Research
NOV 15 2019
After 12pm
STATE CLEARINGHOUSE

Local Action Type:

☐ General Plan Update ☐ General Plan Amendment ☐ General Plan Element ☐ Community Plan
☐ Specific Plan ☐ Master Plan ☐ Planned Unit Development ☐ Site Plan
☐ Rezone ☐ Prezone ☐ Use Permit ☐ Land Division (Subdivision, etc.)
☐ Annexation ☐ Redevelopment ☐ Coastal Permit ☒ Other: Encroachment Permit

Development Type:

☐ Residential: Units ______ Acres ______
☐ Office: Sq.ft. ______ Acres ______ Employees ______
☐ Commercial: Sq.ft. ______ Acres ______ Employees ______
☐ Industrial: Sq.ft. ______ Acres ______ Employees ______
☐ Educational: ______
☐ Recreational: ______
☐ Water Facilities: Type ______ MGD ______
☐ Transportation: Type ______
☐ Mining: Mineral ______
☐ Power: Type ______ MW ______
☐ Waste Treatment: Type ______ MGD ______
☐ Hazardous Waste: Type ______
☒ Other: surface water discharge pipeline and outfall

Project Issues Discussed in Document:

☐ Aesthetic/Visual ☐ Agricultural Land ☒ Air Quality ☒ Archeological/Historical ☒ Biological Resources ☐ Coastal Zone ☐ Drainage/Absorption ☐ Economic/Jobs
☐ Fiscal ☒ Flood Plain/Flooding ☐ Forest Land/Fire Hazard ☒ Geologic/Seismic ☐ Minerals ☒ Noise ☐ Population/Housing Balance ☒ Public Services/Facilities
☐ Recreation/Parks ☐ Schools/Universities ☐ Septic Systems ☐ Sewer Capacity ☒ Soil Erosion/Compaction/Grading ☐ Solid Waste ☒ Toxic/Hazardous ☒ Traffic/Circulation
☒ Vegetation ☒ Water Quality ☒ Water Supply/Groundwater ☒ Wetland/Riparian ☒ Growth Inducement ☐ Land Use ☒ Cumulative Effects ☐ Other: ______

Present Land Use/Zoning/General Plan Designation:
General Industrial (GI)/General Industrial (IG)

Project Description: *(please use a separate page if necessary)*
The City is seeking to discharge treated effluent from the City's Consolidated Treatment Facility (CTF) that meets the requirements for disinfected tertiary recycled water in accordance with Title 22 of the California Code of Regulations to the San Joaquin River (SJR). The majority of CTF effluent would be discharged to the SJR during the winter, non-irrigation period (when river flow is relatively high) and less would be discharged in the irrigation season, during which CTF recycled water would be used for landscape irrigation. This would allow land designated under the General Plan for urban uses to be developed. Project implementation would involve repurposing approximately 1.1 miles of existing recycled water pipeline or constructing approximately 1.7 miles of new effluent pipeline within City rights-of-way, and installing a new river side-bank or bottom-diffuser outfall to discharge excess treated effluent from the CTF to the SJR. Construction of the proposed project is expected to begin in Spring 2021 and be completed within approximately 24 to 30 months.

Note: The State Clearinghouse will assign identification numbers for all new projects. If a SCH number already exists for a project (e.g. Notice of Preparation or previous draft document) please fill in.

NOP Distribution List

County: San Joaquin

SCH# 2019110339

Resources Agency

- [x] **Resources Agency**
  Nadell Gayou
- [ ] **Dept. of Boating & Waterways**
  Denise Peterson
- [ ] **California Coastal Commission**
  Allyson Hitt
- [ ] **Colorado River Board**
  Elsa Contreras
- [x] **Dept. of Conservation**
  Crina Chan
- [ ] **Cal Fire**
  Dan Foster
- [x] **Central Valley Flood Protection Board**
  James Herota
- [x] **Office of Historic Preservation**
  Ron Parsons
- [x] **Dept of Parks & Recreation**
  Environmental Stewardship Section
- [ ] **S.F. Bay Conservation & Dev't. Comm.**
  Steve Goldbeck
- [x] **Dept. of Water Resources**
  Resources Agency
  Nadell Gayou

Fish and Wildlife

- [ ] **Depart. of Fish & Wildlife**
  Scott Flint
  Environmental Services Division
- [ ] **Fish & Wildlife Region 1**
  Curt Babcock
- [ ] **Fish & Wildlife Region 1E**
  Laurie Harnsberger
- [x] **Fish & Wildlife Region 2**
  Jeff Drongesen
- [x] **Fish & Wildlife Region 3**
  Craig Weightman
- [x] **Fish & Wildlife Region 4**
  Julie Vance
- [ ] **Fish & Wildlife Region 5**
  Leslie Newton-Reed
  Habitat Conservation Program
- [ ] **Fish & Wildlife Region 6**
  Tiffany Ellis
  Habitat Conservation Program
- [ ] **Fish & Wildlife Region 6 I/M**
  Heidi Calvert
  Inyo/Mono, Habitat Conservation Program
- [ ] **Dept. of Fish & Wildlife M**
  William Paznokas
  Marine Region

Other Departments

- [ ] **California Department of Education**
  Lesley Taylor
- [ ] **OES (Office of Emergency Services)**
  Monique Wilber
- [ ] **Food & Agriculture**
  Sandra Schubert
  Dept. of Food and Agriculture
- [ ] **Dept. of General Services**
  Cathy Buck
  Environmental Services Section
- [ ] **Housing & Comm. Dev.**
  CEQA Coordinator
  Housing Policy Division

Independent Commissions, Boards

- [ ] **Delta Protection Commission**
  Erik Vink
- [ ] **Delta Stewardship Council**
  Anthony Navasero
- [ ] **California Energy Commission**
  Eric Knight
- [x] **Native American Heritage Comm.**
  Debbie Treadway
- [x] **Public Utilities Commission**
  Supervisor
- [ ] **Santa Monica Bay Restoration**
  Guangyu Wang
- [x] **State Lands Commission**
  Jennifer Deleong
- [ ] **Tahoe Regional Planning Agency (TRPA)**
  Cherry Jacques

Cal State Transportation Agency CalSTA

- [ ] **Caltrans - Division of Aeronautics**
  Philip Crimmins
- [ ] **Caltrans – Planning HQ LD-IGR**
  Christian Bushong
- [x] **California Highway Patrol**
  Suzann Ikeuchi
  Office of Special Projects

Dept. of Transportation

- [ ] **Caltrans, District 1**
  Rex Jackman
- [ ] **Caltrans, District 2**
  Marcelino Gonzalez
- [ ] **Caltrans, District 3**
  Susan Zanchi
- [ ] **Caltrans, District 4**
  Patricia Maurice
- [ ] **Caltrans, District 5**
  Larry Newland
- [ ] **Caltrans, District 6**
  Michael Navarro
- [ ] **Caltrans, District 7**
  Dianna Watson
- [ ] **Caltrans, District 8**
  Mark Roberts
- [ ] **Caltrans, District 9**
  Gayle Rosander
- [x] **Caltrans, District 10**
  Tom Dumas
- [ ] **Caltrans, District 11**
  Jacob Armstrong
- [ ] **Caltrans, District 12**
  Maureen El Harake

Cal EPA

Air Resources Board

- [ ] **Airport & Freight**
  Jack Wursten
  - [ ] **Transportation Projects**
    Nesamani Kalandiyur
  - [x] **Industrial/Energy Projects**
    Mike Tollstrup

California Department of Resources, Recycling & Recovery
Kevin Taylor/Jeff Esquivel

- [x] **State Water Resources Control Board**
  Regional Programs Unit
  Division of Financial Assistance
- [x] **State Water Resources Control Board**
  Cindy Forbes – Asst Deputy
  Division of Drinking Water
- [x] **State Water Resources Control Board**
  Div. Drinking Water # 10
- [x] **State Water Resources Control Board**
  Student Intern, 401 Water Quality Certification Unit
  Division of Water Quality
- [ ] **State Water Resouces Control Board**
  Phil Crader
  Division of Water Rights
- [x] **Dept. of Toxic Substances Control Reg. #**________
  CEQA Tracking Center
- [ ] **Department of Pesticide Regulation**
  CEQA Coordinator

Regional Water Quality Control Board (RWQCB)

- [ ] **RWQCB 1**
  Cathleen Hudson
  North Coast Region (1)
- [ ] **RWQCB 2**
  Environmental Document Coordinator
  San Francisco Bay Region (2)
- [ ] **RWQCB 3**
  Central Coast Region (3)
- [ ] **RWQCB 4**
  Teresa Rodgers
  Los Angeles Region (4)
- [x] **RWQCB 5S**
  Central Valley Region (5)
  - [ ] **RWQCB 5F**
    Central Valley Region (5)
    Fresno Branch Office
  - [ ] **RWQCB 5R**
    Central Valley Region (5)
    Redding Branch Office
- [ ] **RWQCB 6**
  Lahontan Region (6)
  - [ ] **RWQCB 6V**
    Lahontan Region (6)
    Victorville Branch Office
- [ ] **RWQCB 7**
  Colorado River Basin Region (7)
- [ ] **RWQCB 8**
  Santa Ana Region (8)
- [ ] **RWQCB 9**
  San Diego Region (9)

- [ ] **Other** ____________________
- [ ] ____________________
  Conservancy

Last Updated 5/22/18

SJCOG, Inc.

S J C O G, Inc.

555 East Weber Avenue • Stockton, CA 95202 • (209) 235-0600 • FAX (209) 235-0438

San Joaquin County Multi-Species Habitat Conservation & Open Space Plan (SJMSCP)

SJMSCP RESPONSE TO LOCAL JURISDICTION (RTLJ)
ADVISORY AGENCY NOTICE TO SJCOG, Inc.

To: Glenn Gebhardt, City of Lathrop, City Engineer

From: Laurel Boyd, SJCOG, Inc.

Date: November 19, 2019

-Local Jurisdiction Project Title: Notice of Preparation of a Draft EIR for the Lathrop Consolidated Treatment Facility Surface Water Discharge Project

Assessor Parcel Number(s): 198-130-19 to -21, -35, -36, -59, -60

Local Jurisdiction Project Number: N/A

Total Acres to be converted from Open Space Use: Unknown

Habitat Types to be Disturbed: Urban and Natural Habitat Land

Species Impact Findings: Findings to be determined by SJMSCP biologist.

Dear Mr. Gebhardt:

SJCOG, Inc. has reviewed the project referral for the Notice of Preparation for a Draft Environmental Impact Report for the Lathrop Consolidated Treatment Facility Surface Water Discharge Project. The proposed project would repurpose approximately 1.1 miles of existing recycled water pipeline or construct approximately 1.7 miles of new effluent pipeline within City rights-of-way and install a new river side-bank or bottom diffuser outfall to discharge excess tertiary-treated, disinfected, and dechlorinated effluent from the CTF to the San Joaquin River during periods when demand for recycled water is low or zero. The City would continue to send East Lathrop wastewater to the Manteca WQCF for Treatment and disposal. Construction of the proposed project is expected to begin in Spring 2021 and be completed within approximately 24 to 30 months.

Elements of the project would be constructed: 1) at the City's existing CTF, located on 54 acres of City owned land at 1880 Christopher Way, Lathrop, CA; 2) along the right bank or bottom of the San Joaquin River approximately 0.6 miles downstream of the I-5 overcrossing; and 3) along roadways in Lathrop between the CTF and the San Joaquin River, potentially including, Nestle Way, Harlan Road, Manthey Road, Sadler Oak and Inland Passage Way.

The City of Lathrop is a signatory to San Joaquin County Multi-Species Habitat Conservation and Open Space Plan (SJMSCP). Participation in the SJMSCP satisfies requirements of both the state and federal endangered species acts, and ensures that the impacts are mitigated below a level of significance in compliance with the California Environmental Quality Act (CEQA). The LOCAL JURISDICTION retains responsibility for ensuring that the appropriate Incidental Take Minimization Measure are properly implemented and monitored and that appropriate fees are paid in compliance with the SJMSCP. Although participation in the SJMSCP is voluntary, Local Jurisdiction/Lead Agencies should be aware that if project applicants choose against participating in the SJMSCP, they will be required to provide alternative mitigation in an amount and kind equal to that provided in the SJMSCP.

This Project is subject to the SJMSCP. This can be up to a 30 day process and it is recommended that the project applicant contact SJMSCP staff as early as possible. It is also recommended that the project applicant obtain an information package. http://www.sjcog.org

Please contact SJMSCP staff regarding completing the following steps to satisfy SJMSCP requirements:

- Schedule a SJMSCP Biologist to perform a pre-construction survey ***prior to any ground disturbance***
- SJMSCP Incidental take Minimization Measures and mitigation requirement:

1. Incidental Take Minimization Measures (ITMMs) will be issued to the project and must be signed by the project applicant prior to any ground disturbance but no later than six (6) months from receipt of the ITMMs. If ITMMs are not signed within six months, the applicant must reapply for SJMSCP Coverage. Upon receipt of signed ITMMs from project applicant, SJCOG, Inc. staff will sign the ITMMs. This is the effective date of the ITMMs.

2. Under no circumstance shall ground disturbance occur without compliance and satisfaction of the ITMMs.
3. Upon issuance of fully executed ITMMs and prior to any ground disturbance, the project applicant must:
    a. Post a bond for payment of the applicable SJMSCP fee covering the entirety of the project acreage being covered (the bond should be valid for no longer than a 6 month period); or
    b. Pay the appropriate SJMSCP fee for the entirety of the project acreage being covered; or
    c. Dedicate land in-lieu of fees, either as conservation easements or fee title; or
    d. Purchase approved mitigation bank credits.
4. Within 6 months from the effective date of the ITMMs or issuance of a building permit, whichever occurs first, the project applicant must:
    a. Pay the appropriate SJMSCP for the entirety of the project acreage being covered; or
    b. Dedicate land in-lieu of fees, either as conservation easements or fee title; or
    c. Purchase approved mitigation bank credits.

Failure to satisfy the obligations of the mitigation fee shall subject the bond to be called.

- Receive your Certificate of Payment and release the required permit

It should be noted that if this project has any potential impacts to waters of the United States [pursuant to Section 404 Clean Water Act], it would require the project to seek voluntary coverage through the unmapped process under the SJMSCP which could take up to 90 days. It may be prudent to obtain a preliminary wetlands map from a qualified consultant. If waters of the United States are confirmed on the project site, the Corps and the Regional Water Quality Control Board (RWQCB) would have regulatory authority over those mapped areas [pursuant to Section 404 and 401 of the Clean Water Act respectively] and permits would be required from each of these resource agencies prior to grading the project site.

If you have any questions, please call (209) 235-0600.

S J C O G, Inc.

San Joaquin County Multi-Species Habitat Conservation & Open Space Plan

555 East Weber Avenue ● Stockton, CA 95202 ● (209) 235-0600 ● FAX (209) 235-0438

SJMSCP HOLD

TO: Local Jurisdiction: Community Development Department, Planning Department, Building Department, Engineering Department, Survey Department, Transportation Department, Other: ___________

FROM: Laurel Boyd, SJCOG, Inc.

DO NOT AUTHORIZE SITE DISTURBANCE
DO NOT ISSUE A BUILDING PERMIT
DO NOT ISSUE ___________ FOR THIS PROJECT

The landowner/developer for this site has requested coverage pursuant to the San Joaquin County Multi-Species Habitat Conservation and Open Space Plan (SJMSCP). In accordance with that agreement, the Applicant has agreed to:

1) SJMSCP Incidental Take Minimization Measures and mitigation requirement:

1. Incidental Take Minimization Measures (ITMMs) will be issued to the project and must be signed by the project applicant prior to any ground disturbance but no later than six (6) months from receipt of the ITMMs. If ITMMs are not signed within six months, the applicant must reapply for SJMSCP Coverage. Upon receipt of signed ITMMs from project applicant, SJCOG, Inc. staff will sign the ITMMs. This is the effective date of the ITMMs.
2. Under no circumstance shall ground disturbance occur without compliance and satisfaction of the ITMMs.
3. Upon issuance of fully executed ITMMs and prior to any ground disturbance, the project applicant must:
   a. Post a bond for payment of the applicable SJMSCP fee covering the entirety of the project acreage being covered (the bond should be valid for no longer than a 6 month period); or
   b. Pay the appropriate SJMSCP fee for the entirety of the project acreage being covered; or
   c. Dedicate land in-lieu of fees, either as conservation easements or fee title; or
   d. Purchase approved mitigation bank credits.
4. Within 6 months from the effective date of the ITMMs or issuance of a building permit, whichever occurs first, the project applicant must:
   a. Pay the appropriate SJMSCP for the entirety of the project acreage being covered; or
   b. Dedicate land in-lieu of fees, either as conservation easements or fee title; or
   c. Purchase approved mitigation bank credits.

   Failure to satisfy the obligations of the mitigation fee shall subject the bond to be called.

Project Title: NOP of a Draft EIR for the Lathrop Consolidated Treatment Facility Surface Water Discharge Project

Assessor Parcel #s: 198-130-19 to -21, -35, -36, -59, -60

T _______, R______, Section(s): _____

Local Jurisdiction Contact: Glenn Gebhardt

The LOCAL JURISDICTION retains responsibility for ensuring that the appropriate Incidental Take Minimization Measures are properly implemented and monitored and that appropriate fees are paid in compliance with the SJMSCP.

KSN inc.
KJELDSEN SINNOCK NEUDECK
CIVIL ENGINEERS & LAND SURVEYORS

Stephen K. Sinnock, P.E.
Christopher H. Neudeck, P.E.
Neal T. Colwell, P.E.
Barry O'Regan, P.E.

RECEIVED
NOV 25 2019
CITY OF LATHROP
PUBLIC WORKS

0856-011

November 22, 2019

Glenn Gebhardt, City Engineer
City of Lathrop
390 Towne Centre Drive
Lathrop, CA 95330

Re: Notice of Preparation (NOP) for the EIR for the Lathrop Consolidated Treatment Facility Surface Water Discharge Project- Reclamation District No. 17 – Mossdale Tract (RD 17) Comments

Dear Mr. Gebhardt:

On behalf of Reclamation District No. 17 – Mossdale Tract (RD 17) I am notifying you that the area of the proposed Treatment Facility Outfall structure into the San Joaquin River through RD 17's flood control levee must take into account the following issues:

1. The existing Levee Section that this proposed outfall is planned to be constructed within already has a number of existing pipeline crossings that must be considered during the sighting and design of this new outfall pipeline and structure.

2. RD 17's Phase III - Levee Seepage Repair Project plans to construct a deep slurry cut-off wall through this section of levee planned for this outfall that will impact the outfall provided it is built prior to the deep slurry cut-off wall being constructed. The deep slurry cut-off wall is intended to be built either the summer of 2020 or 2021. I have attached a design section of the proposed slurry cut-off wall for your consideration. Provided the construction of this outfall were to occur before the Summer/Fall of 2021 design provisions would need to made to allow for removal of a portion of the pipe that will be in the way of installing the cut-off wall, otherwise your design team will need to work with us Kjeldsen, Sinnock & Neudeck to design appropriate protection measures for future construction of the cut-off wall.

3. RD 17 requires that any pipe penetrations thru its levee must be above the Base Flood Elevation (BFE) similar to the last two City storm water outfall structures for Central Lathrop and South Lathrop Drainage Basins. Beyond the requirement to cross the levee above the BFE, RD 17 will also require adequate rock slope protection be placed upstream and downstream of the new outfall facility to provide adequate erosion protection from flow in the San Joaquin River. The United States Army Corp of Engineers and the Central Valley Flood Protection Board will also require positive closure (Valve) located on the waterside hinge of the levee for any open discharge into the San Joaquin River.

4. RD 17 requires that the existing levee section geometry be maintained and partially the crown levee access road. Any encroachment by this Outfall structure must mitigate and maintain the existing crown width and waterside and landside slope geometry

RD 17 has successfully worked with the City on several other outfall projects in the past and fully anticipates that we will be able to work well together to handle any concerns or mitigate any impacts to the reclamation works of RD 17.

I look forward to playing a roll in the design and planning of this outfall project. Any question please call me.

Sincerely,
KJELDSEN, SINNOCK & NEUDECK, INC.

Christopher H. Neudeck

Christopher H. Neudeck, P.E.
RD 17 District Engineer

w/enclosures
RD 17 Cut Off Wall Detail
COL NOP

cc: Trustees (w/encl)
Dante J. Nomellini, Sec, Counsel (w/encl)
Scott Solari, Supt. (w/encl)

CITY OF LATHROP
NOTICE OF PREPARATION OF AN ENVIRONMENTAL IMPACT REPORT AND NOTICE OF PUBLIC SCOPING MEETING FOR THE LATHROP CONSOLIDATED TREATMENT FACILITY SURFACE WATER DISCHARGE PROJECT

Date: November 13, 2019

To: Responsible Agencies, Trustee Agencies, and Interested Persons

Re: Notice of Preparation of a Draft Environmental Impact Report for the Lathrop Consolidated Treatment Facility Surface Water Discharge Project

Lead Agency: City of Lathrop

Contact: Glenn Gebhardt, City Engineer
390 Towne Centre Drive
Lathrop, CA 95330
(209) 941-7200
ggebhardt@ci.lathrop.ca.us

Comment Period: November 18, 2019 to December 17, 2019

In accordance with the provisions of the California Environmental Quality Act (CEQA), the City of Lathrop (City) has determined that the proposed Lathrop Consolidated Treatment Facility (CTF) Surface Water Discharge Project will require preparation of an Environmental Impact Report (EIR). The purpose of this Notice of Preparation (NOP) is to provide sufficient information describing the proposed project and the potential environmental effects to enable meaningful input related to the scope and content of information to be included in the EIR.

This NOP initiates the CEQA scoping process. The City will be the lead agency for preparation of the EIR. The State Water Resources Control Board may also use this EIR for issuance of State Revolving Funds (SRF) under an EPA-funded grant program. If the City seeks SRF funding, this EIR will also be prepared under the requirements for SRF funding, which means the EIR will also be used by federal agencies for their permitting process and will cover many of the issues needed to meet the requirements of the National Environmental Policy Act (NEPA).

Documents related to the EIR will be available for review on the City's website at https://www.ci.lathrop.ca.us/com-dev/page/public-review-documents.

PUBLIC REVIEW PERIOD

This NOP is being circulated for public review and comment for a period of 30 days beginning November 18, 2019. The City will hold a public scoping meeting to inform interested parties about the proposed project and to provide agencies and the public with an opportunity to provide comments on the scope and content of the EIR. The public scoping meeting will be held at Lathrop City Hall as follows:

Scoping Meeting:
Wednesday, December 4, 2019
2:00 p.m. to 3:00 p.m.
Lathrop City Hall, Council Chambers
390 Towne Centre Drive
Lathrop, CA 95330

Copies of the full Notice of Preparation may be reviewed online and in person at the following locations:

- Stockton-San Joaquin County Public Library–Lathrop Branch Library, 450 Spartan Way, Lathrop, CA 95330, during library hours;
- Lathrop City Hall, Front Counter in the Lobby; 390 Towne Centre Drive, Lathrop, CA 95330 between 8:00 a.m. and 6:00 p.m. Monday through Thursday or 8:00 a.m. and 5:00 p.m. on Friday; or
- Online at: https://www.ci.lathrop.ca.us/com-dev/page/public-review-documents.

Your views and comments on how the project may affect the environment are welcomed. Please contact Mr. Gebhardt if you have any questions about the environmental review process for the Lathrop CTF Surface Water Discharge Project.

PROVIDING COMMENTS ON THIS NOTICE OF PREPARATION

Written and/or email comments on the NOP should be provided at the earliest possible date, but must be received by no later than 5:00 p.m. on Tuesday, November 17, 2019. Please send all comments on the NOP to:

City of Lathrop
Attn: Glenn Gebhardt, City Engineer
390 Towne Centre Drive
Lathrop, CA 95330
Email: website_pwk@ci.lathrop.ca.us

If you are from an agency that will need to consider the EIR when deciding whether to issue permits or other approvals for the project, please provide the name of a contact person. Comments provided by email should include the name and mailing address (e-mail or physical) of the commenter in the body of the email.

Focus of Input

The City relies on responsible and trustee agencies to provide information relevant to the analysis of resources falling within its jurisdiction. The City encourages input for the proposed EIR, with a focus on the following topics:

Scope of Environmental Analysis. Guidance on the scope of analysis for this EIR, including identification of specific issues that will require closer study due to the location, scale, and character of the Lathrop CTF Surface Water Discharge Project;

Mitigation Measures. Ideas for feasible mitigation that could potentially be imposed by the City to avoid, eliminate, or reduce potentially significant or significant impacts;

Alternatives. Suggestions for alternatives to the Lathrop CTF Surface Water Discharge Project that could potentially reduce or avoid potentially significant or significant impacts; and

Interested Parties. Identification of public agencies, public and private groups, and individuals that the City should notice regarding this Lathrop CTF Surface Water Discharge Project and the accompanying EIR.

PROJECT LOCATION

Lathrop is located within the Interstate 5 (I-5) corridor, within an approximately 50-minute drive (or less) of the cities of Tracy, Manteca, Stockton, Lodi, Modesto, Livermore, and Pleasanton (Figure 1). Lathrop has an estimated population of approximately 23,000[1] and is considered one of northern California's fastest growing master planned communities.

Elements of the project would be constructed: (1) at the City's existing CTF, located on 54 acres of City-owned land at 18800 Christopher Way, Lathrop, CA; (2) along the right bank or bottom of the San Joaquin River approximately 0.6 mile downstream of the I-5 overcrossing; and (3) along roadways in Lathrop between the CTF and the San Joaquin River, potentially including, Nestle Way, Harlan Road, Manthey Road, Sadler Oak, and Inland Passage Way.

BACKGROUND AND NEED

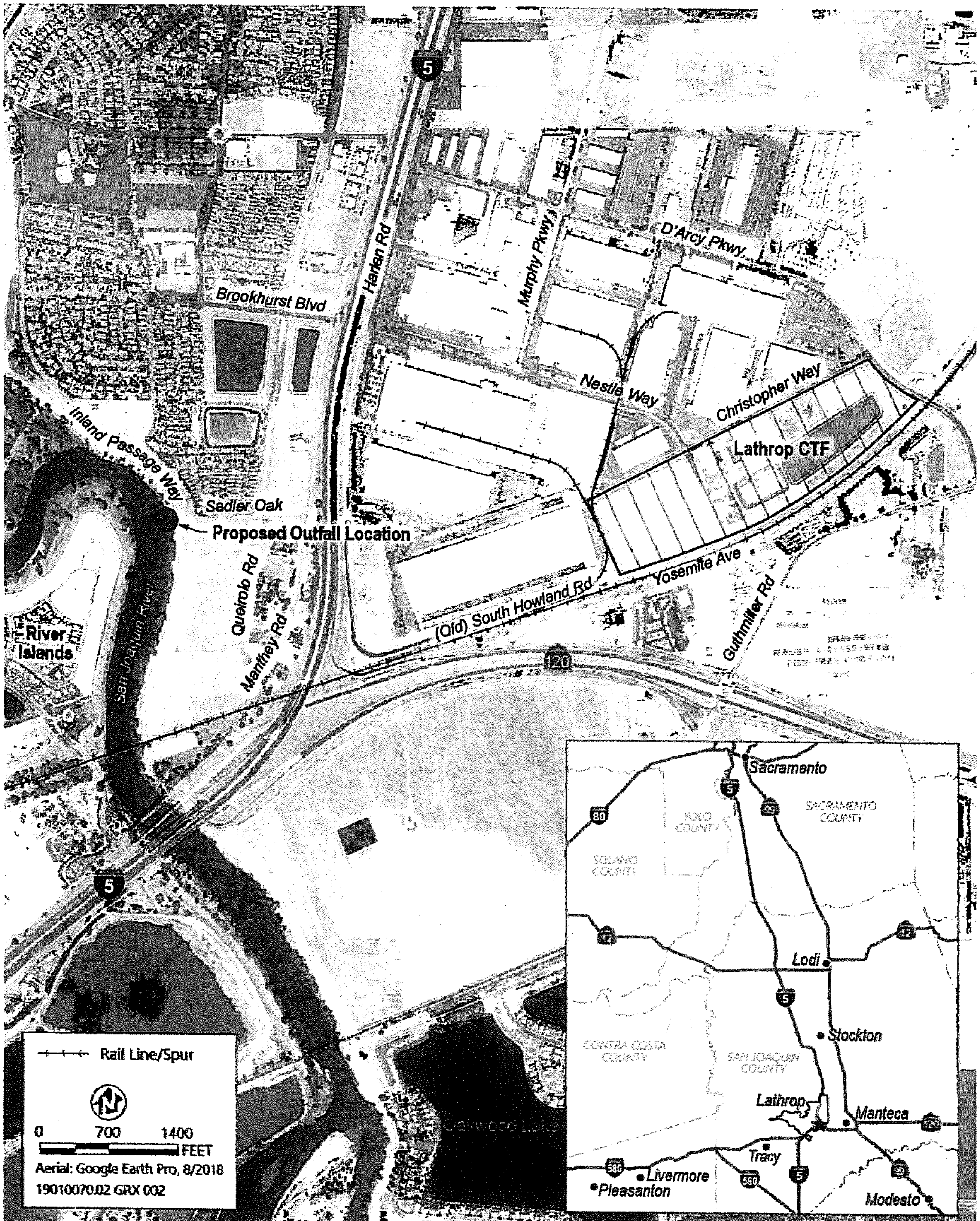
Wastewater from the City is treated at two separate facilities, the City of Manteca (Manteca) Water Quality Control Facility (WQCF) and the City's CTF. Treated wastewater effluent from the Manteca WQCF is primarily disposed of via discharge to the San Joaquin River at river mile 57. Treated wastewater effluent from the CTF is currently stored in ponds and used for urban and agricultural irrigation.

Currently, the City has 10 storage ponds, one percolation pond and approximately 297 acres of urban and agricultural irrigation area for storage and use of treated effluent. However, all this land is designated under the City General Plan for some form of urban development and keeping this land for effluent storage and disposal precludes the ability of the City to fulfill its General Plan land use vision. Therefore, the City is seeking to discharge treated effluent to the San Joaquin River. The CTF produces treated effluent that meets the requirements for disinfected tertiary recycled water in accordance with Title 22 of the California Code of Regulations, and the City plans to use CTF recycled water for landscape irrigation as the City is developed. The majority of CTF effluent would be discharged to the San Joaquin River during the winter, non-irrigation period (when river flow is relatively high) and less would be discharged in the irrigation season, during which CTF recycled water would be used for landscape irrigation. This would allow land designated under the General Plan for urban uses to be developed as such.

PROJECT DESCRIPTION

The proposed project would repurpose approximately 1.1 miles of existing recycled water pipeline or construct approximately 1.7 miles of new effluent pipeline within City rights-of-way, and install a new river side-bank or bottom-diffuser outfall to discharge excess tertiary-treated, disinfected, and dechlorinated effluent from the CTF to the San Joaquin River during periods when demand for recycled water is low or zero. The City would continue to send East Lathrop wastewater to the Manteca WQCF for treatment and disposal. Construction of the proposed project is expected to begin in Spring 2021 and be completed within approximately 24 to 30 months.

[1] U.S. Census Bureau. 2019. Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2018. Released by the U.S. Census Bureau, Population Division, May 2019. Available: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF. Accessed November 4, 2019.



Source: Prepared by Ascent Environmental in 2019

Figure 1 Project Location and Vicinity

RESPONSIBLE AGENCIES

For the purposes of CEQA, the term "Responsible Agency" includes all public agencies (other than federal agencies) other than the Lead Agency that have discretionary approval power over the project (CEQA Guidelines Section 15381). Discretionary approval power may include such actions as issuance of a permit, authorization, or easement needed to complete some aspect of the proposed project. Responsible agencies may include, but are not limited to, the following:

- California Department of Transportation (Caltrans) – Encroachment permit for placement of encroachments within, under, or over the State highway rights-of-way
- California State Water Resources Control Board (SWRCB) ¬ Potential approval of Clean Water State Revolving Fund loan
- California Department of Fish and Wildlife (CDFW) ¬ Section 1602 Streambed Alteration Agreement; California Endangered Species Act incidental take permit authorizations
- Central Valley Flood Protection Board – Encroachment permit for work in the floodway
- Central Valley Regional Water Quality Control Board (CVRWQCB) – Clean Water Act Section 401 water quality certification; and Clean Water Act Section 402 National Pollutant Discharge Elimination System permit
- Reclamation District (RD) 17 – District Permit Agreement for construction and maintenance of facilities affecting the RD 17 levee system
- San Joaquin Valley Air Pollution Control District (SJVAPCD) – Authority to Construct/Permit to Operate
- Union Pacific Railroad (UPRR) – Encroachment permit for placement of encroachments within, under, or over the UPRR rights-of-way

In addition, the following federal agencies may use this EIR for consideration of permits and approvals:

- National Marine Fisheries Service (NMFS) – Endangered Species Act (ESA) Section 7 consultation; Magnuson-Stevens Fisheries Conservation Management Act Section 305(b) consultation
- U.S. Army Corps of Engineers (USACE) – Clean Water Act Section 404 permit for discharge of fill to Waters of the U.S.; Rivers and Harbors Act Section 10 Permit for construction in navigable waterways; and 33 USC Section 408 authorization or categorical permission for alteration of a Federal Project levee
- U.S. Fish and Wildlife Service (USFWS) – Endangered Species Act (ESA) Section 7 consultation

POTENTIAL ENVIRONMENTAL EFFECTS

The City has determined that the proposed Project may have a significant effect on the environmental, and therefore, an EIR should be prepared. As required by CEQA, the EIR will describe existing conditions and evaluate the potential environmental effects of the proposed project and a reasonable range of alternatives, including the no-project alternative. It will address direct, indirect, and cumulative effects. The EIR will also discuss potential growth-inducing impacts and summarize significant and unavoidable environmental effects. The EIR will identify feasible mitigation measures, if available, to reduce potentially significant impacts. The EIR will focus on the potentially significant environmental impacts of the project. At this time, the City has identified a potential for environmental effects in the areas identified below.

Air Quality. The analysis will address short-term construction-related and long-term operations-related increases in criteria air pollutants and precursors (e.g., reactive organic gases [ROG], oxides of nitrogen [NOX], respirable particulate matter [PM10], and fine particulate matter [PM2.5]). The analysis will also assess the potential for construction- and operations-related toxic air contaminants (TACs) to result in levels of health risk exposure at off-site sensitive receptors. This analysis will focus on diesel particulate emitted by heavy equipment during project construction, and any additional trucks serving the project during operations. The potential for off-site receptors to be exposed to odors from pump stations will also be evaluated.

Biological Resources. The analysis will evaluate potential direct and indirect impacts on biological resources, including riparian habitat, special-status fish, and other terrestrial and aquatic resources, that could result from implementation of the proposed project. The analysis will include modeling of effluent discharge into the San Joaquin River, and the effect of discharge on river temperature and water quality.

Cultural Resources and Tribal Cultural Resources. A record search will be conducted at the Central California Information Center and pedestrian surveys of areas proposed for ground disturbance will be conducted by a qualified archaeologist. Any tribal or other cultural resources that are known or have the potential to occur on the project site will be assessed, and the potential impacts that may occur to known and unanticipated resources because of project implementation will be evaluated. The EIR will also document the results of required consultation and any agreements on mitigation measures for California Tribal Cultural Resources.

Energy. The levels of electricity, natural gas, propane, gasoline, and diesel consumed in the construction and operation of the project will be estimated, and whether the project would result in the wasteful use of energy will be determined.

Paleontological Resources. The analysis will assess the potential for unique paleontological resources to occur on the project site, and the potential for project-related construction or operations to impact these resources.

Greenhouse Gases and Climate Change. The analysis will evaluate the project's consistency with California's GHG reduction goals and related regulations and policies, and will determine whether project-generated GHG emissions would be a cumulatively considerable contribution to the global impact of climate change.

Hazards and Hazardous Materials. The analysis will address the potential for project-related construction and operations to create a significant hazard to the public or the environment through use of hazardous materials, or cause reasonably foreseeable upset and accident conditions involving the release of hazardous materials.

Hydrology and Water Quality. The analysis will describe the existing drainage and water quality conditions of the site, provide a description of the applicable regulatory environment, and evaluate the project's hydrology and water quality impacts including: short-term construction-related effects; permanent stormwater changes; impacts to surface water quality; impacts to groundwater quality and quantity; and cumulative on- and off-site impacts. The analysis will also evaluate any effects on flows in the San Joaquin River, including from installation of any in-river facilities. The analysis will also evaluate the potential effects on beneficial uses of the San Joaquin River, including for drinking water, associated with discharge of treated effluent.

Noise and Vibration. The analysis will include information on the location of existing sensitive receptors, ambient noise levels, and natural factors that relate to the attenuation thereof. Noise and vibration impacts that would be anticipated to occur with construction and operational activities associated with the proposed project will be assessed.

Transportation. The analysis will not affect any long-term traffic as it would not add substantial trips on roadways surrounding the CTF. The analysis will qualitatively address vehicle miles traveled associated with construction activities.

Utilities and Service Systems. The EIR will discuss the potential need for electric utility improvements/extensions at/near the project site as a result of project implementation based on review of project plans. No other utilities would be affected by the project and the EIR will not include analysis of any other utility issues.

Growth-Inducement. The project would remove the need to dedicate farmland used for sprayfields, and would allow planned and approved urban development on those lands. The EIR will evaluate the effects of the removal of this barrier to growth, including whether it would facilitate unplanned growth and its effects.

ISSUES TO BE SCOPED OUT OF THE ANALYSIS IN THE EIR

The City anticipates that the following environmental issues would result in less-than-significant or no impacts and will not be discussed in the EIR for the reasons discussed below.

Aesthetics. All project facilities, except minor infrastructure such as pump stations, would be constructed below ground. Pump stations would be located in areas that are already planned for development. The effluent discharge location is already the site of a stormwater discharge pipe. Therefore, no significant effects to visual resources would be expected and this issue will not be discussed in the EIR.

Agriculture and Forestry Resources. No important farmland, Williamson Act contract lands, forest land, or timberland exists on the Project site. Therefore, the project would not directly remove agriculture or forestry resources, and this issue will not be discussed in the EIR. The project would remove an existing impediment to planned growth because the surface water discharge would provide an alternative method of disposal of treated effluent that would otherwise require application to agricultural land. Consequently, the project may result in the indirect conversion of agricultural land to nonagricultural use. However, this land is designated in the Lathrop General Plan for urban development, and this impact was previously addressed in the River Islands at Lathrop Project Subsequent EIR[2], which is incorporated herein by reference. That EIR was certified and the City of Lathrop accepted the impacts to agricultural resources in its approval of the subject project.

Geology and Soils. The proposed project would be designed and constructed to meet California Building Code requirements to avoid potentially significant impacts related to seismic events and soil stability. Also, the Project would not involve the construction or use of septic tanks or alternative wastewater disposal systems. Therefore, issues related to geology and soils will not be discussed in the EIR.

Landslides. Based on the topography (relatively flat) of the project area, there would be no impact related to landslides. Therefore, this impact will not be discussed in the EIR.

Land Use. Project implementation would not affect any land use designations and would not physically divide a community. In fact, the project would remove physical barriers (storage ponds and sprayfield areas) to a cohesive community. Therefore, this issue will not be discussed in the EIR.

Mineral Resources. The Project site is not used for mineral extraction, nor is it designated as an important mineral recovery site. Therefore, the project would not have the potential to impact mineral resources, and this issue will not be discussed in the EIR.

Population and Housing. The Project would not contribute to unplanned growth and would not displace existing people or housing. Therefore, the project would have no impact on population and housing, and this issue will not be discussed in the EIR.

Public Services. The Project would not cause the need for or result in the addition of new government facilities or physically alter existing government facilities such that service ratios, response times, or other performance objectives for fire protection, police protection, schools, parks or other public facilities would be impacted. Therefore, this issue will not be discussed in the EIR.

Recreation. The Project would not contribute to unplanned growth and would not include new housing that would increase the use of existing recreational facilities or demand for new recreational facilities that would

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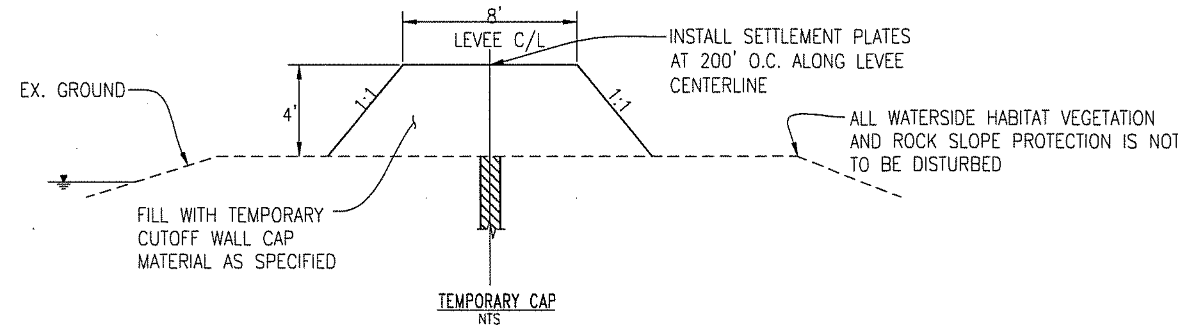
[2] City of Lathrop. 2003. *River Islands at Lathrop Project Subsequent EIR*. State Clearinghouse No. 1993112027. Lathrop, CA. Prepared by Ascent Environmental, Inc., Sacramento, CA.

adversely affect the environment. Therefore, the project would have no impact on recreation, and this issue will not be discussed in the EIR.

Wildfire. The Project site is not located in or near a state responsibility area or lands classified as a very high fire hazard severity zone. Therefore, there would be no impact related to wildfire, and this issue will not be discussed in the EIR.

NOTES:

1. RD17 RIGHT OF WAY EXTENDS FROM THE SAN JOAQUIN RIVER WATER'S EDGE (AT ORDINARY HIGH WATER) TO THE PROPOSED RD17 RIGHT OF WAY SHOWN ABOVE AND ON THE DETAILED CROSS-SECTIONS WITHIN THIS PLAN SET. TEMPORARY CONSTRUCTION EASEMENTS WILL BE OBTAINED BY RD17 TO COVER THE LIMITS OF WORK AS SHOWN.
2. CONTRACTOR SHALL CLEAR AND GRUB WORKING AREAS. SCARIFY AND RECOMPACT EXISTING GROUND WORKING AREAS PER GEOTECHNICAL ENGINEER'S RECOMMENDATION. SUBGRADE SHALL BE GRADED FLAT OR WITH POSITIVE FALL AWAY FROM THE LEVEE SUCH THAT THE TOE OF THE LEVEE IS SET AT THE EXISTING GROUND SURFACE.
3. FILL LEVEE AFTER SLURRY WALL HAS BEEN ACCEPTED BY DISTRICT.
4. STRIP AND STOCKPILE EX. AB AS APPROVED BY ENGINEER PRIOR TO CONSTRUCTION. EACH LAYER OF AB PLACED SHALL BE NO LESS THAN 95% COMPACTION.
5. REMOVE TOP 1/3 OF LEVEE (DEGRADE ELEVATION TO SHOW IN SECTION) AND REPLACE WITH LEVEE FILL MATERIAL AT 95% COMPACTION. SOIL REMOVED FROM THE LEVEE TO BE USED AS CROWN WIDENING SLOPE FILL.
6. PLACE WATTLES ALONG THE LIMIT OF THE TEMPORARY CONSTRUCTION EASEMENT PRIOR TO BEGINNING WORK, ALL SUBSEQUENT EROSION CONTROL MEASURES SHALL BE INSTALLED PER THE PROVISIONS OF THE SWPPP.
7. FILL LEVEE AFTER SLURRY WALL HAS CURED AT THE DIRECTION OF THE SOILS ENGINEER.
8. CONTRACTOR SHALL NOT PERFORM ADVANCE WORK WITHIN LEVEE PRISM WITHOUT DISTRICT AUTHORIZATION AND WORK CAN BE COMPLETED AND THE LEVEE RETURNED TO WORKING CONDITION WITHIN TWO WORKING DAYS.



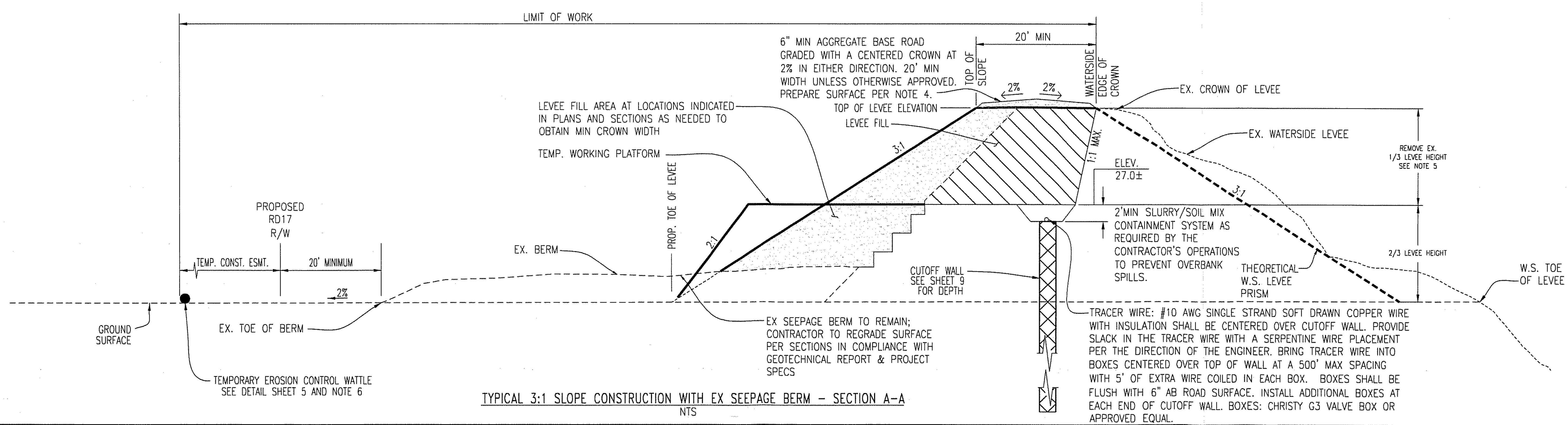
TEMPORARY CAP
NTS

TEMPORARY CAP NOTES:

1. AFTER SLURRY WALL HAS BEEN CONSTRUCTED. FILL LEVEE TO ELEVATION 32.2 WITH TEMPORARY CUTOFF WALL CAP MATERIAL.

2. INSTALL SETTLEMENT PLATES @ 200' O.C. ALONG LEVEE CENTERLINE. CONTRACTOR SHALL BE RESPONSIBLE TO SURVEY THE TOP OF EACH RISER PIPE EVERY OTHER DAY FOR A MINIMUM 2 WEEKS AND UNTIL SETTLEMENT HAS CEASED. AS APPROVED BY THE ENGINEER. THE SURVEYING OF SETTLEMENT PLATES SHALL BE PERFORMED BY A LICENSED SURVEYOR.

3. AFTER SETTLEMENT HAS CEASED, (PER THE DETERMINATION OF THE PROJECT GEOTECHNICAL ENGINEER.) REMOVE TEMPORARY CUTOFF WALL CAP MATERIAL. SOIL MAY BE USED AS CROWN WIDENING SLOPE FILL.. ANY EXCESS SOIL SHALL BE DISPOSED OF OFFSITE AT THE CONTRACTOR'S EXPENSE



TYPICAL 3:1 SLOPE CONSTRUCTION WITH EX SEEPAGE BERM - SECTION A-A
NTS

REGISTERED PROFESSIONAL ENGINEER CHRISTOPHER H. NEUDECK NO. 43473 CIVIL STATE OF CALIFORNIA

REVIEWED AND APPROVED BY:
K S N KJELDSEN SINNOCK NEUDECK INC. Consulting Engineers and Land Surveyors
Post Office Box 844
711 N. Pershing Avenue
Stockton, CA 95201-0844
Office: (209) 946-0268
Faxes: (209) 946-0296
E-mail: KSN@ksninc.com

REGISTERED PROFESSIONAL ENGINEER JOSEF TOOTLE No. 2677 GEOTECHNICAL STATE OF CALIFORNIA

THIS PLAN CONFORMS TO THE GEOTECHNICAL REPORT ENTITLED: SEEPAGE EVALUATION PROJECT #5747.000.000
ENGEO INCORPORATED EXCELLENT SERVICE SINCE 1971

REGISTERED PROFESSIONAL ENGINEER JAMES F. TEMPLETON JR. No.43061 CIVIL STATE OF CALIFORNIA

PREPARED UNDER THE DIRECTION OF:
MACKAY & SOMPS ENGINEERS PLANNERS SURVEYORS
5142 Franklin Drive, Suite B, Pleasanton, CA 94588 (925) 225-0690
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RECLAMATION DISTRICT NO. 17
ELEMENT VI-B, VI-C, VI-D, VI-E
TYPICAL SECTIONS & DETAILS

SAN JOAQUIN COUNTY CALIFORNIA

NO.	REVISION	DATE

DATE: JAN 2018
SCALE: NTS
DRAWN BY: RTH
DESIGNED BY: GJ
CHECKED BY: CWG

PROJECT NO. 25182.010
SHT 6 OF 21

01-22-2018 2:31pm Rick Hiatt P:\25182_ENGDE - SEEPAGE BERM\VI-B6 DETAILS.DWG

DELTA STEWARDSHIP COUNCIL
A California State Agency

980 NINTH STREET, SUITE 1500
SACRAMENTO, CALIFORNIA 95814
HTTP://DELTACOUNCIL.CA.GOV
(916) 445-5511

December 17, 2019

Mr. Glenn Gebhardt, City Engineer
City of Lathrop
390 Towne Centre Drive
Lathrop, CA 95330

Sent via email: website_pwk@ci.lathrop.ca.us

RE: Comments on Notice of Preparation of a Draft Environmental Impact Report for the Lathrop Consolidated Treatment Facility Surface Water Discharge Project, SCH# 2019110339

Dear Mr. Gebhardt:

Thank you for the opportunity to review and comment on the Notice of Preparation (NOP) of a draft Environmental Impact Report (EIR) for the Lathrop Consolidated Treatment Facility Surface Water Discharge Project (CTF). According to the NOP, the proposed project is to repurpose approximately 1.1 miles of existing recycled water pipeline or construct approximately 1.7 miles of new effluent pipeline within City rights-of-way, and install a new river side-bank or bottom-diffuser outfall to discharge excess tertiary-treated, disinfected, and dechlorinated effluent from the CTF to the San Joaquin River. This project would allow the City to convert land currently used to store treated effluent to urban development consistent with the City's General Plan. Additionally, based on discussions from the public scoping meeting, the City will be applying for permit(s) from the State Water Resources Control Board regarding discharges into the San Joaquin River.

The Council is an independent state agency established by the Sacramento-San Joaquin Delta Reform Act of 2009 (SBX7 1; Delta Reform Act (Wat. Code, §§ 85000 *et seq*.)). As stated in the Delta Reform Act, the State has coequal goals for the Delta: providing a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem. The coequal goals shall be achieved in a manner that protects and enhances the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place (Wat. Code, § 85054). The Council is charged with furthering California's coequal goals for the Delta through the adoption and implementation of the Delta Plan. The Delta Plan identifies 14 regulatory policies, which are set forth in California Code of Regulations, Title 23, sections 5001-5015.

Covered Action Determination and Certification of Consistency with the Delta Plan

Through the Delta Reform Act, the Council was granted specific regulatory and appellate authority over certain actions that take place in whole or in part in the Delta and Suisun Marsh, which are referred to as "covered actions". A state or local agency that proposes to undertake a covered action is required to prepare a written certification of consistency with detailed findings as to whether the covered action is consistent with the Delta Plan and submit that certification to the Council prior to implementation of the project (Wat. Code, § 85225).

Based on the project location and scope, as provided in the NOP, the proposed project appears to meet the definition of a covered action. However, it is the state or local agency approving, funding, or carrying out the project that ultimately must determine if that project is a covered action. Water Code section 85057.5 subdivision (a) provides a four-part test defining what activities would be considered covered actions.

(1) Will occur, in whole or in part, within the boundaries of the Delta or Suisun Marsh;
(2) Will be carried out, approved, or funded by a state or a local public agency;
(3) Is covered by one of the provisions of the Delta Plan; and
(4) Will have a significant impact on achievement of one or both of the coequal goals or the implementation of government-sponsored flood control programs to reduce risks to people, property, and State interests in the Delta.

The project appears to meet the criteria of a covered action because:

1. The CTF would occur in whole within the boundary of the Delta. According to the project location map in the NOP, the CTF is located within the Secondary Zone of the Delta;
2. The NOP identifies that the project would be carried out, approved or funded by a local public agency, the City of Lathrop.
3. The NOP describes activities that may be covered by Delta Plan Policies as described below; and
4. The activities described in the NOP indicate that the project may have a significant positive or negative impact on both providing for a more reliable water supply and the protection, restoration, and enhancement of the Delta ecosystem.

As the City proceeds with design, development, and environmental impact analysis of the project, we invite you to engage Council staff in early consultation to discuss project features and mitigation measures that would promote consistency with the Delta Plan. More information on covered actions, early consultation, and the certification process can be found on the Council website: http://deltacouncil.ca.gov/delta-plan/covered-actions.

Comments Regarding Delta Plan Policies and Potential Consistency Certification

The following section describes regulatory Delta Plan policies that may apply to the proposed project based on the NOP. This information is offered to assist the City to prepare certified environmental documents that can be used to support a certification of consistency with the Delta Plan for the proposed project. This information may also assist the City to describe the Delta Reform Act and the Council in the regulatory setting of the EIR, and the relationship between the proposed project and Delta Plan policies in topical sections of the EIR.

General Policy 1: Detailed Finding to Establish Consistency with the Delta Plan

Delta Plan Policy **G P1** (Cal. Code Regs., tit. 23, § 5002) specifies what must be addressed in a certification of consistency filed by a state or local agency with regard to a covered action. The certification of consistency must include detailed findings that address the requirements in Delta Plan Policy **G P1**, including the following:

Mitigation Measures

Delta Plan Policy **G P1** (Cal. Code Regs., tit. 23, § 5002(b)(2)) requires that covered actions not exempt from CEQA must include applicable feasible mitigation measures identified in the Delta Plan Program EIR (unless the measures are within the exclusive jurisdiction of another agency) or substitute mitigation measures that the agency finds are equally or more effective. For your reference, the mitigation measures adopted and incorporated into the Delta Plan can be found in the Delta Plan's Mitigation and Monitoring Report Program (Delta Plan MMRP), which is available at: http://www.deltacouncil.ca.gov/pdf/delta-plan/2018-appendix-o-mitigation-monitoring-and-reporting-program.pdf.

If the CTF EIR identifies significant impacts that require mitigation, the City should review proposed mitigation measures for effectiveness and consistency with corresponding applicable and feasible Delta Plan mitigation measures for each of the identified impacts consistent with Delta Plan Policy **G P1**.

Best Available Science

Delta Plan Policy **G P1** (Cal. Code Regs., tit. 23, § 5002(b)(3)) requires that all covered actions must document use of best available science relevant to the purpose and nature of the project. The Delta Plan defines best available science as "the best scientific information and data for informing management and policy decisions." (Cal. Code Regs, tit. 23, § 5001 (f).) Best available science is also required to be consistent with the guidelines and criteria in Appendix 1A of the Delta Plan (http://www.deltacouncil.ca.gov/pdf/delta-plan/2015-appendix-1a.pdf).

Adaptive Management

Delta Plan Policy **G P1** (Cal. Code Regs, tit. 23, § 5002(b)(4)) requires that ecosystem restoration and water management covered actions include adequate provisions, appropriate to the scope of the action, to assure continued implementation of adaptive management. This requirement is satisfied through (1) an adaptive management plan that describes the approach to be taken consistent with the adaptive management framework described in Appendix 1 B of the Delta Plan (http://deltacouncil.ca.gov/sites/default/files/2015/09/Appendix%201B.pdf); and (2) documentation of access to adequate resources and delineated authority by the entity responsible to implement the proposed adaptive management process.

At the public scoping meeting held for this project on December 4, 2019, there was discussion that the City may consider selling treated effluent to other parties to help supplement needs (e.g., meet State Groundwater Management Act requirements), which may lower the amount of water discharged to the San Joaquin River in the future. Please add this potential to the EIR project description if this is an intended component of the project. If the City intends to sell treated effluent for these purposes, the CTF may be considered a water management project subject to this Delta Plan policy.

Ecosystem Restoration Policy 1: Delta Flow Objectives
Delta Plan Policy **ER P1** (Cal. Code Regs, tit. 23, § 5005) requires the State Water Resources Control Board's Bay-Delta Water Quality Control Plan flow objectives to be used to determine consistency with the Delta Plan.

In the Biological Resources and Hydrology and Water Quality sections of the EIR, the City should analyze and document how the CTF may affect or alter Delta flows subject to the Bay-Delta Water Quality Control Plan flow objectives. Potential treated effluent releases may impact listed species and the ability to meet flow objectives under different hydrologic conditions and water type years. In addition, the State Water Resources Control Board adopted, and the State Office of Administrative Law recently approved, Bay-Delta Plan amendments establishing revised flow objectives for the Lower San Joaquin River and revised southern Delta salinity standards. The objectives and standards in these amendments are therefore relevant to ER P1. The City should consider these amendments and potential impacts of the project on Delta flow objectives and salinity standards in the EIR.

Ecosystem Restoration Policy 5: Avoid Introductions of and Habitat Improvements for Invasive Nonnative Species
Delta Plan Policy **ER P5** (Cal. Code Regs, tit. 23, § 5009) requires that the potential for new introductions of or improved habitat conditions for nonnative invasive specifies, striped bass, or bass must be fully considered and avoided or mitigated in a way that appropriately protects the ecosystem.
In the Biological Resources section of the EIR, the City should consider how the introduction of treated effluent water and the potential development of a new or refurbished outfall in the San Joaquin River could induce invasive nonnative species. The analysis may consider how these project aspects could provide habitat for invasive nonnative species (both aquatic and terrestrial) or provide an increase or concentration of nutrients that could develop conditions beneficial to invasive nonnative species. Water temperature impacts should also be considered. In the event that mitigation is warranted, mitigation and minimization measures should be consistent with Delta Plan Mitigation Measure 4-1, as described in the Delta Plan

Mitigation Monitoring and Reporting Program (http://www.deltacouncil.ca.gov/pdf/delta-plan/2018-appendix-o-mitigation-monitoring-and-reporting-program.pdf).

Delta as Place Policy 1: Locate New Urban Development Wisely
Delta Plan Policy **DP P1** (23 Cal. Code Regs., tit. 23, § 5010) places certain limits on new urban development within the Delta. As it applies to the proposed project, Policy DP P1 states that new residential, commercial, or industrial development must be limited to areas that city or county general plans designate for residential, commercial, and industrial development in cities or their spheres of influence as of the date of the Delta Plan's adoption (May 16, 2013).

The NOP project description identifies that "currently, the City has 10 storage ponds, one percolation pond and approximately 297 acres of urban and agricultural irrigation area for storage and use of treated effluent. However, all this land is designated under the City General Plan for some form of urban development and keeping this land for effluent storage and disposal precludes the ability of the City to fulfill its General Plan land use vision." (NOP, p. 3) Please include a map in the EIR depicting each area currently used for effluent storage, use, and percolation along with its intended urban development use, and identify whether all such areas were designated for residential, commercial, and industrial development in the City of Lathrop General Plan that was in effect on May 16, 2013. Also, please analyze the potential of the improved CTF to induce new development in the Delta that was not accounted for in applicable city or county general plans as of May 16, 2013 in the growth inducement and cumulative impacts discussions in the EIR.

CEQA Regulatory Setting
Please include a description of the Delta Plan and reference to the specific applicable policies in the regulatory setting of the EIR for each resource section in which a Delta Plan policy is applicable.

Closing Comments

We invite the City to engage with Council staff in early consultation to collaborate and discuss project features and mitigation measures as you proceed with design, development, and environmental impact analysis of the project. Please contact Anthony Navasero at (916) 445-5471 Anthony.Navasero@deltacouncil.ca.gov with any questions.

Sincerely,

Jeff Henderson, AICP
Deputy Executive Officer
Delta Stewardship Council

Appendix B

Construction Assumptions

Summary For: Environmental Impact Report (EIR)
Opinion is based upon: Concept Plans

Proj. Name: City of Lathrop Recycled Water River Discharge
Proj. No: 1900-235
Prepared by: Steven Millett
Date: 08/26/20

Note: The equipment list here would be associated with use of one crew for pipeline construction.

CONSTRUCTION EQUIPMENT SUMMARY

Item	Description	Estimated Quantity	Estimated Hours/Day	Estimated No. Days Used	Total Hours
CONSOLIDATED TREATMENT FACILITY (CTF)					
1	BACKHOE	~~0~~	0	0	0
2	MISC. HAND TOOLS	1	8	140	1120
3	DUMP TRUCK	2	8	28	448
4	FRONT END LOADER	1	8	14	112
5	COMPACTOR	1	8	14	112
6	WATER TRUCK	1	8	140	1120
7	WORK TRUCK	6	8	140	6720
8	HAUL TRUCK / TRAILER	1	8	14	112
9	ASPHALT PAVER	1	8	2	16
10	ASPHALT / CONCRETE SAW	1	8	4	32
11	ASPHALT ROLLER	1	8	2	16
12	GENERATOR	1	8	140	1120
13	EXCAVATOR	1	8	14	112
14	FORKLIFT	1	8	70	560
15	CORE DRILLING MACHINE	1	8	2	16
16	WELDER AND TORCH	1	8	14	112
LEVEE CROSSING					
17	BACKHOE	1	8	7	56
18	EXCAVATOR	1	8	21	168
19	MISC. HAND TOOLS	1	8	112	896
20	DUMP TRUCK	4	8	42	1344
21	FRONT END LOADER	1	8	42	336
22	CEMENT TRUCK	2	8	14	224
23	BARGE	1	8	7	56
24	PILE DRIVER / AUGER DRILL RIG	1	8	21	168
25	COMPACTOR	1	8	7	56

26	WATER TRUCK	1	8	112	896
27	WORK TRUCK	6	8	112	5376
28	HAUL TRUCK / TRAILER	1	8	112	896
29	TRUCK TRAILER (MOB./DEMOB.)	1	8	14	112
30	SCRAPER	1	8	7	56
31	DOZER	1	8	56	448
32	DEWATERING PUMP EQUIPMENT	1	8	70	560
33	WELDING MACHINE	1	8	14	112
34	CRANE	1	8	28	224
35	HYDROSEEDER	1	8	7	56

NEW PIPELINE BETWEEN CTF AND LEVEE

36	BACKHOE	1	8	0	0
37	EXCAVATOR	1	8	21	168
38	MISC. HAND TOOLS	2	8	84	1344
39	DUMP TRUCK	5	8	42	1680
40	FRONT END LOADER	2	8	42	672
41	CEMENT TRUCK	~~0~~	8	0	0
42	COMPACTOR	1	8	21	168
43	WATER TRUCK	1	8	84	672
44	WORK TRUCK	5	8	84	3360
45	HAUL TRUCK / TRAILER	2	8	42	672
46	ASPHALT PAVER	1	8	10	80
47	ASPHALT ROLLER	1	8	10	80
48	JACK AND BORE DRILL RIG	1	8	7	56
49	PAINTING EQUIPMENT	1	8	0	0
50	ASPHALT / CONCRETE SAW	1	8	8	64
51	GENERATOR	1	8	84	672
52	TRUCK TRAILER (MOB./DEMOB.)	1	8	14	112

Pond A, B, and C Decommissioning

53	BACKHOE	6	8	28	1344
54	EXCAVATOR	3	8	28	672
55	DOZER	6	8	28	1344
56	DUMP TRUCK	6	8	28	1344
57	FRONT END LOADER	10	8	28	2240
58	WORK TRUCK	10	8	28	2240
59	COMPACTOR	6	8	28	1344
60	WATER TRUCK	3	8	28	672
61	HAUL TRUCK / TRAILER	10	8	28	2240
62	HYDROSEEDER	3	8	28	672

ITEMS NOT INCLUDED IN THE ABOVE SUMMARY

1 PUMP MODIFICATIONS

2 SCADA / CONTROLS

Summary For: Environmental Impact Report (EIR)
Opinion is based upon: Concept Plans

Proj. Name: City of Lathrop Recycled Water River Discharge
Proj. No: 1900-235
Prepared by: Steven Millett
Date: 08/26/20

Note: The equipment list here would be associated with use of two crews for pipeline construction.

CONSTRUCTION EQUIPMENT SUMMARY

Item	Description	Estimated Quantity	Estimated Hours/Day	Estimated No. Days Used	Total Hours
CONSOLIDATED TREATMENT FACILITY (CTF)					
1	BACKHOE	~~0~~	0	0	0
2	MISC. HAND TOOLS	1	8	140	1120
3	DUMP TRUCK	2	8	28	448
4	FRONT END LOADER	1	8	14	112
5	COMPACTOR	1	8	14	112
6	WATER TRUCK	1	8	140	1120
7	WORK TRUCK	6	8	140	6720
8	HAUL TRUCK / TRAILER	1	8	14	112
9	ASPHALT PAVER	1	8	2	16
10	ASPHALT / CONCRETE SAW	1	8	4	32
11	ASPHALT ROLLER	1	8	2	16
12	GENERATOR	1	8	140	1120
13	EXCAVATOR	1	8	14	112
14	FORKLIFT	1	8	70	560
15	CORE DRILLING MACHINE	1	8	2	16
16	WELDER AND TORCH	1	8	14	112
LEVEE CROSSING					
17	BACKHOE	1	8	7	56
18	EXCAVATOR	1	8	21	168
19	MISC. HAND TOOLS	1	8	112	896
20	DUMP TRUCK	4	8	42	1344
21	FRONT END LOADER	1	8	42	336
22	CEMENT TRUCK	2	8	14	224
23	BARGE	1	8	7	56
24	PILE DRIVER / AUGER DRILL RIG	1	8	21	168
25	COMPACTOR	1	8	7	56

26	WATER TRUCK	1	8	112	896
27	WORK TRUCK	6	8	112	5376
28	HAUL TRUCK / TRAILER	1	8	112	896
29	TRUCK TRAILER (MOB./DEMOB.)	1	8	14	112
30	SCRAPER	1	8	7	56
31	DOZER	1	8	56	448
32	DEWATERING PUMP EQUIPMENT	1	8	70	560
33	WELDING MACHINE	1	8	14	112
34	CRANE	1	8	28	224
35	HYDROSEEDER	1	8	7	56

NEW PIPELINE BETWEEN CTF AND LEVEE

36	BACKHOE	2	8	0	0
37	EXCAVATOR	2	8	21	336
38	MISC. HAND TOOLS	2	8	84	1344
39	DUMP TRUCK	9	8	42	3024
40	FRONT END LOADER	4	8	42	1344
41	CEMENT TRUCK	~~0~~	8	0	0
42	COMPACTOR	2	8	21	336
43	WATER TRUCK	1	8	84	672
44	WORK TRUCK	9	8	84	6048
45	HAUL TRUCK / TRAILER	2	8	42	672
46	ASPHALT PAVER	2	8	10	160
47	ASPHALT ROLLER	2	8	10	160
48	JACK AND BORE DRILL RIG	1	8	7	56
49	PAINTING EQUIPMENT	1	8	0	0
50	ASPHALT / CONCRETE SAW	1	8	8	64
51	GENERATOR	1	8	84	672
52	TRUCK TRAILER (MOB./DEMOB.)	1	8	14	112

Pond A, B, and C Decommissioning

53	BACKHOE	6	8	28	1344
54	EXCAVATOR	3	8	28	672
55	DOZER	6	8	28	1344
56	DUMP TRUCK	6	8	28	1344
57	FRONT END LOADER	10	8	28	2240
58	WORK TRUCK	10	8	28	2240
59	COMPACTOR	6	8	28	1344
60	WATER TRUCK	3	8	28	672
61	HAUL TRUCK / TRAILER	10	8	28	2240
62	HYDROSEEDER	3	8	28	672

ITEMS NOT INCLUDED IN THE ABOVE SUMMARY

1	PUMP MODIFICATIONS
2	SCADA / CONTROLS

Construction Equipment Use on a Peak Day

Description	Estimated Quantity	Estimated Hours
Consolidated Treatment Facility (CTF)		
Work Trucks	2	4
Dump Truck	1	8
Backhoe	1	8
Front End Loader	1	8

Levee Crossing		
Work Trucks	2	4
Dump Trucks	4	8
Backhoes	2	8
Excavator	1	8

New Pipeline between CTF and Levee (1 Crew)		
Work Trucks	4	4
Dump Trucks	4	8
Front End Loaders	2	8
Water Truck	1	4
Excavators	1	8
Backhoes	1	8
Asphalt Paver	1	8
Asphalt Roller	1	8
Jack and Bore	1	8
Generator	1	8
Compactors	1	8
Haul Trucks	1	8

New Pipeline between CTF and Levee (2 Crews)		
Work Trucks	9	4
Dump Trucks	9	8
Front End Loaders	4	8
Water Truck	1	4
Excavators	2	8
Backhoes	2	8
Asphalt Paver	2	8
Asphalt Roller	2	8
Jack and Bore	1	8
Generator	2	8
Compactors	2	8
Haul Trucks	2	8

kpff 2250 Douglas Blvd, Suite 200 Roseville, CA 95661 p (916) 772-7688				
	Project:	Lathrop River Discharge	Date:	7/29/2020
	Location:	Lathrop, CA	Sheet #	1
	Client:	City of Lathrop	Job #	1900-235
	By:	S. Millett		

Determine:

Earthwork quantities for the Lathrop River Discharge Pipeline

Assumptions:

1. All Levee material excavated will be exported and replaced as needed
2. Existing PVC and Steel pipe will be suitable for reuse with the exception of the levee crossing
3. New pipe will have 5' cover, and trenches will be 5' wide
4. Pipe bedding will extend width of trench and 1' above/below the pipe O.D.
5. Trenching excavation materials for pipe outside of levee crossing can be reused for backfill

Item	Unit	Total	CTF to Rail Crossing	Rail Crossing	Rail Crossing to	Murphy to I-5	Inland Passage	Levee Crossing	Outfall Construction	Rip Rap Construction	Articulated Concrete	Pond A Decommisioning	Pond B Decommisioning	Pond C Decommisioning	Notes
Total Excavation	(CY)	9,213	1,102	193	1,491	4,174	869	942	98	344	-	-	-	-	*Excavation Quantity does not assume import or export, and only represent the total volume of earth moved*
CONSTRUCTION MATERIALS OUTSIDE OF LEVEE BOUNDARY (PIPE ALIGNMENT FROM CTF TO LEVEE TOE)															
Total Excavation	(CY)	7,828	1,102	193	1,491	4,174	869	-	-	-	-	-	-	-	
Total Bedding Material Import	(CY)	3,435	495	-	670	1,876	390	-	3	-	-	-	-	-	
Total Trenching Material Export	(CY)	3,962	551	144	745	2,087	434	-	-	-	-	-	-	-	
Total Pavement Replacement	(SF)	29,450	4250	-	5,750	16,100	3,350	-	-	-	-	-	-	-	
CONSTRUCTION MATERIALS WITHIN LEVEE BOUNDARY															
Total Excavation	(CY)	1,385	-	-	-	-	-	942	98	344	-	-	-	-	
Total CLSM Import	(CY)	920	-	-	-	-	-	920	-	-	-	-	-	-	
Total Levee Material Import	(CY)	42	-	-	-	-	-	-	42	-	-	-	-	-	
Total Levee Spoils Export	(CY)	1,363	-	-	-	-	-	920	98	344	-	-	-	-	
Total Rip Rap Material Import	(CY)	344	-	-	-	-	-	-	-	-	344	-	-	-	
Total Concrete Import	(CY)	9	-	-	-	-	-	-	9	-	-	-	-	-	
Total Levee Ramp Import	(CY)	889	-	-	-	-	-	889	-	-	-	-	-	-	
PIPE LENGTHS															
18" HDPE Pipe	(LF)	2,060	850	60	1,150	-	-	-	-	-	-	-	-	-	
20" HDPE Pipe	(LF)	945	-	-	-	-	670	275	-	-	-	-	-	-	
POND A, B, AND C DECOMMISSIONING															
Total Pond Excavation	(CY)	35,481	-	-	-	-	-	-	-	-	-	15,111	11,852	8,519	*Excavation includes excavation of berm and filling of pond with same material*
Total Lining Removal	(SF)	640,500	-	-	-	-	-	-	-	-	-	278,000	230,000	132,500	

Summary For: Environmental Impact Report (EIR)
Opinion is based upon: Concept Plans

Proj. Name: City of Lathrop Recycled Water River Discharge
Proj. No: 1900-235
Prepared by: Steven Millett
Date: 07/29/20

kpff

TRUCK TRIP ESTIMATE

Assumptions:

Dump Truck Volume	10	CY
Concrete Truck Volume	8	CY
Barge Volume	140	CY

Item	Transport Type	Quantity		Truck Trips	Notes
Total Bedding Material	**Dump Truck**	**3,435**	**CY**	**344**	
CTF to Rail Crossing		495	*CY*	*50*	
Rail Crossing		-	*CY*	*0*	
Rail Crossing to Murphy		670	*CY*	*68*	
Murphy to I-5		1,876	*CY*	*188*	
Inland Passage Way		390	*CY*	*40*	
Levee Crossing		-		*0*	
Outfall Construction		3		*1*	
Rip Rap Construction		-		*0*	
Total Trenching Material Export	**Dump Truck**	**3,962**	**CY**	**397**	
CTF to Rail Crossing		551		*55*	
Rail Crossing		144		*14*	
Rail Crossing to Murphy		745		*75*	
Murphy to I-5		2,087		*209*	
Inland Passage Way		434		*44*	
Levee Crossing		-		*0*	
Outfall Construction		-		*0*	
Rip Rap Construction		-		*0*	
Total Levee Material Import	**Dump Truck**	**42**	**CY**	**5**	
CTF to Rail Crossing		-		*0*	
Rail Crossing		-		*0*	
Rail Crossing to Murphy		-		*0*	
Murphy to I-5		-		*0*	
Inland Passage Way		-		*0*	
Levee Crossing		-		*0*	
Outfall Construction		42		*5*	
Rip Rap Construction		-		*0*	

Total Levee Spoils Export	**Dump Truck**	**1,363**	**CY**	**137**	
CTF to Rail Crossing		-		*0*	
Rail Crossing		-		*0*	
Rail Crossing to Murphy		-		*0*	
Murphy to I-5		-		*0*	
Inland Passage Way		-		*0*	
Levee Crossing		920		*92*	
Outfall Construction		98		*10*	
Rip Rap Construction		344		*35*	
Total Rip Rap Material Import	**Dump Truck**	**344**	**CY**	**35**	
CTF to Rail Crossing		-		*0*	
Rail Crossing		-		*0*	
Rail Crossing to Murphy		-		*0*	
Murphy to I-5		-		*0*	
Inland Passage Way		-		*0*	
Levee Crossing		-		*0*	
Outfall Construction		-		*0*	
Rip Rap Construction		344		*35*	
Total Concrete Import	**Concrete Truck**	**9**	**CY**	**2**	
CTF to Rail Crossing		-		*0*	
Rail Crossing		-		*0*	
Rail Crossing to Murphy		-		*0*	
Murphy to I-5		-		*0*	
Inland Passage Way		-		*0*	
Levee Crossing		-		*0*	
Outfall Construction		9		*2*	
Rip Rap Construction		-		*0*	
Total CLSM Import	**Concrete Truck**	**920**	**CY**	**115**	
CTF to Rail Crossing		-		*0*	
Rail Crossing		-		*0*	
Rail Crossing to Murphy		-		*0*	
Murphy to I-5		-		*0*	
Inland Passage Way		-		*0*	
Levee Crossing		920		*115*	
Outfall Construction		-		*0*	
Rip Rap Construction		-		*0*	
Total Pavement Replacement	**Dump Truck**	**545**	**CY**	**55**	**Assume 6" Asphalt Section**
CTF to Rail Crossing		79		*8*	
Rail Crossing		-		*0*	
Rail Crossing to Murphy		106		*11*	
Murphy to I-5		298		*30*	
Inland Passage Way		62		*6*	
Levee Crossing		-		*0*	

Outfall Construction		-	*0*
Rip Rap Construction		-	*0*
Total Levee Ramp Material Import	**Dump Truck**	**889 CY**	**89**
CTF to Rail Crossing		-	*0*
Rail Crossing		-	*0*
Rail Crossing to Murphy		-	*0*
Murphy to I-5		-	*0*
Inland Passage Way		-	*0*
Levee Crossing		889	*89*
Outfall Construction		-	*0*
Rip Rap Construction		-	*0*

Sub-Total

Dump Truck	**1,062 Trips**
Concrete	**117 Trips**

Summary For: Environmental Impact Report (EIR)
Opinion is based upon: Concept Plans

Proj. Name:	City of Lathrop Recycled Water River Discharge
Proj. No:	1900-235
Prepared by:	Steven Millett
Date:	06/02/20

Construction Workers Estimate

Levee Crossing

Gerneral Laborers	4
Crane Operator	1
Excavator Operator	1
Crane Riggers	2
Truck Driver	3
CLSM Truck Driver	2
Labor Foreman	1
Superintendent	1
Project Engineer	1
Total	**16**

Effluent Pipe Trenching

General Laborers	6
Excavator Operator	2
Jack + Bore Operator	1
Jack + Bore Labor	3
Truck Driver	4
Paving Crew	4
Labor Foreman	2
Superintendent	1
Project Engineer	1
Total	**24**

CTF Modifications

General Laborers	4
Excavator Operator	1
Dechlor Labor	3
Plumber	2
Pipe Fitter	2
Electrician	2
Paving Crew	4
Labor Foreman	1
Superintendent	1
Project Engineer	1
Truck Driver	4
Total	**25**

Appendix C

Air Quality, Energy, and Greenhouse Gas Emissions Modeling Results

Annual Construction Emissions: Lathrop Surface Discharge Project

	2021 (TPY)							2022 (TPY)						
	ROG	Nox	PM10	PM2.5	CO	Sox	CO2e (MT)	ROG	Nox	PM10	PM2.5	CO	Sox	CO2e (MT)
Effluent Discharge Pipeline	0.15	1.3	0.1	0	1	0	279							
CTF	0.13	1.3	0	0	1	0	227							
Levee Crossing and Outfall	0.1	1.06	0.14	0.08	0.65	0	207							
Decommissionning of Ponds								0.1	1.1	0.3	0.2	0.7	0	260
Total	**0.38**	**3.66**	**0.24**	**0.08**	**2.65**	**0**	**713**	**0.1**	**1.1**	**0.3**	**0.2**	**0.7**	**0**	**260**

Phase 2 Surface Discharge Project CTF (Construction Emissions)

San Joaquin County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Light Industry	9.00	1000sqft	0.21	9,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.7	**Precipitation Freq (Days)**	51
Climate Zone	2			**Operational Year**	2023
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	208	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - 95330 Zip Code; CO2 Intensity Factor amended for 2018 based on PG&E 10-k form. This model runs for construction emissions only.

Land Use - 9,000 SF of trenching/construction area associated with this component.

Construction Phase - No demolition, grading, paving, or architectural coatings associated with project. This component would occur from 7/9/21 to 11/26/21

Off-road Equipment -

Trips and VMT - 25 total workers for this phase; estimated 211 total haul truck trips.

On-road Fugitive Dust -

Demolition - No demolition

Grading - estimated 5,038 CY export of materials

Off-road Equipment - Construction equipment list provided by applicant. Hours averaged over phase of this component.

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	1.00	101.00
tblConstructionPhase	PhaseEndDate	7/9/2021	11/26/2021
tblGrading	AcresOfGrading	50.50	0.50
tblGrading	MaterialExported	0.00	5,038.00
tblOffRoadEquipment	OffRoadEquipmentType		Plate Compactors
tblOffRoadEquipment	OffRoadEquipmentType		Off-Highway Trucks
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Welders
tblOffRoadEquipment	OffRoadEquipmentType		Other General Industrial Equipment
tblOffRoadEquipment	OffRoadEquipmentType		Off-Highway Trucks
tblOffRoadEquipment	OffRoadEquipmentType		Generator Sets
tblOffRoadEquipment	OffRoadEquipmentType		Pavers
tblOffRoadEquipment	OffRoadEquipmentType		Rollers
tblOffRoadEquipment	OffRoadEquipmentType		Bore/Drill Rigs
tblOffRoadEquipment	OffRoadEquipmentType		Concrete/Industrial Saws
tblOffRoadEquipment	OffRoadEquipmentType		Forklifts
tblOffRoadEquipment	UsageHours	8.00	1.10
tblProjectCharacteristics	CO2IntensityFactor	641.35	208
tblTripsAndVMT	HaulingTripNumber	498.00	211.00
tblTripsAndVMT	HaulingTripNumber	498.00	0.00
tblTripsAndVMT	WorkerTripNumber	38.00	25.00
tblTripsAndVMT	WorkerTripNumber	38.00	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2021	0.1340	1.2538	0.9096	2.5700e-003	0.0222	0.0516	0.0737	5.6600e-003	0.0482	0.0539			225.2003	0.0597	0.0000	226.6931
Maximum	**0.1340**	**1.2538**	**0.9096**	**2.5700e-003**	**0.0222**	**0.0516**	**0.0737**	**5.6600e-003**	**0.0482**	**0.0539**			**225.2003**	**0.0597**	**0.0000**	**226.6931**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2021	0.1340	1.2538	0.9096	2.5700e-003	0.0222	0.0516	0.0737	5.6600e-003	0.0482	0.0539			225.2000	0.0597	0.0000	226.6929
Maximum	**0.1340**	**1.2538**	**0.9096**	**2.5700e-003**	**0.0222**	**0.0516**	**0.0737**	**5.6600e-003**	**0.0482**	**0.0539**			**225.2000**	**0.0597**	**0.0000**	**226.6929**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	**7-9-2021**	**9-30-2021**	0.8242	0.8242
		Highest	0.8242	0.8242

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0414	0.0000	8.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000			1.6000e-004	0.0000	0.0000	1.7000e-004
Energy	9.0000e-004	8.2200e-003	6.9100e-003	5.0000e-005		6.2000e-004	6.2000e-004		6.2000e-004	6.2000e-004			16.1274	1.1700e-003	3.7000e-004	16.2673
Mobile	0.0131	0.0832	0.1517	6.6000e-004	0.0520	4.4000e-004	0.0524	0.0139	4.1000e-004	0.0143			60.6444	2.3500e-003	0.0000	60.7033
Waste						0.0000	0.0000		0.0000	0.0000			2.2654	0.1339	0.0000	5.6124
Water						0.0000	0.0000		0.0000	0.0000			1.7228	0.0680	1.6300e-003	3.9083
Total	**0.0554**	**0.0914**	**0.1587**	**7.1000e-004**	**0.0520**	**1.0600e-003**	**0.0530**	**0.0139**	**1.0300e-003**	**0.0150**			**80.7602**	**0.2054**	**2.0000e-003**	**86.4914**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0414	0.0000	8.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000			1.6000e-004	0.0000	0.0000	1.7000e-004
Energy	9.0000e-004	8.2200e-003	6.9100e-003	5.0000e-005		6.2000e-004	6.2000e-004		6.2000e-004	6.2000e-004			16.1274	1.1700e-003	3.7000e-004	16.2673
Mobile	0.0131	0.0832	0.1517	6.6000e-004	0.0520	4.4000e-004	0.0524	0.0139	4.1000e-004	0.0143			60.6444	2.3500e-003	0.0000	60.7033
Waste						0.0000	0.0000		0.0000	0.0000			2.2654	0.1339	0.0000	5.6124
Water						0.0000	0.0000		0.0000	0.0000			1.7228	0.0680	1.6300e-003	3.9083
Total	**0.0554**	**0.0914**	**0.1587**	**7.1000e-004**	**0.0520**	**1.0600e-003**	**0.0530**	**0.0139**	**1.0300e-003**	**0.0150**			**80.7602**	**0.2054**	**2.0000e-003**	**86.4914**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Infrastructure Modifications	Site Preparation	7/9/2021	11/26/2021	5	101	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Infrastructure Modifications	Plate Compactors	1	1.10	8	0.43
Infrastructure Modifications	Off-Highway Trucks	1	1.10	402	0.38
Infrastructure Modifications	Excavators	1	1.10	158	0.38
Infrastructure Modifications	Welders	1	1.10	46	0.45
Infrastructure Modifications	Graders	1	8.00	187	0.41
Infrastructure Modifications	Other General Industrial Equipment	1	8.00	88	0.34
Infrastructure Modifications	Off-Highway Trucks	2	8.00	402	0.38
Infrastructure Modifications	Generator Sets	1	8.00	84	0.74
Infrastructure Modifications	Pavers	1	0.20	130	0.42
Infrastructure Modifications	Rollers	1	0.20	80	0.38
Infrastructure Modifications	Bore/Drill Rigs	1	0.20	221	0.50
Infrastructure Modifications	Tractors/Loaders/Backhoes	1	1.10	97	0.37
Infrastructure Modifications	Concrete/Industrial Saws	1	0.30	81	0.73
Infrastructure Modifications	Forklifts	1	5.60	89	0.20

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Infrastructure Modifications	15	25.00	0.00	211.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Infrastructure Modifications	15	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Infrastructure Modifications - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					2.7000e-004	0.0000	2.7000e-004	3.0000e-005	0.0000	3.0000e-005			0.0000	0.0000	0.0000	0.0000
Off-Road	0.1285	1.2236	0.8728	2.3900e-003		0.0514	0.0514		0.0480	0.0480			208.6947	0.0592	0.0000	210.1734
Total	**0.1285**	**1.2236**	**0.8728**	**2.3900e-003**	**2.7000e-004**	**0.0514**	**0.0517**	**3.0000e-005**	**0.0480**	**0.0481**			**208.6947**	**0.0592**	**0.0000**	**210.1734**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	7.9000e-004	0.0270	4.3100e-003	8.0000e-005	3.1400e-003	9.0000e-005	3.2300e-003	8.2000e-004	8.0000e-005	9.1000e-004			7.9237	3.4000e-004	0.0000	7.9323
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Worker	4.6500e-003	3.2200e-003	0.0325	9.0000e-005	0.0188	7.0000e-005	0.0188	4.8100e-003	6.0000e-005	4.8700e-003			8.5819	2.2000e-004	0.0000	8.5874
Total	**5.4400e-003**	**0.0302**	**0.0368**	**1.7000e-004**	**0.0219**	**1.6000e-004**	**0.0221**	**5.6300e-003**	**1.4000e-004**	**5.7800e-003**			**16.5056**	**5.6000e-004**	**0.0000**	**16.5197**

3.2 Infrastructure Modifications - 2021

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					2.7000e-004	0.0000	2.7000e-004	3.0000e-005	0.0000	3.0000e-005			0.0000	0.0000	0.0000	0.0000
Off-Road	0.1285	1.2236	0.8728	2.3900e-003		0.0514	0.0514		0.0480	0.0480			208.6944	0.0592	0.0000	210.1732
Total	**0.1285**	**1.2236**	**0.8728**	**2.3900e-003**	**2.7000e-004**	**0.0514**	**0.0517**	**3.0000e-005**	**0.0480**	**0.0481**			**208.6944**	**0.0592**	**0.0000**	**210.1732**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	7.9000e-004	0.0270	4.3100e-003	8.0000e-005	3.1400e-003	9.0000e-005	3.2300e-003	8.2000e-004	8.0000e-005	9.1000e-004			7.9237	3.4000e-004	0.0000	7.9323
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Worker	4.6500e-003	3.2200e-003	0.0325	9.0000e-005	0.0188	7.0000e-005	0.0188	4.8100e-003	6.0000e-005	4.8700e-003			8.5819	2.2000e-004	0.0000	8.5874
Total	**5.4400e-003**	**0.0302**	**0.0368**	**1.7000e-004**	**0.0219**	**1.6000e-004**	**0.0221**	**5.6300e-003**	**1.4000e-004**	**5.7800e-003**			**16.5056**	**5.6000e-004**	**0.0000**	**16.5197**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0131	0.0832	0.1517	6.6000e-004	0.0520	4.4000e-004	0.0524	0.0139	4.1000e-004	0.0143			60.6444	2.3500e-003	0.0000	60.7033
Unmitigated	0.0131	0.0832	0.1517	6.6000e-004	0.0520	4.4000e-004	0.0524	0.0139	4.1000e-004	0.0143			60.6444	2.3500e-003	0.0000	60.7033

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Light Industry	62.73	11.88	6.12	138,322	138,322
Total	62.73	11.88	6.12	138,322	138,322

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Light Industry	9.50	7.30	7.30	59.00	28.00	13.00	92	5	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Light Industry	0.561380	0.034626	0.184829	0.116141	0.016642	0.004535	0.016185	0.056706	0.001192	0.001407	0.004983	0.000606	0.000767

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000			7.1751	1.0000e-003	2.1000e-004	7.2618
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000			7.1751	1.0000e-003	2.1000e-004	7.2618
NaturalGas Mitigated	9.0000e-004	8.2200e-003	6.9100e-003	5.0000e-005		6.2000e-004	6.2000e-004		6.2000e-004	6.2000e-004			8.9523	1.7000e-004	1.6000e-004	9.0055
NaturalGas Unmitigated	9.0000e-004	8.2200e-003	6.9100e-003	5.0000e-005		6.2000e-004	6.2000e-004		6.2000e-004	6.2000e-004			8.9523	1.7000e-004	1.6000e-004	9.0055

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Light Industry	167760	9.0000e-004	8.2200e-003	6.9100e-003	5.0000e-005		6.2000e-004	6.2000e-004		6.2000e-004	6.2000e-004			8.9523	1.7000e-004	1.6000e-004	9.0055
Total		**9.0000e-004**	**8.2200e-003**	**6.9100e-003**	**5.0000e-005**		**6.2000e-004**	**6.2000e-004**		**6.2000e-004**	**6.2000e-004**			**8.9523**	**1.7000e-004**	**1.6000e-004**	**9.0055**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Light Industry	167760	9.0000e-004	8.2200e-003	6.9100e-003	5.0000e-005		6.2000e-004	6.2000e-004		6.2000e-004	6.2000e-004			8.9523	1.7000e-004	1.6000e-004	9.0055
Total		**9.0000e-004**	**8.2200e-003**	**6.9100e-003**	**5.0000e-005**		**6.2000e-004**	**6.2000e-004**		**6.2000e-004**	**6.2000e-004**			**8.9523**	**1.7000e-004**	**1.6000e-004**	**9.0055**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Light Industry	76050	7.1751	1.0000e-003	2.1000e-004	7.2618
Total		**7.1751**	**1.0000e-003**	**2.1000e-004**	**7.2618**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Light Industry	76050	7.1751	1.0000e-003	2.1000e-004	7.2618
Total		**7.1751**	**1.0000e-003**	**2.1000e-004**	**7.2618**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0414	0.0000	8.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000			1.6000e-004	0.0000	0.0000	1.7000e-004
Unmitigated	0.0414	0.0000	8.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000			1.6000e-004	0.0000	0.0000	1.7000e-004

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	6.2600e-003					0.0000	0.0000		0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0352					0.0000	0.0000		0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	8.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000			1.6000e-004	0.0000	0.0000	1.7000e-004
Total	**0.0414**	**0.0000**	**8.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**			**1.6000e-004**	**0.0000**	**0.0000**	**1.7000e-004**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	6.2600e-003					0.0000	0.0000		0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0352					0.0000	0.0000		0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	8.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000			1.6000e-004	0.0000	0.0000	1.7000e-004
Total	**0.0414**	**0.0000**	**8.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**			**1.6000e-004**	**0.0000**	**0.0000**	**1.7000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	1.7228	0.0680	1.6300e-003	3.9083
Unmitigated	1.7228	0.0680	1.6300e-003	3.9083

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Light Industry	2.08125 / 0	1.7228	0.0680	1.6300e-003	3.9083
Total		**1.7228**	**0.0680**	**1.6300e-003**	**3.9083**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Light Industry	2.08125 / 0	1.7228	0.0680	1.6300e-003	3.9083
Total		**1.7228**	**0.0680**	**1.6300e-003**	**3.9083**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	2.2654	0.1339	0.0000	5.6124
Unmitigated	2.2654	0.1339	0.0000	5.6124

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Light Industry	11.16	2.2654	0.1339	0.0000	5.6124
Total		**2.2654**	**0.1339**	**0.0000**	**5.6124**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Light Industry	11.16	2.2654	0.1339	0.0000	5.6124
Total		**2.2654**	**0.1339**	**0.0000**	**5.6124**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Phase 2 Surface Discharge Project Effluent Discharge Pipeline (Construction Emissions)

San Joaquin County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Light Industry	27.00	1000sqft	0.62	27,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.7	**Precipitation Freq (Days)**	51
Climate Zone	2			**Operational Year**	2023
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	208	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - 95330 Zip Code; CO2 Intensity Factor amended for 2018 based on PG&E 10-k form. This model runs for construction emissions only.

Land Use - 27,000 SF of trenching/construction area associated with this component.

Construction Phase - No demolition, grading, paving, or architectural coatings associated with project. This component would occur from 7/9/21 to 12/10/21

Off-road Equipment -

Off-road Equipment - Equipment list obtained from applicant, daily use averaged over total construction phase.

Trips and VMT - 24 total workers for this phase; estimated 211 total haul truck trips.

On-road Fugitive Dust -

Demolition - No demolition

Grading - estimated 1,559 CY import and 5,529 CY export of materials

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	1.00	111.00
tblConstructionPhase	PhaseEndDate	7/9/2021	12/10/2021
tblGrading	AcresOfGrading	0.00	0.50
tblGrading	MaterialExported	0.00	5,529.00
tblGrading	MaterialImported	0.00	1,559.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	3.00
tblProjectCharacteristics	CO2IntensityFactor	641.35	208
tblTripsAndVMT	HaulingTripNumber	886.00	211.00
tblTripsAndVMT	HaulingTripNumber	886.00	0.00
tblTripsAndVMT	VendorTripNumber	0.00	4.00
tblTripsAndVMT	WorkerTripNumber	38.00	24.00
tblTripsAndVMT	WorkerTripNumber	38.00	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2021	0.1504	1.3352	1.0420	3.1600e-003	0.0262	0.0536	0.0798	6.6800e-003	0.0499	0.0566			277.9356	0.0760	0.0000	279.8354
Maximum	**0.1504**	**1.3352**	**1.0420**	**3.1600e-003**	**0.0262**	**0.0536**	**0.0798**	**6.6800e-003**	**0.0499**	**0.0566**			**277.9356**	**0.0760**	**0.0000**	**279.8354**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2021	0.1504	1.3352	1.0420	3.1600e-003	0.0262	0.0536	0.0798	6.6800e-003	0.0499	0.0566			277.9353	0.0760	0.0000	279.8350
Maximum	**0.1504**	**1.3352**	**1.0420**	**3.1600e-003**	**0.0262**	**0.0536**	**0.0798**	**6.6800e-003**	**0.0499**	**0.0566**			**277.9353**	**0.0760**	**0.0000**	**279.8350**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	**7-9-2021**	**9-30-2021**	0.8027	0.8027
		Highest	0.8027	0.8027

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.1242	0.0000	2.5000e-004	0.0000		0.0000	0.0000		0.0000	0.0000			4.8000e-004	0.0000	0.0000	5.1000e-004
Energy	2.7100e-003	0.0247	0.0207	1.5000e-004		1.8700e-003	1.8700e-003		1.8700e-003	1.8700e-003			48.3823	3.5200e-003	1.1100e-003	48.8019
Mobile	0.0393	0.2494	0.4550	1.9700e-003	0.1559	1.3100e-003	0.1572	0.0418	1.2300e-003	0.0430			181.9333	7.0600e-003	0.0000	182.1099
Waste						0.0000	0.0000		0.0000	0.0000			6.7961	0.4016	0.0000	16.8371
Water						0.0000	0.0000		0.0000	0.0000			5.1684	0.2039	4.9000e-003	11.7248
Total	**0.1663**	**0.2741**	**0.4760**	**2.1200e-003**	**0.1559**	**3.1800e-003**	**0.1591**	**0.0418**	**3.1000e-003**	**0.0449**			**242.2805**	**0.6161**	**6.0100e-003**	**259.4742**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.1242	0.0000	2.5000e-004	0.0000		0.0000	0.0000		0.0000	0.0000			4.8000e-004	0.0000	0.0000	5.1000e-004
Energy	2.7100e-003	0.0247	0.0207	1.5000e-004		1.8700e-003	1.8700e-003		1.8700e-003	1.8700e-003			48.3823	3.5200e-003	1.1100e-003	48.8019
Mobile	0.0393	0.2494	0.4550	1.9700e-003	0.1559	1.3100e-003	0.1572	0.0418	1.2300e-003	0.0430			181.9333	7.0600e-003	0.0000	182.1099
Waste						0.0000	0.0000		0.0000	0.0000			6.7961	0.4016	0.0000	16.8371
Water						0.0000	0.0000		0.0000	0.0000			5.1684	0.2039	4.9000e-003	11.7248
Total	**0.1663**	**0.2741**	**0.4760**	**2.1200e-003**	**0.1559**	**3.1800e-003**	**0.1591**	**0.0418**	**3.1000e-003**	**0.0449**			**242.2805**	**0.6161**	**6.0100e-003**	**259.4742**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Earthwork/Trenching	Site Preparation	7/9/2021	12/10/2021	5	111	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Earthwork/Trenching	Concrete/Industrial Saws	1	0.70	81	0.73
Earthwork/Trenching	Dumpers/Tenders	1	3.00	16	0.38
Earthwork/Trenching	Excavators	1	1.50	158	0.38
Earthwork/Trenching	Generator Sets	1	6.00	84	0.74
Earthwork/Trenching	Graders	1	0.00	187	0.41
Earthwork/Trenching	Off-Highway Trucks	4	6.00	402	0.38
Earthwork/Trenching	Other General Industrial Equipment	1	6.00	88	0.34
Earthwork/Trenching	Pavers	1	0.70	130	0.42
Earthwork/Trenching	Plate Compactors	1	1.50	8	0.43
Earthwork/Trenching	Rollers	1	0.70	80	0.38
Earthwork/Trenching	Rubber Tired Loaders	1	3.00	203	0.36
Earthwork/Trenching	Tractors/Loaders/Backhoes	1	3.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Earthwork/Trenching	15	24.00	4.00	211.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Earthwork/Trenching	15	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Earthwork/Trenching - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					7.9000e-004	0.0000	7.9000e-004	1.1000e-004	0.0000	1.1000e-004			0.0000	0.0000	0.0000	0.0000
Off-Road	0.1440	1.2811	0.9985	2.9100e-003		0.0533	0.0533		0.0497	0.0497			255.0501	0.0751	0.0000	256.9268
Total	**0.1440**	**1.2811**	**0.9985**	**2.9100e-003**	**7.9000e-004**	**0.0533**	**0.0541**	**1.1000e-004**	**0.0497**	**0.0498**			**255.0501**	**0.0751**	**0.0000**	**256.9268**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	7.9000e-004	0.0270	4.3100e-003	8.0000e-005	3.1400e-003	9.0000e-005	3.2300e-003	8.2000e-004	8.0000e-005	9.1000e-004			7.9237	3.4000e-004	0.0000	7.9323
Vendor	7.4000e-004	0.0238	4.9000e-003	6.0000e-005	2.5000e-003	7.0000e-005	2.5700e-003	6.8000e-004	6.0000e-005	7.4000e-004			5.9075	3.5000e-004	0.0000	5.9162
Worker	4.9100e-003	3.4000e-003	0.0343	1.0000e-004	0.0198	7.0000e-005	0.0199	5.0700e-003	6.0000e-005	5.1400e-003			9.0543	2.3000e-004	0.0000	9.0601
Total	**6.4400e-003**	**0.0542**	**0.0435**	**2.4000e-004**	**0.0254**	**2.3000e-004**	**0.0257**	**6.5700e-003**	**2.0000e-004**	**6.7900e-003**			**22.8855**	**9.2000e-004**	**0.0000**	**22.9086**

3.2 Earthwork/Trenching - 2021

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					7.9000e-004	0.0000	7.9000e-004	1.1000e-004	0.0000	1.1000e-004			0.0000	0.0000	0.0000	0.0000
Off-Road	0.1440	1.2811	0.9985	2.9100e-003		0.0533	0.0533		0.0497	0.0497			255.0498	0.0751	0.0000	256.9264
Total	**0.1440**	**1.2811**	**0.9985**	**2.9100e-003**	**7.9000e-004**	**0.0533**	**0.0541**	**1.1000e-004**	**0.0497**	**0.0498**			**255.0498**	**0.0751**	**0.0000**	**256.9264**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	7.9000e-004	0.0270	4.3100e-003	8.0000e-005	3.1400e-003	9.0000e-005	3.2300e-003	8.2000e-004	8.0000e-005	9.1000e-004			7.9237	3.4000e-004	0.0000	7.9323
Vendor	7.4000e-004	0.0238	4.9000e-003	6.0000e-005	2.5000e-003	7.0000e-005	2.5700e-003	6.8000e-004	6.0000e-005	7.4000e-004			5.9075	3.5000e-004	0.0000	5.9162
Worker	4.9100e-003	3.4000e-003	0.0343	1.0000e-004	0.0198	7.0000e-005	0.0199	5.0700e-003	6.0000e-005	5.1400e-003			9.0543	2.3000e-004	0.0000	9.0601
Total	**6.4400e-003**	**0.0542**	**0.0435**	**2.4000e-004**	**0.0254**	**2.3000e-004**	**0.0257**	**6.5700e-003**	**2.0000e-004**	**6.7900e-003**			**22.8855**	**9.2000e-004**	**0.0000**	**22.9086**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0393	0.2494	0.4550	1.9700e-003	0.1559	1.3100e-003	0.1572	0.0418	1.2300e-003	0.0430			181.9333	7.0600e-003	0.0000	182.1099
Unmitigated	0.0393	0.2494	0.4550	1.9700e-003	0.1559	1.3100e-003	0.1572	0.0418	1.2300e-003	0.0430			181.9333	7.0600e-003	0.0000	182.1099

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Light Industry	188.19	35.64	18.36	414,967	414,967
Total	188.19	35.64	18.36	414,967	414,967

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Light Industry	9.50	7.30	7.30	59.00	28.00	13.00	92	5	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Light Industry	0.561380	0.034626	0.184829	0.116141	0.016642	0.004535	0.016185	0.056706	0.001192	0.001407	0.004983	0.000606	0.000767

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000			21.5253	3.0000e-003	6.2000e-004	21.7854
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000			21.5253	3.0000e-003	6.2000e-004	21.7854
NaturalGas Mitigated	2.7100e-003	0.0247	0.0207	1.5000e-004		1.8700e-003	1.8700e-003		1.8700e-003	1.8700e-003			26.8569	5.1000e-004	4.9000e-004	27.0165
NaturalGas Unmitigated	2.7100e-003	0.0247	0.0207	1.5000e-004		1.8700e-003	1.8700e-003		1.8700e-003	1.8700e-003			26.8569	5.1000e-004	4.9000e-004	27.0165

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Light Industry	503280	2.7100e-003	0.0247	0.0207	1.5000e-004		1.8700e-003	1.8700e-003		1.8700e-003	1.8700e-003			26.8569	5.1000e-004	4.9000e-004	27.0165
Total		**2.7100e-003**	**0.0247**	**0.0207**	**1.5000e-004**		**1.8700e-003**	**1.8700e-003**		**1.8700e-003**	**1.8700e-003**			**26.8569**	**5.1000e-004**	**4.9000e-004**	**27.0165**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Light Industry	503280	2.7100e-003	0.0247	0.0207	1.5000e-004		1.8700e-003	1.8700e-003		1.8700e-003	1.8700e-003			26.8569	5.1000e-004	4.9000e-004	27.0165
Total		**2.7100e-003**	**0.0247**	**0.0207**	**1.5000e-004**		**1.8700e-003**	**1.8700e-003**		**1.8700e-003**	**1.8700e-003**			**26.8569**	**5.1000e-004**	**4.9000e-004**	**27.0165**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Light Industry	228150	21.5253	3.0000e-003	6.2000e-004	21.7854
Total		**21.5253**	**3.0000e-003**	**6.2000e-004**	**21.7854**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Light Industry	228150	21.5253	3.0000e-003	6.2000e-004	21.7854
Total		**21.5253**	**3.0000e-003**	**6.2000e-004**	**21.7854**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.1242	0.0000	2.5000e-004	0.0000		0.0000	0.0000		0.0000	0.0000			4.8000e-004	0.0000	0.0000	5.1000e-004
Unmitigated	0.1242	0.0000	2.5000e-004	0.0000		0.0000	0.0000		0.0000	0.0000			4.8000e-004	0.0000	0.0000	5.1000e-004

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0188					0.0000	0.0000		0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Consumer Products	0.1055					0.0000	0.0000		0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Landscaping	2.0000e-005	0.0000	2.5000e-004	0.0000		0.0000	0.0000		0.0000	0.0000			4.8000e-004	0.0000	0.0000	5.1000e-004
Total	**0.1242**	**0.0000**	**2.5000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**			**4.8000e-004**	**0.0000**	**0.0000**	**5.1000e-004**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0188					0.0000	0.0000		0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Consumer Products	0.1055					0.0000	0.0000		0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Landscaping	2.0000e-005	0.0000	2.5000e-004	0.0000		0.0000	0.0000		0.0000	0.0000			4.8000e-004	0.0000	0.0000	5.1000e-004
Total	**0.1242**	**0.0000**	**2.5000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**			**4.8000e-004**	**0.0000**	**0.0000**	**5.1000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	5.1684	0.2039	4.9000e-003	11.7248
Unmitigated	5.1684	0.2039	4.9000e-003	11.7248

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Light Industry	6.24375 / 0	5.1684	0.2039	4.9000e-003	11.7248
Total		**5.1684**	**0.2039**	**4.9000e-003**	**11.7248**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Light Industry	6.24375 / 0	5.1684	0.2039	4.9000e-003	11.7248
Total		**5.1684**	**0.2039**	**4.9000e-003**	**11.7248**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	6.7961	0.4016	0.0000	16.8371
Unmitigated	6.7961	0.4016	0.0000	16.8371

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Light Industry	33.48	6.7961	0.4016	0.0000	16.8371
Total		**6.7961**	**0.4016**	**0.0000**	**16.8371**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Light Industry	33.48	6.7961	0.4016	0.0000	16.8371
Total		**6.7961**	**0.4016**	**0.0000**	**16.8371**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Phase 2 Surface Discharge Project Levee Crossing and Outfall (Construction Emissions)

San Joaquin County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Light Industry	20.50	1000sqft	0.47	20,500.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.7	**Precipitation Freq (Days)**	51
Climate Zone	2			**Operational Year**	2023
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	208	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - 95330 Zip Code; CO2 Intensity Factor amended for 2018 based on PG&E 10-k form. This model runs for construction emissions only.

Land Use - 20,500 SF of trenching/construction area associated with this component.

Construction Phase - No demolition, grading, paving, or architectural coatings associated with project. This component would occur from 9/7/2021-11/1/2021

Off-road Equipment -

Off-road Equipment - Equipment list obtained from applicant, daily use averaged over total construction phase.

Trips and VMT - 16 total workers for this phase; estimated 331 total haul truck trips.

On-road Fugitive Dust -

Demolition - No demolition

Grading - estimated 2,526 CY import and 2,748 CY export of materials

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	1.00	40.00
tblConstructionPhase	PhaseEndDate	9/7/2021	11/1/2021
tblGrading	AcresOfGrading	3.50	0.50
tblGrading	MaterialExported	0.00	2,748.00
tblGrading	MaterialImported	0.00	2,526.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.70
tblProjectCharacteristics	CO2IntensityFactor	641.35	208
tblTripsAndVMT	HaulingTripNumber	659.00	331.00
tblTripsAndVMT	WorkerTripNumber	53.00	16.00
tblTripsAndVMT	WorkerTripNumber	53.00	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2021	0.1070	1.0673	0.6596	2.3200e-003	0.1045	0.0395	0.1440	0.0515	0.0366	0.0881			205.9189	0.0527	0.0000	207.2363
Maximum	**0.1070**	**1.0673**	**0.6596**	**2.3200e-003**	**0.1045**	**0.0395**	**0.1440**	**0.0515**	**0.0366**	**0.0881**			**205.9189**	**0.0527**	**0.0000**	**207.2363**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2021	0.1070	1.0673	0.6596	2.3200e-003	0.1045	0.0395	0.1440	0.0515	0.0366	0.0881			205.9187	0.0527	0.0000	207.2361
Maximum	**0.1070**	**1.0673**	**0.6596**	**2.3200e-003**	**0.1045**	**0.0395**	**0.1440**	**0.0515**	**0.0366**	**0.0881**			**205.9187**	**0.0527**	**0.0000**	**207.2361**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	**9-7-2021**	**9-30-2021**	0.5020	0.5020
		Highest	0.5020	0.5020

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0943	0.0000	1.9000e-004	0.0000		0.0000	0.0000		0.0000	0.0000			3.7000e-004	0.0000	0.0000	3.9000e-004
Energy	2.0600e-003	0.0187	0.0157	1.1000e-004		1.4200e-003	1.4200e-003		1.4200e-003	1.4200e-003			36.7347	2.6700e-003	8.5000e-004	37.0533
Mobile	0.0299	0.1894	0.3455	1.5000e-003	0.1184	1.0000e-003	0.1194	0.0317	9.3000e-004	0.0327			138.1345	5.3600e-003	0.0000	138.2686
Waste						0.0000	0.0000		0.0000	0.0000			5.1600	0.3050	0.0000	12.7838
Water						0.0000	0.0000		0.0000	0.0000			3.9241	0.1548	3.7200e-003	8.9021
Total	**0.1262**	**0.2081**	**0.3614**	**1.6100e-003**	**0.1184**	**2.4200e-003**	**0.1208**	**0.0317**	**2.3500e-003**	**0.0341**			**183.9537**	**0.4678**	**4.5700e-003**	**197.0082**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0943	0.0000	1.9000e-004	0.0000		0.0000	0.0000		0.0000	0.0000			3.7000e-004	0.0000	0.0000	3.9000e-004
Energy	2.0600e-003	0.0187	0.0157	1.1000e-004		1.4200e-003	1.4200e-003		1.4200e-003	1.4200e-003			36.7347	2.6700e-003	8.5000e-004	37.0533
Mobile	0.0299	0.1894	0.3455	1.5000e-003	0.1184	1.0000e-003	0.1194	0.0317	9.3000e-004	0.0327			138.1345	5.3600e-003	0.0000	138.2686
Waste						0.0000	0.0000		0.0000	0.0000			5.1600	0.3050	0.0000	12.7838
Water						0.0000	0.0000		0.0000	0.0000			3.9241	0.1548	3.7200e-003	8.9021
Total	**0.1262**	**0.2081**	**0.3614**	**1.6100e-003**	**0.1184**	**2.4200e-003**	**0.1208**	**0.0317**	**2.3500e-003**	**0.0341**			**183.9537**	**0.4678**	**4.5700e-003**	**197.0082**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Earthwork/Trenching	Site Preparation	9/7/2021	11/1/2021	5	40	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Earthwork/Trenching	Bore/Drill Rigs	1	2.10	221	0.50
Earthwork/Trenching	Cement and Mortar Mixers	1	1.40	9	0.56
Earthwork/Trenching	Cranes	1	2.80	231	0.29
Earthwork/Trenching	Excavators	1	2.10	158	0.38
Earthwork/Trenching	Graders	1	0.00	187	0.41
Earthwork/Trenching	Off-Highway Trucks	5	8.00	402	0.38
Earthwork/Trenching	Off-Highway Trucks	1	1.40	402	0.38
Earthwork/Trenching	Other Construction Equipment	2	0.70	172	0.42
Earthwork/Trenching	Other General Industrial Equipment	1	8.00	88	0.34
Earthwork/Trenching	Plate Compactors	1	0.70	8	0.43
Earthwork/Trenching	Pumps	1	7.00	84	0.74
Earthwork/Trenching	Rubber Tired Dozers	1	5.60	247	0.40
Earthwork/Trenching	Rubber Tired Loaders	1	4.20	203	0.36
Earthwork/Trenching	Scrapers	1	0.70	367	0.48
Earthwork/Trenching	Tractors/Loaders/Backhoes	1	0.70	97	0.37
Earthwork/Trenching	Welders	1	1.40	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Earthwork/Trenching	21	16.00	0.00	331.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Earthwork/Trenching	21	0.00	0.00	659.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Earthwork/Trenching - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0850	0.0000	0.0850	0.0464	0.0000	0.0464			0.0000	0.0000	0.0000	0.0000
Off-Road	0.1021	0.9399	0.6311	1.9000e-003		0.0391	0.0391		0.0362	0.0362			166.5659	0.0510	0.0000	167.8419
Total	**0.1021**	**0.9399**	**0.6311**	**1.9000e-003**	**0.0850**	**0.0391**	**0.1240**	**0.0464**	**0.0362**	**0.0826**			**166.5659**	**0.0510**	**0.0000**	**167.8419**

3.2 Earthwork/Trenching - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	3.7300e-003	0.1266	0.0202	3.9000e-004	0.0148	4.1000e-004	0.0152	3.8700e-003	4.0000e-004	4.2700e-003			37.1777	1.6100e-003	0.0000	37.2179
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Worker	1.1800e-003	8.2000e-004	8.2400e-003	2.0000e-005	4.7500e-003	2.0000e-005	4.7700e-003	1.2200e-003	2.0000e-005	1.2300e-003			2.1752	6.0000e-005	0.0000	2.1766
Total	**4.9100e-003**	**0.1274**	**0.0285**	**4.1000e-004**	**0.0195**	**4.3000e-004**	**0.0199**	**5.0900e-003**	**4.2000e-004**	**5.5000e-003**			**39.3529**	**1.6700e-003**	**0.0000**	**39.3945**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0850	0.0000	0.0850	0.0464	0.0000	0.0464			0.0000	0.0000	0.0000	0.0000
Off-Road	0.1021	0.9399	0.6311	1.9000e-003		0.0391	0.0391		0.0362	0.0362			166.5657	0.0510	0.0000	167.8417
Total	**0.1021**	**0.9399**	**0.6311**	**1.9000e-003**	**0.0850**	**0.0391**	**0.1240**	**0.0464**	**0.0362**	**0.0826**			**166.5657**	**0.0510**	**0.0000**	**167.8417**

3.2 Earthwork/Trenching - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	3.7300e-003	0.1266	0.0202	3.9000e-004	0.0148	4.1000e-004	0.0152	3.8700e-003	4.0000e-004	4.2700e-003			37.1777	1.6100e-003	0.0000	37.2179
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Worker	1.1800e-003	8.2000e-004	8.2400e-003	2.0000e-005	4.7500e-003	2.0000e-005	4.7700e-003	1.2200e-003	2.0000e-005	1.2300e-003			2.1752	6.0000e-005	0.0000	2.1766
Total	**4.9100e-003**	**0.1274**	**0.0285**	**4.1000e-004**	**0.0195**	**4.3000e-004**	**0.0199**	**5.0900e-003**	**4.2000e-004**	**5.5000e-003**			**39.3529**	**1.6700e-003**	**0.0000**	**39.3945**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0299	0.1894	0.3455	1.5000e-003	0.1184	1.0000e-003	0.1194	0.0317	9.3000e-004	0.0327			138.1345	5.3600e-003	0.0000	138.2686
Unmitigated	0.0299	0.1894	0.3455	1.5000e-003	0.1184	1.0000e-003	0.1194	0.0317	9.3000e-004	0.0327			138.1345	5.3600e-003	0.0000	138.2686

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Light Industry	142.89	27.06	13.94	315,067	315,067
Total	142.89	27.06	13.94	315,067	315,067

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Light Industry	9.50	7.30	7.30	59.00	28.00	13.00	92	5	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Light Industry	0.561380	0.034626	0.184829	0.116141	0.016642	0.004535	0.016185	0.056706	0.001192	0.001407	0.004983	0.000606	0.000767

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000			16.3433	2.2800e-003	4.7000e-004	16.5408
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000			16.3433	2.2800e-003	4.7000e-004	16.5408
NaturalGas Mitigated	2.0600e-003	0.0187	0.0157	1.1000e-004		1.4200e-003	1.4200e-003		1.4200e-003	1.4200e-003			20.3914	3.9000e-004	3.7000e-004	20.5126
NaturalGas Unmitigated	2.0600e-003	0.0187	0.0157	1.1000e-004		1.4200e-003	1.4200e-003		1.4200e-003	1.4200e-003			20.3914	3.9000e-004	3.7000e-004	20.5126

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Light Industry	382120	2.0600e-003	0.0187	0.0157	1.1000e-004		1.4200e-003	1.4200e-003		1.4200e-003	1.4200e-003			20.3914	3.9000e-004	3.7000e-004	20.5126
Total		**2.0600e-003**	**0.0187**	**0.0157**	**1.1000e-004**		**1.4200e-003**	**1.4200e-003**		**1.4200e-003**	**1.4200e-003**			**20.3914**	**3.9000e-004**	**3.7000e-004**	**20.5126**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Light Industry	382120	2.0600e-003	0.0187	0.0157	1.1000e-004		1.4200e-003	1.4200e-003		1.4200e-003	1.4200e-003			20.3914	3.9000e-004	3.7000e-004	20.5126
Total		**2.0600e-003**	**0.0187**	**0.0157**	**1.1000e-004**		**1.4200e-003**	**1.4200e-003**		**1.4200e-003**	**1.4200e-003**			**20.3914**	**3.9000e-004**	**3.7000e-004**	**20.5126**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Light Industry	173225	16.3433	2.2800e-003	4.7000e-004	16.5408
Total		**16.3433**	**2.2800e-003**	**4.7000e-004**	**16.5408**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Light Industry	173225	16.3433	2.2800e-003	4.7000e-004	16.5408
Total		**16.3433**	**2.2800e-003**	**4.7000e-004**	**16.5408**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0943	0.0000	1.9000e-004	0.0000		0.0000	0.0000		0.0000	0.0000			3.7000e-004	0.0000	0.0000	3.9000e-004
Unmitigated	0.0943	0.0000	1.9000e-004	0.0000		0.0000	0.0000		0.0000	0.0000			3.7000e-004	0.0000	0.0000	3.9000e-004

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0143					0.0000	0.0000		0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0801					0.0000	0.0000		0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Landscaping	2.0000e-005	0.0000	1.9000e-004	0.0000		0.0000	0.0000		0.0000	0.0000			3.7000e-004	0.0000	0.0000	3.9000e-004
Total	**0.0943**	**0.0000**	**1.9000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**			**3.7000e-004**	**0.0000**	**0.0000**	**3.9000e-004**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0143					0.0000	0.0000		0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0801					0.0000	0.0000		0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Landscaping	2.0000e-005	0.0000	1.9000e-004	0.0000		0.0000	0.0000		0.0000	0.0000			3.7000e-004	0.0000	0.0000	3.9000e-004
Total	**0.0943**	**0.0000**	**1.9000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**			**3.7000e-004**	**0.0000**	**0.0000**	**3.9000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	3.9241	0.1548	3.7200e-003	8.9021
Unmitigated	3.9241	0.1548	3.7200e-003	8.9021

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Light Industry	4.74062 / 0	3.9241	0.1548	3.7200e-003	8.9021
Total		**3.9241**	**0.1548**	**3.7200e-003**	**8.9021**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Light Industry	4.74062 / 0	3.9241	0.1548	3.7200e-003	8.9021
Total		**3.9241**	**0.1548**	**3.7200e-003**	**8.9021**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	5.1600	0.3050	0.0000	12.7838
Unmitigated	5.1600	0.3050	0.0000	12.7838

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Light Industry	25.42	5.1600	0.3050	0.0000	12.7838
Total		**5.1600**	**0.3050**	**0.0000**	**12.7838**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Light Industry	25.42	5.1600	0.3050	0.0000	12.7838
Total		**5.1600**	**0.3050**	**0.0000**	**12.7838**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Phase 2 Surface Discharge Ponds (Construction Emissions)

San Joaquin County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Light Industry	1,002.00	1000sqft	23.00	1,002,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.7	**Precipitation Freq (Days)**	51
Climate Zone	2			**Operational Year**	2023
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	208	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - 95330 Zip Code; CO2 Intensity Factor amended for 2018 based on PG&E 10-k form. This model runs for construction emissions only.

Land Use - Approximately 23 acres of disturbed site.

Construction Phase - No demolition, grading, paving, or architectural coatings associated with project. This component would occur from 9/27/22 to 10/27/22

Off-road Equipment -

Off-road Equipment - Equipment list obtained from applicant, daily use averaged over total construction phase.

Trips and VMT - Estimated 1,090 total haul truck trips.

On-road Fugitive Dust -

Demolition - No demolition

Grading - estimated 35,481 CY export of materials

Phase 2 Surface Discharge Ponds (Construction Emissions) - San Joaquin County, Annual

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	10.00	23.00
tblConstructionPhase	PhaseEndDate	7/21/2022	10/27/2022
tblConstructionPhase	PhaseStartDate	7/8/2022	9/27/2022
tblGrading	MaterialExported	0.00	35,481.00
tblOffRoadEquipment	HorsePower	158.00	97.00
tblOffRoadEquipment	HorsePower	97.00	247.00
tblOffRoadEquipment	LoadFactor	0.40	0.40
tblOffRoadEquipment	LoadFactor	0.38	0.37
tblOffRoadEquipment	LoadFactor	0.36	0.36
tblOffRoadEquipment	LoadFactor	0.38	0.38
tblOffRoadEquipment	LoadFactor	0.38	0.38
tblOffRoadEquipment	LoadFactor	0.37	0.40
tblOffRoadEquipment	OffRoadEquipmentType		Rubber Tired Dozers
tblOffRoadEquipment	OffRoadEquipmentType	Tractors/Loaders/Backhoes	Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Dumpers/Tenders
tblOffRoadEquipment	OffRoadEquipmentType		Rubber Tired Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Off-Highway Trucks
tblOffRoadEquipment	OffRoadEquipmentType		Plate Compactors
tblOffRoadEquipment	OffRoadEquipmentType		Off-Highway Trucks
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	6.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	6.00
tblOffRoadEquipment	UsageHours	8.00	3.50
tblOffRoadEquipment	UsageHours	8.00	3.50
tblProjectCharacteristics	CO2IntensityFactor	641.35	208
tblTripsAndVMT	HaulingTripNumber	4,435.00	1,090.00
tblTripsAndVMT	HaulingTripNumber	4,435.00	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	0.1239	1.1049	0.7309	2.9100e-003	0.2495	0.0386	0.2881	0.1171	0.0356	0.1527			258.5773	0.0652	0.0000	260.2077
Maximum	**0.1239**	**1.1049**	**0.7309**	**2.9100e-003**	**0.2495**	**0.0386**	**0.2881**	**0.1171**	**0.0356**	**0.1527**			**258.5773**	**0.0652**	**0.0000**	**260.2077**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	0.1239	1.1049	0.7309	2.9100e-003	0.2495	0.0386	0.2881	0.1171	0.0356	0.1527			258.5771	0.0652	0.0000	260.2074
Maximum	**0.1239**	**1.1049**	**0.7309**	**2.9100e-003**	**0.2495**	**0.0386**	**0.2881**	**0.1171**	**0.0356**	**0.1527**			**258.5771**	**0.0652**	**0.0000**	**260.2074**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	**7-8-2022**	**9-30-2022**	0.1524	0.1524
		Highest	0.1524	0.1524

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	4.6108	8.0000e-005	9.2100e-003	0.0000		3.0000e-005	3.0000e-005		3.0000e-005	3.0000e-005			0.0179	5.0000e-005	0.0000	0.0191
Energy	0.1007	0.9156	0.7691	5.4900e-003		0.0696	0.0696		0.0696	0.0696			1,795.519 2	0.1305	0.0413	1,811.0933
Mobile	1.4589	9.2568	16.8867	0.0732	5.7861	0.0488	5.8349	1.5509	0.0456	1.5965			6,751.746 7	0.2621	0.0000	6,758.300 0
Waste						0.0000	0.0000		0.0000	0.0000			252.2122	14.9053	0.0000	624.8451
Water						0.0000	0.0000		0.0000	0.0000			191.8039	7.5669	0.1817	435.1194
Total	**6.1704**	**10.1725**	**17.6650**	**0.0787**	**5.7861**	**0.1184**	**5.9045**	**1.5509**	**0.1152**	**1.6661**			**8,991.299 9**	**22.8648**	**0.2230**	**9,629.376 9**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	4.6108	8.0000e-005	9.2100e-003	0.0000		3.0000e-005	3.0000e-005		3.0000e-005	3.0000e-005			0.0179	5.0000e-005	0.0000	0.0191
Energy	0.1007	0.9156	0.7691	5.4900e-003		0.0696	0.0696		0.0696	0.0696			1,795.5192	0.1305	0.0413	1,811.0933
Mobile	1.4589	9.2568	16.8867	0.0732	5.7861	0.0488	5.8349	1.5509	0.0456	1.5965			6,751.7467	0.2621	0.0000	6,758.3000
Waste						0.0000	0.0000		0.0000	0.0000			252.2122	14.9053	0.0000	624.8451
Water						0.0000	0.0000		0.0000	0.0000			191.8039	7.5669	0.1817	435.1194
Total	**6.1704**	**10.1725**	**17.6650**	**0.0787**	**5.7861**	**0.1184**	**5.9045**	**1.5509**	**0.1152**	**1.6661**			**8,991.2999**	**22.8648**	**0.2230**	**9,629.3769**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Earthwork/Trenching	Site Preparation	9/27/2022	10/27/2022	5	23	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Earthwork/Trenching	Rubber Tired Dozers	6	3.50	247	0.40
Earthwork/Trenching	Dumpers/Tenders	6	3.50	16	0.38
Earthwork/Trenching	Rubber Tired Loaders	10	3.50	203	0.36
Earthwork/Trenching	Off-Highway Trucks	10	3.50	402	0.38
Earthwork/Trenching	Plate Compactors	6	3.50	8	0.43
Earthwork/Trenching	Off-Highway Trucks	10	3.50	402	0.38
Earthwork/Trenching	Tractors/Loaders/Backhoes	6	3.50	247	0.40
Earthwork/Trenching	Excavators	3	3.50	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Earthwork/Trenching	57	143.00	0.00	1,090.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Earthwork/Trenching	57	143.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Earthwork/Trenching - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1844	0.0000	0.1844	0.1003	0.0000	0.1003			0.0000	0.0000	0.0000	0.0000
Off-Road	0.1088	0.9699	0.6322	2.2500e-003		0.0380	0.0380		0.0350	0.0350			196.6024	0.0630	0.0000	198.1779
Total	**0.1088**	**0.9699**	**0.6322**	**2.2500e-003**	**0.1844**	**0.0380**	**0.2224**	**0.1003**	**0.0350**	**0.1354**			**196.6024**	**0.0630**	**0.0000**	**198.1779**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	3.8500e-003	0.1275	0.0215	4.2000e-004	0.0162	3.8000e-004	0.0166	4.2600e-003	3.7000e-004	4.6300e-003			40.4126	1.6800e-003	0.0000	40.4547
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Worker	0.0112	7.5100e-003	0.0772	2.4000e-004	0.0489	1.7000e-004	0.0490	0.0125	1.5000e-004	0.0127			21.5623	5.1000e-004	0.0000	21.5751
Total	**0.0151**	**0.1350**	**0.0987**	**6.6000e-004**	**0.0651**	**5.5000e-004**	**0.0657**	**0.0168**	**5.2000e-004**	**0.0173**			**61.9749**	**2.1900e-003**	**0.0000**	**62.0298**

3.2 Earthwork/Trenching - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1844	0.0000	0.1844	0.1003	0.0000	0.1003			0.0000	0.0000	0.0000	0.0000
Off-Road	0.1088	0.9699	0.6322	2.2500e-003		0.0380	0.0380		0.0350	0.0350			196.6022	0.0630	0.0000	198.1776
Total	**0.1088**	**0.9699**	**0.6322**	**2.2500e-003**	**0.1844**	**0.0380**	**0.2224**	**0.1003**	**0.0350**	**0.1354**			**196.6022**	**0.0630**	**0.0000**	**198.1776**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	3.8500e-003	0.1275	0.0215	4.2000e-004	0.0162	3.8000e-004	0.0166	4.2600e-003	3.7000e-004	4.6300e-003			40.4126	1.6800e-003	0.0000	40.4547
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Worker	0.0112	7.5100e-003	0.0772	2.4000e-004	0.0489	1.7000e-004	0.0490	0.0125	1.5000e-004	0.0127			21.5623	5.1000e-004	0.0000	21.5751
Total	**0.0151**	**0.1350**	**0.0987**	**6.6000e-004**	**0.0651**	**5.5000e-004**	**0.0657**	**0.0168**	**5.2000e-004**	**0.0173**			**61.9749**	**2.1900e-003**	**0.0000**	**62.0298**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	1.4589	9.2568	16.8867	0.0732	5.7861	0.0488	5.8349	1.5509	0.0456	1.5965			6,751.746 7	0.2621	0.0000	6,758.300 0
Unmitigated	1.4589	9.2568	16.8867	0.0732	5.7861	0.0488	5.8349	1.5509	0.0456	1.5965			6,751.746 7	0.2621	0.0000	6,758.300 0

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Light Industry	6,983.94	1,322.64	681.36	15,399,879	15,399,879
Total	6,983.94	1,322.64	681.36	15,399,879	15,399,879

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Light Industry	9.50	7.30	7.30	59.00	28.00	13.00	92	5	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Light Industry	0.561380	0.034626	0.184829	0.116141	0.016642	0.004535	0.016185	0.056706	0.001192	0.001407	0.004983	0.000606	0.000767

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000			798.8284	0.1114	0.0230	808.4797
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000			798.8284	0.1114	0.0230	808.4797
NaturalGas Mitigated	0.1007	0.9156	0.7691	5.4900e-003		0.0696	0.0696		0.0696	0.0696			996.6908	0.0191	0.0183	1,002.6136
NaturalGas Unmitigated	0.1007	0.9156	0.7691	5.4900e-003		0.0696	0.0696		0.0696	0.0696			996.6908	0.0191	0.0183	1,002.6136

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Light Industry	1.86773e+007	0.1007	0.9156	0.7691	5.4900e-003		0.0696	0.0696		0.0696	0.0696			996.6908	0.0191	0.0183	1,002.6136
Total		**0.1007**	**0.9156**	**0.7691**	**5.4900e-003**		**0.0696**	**0.0696**		**0.0696**	**0.0696**			**996.6908**	**0.0191**	**0.0183**	**1,002.6136**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Light Industry	1.86773e+007	0.1007	0.9156	0.7691	5.4900e-003		0.0696	0.0696		0.0696	0.0696			996.6908	0.0191	0.0183	1,002.6136
Total		**0.1007**	**0.9156**	**0.7691**	**5.4900e-003**		**0.0696**	**0.0696**		**0.0696**	**0.0696**			**996.6908**	**0.0191**	**0.0183**	**1,002.6136**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Light Industry	8.4669e +006	798.8284	0.1114	0.0230	808.4797
Total		**798.8284**	**0.1114**	**0.0230**	**808.4797**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Light Industry	8.4669e +006	798.8284	0.1114	0.0230	808.4797
Total		**798.8284**	**0.1114**	**0.0230**	**808.4797**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	4.6108	8.0000e-005	9.2100e-003	0.0000		3.0000e-005	3.0000e-005		3.0000e-005	3.0000e-005			0.0179	5.0000e-005	0.0000	0.0191
Unmitigated	4.6108	8.0000e-005	9.2100e-003	0.0000		3.0000e-005	3.0000e-005		3.0000e-005	3.0000e-005			0.0179	5.0000e-005	0.0000	0.0191

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.6966					0.0000	0.0000		0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Consumer Products	3.9133					0.0000	0.0000		0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Landscaping	8.5000e-004	8.0000e-005	9.2100e-003	0.0000		3.0000e-005	3.0000e-005		3.0000e-005	3.0000e-005			0.0179	5.0000e-005	0.0000	0.0191
Total	**4.6108**	**8.0000e-005**	**9.2100e-003**	**0.0000**		**3.0000e-005**	**3.0000e-005**		**3.0000e-005**	**3.0000e-005**			**0.0179**	**5.0000e-005**	**0.0000**	**0.0191**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.6966					0.0000	0.0000		0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Consumer Products	3.9133					0.0000	0.0000		0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Landscaping	8.5000e-004	8.0000e-005	9.2100e-003	0.0000		3.0000e-005	3.0000e-005		3.0000e-005	3.0000e-005			0.0179	5.0000e-005	0.0000	0.0191
Total	**4.6108**	**8.0000e-005**	**9.2100e-003**	**0.0000**		**3.0000e-005**	**3.0000e-005**		**3.0000e-005**	**3.0000e-005**			**0.0179**	**5.0000e-005**	**0.0000**	**0.0191**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	191.8039	7.5669	0.1817	435.1194
Unmitigated	191.8039	7.5669	0.1817	435.1194

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Light Industry	231.713 / 0	191.8039	7.5669	0.1817	435.1194
Total		**191.8039**	**7.5669**	**0.1817**	**435.1194**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Light Industry	231.713 / 0	191.8039	7.5669	0.1817	435.1194
Total		**191.8039**	**7.5669**	**0.1817**	**435.1194**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	252.2122	14.9053	0.0000	624.8451
Unmitigated	252.2122	14.9053	0.0000	624.8451

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Light Industry	1242.48	252.2122	14.9053	0.0000	624.8451
Total		**252.2122**	**14.9053**	**0.0000**	**624.8451**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Light Industry	1242.48	252.2122	14.9053	0.0000	624.8451
Total		**252.2122**	**14.9053**	**0.0000**	**624.8451**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Phase 2 Surface Discharge Project Worst-Case Scenario Construction

San Joaquin County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Light Industry	9.00	1000sqft	0.21	9,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.7	**Precipitation Freq (Days)**	51
Climate Zone	2			**Operational Year**	2023
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	208	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - 95330 Zip Code; CO2 Intensity Factor amended for 2018 based on PG&E 10-k form. This model runs for worst-case single day construction emissions only.

Land Use - This model runs for worst-case scenario equipment use.

Construction Phase -

Off-road Equipment -

Off-road Equipment - Worst-case scenario daily construction usage assuming 2 crews working simultaneously for trenching. Equipment list provided by applicant.

Trips and VMT - Worst-case scenario for daily emissions.

On-road Fugitive Dust -

Demolition - No demolition

Grading -

Construction Off-road Equipment Mitigation - Application of 30% Tier 4 equipment consistent with MM 3.2-1

Phase 2 Surface Discharge Project Worst-Case Scenario Construction - San Joaquin County, Summer

Table Name	Column Name	Default Value	New Value
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	10.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	10.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblGrading	AcresOfGrading	0.00	0.50
tblOffRoadEquipment	HorsePower	16.00	221.00
tblOffRoadEquipment	HorsePower	402.00	221.00
tblOffRoadEquipment	LoadFactor	0.38	0.50
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	5.00
tblProjectCharacteristics	CO2IntensityFactor	641.35	208
tblTripsAndVMT	HaulingTripNumber	0.00	211.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2021	11.2528	136.2525	82.4252	0.3551	10.8518	3.7571	14.6088	2.7375	3.4913	6.2288			35,753.4017	5.6217	0.0000	35,893.9442
Maximum	**11.2528**	**136.2525**	**82.4252**	**0.3551**	**10.8518**	**3.7571**	**14.6088**	**2.7375**	**3.4913**	**6.2288**			**35,753.4017**	**5.6217**	**0.0000**	**35,893.9442**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2021	7.4340	95.1146	95.5956	0.3551	10.8518	1.8922	12.7439	2.7375	1.7735	4.5109			35,753.4017	5.6217	0.0000	35,893.9442
Maximum	**7.4340**	**95.1146**	**95.5956**	**0.3551**	**10.8518**	**1.8922**	**12.7439**	**2.7375**	**1.7735**	**4.5109**			**35,753.4017**	**5.6217**	**0.0000**	**35,893.9442**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	33.94	30.19	-15.98	0.00	0.00	49.64	12.77	0.00	49.20	27.58	0.00	0.00	0.00	0.00	0.00	0.00

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.2270	1.0000e-005	9.2000e-004	0.0000		0.0000	0.0000		0.0000	0.0000			1.9700e-003	1.0000e-005		2.1000e-003
Energy	4.9600e-003	0.0451	0.0379	2.7000e-004		3.4200e-003	3.4200e-003		3.4200e-003	3.4200e-003			54.0725	1.0400e-003	9.9000e-004	54.3939
Mobile	0.1141	0.5910	1.1981	5.0800e-003	0.3897	3.1800e-003	0.3929	0.1042	2.9800e-003	0.1072			515.8534	0.0189		516.3269
Total	**0.3461**	**0.6361**	**1.2368**	**5.3500e-003**	**0.3897**	**6.6000e-003**	**0.3963**	**0.1042**	**6.4000e-003**	**0.1106**			**569.9278**	**0.0200**	**9.9000e-004**	**570.7228**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.2270	1.0000e-005	9.2000e-004	0.0000		0.0000	0.0000		0.0000	0.0000			1.9700e-003	1.0000e-005		2.1000e-003
Energy	4.9600e-003	0.0451	0.0379	2.7000e-004		3.4200e-003	3.4200e-003		3.4200e-003	3.4200e-003			54.0725	1.0400e-003	9.9000e-004	54.3939
Mobile	0.1141	0.5910	1.1981	5.0800e-003	0.3897	3.1800e-003	0.3929	0.1042	2.9800e-003	0.1072			515.8534	0.0189		516.3269
Total	**0.3461**	**0.6361**	**1.2368**	**5.3500e-003**	**0.3897**	**6.6000e-003**	**0.3963**	**0.1042**	**6.4000e-003**	**0.1106**			**569.9278**	**0.0200**	**9.9000e-004**	**570.7228**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Infrastructure Modifications	Site Preparation	7/9/2021	7/9/2021	5	1	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Infrastructure Modifications	Bore/Drill Rigs	1	8.00	221	0.50
Infrastructure Modifications	Dumpers/Tenders	14	8.00	221	0.38
Infrastructure Modifications	Excavators	3	8.00	158	0.38
Infrastructure Modifications	Generator Sets	2	8.00	84	0.74
Infrastructure Modifications	Graders	0	8.00	187	0.41
Infrastructure Modifications	Off-Highway Trucks	14	4.00	221	0.50
Infrastructure Modifications	Pavers	2	8.00	130	0.42
Infrastructure Modifications	Plate Compactors	2	8.00	8	0.43
Infrastructure Modifications	Rollers	2	8.00	80	0.38
Infrastructure Modifications	Rubber Tired Loaders	5	8.00	203	0.36
Infrastructure Modifications	Tractors/Loaders/Backhoes	5	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Infrastructure Modifications	50	125.00	0.00	211.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Infrastructure Modifications	50	125.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

3.2 Infrastructure Modifications - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.5303	0.0000	0.5303	0.0573	0.0000	0.0573			0.0000			0.0000
Off-Road	8.6653	82.9215	66.9398	0.1667		3.5694	3.5694		3.3123	3.3123			16,091.06 84	4.8496		16,212.30 89
Total	**8.6653**	**82.9215**	**66.9398**	**0.1667**	**0.5303**	**3.5694**	**4.0997**	**0.0573**	**3.3123**	**3.3695**			**16,091.06 84**	**4.8496**		**16,212.30 89**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	1.5671	52.7540	8.2126	0.1679	6.4830	0.1746	6.6576	1.6974	0.1670	1.8644			17,624.70 57	0.7198		17,642.70 09
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000		0.0000
Worker	1.0204	0.5769	7.2729	0.0205	3.8385	0.0131	3.8516	0.9828	0.0120	0.9949			2,037.627 5	0.0523		2,038.934 4
Total	**2.5875**	**53.3309**	**15.4855**	**0.1883**	**10.3215**	**0.1877**	**10.5092**	**2.6802**	**0.1791**	**2.8593**			**19,662.33 32**	**0.7721**		**19,681.63 53**

3.2 Infrastructure Modifications - 2021

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.5303	0.0000	0.5303	0.0573	0.0000	0.0573			0.0000			0.0000
Off-Road	4.8465	41.7837	80.1101	0.1667		1.7045	1.7045		1.5944	1.5944			16,091.06 84	4.8496		16,212.30 88
Total	**4.8465**	**41.7837**	**80.1101**	**0.1667**	**0.5303**	**1.7045**	**2.2348**	**0.0573**	**1.5944**	**1.6517**			**16,091.06 84**	**4.8496**		**16,212.30 88**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	1.5671	52.7540	8.2126	0.1679	6.4830	0.1746	6.6576	1.6974	0.1670	1.8644			17,624.70 57	0.7198		17,642.70 09
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000		0.0000
Worker	1.0204	0.5769	7.2729	0.0205	3.8385	0.0131	3.8516	0.9828	0.0120	0.9949			2,037.627 5	0.0523		2,038.934 4
Total	**2.5875**	**53.3309**	**15.4855**	**0.1883**	**10.3215**	**0.1877**	**10.5092**	**2.6802**	**0.1791**	**2.8593**			**19,662.33 32**	**0.7721**		**19,681.63 53**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.1141	0.5910	1.1981	5.0800e-003	0.3897	3.1800e-003	0.3929	0.1042	2.9800e-003	0.1072			515.8534	0.0189		516.3269
Unmitigated	0.1141	0.5910	1.1981	5.0800e-003	0.3897	3.1800e-003	0.3929	0.1042	2.9800e-003	0.1072			515.8534	0.0189		516.3269

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Light Industry	62.73	11.88	6.12	138,322	138,322
Total	62.73	11.88	6.12	138,322	138,322

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Light Industry	9.50	7.30	7.30	59.00	28.00	13.00	92	5	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Light Industry	0.561380	0.034626	0.184829	0.116141	0.016642	0.004535	0.016185	0.056706	0.001192	0.001407	0.004983	0.000606	0.000767

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	4.9600e-003	0.0451	0.0379	2.7000e-004		3.4200e-003	3.4200e-003		3.4200e-003	3.4200e-003			54.0725	1.0400e-003	9.9000e-004	54.3939
NaturalGas Unmitigated	4.9600e-003	0.0451	0.0379	2.7000e-004		3.4200e-003	3.4200e-003		3.4200e-003	3.4200e-003			54.0725	1.0400e-003	9.9000e-004	54.3939

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
General Light Industry	459.616	4.9600e-003	0.0451	0.0379	2.7000e-004		3.4200e-003	3.4200e-003		3.4200e-003	3.4200e-003			54.0725	1.0400e-003	9.9000e-004	54.3939
Total		**4.9600e-003**	**0.0451**	**0.0379**	**2.7000e-004**		**3.4200e-003**	**3.4200e-003**		**3.4200e-003**	**3.4200e-003**			**54.0725**	**1.0400e-003**	**9.9000e-004**	**54.3939**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
General Light Industry	0.459616	4.9600e-003	0.0451	0.0379	2.7000e-004		3.4200e-003	3.4200e-003		3.4200e-003	3.4200e-003			54.0725	1.0400e-003	9.9000e-004	54.3939
Total		**4.9600e-003**	**0.0451**	**0.0379**	**2.7000e-004**		**3.4200e-003**	**3.4200e-003**		**3.4200e-003**	**3.4200e-003**			**54.0725**	**1.0400e-003**	**9.9000e-004**	**54.3939**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.2270	1.0000e-005	9.2000e-004	0.0000		0.0000	0.0000		0.0000	0.0000			1.9700e-003	1.0000e-005		2.1000e-003
Unmitigated	0.2270	1.0000e-005	9.2000e-004	0.0000		0.0000	0.0000		0.0000	0.0000			1.9700e-003	1.0000e-005		2.1000e-003

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0343					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.1926					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	9.0000e-005	1.0000e-005	9.2000e-004	0.0000		0.0000	0.0000		0.0000	0.0000			1.9700e-003	1.0000e-005		2.1000e-003
Total	**0.2270**	**1.0000e-005**	**9.2000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**			**1.9700e-003**	**1.0000e-005**		**2.1000e-003**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0343					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.1926					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	9.0000e-005	1.0000e-005	9.2000e-004	0.0000		0.0000	0.0000		0.0000	0.0000			1.9700e-003	1.0000e-005		2.1000e-003
Total	**0.2270**	**1.0000e-005**	**9.2000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**			**1.9700e-003**	**1.0000e-005**		**2.1000e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Phase 2 Surface Discharge Project Worst-Case Scenario 2 Construction

San Joaquin County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Light Industry	9.00	1000sqft	0.21	9,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.7	**Precipitation Freq (Days)**	51
Climate Zone	2			**Operational Year**	2023
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	208	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - 95330 Zip Code; CO2 Intensity Factor amended for 2018 based on PG&E 10-k form. This model runs for worst-case single day construction emissions only.

Land Use - This model runs for worst-case scenario equipment use.

Construction Phase -

Off-road Equipment -

Off-road Equipment - Worst-case scenario daily construction usage assuming 1 crews working. Equipment list provided by applicant.

Trips and VMT - Worst-case scenario for daily emissions.

On-road Fugitive Dust -

Demolition - No demolition

Grading -

Construction Off-road Equipment Mitigation -

Table Name	Column Name	Default Value	New Value
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	4.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	4.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblGrading	AcresOfGrading	0.00	0.50
tblOffRoadEquipment	HorsePower	16.00	221.00
tblOffRoadEquipment	HorsePower	402.00	221.00
tblOffRoadEquipment	LoadFactor	0.38	0.50
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	4.00
tblProjectCharacteristics	CO2IntensityFactor	641.35	208
tblTripsAndVMT	HaulingTripNumber	0.00	211.00
tblTripsAndVMT	WorkerTripNumber	73.00	80.00
tblTripsAndVMT	WorkerTripNumber	73.00	80.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2021	6.9059	98.0839	51.6010	0.2732	9.4699	2.1689	11.6389	2.3837	2.0160	4.3997			27,829.18 57	3.4546	0.0000	27,915.54 96
Maximum	**6.9059**	**98.0839**	**51.6010**	**0.2732**	**9.4699**	**2.1689**	**11.6389**	**2.3837**	**2.0160**	**4.3997**			**27,829.18 57**	**3.4546**	**0.0000**	**27,915.54 96**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2021	6.9059	98.0839	51.6010	0.2732	9.4699	2.1689	11.6389	2.3837	2.0160	4.3997			27,829.18 57	3.4546	0.0000	27,915.54 96
Maximum	**6.9059**	**98.0839**	**51.6010**	**0.2732**	**9.4699**	**2.1689**	**11.6389**	**2.3837**	**2.0160**	**4.3997**			**27,829.18 57**	**3.4546**	**0.0000**	**27,915.54 96**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.2270	1.0000e-005	9.2000e-004	0.0000		0.0000	0.0000		0.0000	0.0000			1.9700e-003	1.0000e-005		2.1000e-003
Energy	4.9600e-003	0.0451	0.0379	2.7000e-004		3.4200e-003	3.4200e-003		3.4200e-003	3.4200e-003			54.0725	1.0400e-003	9.9000e-004	54.3939
Mobile	0.1141	0.5910	1.1981	5.0800e-003	0.3897	3.1800e-003	0.3929	0.1042	2.9800e-003	0.1072			515.8534	0.0189		516.3269
Total	**0.3461**	**0.6361**	**1.2368**	**5.3500e-003**	**0.3897**	**6.6000e-003**	**0.3963**	**0.1042**	**6.4000e-003**	**0.1106**			**569.9278**	**0.0200**	**9.9000e-004**	**570.7228**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.2270	1.0000e-005	9.2000e-004	0.0000		0.0000	0.0000		0.0000	0.0000			1.9700e-003	1.0000e-005		2.1000e-003
Energy	4.9600e-003	0.0451	0.0379	2.7000e-004		3.4200e-003	3.4200e-003		3.4200e-003	3.4200e-003			54.0725	1.0400e-003	9.9000e-004	54.3939
Mobile	0.1141	0.5910	1.1981	5.0800e-003	0.3897	3.1800e-003	0.3929	0.1042	2.9800e-003	0.1072			515.8534	0.0189		516.3269
Total	**0.3461**	**0.6361**	**1.2368**	**5.3500e-003**	**0.3897**	**6.6000e-003**	**0.3963**	**0.1042**	**6.4000e-003**	**0.1106**			**569.9278**	**0.0200**	**9.9000e-004**	**570.7228**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Infrastructure Modifications	Site Preparation	7/9/2021	7/9/2021	5	1	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Infrastructure Modifications	Bore/Drill Rigs	1	8.00	221	0.50
Infrastructure Modifications	Dumpers/Tenders	9	8.00	221	0.38
Infrastructure Modifications	Excavators	2	8.00	158	0.38
Infrastructure Modifications	Generator Sets	1	8.00	84	0.74
Infrastructure Modifications	Graders	0	8.00	187	0.41
Infrastructure Modifications	Off-Highway Trucks	7	4.00	221	0.50
Infrastructure Modifications	Pavers	1	8.00	130	0.42
Infrastructure Modifications	Plate Compactors	1	8.00	8	0.43
Infrastructure Modifications	Rollers	1	8.00	80	0.38
Infrastructure Modifications	Rubber Tired Loaders	2	8.00	203	0.36
Infrastructure Modifications	Tractors/Loaders/Backhoes	4	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Infrastructure Modifications	29	80.00	0.00	211.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Infrastructure Modifications	29	80.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Infrastructure Modifications - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.5303	0.0000	0.5303	0.0573	0.0000	0.0573			0.0000			0.0000
Off-Road	4.6857	44.9607	38.7338	0.0922		1.9860	1.9860		1.8413	1.8413			8,900.398 4	2.7013		8,967.930 6
Total	**4.6857**	**44.9607**	**38.7338**	**0.0922**	**0.5303**	**1.9860**	**2.5162**	**0.0573**	**1.8413**	**1.8986**			**8,900.398 4**	**2.7013**		**8,967.930 6**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	1.5671	52.7540	8.2126	0.1679	6.4830	0.1746	6.6576	1.6974	0.1670	1.8644			17,624.70 57	0.7198		17,642.70 09
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000		0.0000
Worker	0.6531	0.3692	4.6546	0.0131	2.4567	8.3600e-003	2.4650	0.6290	7.7000e-003	0.6367			1,304.081 6	0.0335		1,304.918 0
Total	**2.2201**	**53.1232**	**12.8672**	**0.1810**	**8.9397**	**0.1830**	**9.1226**	**2.3264**	**0.1747**	**2.5011**			**18,928.78 73**	**0.7533**		**18,947.61 90**

3.2 Infrastructure Modifications - 2021

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.5303	0.0000	0.5303	0.0573	0.0000	0.0573			0.0000			0.0000
Off-Road	4.6857	44.9607	38.7338	0.0922		1.9860	1.9860		1.8413	1.8413			8,900.3984	2.7013		8,967.9306
Total	**4.6857**	**44.9607**	**38.7338**	**0.0922**	**0.5303**	**1.9860**	**2.5162**	**0.0573**	**1.8413**	**1.8986**			**8,900.3984**	**2.7013**		**8,967.9306**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	1.5671	52.7540	8.2126	0.1679	6.4830	0.1746	6.6576	1.6974	0.1670	1.8644			17,624.7057	0.7198		17,642.7009
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000		0.0000
Worker	0.6531	0.3692	4.6546	0.0131	2.4567	8.3600e-003	2.4650	0.6290	7.7000e-003	0.6367			1,304.0816	0.0335		1,304.9180
Total	**2.2201**	**53.1232**	**12.8672**	**0.1810**	**8.9397**	**0.1830**	**9.1226**	**2.3264**	**0.1747**	**2.5011**			**18,928.7873**	**0.7533**		**18,947.6190**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.1141	0.5910	1.1981	5.0800e-003	0.3897	3.1800e-003	0.3929	0.1042	2.9800e-003	0.1072			515.8534	0.0189		516.3269
Unmitigated	0.1141	0.5910	1.1981	5.0800e-003	0.3897	3.1800e-003	0.3929	0.1042	2.9800e-003	0.1072			515.8534	0.0189		516.3269

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Light Industry	62.73	11.88	6.12	138,322	138,322
Total	62.73	11.88	6.12	138,322	138,322

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Light Industry	9.50	7.30	7.30	59.00	28.00	13.00	92	5	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Light Industry	0.561380	0.034626	0.184829	0.116141	0.016642	0.004535	0.016185	0.056706	0.001192	0.001407	0.004983	0.000606	0.000767

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	4.9600e-003	0.0451	0.0379	2.7000e-004		3.4200e-003	3.4200e-003		3.4200e-003	3.4200e-003			54.0725	1.0400e-003	9.9000e-004	54.3939
NaturalGas Unmitigated	4.9600e-003	0.0451	0.0379	2.7000e-004		3.4200e-003	3.4200e-003		3.4200e-003	3.4200e-003			54.0725	1.0400e-003	9.9000e-004	54.3939

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
General Light Industry	459.616	4.9600e-003	0.0451	0.0379	2.7000e-004		3.4200e-003	3.4200e-003		3.4200e-003	3.4200e-003			54.0725	1.0400e-003	9.9000e-004	54.3939
Total		**4.9600e-003**	**0.0451**	**0.0379**	**2.7000e-004**		**3.4200e-003**	**3.4200e-003**		**3.4200e-003**	**3.4200e-003**			**54.0725**	**1.0400e-003**	**9.9000e-004**	**54.3939**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
General Light Industry	0.459616	4.9600e-003	0.0451	0.0379	2.7000e-004		3.4200e-003	3.4200e-003		3.4200e-003	3.4200e-003			54.0725	1.0400e-003	9.9000e-004	54.3939
Total		**4.9600e-003**	**0.0451**	**0.0379**	**2.7000e-004**		**3.4200e-003**	**3.4200e-003**		**3.4200e-003**	**3.4200e-003**			**54.0725**	**1.0400e-003**	**9.9000e-004**	**54.3939**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.2270	1.0000e-005	9.2000e-004	0.0000		0.0000	0.0000		0.0000	0.0000			1.9700e-003	1.0000e-005		2.1000e-003
Unmitigated	0.2270	1.0000e-005	9.2000e-004	0.0000		0.0000	0.0000		0.0000	0.0000			1.9700e-003	1.0000e-005		2.1000e-003

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0343					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.1926					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	9.0000e-005	1.0000e-005	9.2000e-004	0.0000		0.0000	0.0000		0.0000	0.0000			1.9700e-003	1.0000e-005		2.1000e-003
Total	**0.2270**	**1.0000e-005**	**9.2000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**			**1.9700e-003**	**1.0000e-005**		**2.1000e-003**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0343					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.1926					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	9.0000e-005	1.0000e-005	9.2000e-004	0.0000		0.0000	0.0000		0.0000	0.0000			1.9700e-003	1.0000e-005		2.1000e-003
Total	**0.2270**	**1.0000e-005**	**9.2000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**			**1.9700e-003**	**1.0000e-005**		**2.1000e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Energy Calculations Summary

Construction Fuel Usage Summary

	Diesel	Gasoline	Diesel	Diesel
Construction Phase	**Off-road Equipment (gallons)**	**On-road (gallons)**	**On-road (gallons)**	**Total**
CTF	21,466	977	226,004	**247,470**
Effluent Discharge	26,418	1,031	250,099	**276,517**
Levee Crossing	17,385	248	419,959	**437,345**
Pond Decommissioning	46,252	1,273	265,868	**312,120**
TOTAL	**111,522**	**3,528**	**1,161,930**	**1,273,452**

Total Gasoline	**3,528**	**gallons**
Total Diesel	**1,273,452**	**gallons**

CTF Construction Offroad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor	Number of days	Diesel Fuel Usage
Infrastructure Modifications	Plate Compators	1	1.10	8	0.43	101	19
Infrastructure Modifications	Off-Highway Trucks	1	1.10	402	0.38	101	849
Infrastructure Modifications	Excavators	1	1.10	158	0.38	101	334
Infrastructure Modifications	Welders	1	1.10	46	0.45	101	115
Infrastructure Modifications	Graders	1	8.00	187	0.41	101	3,097
Infrastructure Modifications	Other General Industrial Equipment	1	8.00	88	0.34	101	1,209
Infrastructure Modifications	Off-Highway Trucks	2	8.00	402	0.38	101	12,343
Infrastructure Modifications	Generator Sets	1	8.00	84	0.74	101	2,511
Infrastructure Modifications	Pavers	1	0.20	130	0.42	101	55
Infrastructure Modifications	Rollers	1	0.20	80	0.38	101	31
Infrastructure Modifications	Bore/Drill Rigs	1	0.20	221	0.50	101	112
Infrastructure Modifications	Tractors/Loaders/Backhoes	1	1.10	97	0.37	101	199
Infrastructure Modifications	Concrete/Industrial Saws	1	0.30	81	0.73	101	90
Infrastructure Modifications	Forklifts	1	5.60	89	0.20	101	503
						TOTAL	21,466

Notes: Equipment assumptions are consistent with CalEEMod. Fuel usage average of 0.05 gallons of diesel fuel per horsepower-hour is from the SCAQMD CEQA Air Quality Handbook, Table A9-3E.

Trips and VMT

Phase Name	Daily Worker Trip	Daily Vendor Trip	Daily Hauling Trip	Days per Year	Total Worker Trips	Total Vendor Trips	Total Haul Trips	Worker Trip Length (miles)	Vendor Trip Length (miles)	Haul Trip Length (miles)	Total Worker Trip Length (miles)	Total Vendor Trip Length (miles)	Total Haul Trip Length (miles)	**Total gallons of gasoline**	**Total gallons of diesel**
Infrastructure Modifications	25	0	211	101	2525	0	21,311.00	10.80	7.30	20.00	27270	0	426,220.00	977	226,004
													TOTAL	977	226,004

Notes: Consistent with CalEEMod, worker vehicles assumed to be gasoline and 50% LDA, 25% LDT1, and 25% LDT2. Vendor and haul trips are assumed to be 100% diesel Heavy-Duty Trucks (T7).

Number of Days Adjusted as demolition would occur over 2 years, but not at same degree year round

Phase 2 Construction Offroad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor	Number of days	Diesel Fuel Usage
Earthwork/Trenching	Concrete/Industrial Saws	1	0.7	81	0.73	111	230
Earthwork/Trenching	Dumpers/Tenders	1	3.0	16	0.38	111	101
Earthwork/Trenching	Excavators	1	1.5	158	0.38	111	500
Earthwork/Trenching	Generator Sets	1	6.0	84	0.74	111	2,070
Earthwork/Trenching	Graders	1	0.0	187	0.41	111	-
Earthwork/Trenching	Off-Highway Trucks	4	6.0	402	0.38	111	20,348
Earthwork/Trenching	Other General Industrial Equipment	1	6.0	88	0.34	111	996
Earthwork/Trenching	Pavers	1	0.7	130	0.42	111	212
Earthwork/Trenching	Plate Compactors	1	1.5	8	0.43	111	29
Earthwork/Trenching	Rollers	1	0.7	80	0.38	111	118
Earthwork/Trenching	Rubber Tired Loaders	1	3.0	203	0.36	111	1,217
Earthwork/Trenching	Tractors/Loaders/Backhoes	1	3.0	97	0.37	111	598
						TOTAL	26,418

Notes: Equipment assumptions are consistent with CalEEMod. Fuel usage average of 0.05 gallons of diesel fuel per horsepower-hour is from the SCAQMD CEQA Air Quality Handbook, Table A9-3E.

Trips and VMT

Phase Name	Daily Worker Trip	Daily Vendor Trip	Daily Haul Trip	Days per Year	Total Worker Trips	Total Vendor Trips	Total Haul Trips	Worker Trip Length (miles)	Vendor Trip Length (miles)	Haul Trip Length (miles)	Total Worker Trip Length (miles)	Total Vendor Trip Length (miles)	Total Haul Trip Length (miles)	Total gallons of gasoline	Total gallons of diesel
Earthwork/Trenching	24	4	211	111	2,664	444	23421	10.80	7.30	20.00	28,771.20	3,241.20	468,420.00	1,031	250,099
													TOTAL	1,031	250,099

Notes: Consistent with CalEEMod, worker vehicles assumed to be gasoline and 50% LDA, 25% LDT1, and 25% LDT2. Vendor and haul trips are assumed to be 100% diesel Heavy-Duty Trucks (T7).

Phase 2 Construction Offroad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor	Number of days	Diesel Fuel Usage
Earthwork/Trenching	Plate Compactors	1	0.7	8	0.43	40	5
Earthwork/Trenching	Scrapers	1	0.7	367	0.48	40	247
Earthwork/Trenching	Other Construction Equipment	2	0.7	172	0.42	40	202
Earthwork/Trenching	Excavators	1	2.1	158	0.38	40	252
Earthwork/Trenching	Graders	1		187	0.41	40	-
Earthwork/Trenching	Bore/Dril Rigs	1	2.1	221	0.50	40	464
Earthwork/Trenching	Other General Industrial Equipment	1	8.0	88	0.34	40	479
Earthwork/Trenching	Off-Highway Trucks	5	8.0	402	0.38	40	12,221
Earthwork/Trenching	Rubber Tired Loaders	1	4.2	203	0.36	40	614
Earthwork/Trenching	Cement and Mortar Mixers	1	1.4	9	0.56	40	14
Earthwork/Trenching	Tractors/Loaders/Backhoes	1	0.7	97	0.37	40	50
Earthwork/Trenching	Off-Highway Trucks	1	1.4	402	0.38	40	428
Earthwork/Trenching	Welders	1	1.4	46	0.45	40	58
Earthwork/Trenching	Rubber Tired Loaders	1	5.6	247	0.40	40	1,107
Earthwork/Trenching	Pumps	1	7.0	84	0.74	40	870
Earthwork/Trenching	Cranes	1	2.8	231	0.29	40	375
						TOTAL	17,385

Notes: Equipment assumptions are consistent with CalEEMod. Fuel usage average of 0.05 gallons of diesel fuel per horsepower-hour is from the SCAQMD CEQA Air Quality Handbook, Table A9-3E.

Trips and VMT

Phase Name	Daily Worker Trip	Daily Vendor Trip	Daily Haul Trip	Days per Year	Total Worker Trips	Total Vendor Trips	Total Haul Trips	Worker Trip Length (miles)	Vendor Trip Length (miles)	Haul Trip Length (miles)	Total Worker Trip Length (miles)	Total Vendor Trip Length (miles)	Total Haul Trip Length (miles)	Total gallons of gasoline	Total gallons of diesel
Earthwork/Trenching	16	0	331	40	640	0	13240	10.80	7.30	20.00	6,912.00	0.00	264,800.00	248	140,411
Earthwork/Trenching	0	0	659	40	0	0	26360	10.80	7.30	20.00	0.00	0.00	527,200.00	0	279,549
													TOTAL	248	419,959

Notes: Consistent with CalEEMod, worker vehicles assumed to be gasoline and 50% LDA, 25% LDT1, and 25% LDT2. Vendor and haul trips are assumed to be 100% diesel Heavy-Duty Trucks (T7).

Phase 2 Construction Offroad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor	Number of days	Diesel Fuel Usage
Earthwork/Trenching	Rubber Tired Dozers	6	3.5	247	0.40	23	2,386
Earthwork/Trenching	Dumpers/Tenders	6	3.5	16	0.38	23	147
Earthwork/Trenching	Rubber Tired Loaders	10	3.5	203	0.36	223	28,519
Earthwork/Trenching	Off-Highway Trucks	10	3.5	402	0.38	23	6,149
Earthwork/Trenching	Plate Compactors	6	3.5	8	0.43	23	83
Earthwork/Trenching	Off-Highway Trucks	10	3.5	402	0.38	23	6,149
Earthwork/Trenching	Tractots/Loaders/Backhoes	6	3.5	247	0.40	23	2,386
Earthwork/Trenching	Excavators	3	3.5	97	0.37	23	433
						TOTAL	46,252

Notes: Equipment assumptions are consistent with CalEEMod. Fuel usage average of 0.05 gallons of diesel fuel per horsepower-hour is from the SCAQMD CEQA Air Quality Handbook, Table A9-3E.

Trips and VMT

Phase Name	Daily Worker Trip	Daily Vendor Trip	Daily Haul Trip	Days per Year	Total Worker Trips	Total Vendor Trips	Total Haul Trips	Worker Trip Length (miles)	Vendor Trip Length (miles)	Haul Trip Length (miles)	Total Worker Trip Length (miles)	Total Vendor Trip Length (miles)	Total Haul Trip Length (miles)	**Total gallons of gasoline**	**Total gallons of diesel**
Earthwork/Trenching	143	0	1090	23	3,289	0	25070	10.80	7.30	20.00	35,521.20	0.00	501,400.00	1,273	265,868
Earthwork/Trenching	143	0		23	3,289	0	0	10.80	7.30	20.00	35,521.20	0.00	-	1,273	0
													TOTAL	1,273	265,868

Notes: Consistent with CalEEMod, worker vehicles assumed to be gasoline and 50% LDA, 25% LDT1, and 25% LDT2. Vendor and haul trips are assumed to be 100% diesel Heavy-Duty Trucks (T7).

EMFAC2017 (v1.0.2) Emissions Inventory
Region Type: County
Region: San Joaquin County
Calendar Year: 2 2021
Season: Annual
Vehicle Classification: EMFAC2011 Categories
Units: miles/day for VMT, trips/day for Trips, tons/day for Emissions, 1000 gallons/day for Fuel Consumption

Region	CalYr	VehClass	MdlYr	Speed miles/hr	Fuel	Population vehicles	VMT miles/day	Trips trips/day	Fuel gas 1,000 gallons/day	Diesel gas 1,000 gallons/day	Miles per gallon	Gasoline miles per gallon	Diesel miles per gallon
San Joaquin	2021	LDA	Aggregated	Aggregated	GAS	286267.82	11331154.17	1340711.479	369.880954	0.00	**30.63**	**27.91**	**1.89**
San Joaquin	2021	LDT1	Aggregated	Aggregated	GAS	29154.08	1025942.82	131402.2718	39.08987559	0.00	**26.25**		
San Joaquin	2021	LDT2	Aggregated	Aggregated	GAS	93274.269	3447688.028	430889.5144	142.9035653	0.00	**24.13**		
San Joaquin	2021	T7 tractor	Aggregated	Aggregated	DSL	416.68411	28942.36827	1883.812669	5.485850939	15.34673242	**1.89**		

Notes: Consistent with CalEEMod, worker vehicles assumed to be gasoline and 50% LDA, 25% LDT1, and 25% LDT2. Vendor trips are assumed to be 100% diesel Heavy-Duty Trucks (T7).

Appendix D

Biological Resources

D1

Database Query Results

United States Department of the Interior

FISH AND WILDLIFE SERVICE
San Francisco Bay-Delta Fish And Wildlife
650 Capitol Mall
Suite 8-300
Sacramento, CA 95814
Phone: (916) 930-5603 Fax: (916) 930-5654
http://kim_squires@fws.gov

In Reply Refer To: April 07, 2020
Consultation Code: 08FBDT00-2020-SLI-0151
Event Code: 08FBDT00-2020-E-00343
Project Name: City of Lathrop Proposed River Outfall Project

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

San Francisco Bay-Delta Fish And Wildlife
650 Capitol Mall
Suite 8-300
Sacramento, CA 95814
(916) 930-5603

Project Summary

Consultation Code: 08FBDT00-2020-SLI-0151

Event Code: 08FBDT00-2020-E-00343

Project Name: City of Lathrop Proposed River Outfall Project

Project Type: WASTEWATER PIPELINE

Project Description: Treated effluent outfall to SJ River

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/37.796474950135064N121.28887153390708W

Counties: San Joaquin, CA

Endangered Species Act Species

There is a total of 9 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Riparian Brush Rabbit *Sylvilagus bachmani riparius* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6189	Endangered

Reptiles

NAME	STATUS
Giant Garter Snake *Thamnophis gigas* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4482	Threatened

Amphibians

NAME	STATUS
California Red-legged Frog *Rana draytonii* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/2891	Threatened
California Tiger Salamander *Ambystoma californiense* Population: U.S.A. (Central CA DPS) There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/2076	Threatened

Fishes

NAME	STATUS
Delta Smelt *Hypomesus transpacificus* There is **final** critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/321	Threatened

Insects

NAME	STATUS
Valley Elderberry Longhorn Beetle *Desmocerus californicus dimorphus* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/7850	Threatened

Crustaceans

NAME	STATUS
Vernal Pool Fairy Shrimp *Branchinecta lynchi* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/498	Threatened
Vernal Pool Tadpole Shrimp *Lepidurus packardi* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/2246	Endangered

Flowering Plants

NAME	STATUS
Large-flowered Fiddleneck *Amsinckia grandiflora* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5558	Endangered

Critical habitats

There is 1 critical habitat wholly or partially within your project area under this office's jurisdiction.

NAME	STATUS
Delta Smelt *Hypomesus transpacificus* https://ecos.fws.gov/ecp/species/321#crithab	Final

Query Criteria: BIOS selection

Element Code	Species	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
AAAAA01180	***Ambystoma californiense*** California tiger salamander	Threatened	Threatened	G2G3	S2S3	WL
AAABF02020	***Spea hammondii*** western spadefoot	None	None	G3	S3	SSC
AAABH01022	***Rana draytonii*** California red-legged frog	Threatened	None	G2G3	S2S3	SSC
AAABH01050	***Rana boylii*** foothill yellow-legged frog	None	Candidate Threatened	G3	S3	SSC
ABNJB05035	***Branta hutchinsii leucopareia*** cackling (=Aleutian Canada) goose	Delisted	None	G5T3	S3	WL
ABNKC06010	***Elanus leucurus*** white-tailed kite	None	None	G5	S3S4	FP
ABNKC19070	***Buteo swainsoni*** Swainson's hawk	None	Threatened	G5	S3	
ABNKD06030	***Falco columbarius*** merlin	None	None	G5	S3S4	WL
ABNME03041	***Laterallus jamaicensis coturniculus*** California black rail	None	Threatened	G3G4T1	S1	FP
ABNRB02022	***Coccyzus americanus occidentalis*** western yellow-billed cuckoo	Threatened	Endangered	G5T2T3	S1	
ABNSB10010	***Athene cunicularia*** burrowing owl	None	None	G4	S3	SSC
ABPAT02011	***Eremophila alpestris actia*** California horned lark	None	None	G5T4Q	S4	WL
ABPBR01030	***Lanius ludovicianus*** loggerhead shrike	None	None	G4	S4	SSC
ABPBW01114	***Vireo bellii pusillus*** least Bell's vireo	Endangered	Endangered	G5T2	S2	
ABPBXA3010	***Melospiza melodia*** song sparrow ("Modesto" population)	None	None	G5	S3?	SSC
ABPBXB0020	***Agelaius tricolor*** tricolored blackbird	None	Threatened	G2G3	S1S2	SSC
ABPBXB3010	***Xanthocephalus xanthocephalus*** yellow-headed blackbird	None	None	G5	S3	SSC
AFCHA0209K	***Oncorhynchus mykiss irideus pop. 11*** steelhead - Central Valley DPS	Threatened	None	G5T2Q	S2	
AFCHB01040	***Hypomesus transpacificus*** Delta smelt	Threatened	Endangered	G1	S1	
AFCHB03010	***Spirinchus thaleichthys*** longfin smelt	Candidate	Threatened	G5	S1	

Element Code	Species	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
AFCJB25010	***Mylopharodon conocephalus*** hardhead	None	None	G3	S3	SSC
AMACC08010	***Corynorhinus townsendii*** Townsend's big-eared bat	None	None	G3G4	S2	SSC
AMACC10010	***Antrozous pallidus*** pallid bat	None	None	G5	S3	SSC
AMACD02011	***Eumops perotis californicus*** western mastiff bat	None	None	G5T4	S3S4	SSC
AMAEB01021	***Sylvilagus bachmani riparius*** riparian brush rabbit	Endangered	Endangered	G5T1	S1	
AMAFD01060	***Perognathus inornatus*** San Joaquin Pocket Mouse	None	None	G2G3	S2S3	
AMAFF08081	***Neotoma fuscipes riparia*** riparian (=San Joaquin Valley) woodrat	Endangered	None	G5T1Q	S1	SSC
AMAJA03041	***Vulpes macrotis mutica*** San Joaquin kit fox	Endangered	Threatened	G4T2	S2	
AMAJF04010	***Taxidea taxus*** American badger	None	None	G5	S3	SSC
ARAAD02030	***Emys marmorata*** western pond turtle	None	None	G3G4	S3	SSC
ARACF12100	***Phrynosoma blainvillii*** coast horned lizard	None	None	G3G4	S3S4	SSC
ARADB01017	***Arizona elegans occidentalis*** California glossy snake	None	None	G5T2	S2	SSC
ARADB21021	***Masticophis flagellum ruddocki*** San Joaquin coachwhip	None	None	G5T2T3	S2?	SSC
ARADB36150	***Thamnophis gigas*** giant gartersnake	Threatened	Threatened	G2	S2	
CTT52410CA	***Coastal and Valley Freshwater Marsh*** Coastal and Valley Freshwater Marsh	None	None	G3	S2.1	
CTT61410CA	***Great Valley Cottonwood Riparian Forest*** Great Valley Cottonwood Riparian Forest	None	None	G2	S2.1	
CTT61420CA	***Great Valley Mixed Riparian Forest*** Great Valley Mixed Riparian Forest	None	None	G2	S2.2	
CTT61430CA	***Great Valley Valley Oak Riparian Forest*** Great Valley Valley Oak Riparian Forest	None	None	G1	S1.1	
CTT63440CA	***Elderberry Savanna*** Elderberry Savanna	None	None	G2	S2.1	
ICBRA03010	***Branchinecta conservatio*** Conservancy fairy shrimp	Endangered	None	G2	S2	
ICBRA03030	***Branchinecta lynchi*** vernal pool fairy shrimp	Threatened	None	G3	S3	

Element Code	Species	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
ICBRA06010	***Linderiella occidentalis*** California linderiella	None	None	G2G3	S2S3	
ICBRA10010	***Lepidurus packardi*** vernal pool tadpole shrimp	Endangered	None	G4	S3S4	
IICOL48011	***Desmocerus californicus dimorphus*** valley elderberry longhorn beetle	Threatened	None	G3T2	S2	
IICOL49010	***Anthicus sacramento*** Sacramento anthicid beetle	None	None	G1	S1	
IICOL4C020	***Lytta moesta*** moestan blister beetle	None	None	G2	S2	
IIHYM24250	***Bombus occidentalis*** western bumble bee	None	Candidate Endangered	G2G3	S1	
IIHYM24480	***Bombus crotchii*** Crotch bumble bee	None	Candidate Endangered	G3G4	S1S2	
PDAPI0Z0S0	***Eryngium racemosum*** Delta button-celery	None	Endangered	G1	S1	1B.1
PDAPI19030	***Lilaeopsis masonii*** Mason's lilaeopsis	None	Rare	G2	S2	1B.1
PDAST1C011	***Blepharizonia plumosa*** big tarplant	None	None	G1G2	S1S2	1B.1
PDAST2E0U0	***Cirsium crassicaule*** slough thistle	None	None	G1	S1	1B.1
PDAST650E0	***Madia radiata*** showy golden madia	None	None	G3	S3	1B.1
PDAST9F031	***Trichocoronis wrightii var. wrightii*** Wright's trichocoronis	None	None	G4T3	S1	2B.1
PDASTE8470	***Symphyotrichum lentum*** Suisun Marsh aster	None	None	G2	S2	1B.2
PDBOR01050	***Amsinckia grandiflora*** large-flowered fiddleneck	Endangered	Endangered	G1	S1	1B.1
PDBRA2R010	***Tropidocarpum capparideum*** caper-fruited tropidocarpum	None	None	G1	S1	1B.1
PDCAB01010	***Brasenia schreberi*** watershield	None	None	G5	S3	2B.3
PDCHE040B0	***Atriplex cordulata var. cordulata*** heartscale	None	None	G3T2	S2	1B.2
PDCHE041F3	***Extriplex joaquinana*** San Joaquin spearscale	None	None	G2	S2	1B.2
PDCHE042M0	***Atriplex minuscula*** lesser saltscale	None	None	G2	S2	1B.1
PDFAB0F8R1	***Astragalus tener var. tener*** alkali milk-vetch	None	None	G2T1	S1	1B.2

Element Code	Species	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
PDFAB250D2	***Lathyrus jepsonii var. jepsonii*** Delta tule pea	None	None	G5T2	S2	1B.2
PDFAB400R5	***Trifolium hydrophilum*** saline clover	None	None	G2	S2	1B.2
PDMAL0H0R3	***Hibiscus lasiocarpos var. occidentalis*** woolly rose-mallow	None	None	G5T3	S3	1B.2
PDPAP0A0D0	***Eschscholzia rhombipetala*** diamond-petaled California poppy	None	None	G1	S1	1B.1
PDRAN0B1J0	***Delphinium recurvatum*** recurved larkspur	None	None	G2?	S2?	1B.2
PDSCR0J0J0	***Chloropyron palmatum*** palmate-bracted bird's-beak	Endangered	Endangered	G1	S1	1B.1
PDSCR10030	***Limosella australis*** Delta mudwort	None	None	G4G5	S2	2B.1
PMALI040Q0	***Sagittaria sanfordii*** Sanford's arrowhead	None	None	G3	S3	1B.2
PMCYP032Y0	***Carex comosa*** bristly sedge	None	None	G5	S2	2B.1
PMPOA53110	***Puccinellia simplex*** California alkali grass	None	None	G3	S2	1B.2

Record Count: 72

CNPS California Native Plant Society

Inventory of Rare and Endangered Plants

*The database used to provide updates to the Online Inventory is under construction. View updates and changes made since May 2019 here.

Plant List

23 matches found. *Click on scientific name for details*

Search Criteria

California Rare Plant Rank is one of [1A, 1B, 2A, 2B], Found in Quads 3712184, 3712183, 3712182, 3712174, 3712173, 3712172, 3712164 3712163 and 3712162;

Modify Search Criteria Export to Excel Modify Columns Modify Sort Display Photos

Scientific Name	Common Name	Family	Lifeform	Blooming Period	CA Rare Plant Rank	State Rank	Global Rank
Amsinckia grandiflora	large-flowered fiddleneck	Boraginaceae	annual herb	(Mar)Apr-May	1B.1	S1	G1
Astragalus tener var. tener	alkali milk-vetch	Fabaceae	annual herb	Mar-Jun	1B.2	S1	G2T1
Atriplex cordulata var. cordulata	heartscale	Chenopodiaceae	annual herb	Apr-Oct	1B.2	S2	G3T2
Atriplex minuscula	lesser saltscale	Chenopodiaceae	annual herb	May-Oct	1B.1	S2	G2
Blepharizonia plumosa	big tarplant	Asteraceae	annual herb	Jul-Oct	1B.1	S1S2	G1G2
Brasenia schreberi	watershield	Cabombaceae	perennial rhizomatous herb (aquatic)	Jun-Sep	2B.3	S3	G5
Carex comosa	bristly sedge	Cyperaceae	perennial rhizomatous herb	May-Sep	2B.1	S2	G5
Chloropyron palmatum	palmate-bracted bird's-beak	Orobanchaceae	annual herb (hemiparasitic)	May-Oct	1B.1	S1	G1
Cirsium crassicaule	slough thistle	Asteraceae	annual / perennial herb	May-Aug	1B.1	S1	G1
Delphinium recurvatum	recurved larkspur	Ranunculaceae	perennial herb	Mar-Jun	1B.2	S2?	G2?
Eryngium racemosum	Delta button-celery	Apiaceae	annual / perennial herb	Jun-Oct	1B.1	S1	G1
Eschscholzia rhombipetala	diamond-petaled California poppy	Papaveraceae	annual herb	Mar-Apr	1B.1	S1	G1
Extriplex joaquinana	San Joaquin spearscale	Chenopodiaceae	annual herb	Apr-Oct	1B.2	S2	G2
Hibiscus lasiocarpos var. occidentalis	woolly rose-mallow	Malvaceae	perennial rhizomatous herb (emergent)	Jun-Sep	1B.2	S3	G5T3
Lathyrus jepsonii var. jepsonii	Delta tule pea	Fabaceae	perennial herb	May-Jul(Aug-Sep)	1B.2	S2	G5T2
Lilaeopsis masonii	Mason's lilaeopsis	Apiaceae	perennial rhizomatous herb	Apr-Nov	1B.1	S2	G2
Madia radiata	showy golden madia	Asteraceae	annual herb	Mar-May	1B.1	S3	G3

Puccinellia simplex	California alkali grass	Poaceae	annual herb	Mar-May	1B.2	S2	G3
Sagittaria sanfordii	Sanford's arrowhead	Alismataceae	perennial rhizomatous herb (emergent)	May-Oct(Nov)	1B.2	S3	G3
Symphyotrichum lentum	Suisun Marsh aster	Asteraceae	perennial rhizomatous herb	(Apr)May-Nov	1B.2	S2	G2
Trichocoronis wrightii var. wrightii	Wright's trichocoronis	Asteraceae	annual herb	May-Sep	2B.1	S1	G4T3
Trifolium hydrophilum	saline clover	Fabaceae	annual herb	Apr-Jun	1B.2	S2	G2
Tropidocarpum capparideum	caper-fruited tropidocarpum	Brassicaceae	annual herb	Mar-Apr	1B.1	S1	G1

Suggested Citation

California Native Plant Society, Rare Plant Program. 2020. Inventory of Rare and Endangered Plants of California (online edition, v8-03 0.39). Website http://www.rareplants.cnps.org [accessed 07 April 2020].

D2

Special-Status Plant Species and Sensitive Natural Communities Evaluated for the City of Lathrop – Consolidated Treatment Facility - Surface Water Discharge Project

Table 1 Special-Status Plant Species and Sensitive Natural Communities Evaluated for the City of Lathrop – Consolidated Treatment Facility - Surface Water Discharge Project

Species Name	Legal Status[1] Federal/ State/CRPR/SJMSCP	Habitat and Distribution	Potential for Occurrence within the Project Site[2]
Large-flowered fiddleneck *Amsinckia grandiflora*	FE/SE/1B.1/Yes	Cismontane woodland, valley and foothill grassland. Annual grassland in various soils. 902–1,804 feet in elevation. Blooms (March), April–May.	**Not expected to occur:** The project site does not support suitable habitat for this species and the project site is outside of the elevational range of this species. Nearest occurrence is southwest of Tracy.
Alkali milk-vetch *Astragalus tener var. tener*	--/--/1B.2/Yes	Low ground, alkali flats, and flooded lands; in annual grassland or in playas or vernal pools. 0–551 feet in elevation. Blooms March–June.	**Not present:** The project site does not support suitable habitat for this species and this species was not found during botanical surveys conducted in June 2020.
Heartscale *Atriplex cordulata var. cordulata*	--/--/1B.2/Yes	Alkaline flats and scalds in the Central Valley, sandy saline or alkaline soils. 10–902 feet in elevation. Blooms April–October.	**Not present:** The project site does not support suitable habitat for this species and this species was not found during botanical surveys conducted in June 2020.
Brittlescale *Atriplex depressa*	--/--/1B.2/Yes	Alkaline, clay soils within chenopod scrub, meadows and seeps, playas, valley and foothill grasslands, vernal pools at elevations ranging from 3-1,050 feet. Blooms April-October	**Not present:** The project site does not support suitable habitat for this species and this species was not found during botanical surveys conducted in June 2020.
Lesser saltscale *Atriplex minuscula*	--/--/1B.1/No	Alkali playa. In alkali sink and grassland in sandy, alkaline soils. 0–738 feet in elevation. Blooms May–October.	**Not present:** The project site does not support suitable habitat for this species and this species was not found during botanical surveys conducted in June 2020.
Big tarplant *Blepharizonia plumosa*	--/--/1B.1/No	Dry hills and plains in annual grassland. Clay to clay-loam soils; usually on slopes and often in burned areas. 98–1657 feet in elevation. Blooms July–October.	**Not expected to occur:** The project site does not support suitable habitat for this species. Nearest recorded occurrence is from Tracy.
Watershield *Brasenia schreberi*	--/--/2B.3/No	Freshwater marshes and swamps. Aquatic from water bodies both natural and artificial. 98–7218 feet in elevation. Blooms June–September.	**Not present:** This species was not found during botanical surveys conducted in June 2020.
Hoover's calycadenia *Calycadenia hooveri*	--/--/1B.3/Yes	Rocky substrate within cismontane woodland, valley and foothill grassland at elevations ranging from 213-984 feet. Blooms July-September.	**Not expected to occur:** The project site does not support suitable habitat for this species and the project site is outside of the elevational range of this species.
Succulent owl's clover aka fleshy owl's clover *Castilleja campestris* ssp. *succulenta* fmr *Orthocarpus succulentus*)	FT/SE/1B.2/Yes	Typically found in vernal pools (often acidic) at elevations ranging from 164-2,460 feet. Blooms April-May (sometimes as early as March).	**Not expected to occur:** The project site does not support suitable habitat for this species and the project site is outside of the elevational range of this species.
Bristly sedge *Carex comosa*	--/--2B.1/Yes	Wetland. Marshes and swamps, coastal prairie, valley and foothill grassland. Lake margins, wet places; site below sea level is on a Delta island. -16–5315 feet in elevation. Blooms May–September.	**Not present:** This species was not found during botanical surveys conducted in June 2020.

Species Name	Legal Status[1] Federal/ State/CRPR/SJMSCP	Habitat and Distribution	Potential for Occurrence within the Project Site[2]
Palmate-bracted salty bird's-beak *Chloropyron palmatum*	FE/SE/1B.1	Chenopod scrub, valley and foothill grassland, meadow and seep, wetland. Usually on Pescadero silty clay which is alkaline, with *Distichlis, Frankenia*, and other alkali species. 16–509 feet in elevation. Blooms May–October.	**Not present:** The project site does not support suitable habitat or Pescadero silty clay soil for this species and this species was not found during botanical surveys conducted in June 2020.
Slough thistle *Cirsium crassicaule*	--/--/1B.1/Yes	Wetland. Sloughs, riverbanks, and marshy areas. 10–328 feet in elevation. Blooms May–August.	**Not present:** The San Joaquin Riverbank provides suitable habitat, but this species was not found during botanical surveys conducted in June 2020.
Mt. Hamilton coreopsis *Coreopsis hamiltonii*	--/--/1B.2/Yes	Annual herb typically found in rocky soils within cismontane woodland at elevations ranging from 1,804-4,265 feet. Blooms March-May.	**Not expected to occur:** The project site does not support suitable habitat for this species and the project site is outside of the elevational range of this species. Nearest occurrence is south of Vernalis.
Hospital Canyon larkspur *Delphinium californicum* ssp. *interius*	--/--/1B.2/Yes	Chaparral (openings), cismontane woodland (mesic), and coastal scrub at elevations ranging from 639-3,952 feet. Blooms April-June.	**Not expected to occur:** The project site does not support suitable habitat for this species and the project site is outside of the elevational range of this species.
Recurved larkspur *Delphinium recurvatum*	--/--/1B.2/Yes	Chenopod scrub, valley and foothill grassland, cismontane woodland. On alkaline soils; often in valley saltbush or valley chenopod scrub. 10–2592 feet in elevation. Blooms March–June.	**Not present:** The valley oak woodland provides marginally suitable habitat, but this species was not found during botanical surveys conducted in June 2020.
Delta button-celery *Eryngium racemosum*	--/SE/1B.1/Yes	Wetland. Riparian scrub. Seasonally inundated floodplain on clay. 3–1099 feet in elevation. Blooms June–October.	**Not present:** The project site is within a historic occurrence that is thought to be extirpated. The riparian woodland provides suitable habitat, but this species was not found during botanical surveys conducted in June 2020.
Diamond-petaled California poppy *Eschscholzia rhombipetala*	--/--/1B.1/Yes	Valley and foothill grassland. Alkaline, clay slopes and flats. 98–2051 feet in elevation. Blooms March–April.	**Not expected to occur:** Project site is outside of the elevational range of the species. Nearest occurrence is southwest of Tracy.
San Joaquin spearscale *Extriplex joaquinana*	--/--/1B.2/No	Alkaline soils. Chenopod scrub, alkali meadow, playas, valley and foothill grassland. In seasonal alkali wetlands or alkali sink scrub with *Distichlis spicata, Frankenia*, etc. 3–2,740 feet in elevation. Blooms April–October.	**Not present:** This species was not found during botanical surveys conducted in June 2020.
Boggs Lake hedge-hyssop *Gratiola heterosepala*	-/SE/1B.2/Yes	Typically found in clay soils within marshes and swamps (lake margins), vernal pools at elevations ranging from 32-7,792 feet. Blooms April-August.	**Not expected to occur:** Project site is outside of the elevational range of the species. Nearest occurrence is east of Herald.

Species Name	Legal Status[1] Federal/ State/CRPR/SJMSCP	Habitat and Distribution	Potential for Occurrence within the Project Site[2]
Woolly rose-mallow *Hibiscus lasiocarpos* var. *occidentalis*	--/--/1B.2/No	Wetland. Marshes and swamps (freshwater). Moist, freshwater-soaked riverbanks and low peat islands in sloughs; can also occur on riprap and levees. In California, known from the delta watershed. 0–509 feet in elevation. Blooms June–September.	**Not present:** This species was not found during botanical surveys conducted in June 2020.
Red Bluff dwarf rush *Juncus leiospermus* var. *leiospermus*	--/--/1B.1/Yes	Vernally mesic areas within chaparral, cismontane woodland, meadows and seeps, valley and foothill grasslands, vernal pools at elevations ranging from 114-4,101 feet. Blooms March to June.	**Not expected to occur:** Project site is outside of the current known range and elevational range of the species.
Delta tule pea *Lathyrus jepsonii* var. *jepsonii*	--/--/1B.2/Yes	Marshes and swamps (brackish and freshwater) at elevations ranging from 0-16.5 feet. Blooms from May-July (sometimes in August-September).	**Not present:** This species was not found during botanical surveys conducted in June 2020.
Legenere *Legenere limosa*	--/--/1B.1/Yes	Typically found in vernal pools at elevations ranging from 3-2,887 feet. Blooms from April-June.	**Not expected to occur:** The project site does not support suitable habitat for this species.
Mason's lilaopsis *Lilaeopsis masonii*	--/--/1B.1/Yes	Wetland. Freshwater and brackish marshes, riparian scrub. Tidal zones, in muddy or silty soil formed through river deposition or riverbank erosion. 0–33 feet in elevation. Blooms April–November.	**Not present:** This species was not found during botanical surveys conducted in June 2020.
Delta mudwort *Limosella australis*	--/--/2B.1/	Wetland. Riparian scrub, marshes and swamps. Usually on mud banks of the Delta in marshy or scrubby riparian associations; often with *Lilaeopsis masonii*. 0–16 feet in elevation. Blooms May–August.	**Not present:** This species was not found during botanical surveys conducted in June 2020.
Showy golden madia *Madia radiata*	--/--/1B.1/Yes	Valley and foothill grassland, cismontane woodland. Mostly on adobe clay in grassland or among shrubs. 246–4003 feet in elevation. Blooms March–May.	**Not expected to occur.** This species is mostly found in the foothills of the Coast Ranges. No clay soils present in the analysis area
California alkali grass *Puccinellia simplex*	--/--/1B.2/no	Alkaline, vernally mesic. Sinks, flats, and lake margins. 3–3,002 feet in elevation. Blooms March–May.	**Not expected to occur:** The project site does not support suitable habitat for this species. Nearest occurrence is northeast of Davis from 1949.
Sanford's arrowhead *Sagittaria sanfordii*	--/--/1B.2/Yes	Wetland. Marshes and swamps. In standing or slow-moving freshwater ponds, marshes, and ditches. 0–2,133 feet in elevation. Blooms May–October (November).	**Not present:** This species was not found during botanical surveys conducted in June 2020.
Mad-dog skullcap (=side-flowering skullcap) *Scutellaria lateriflora*	-/--/2B.2/Yes	Meadows and seeps (mesic), marshes and swamps at elevations ranging from 0-1,640 feet. Blooms July-September.	**Not expected to occur:** The project site does not support suitable habitat for this species. Nearest known occurrence is from northwest of Stockton.

Species Name	Legal Status[1] Federal/ State/CRPR/SJMSCP	Habitat and Distribution	Potential for Occurrence within the Project Site[2]
Suisun Marsh aster *Symphyotrichum lentum*	--/--/1B.2/Yes	Marshes and swamps (brackish and freshwater). Most often seen along sloughs with *Phragmites, Scirpus*, blackberry, *Typha*, etc. 0–98 feet in elevation. Blooms (April), May–November.	**Not present:** This species was not found during botanical surveys conducted in June 2020.
Wright's trichocoronis *Trichocoronis wrightii* var. *wrightii*	--/--/2B.1/Yes	Marshes and swamps, riparian forest, meadows and seeps, vernal pools. Mud flats of vernal lakes, drying riverbeds, alkali meadows. 16–1427 feet in elevation. Blooms May–September.	**Not present:** This species was not found during botanical surveys conducted in June 2020.
Saline clover *Trifolium hydrophilum*	--/--/1B.2/No	Alkaline vernal pools at elevations ranging from 0-685 feet. Blooms from April-June.	**Not expected to occur:** The project site does not support suitable habitat for this species. Nearest known occurrence is from the Stone Lakes National Wildlife Refuge from 2010.
Caper-fruited tropidocarpum *Tropidocarpum capparideum*	--/--1B.1/Yes	Valley and foothill grassland. Alkaline clay. 0–1181 feet in elevation. Blooms March–April.	**Not expected to occur:** alkaline clay soils are not present in the project site.
Orcutt grass/Greene's tuctoria *Tuctoria greenei*	FE/SR/1B.1/Yes	Vernal pools at elevations ranging from 98-3,510 feet. Blooms May-July (sometimes in September).	**Not expected to occur:** Project site is outside of the elevational range of the species.

Notes: CRPR = California Rare Plant Rank; CNDDB = California Natural Diversity Database; SJMSCP = San Joaquin County Multi-Species Habitat Conservation and Open Space Plan.

[1] Legal Status Definitions

Federal:
E Endangered (legally protected by ESA)
T Threatened (legally protected by ESA)

State:
E Endangered (legally protected by CESA)
T Threatened (legally protected by CESA)
R Rare (legally protected by CNPPA)

California Rare Plant Ranks:
1B Plant species considered rare or endangered in California and elsewhere (protected under CEQA, but not legally protected under ESA or CESA)
2B Plant species considered rare or endangered in California but more common elsewhere (protected under CEQA, but not legally protected under ESA or CESA)

Threat Ranks:
0.1 Seriously threatened in California (over 80% of occurrences threatened; high degree and immediacy of threat)
0.2 Moderately threatened in California (20-80% occurrences threatened; moderate degree and immediacy of threat)
0.3 Not very threatened in California (less than 20% of occurrences threatened; low degree and immediacy of threat or not current threats known)

SJMSCP:
Yes Covered No Not Covered

[2] Potential for Occurrence Definitions

Not expected to occur: Species is unlikely to be present within the plan area due to poor habitat quality, lack of suitable habitat features, or restricted current distribution of the species.

May occur: Suitable habitat is available within the plan area; however, there are little to no other indicators that the species might be present.

Likely to occur: All of the species life history requirements can be met by habitat present on the site, and populations/occurrences are known to occur in the immediate vicinity.

Sources: CNDDB 2020; CNPS 2020; SJMSCP 2000, Baldwin et al. 2012.

D3

Species Observed During Field Surveys

Table 2 Plant and Wildlife Species Observed During the 2020 Biological Resource Reconnaissance Surveys

Scientific Name	Common Name
Plants	
Acer negundo	Boxelder
Acmispon americanus var. americanus	Spanish lotus
Achillea millefolium	Yarrow
Allium sp.	Ornamental onion
Amsinckia intermedia	Common fiddleneck
Artemisia douglasiana	California mugwort
Avena barbata	Slender wild oat
Baccharis pilularis	Coyote brush
Bidens frondosa	Devil's-pitchfork
Brassica rapa	Birdsrape mustard
Bromus diandrus	Ripgut brome
Carduus pycnocephalus	Italian thistle
Ceanuthus thyrsiflorus	Blueblossom
Centaurea solstitialis	Yellow starthistle
Cephalanthus occidentalis	Common buttonbush
Chenopodium murale	Nettle-leaf goosefoot
Cistus ladanifer	Common gum cistus
Conium maculatum	Poison hemlock
Convolvulus arvensis	Field bindweed
Croton setigerus	Doveweed
Cynodon dactylon	Bermuda grass
Cyperus eragrostis	Tall flatsedge
Datura wrightii	Jimsonweed
Deschampsia danthonioides	Annual hair grass
Dietes iridiodes	Fortnight lily
Echinochloa colona	Jungle-rice
Egeria densa	Brazilian waterweed
Eichhornia crassipes	Common water-hyacinth
Epilobioum angustifolium	Fireweed
Epilobium brachycarpum	Willow herb
Erodium botrys	Big heron bill
Erodium cicutarium	Redstem filaree
Eschscholzia californica	California poppy
Eucalyptus sp.	Eucalyptus
Eucalyptus cinereal	Dollar eucalyptus
Euphorbia prostrata	Prostrate sandmat
Euphorbia serpillifolia	Thyme-leafed spurge
Euthamia occidentalis	Western goldenrod
Festuca perennis	Italian rye grass
Fraxinus latifolia	Oregon ash
Galium aparine	Cleavers

Scientific Name	Common Name
Grindelia camporum	Gumweed
Helenium puberulum	Sneezeweed
Heliotropium curassavicum var. oculatum	Seaside heliotrope
Helmintotheca echioides	Bristly ox-tongue
Hirschfeldia incana	Short podded mustard
Hordeum murinum ssp. *leporinum*	Foxtail barley
Hypericum calycinum	Aaron's beard
Juncus effusus	Common bog rush
Lactuca serriola	Prickly lettuce
Laennecia coulteri	Coulter's woolwort
Lepidium latifolium	Broadleaved pepperweed
Ligustrum sp.	Privet
Magnolia grandiflora	Southern magnolia
Malva parviflora	Cheeseweed
Malva pseudolavatera	Cretan mallow
Matricaria discoidea	Pineapple weed
Medicago sativa	Alfalfa
Melilotus albus	White sweetclover
Melilotus indicus	Small melilot
Melilotus officinalis	Yellow sweetclover
Muhlenbergia sp.	Deergrass
Nicotiana glauca	Tobacco tree
Nicotiana quadrivalvis	Indian tobacco
Oenothera sp. possibly *elata* (NF)	Evening primrose
Paspalum dilatatum	Dallis grass
Persicaria punctata	Dotted smartweed
Phacelia distans	Common phacelia
Phalaris aquatica	Harding grass
Phyla nodiflora	Common lippia
Pinus sp.	Pine
Plantago major	Common plantain
Platanus x hispanica	London planetree
Platanus racemosa	California sycamore
Polygonum aviculare	Prostrate knotweed
Polypogon monspeliensis	Rabbits foot grass
Populus fremontii ssp. fremontii	Cottonwood
Portulaca oleracea	Common purslane
Potentilla norvegica	Norwegian cinquefoil
Prunus cerasifera	Cherry plum tree
Prunus sp.	Ornamental tree
Pseudognaphalium luteoalbum	Jersey cudweed
Quercus lobata	Valley oak
Raphanus sativus	Jointed charlock

Scientific Name	Common Name
Raphanus raphanistrum	Wild radish
Ricinus communis	Castor-bean
Rorippa palustris	Bog yellowcress
Rosa californica	California rose
Rubus ursinus	California blackberry
Rumex crispus	Curly dock
Rumex dentatus	Toothed dock
Rumex salicifolius	Willow leaved dock
Salix exigua	Sandbar willow
Salix gooddingii	Black willow
Salix laevigata	Red willow
Salix lasiandra	Pacific willow
Salix lasiolepis	Arroyo willow
Salsola tragus	Russian thistle
Salvia clevelandii	Cleveland sedge
Salvia leucantha	Mexican bush sage
Sambucus nigra ssp. caerulea	Blue elderberry
Setaria parviflora	Marsh bristle grass
Silybum marianum	Blessed milkthistle
Solanum americanum	White nightshade
Sonchus oleraceus	Sow thistle
Sorghum halepense	Johnson grass
Triticum aestivum.	Wheat
Urtica dioica	Stinging nettle
Verbena bonariensis	Purple-top vervain
Veronica anagallis-aquatica	Blue Water Speedwell
Vitis californica	California grape
Xanthium strumarium	Cocklebur
Birds	
Agelaius phoeniceus	Red-winged blackbird
Aphelocoma californica	California scrub jay
Ardea alba	Great egret
Ardea herodias	Great blue heron
Branta canadensis	Canada goose
Buteo jamaicensis	Red-tailed hawk
Calidris mauri	Western sandpiper
Callipepla californica	California quail
Calypte anna	Anna's hummingbird
Charadrius vociferus	Killdeer
Columba livia	Rock pigeon
Corvus brachyrhynchos	American crow
Elanus leucurus	White-tailed kite
Falco sparverius	American kestrel

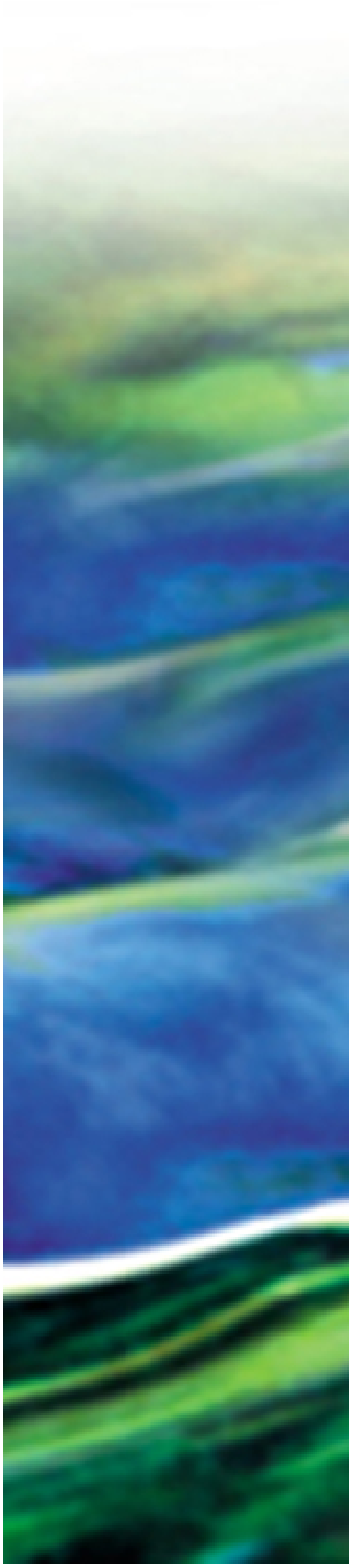
Scientific Name	Common Name
Haemorhous mexicanus	House finch
Himantopus mexicanus	Black-necked stilt
Larus californicus	California gull
Megaceryle alcyon	Belted kingfisher
Meleagris gallopavo	Wild turkey
Mimus polyglottos	Northern mockingbird
Petrochelidon pyrrhonota	Cliff swallow
Phasianus colchicus	Ring-necked pheasant
Sayornis nigricans	Black phoebe
Sturnus vulgaris	European starling
Tringa melanoleuca	Greater yellowlegs
Zenaida macroura	Mourning dove
Tyrannus verticalis	Western kingbird
Buteo swainsoni	Swainson's hawk
Quiscalus mexicanus	Great-tailed grackle
Icterus bullockii	Bullock's oriole
Sayornis nigricans	Black phoebe
Lanius ludovicianus	Loggerhead shrike
Mammals	
Canis latrans	Coyote (Scat)
Didelphis virginiana	Virginia opossum (Tracks)
Otospermophilus beecheyi	California ground squirrel
Procyon lotor	Raccoon (Tracks)
Sylvilagus audubonii	Desert cottontail
Lepus californicus	Black-tailed jackrabbit
Reptiles	
Sceloporus occidentalis	Western fence lizard

Source: Data provided by Ascent Environmental in 2020

Appendix E

Aquatic Biological Resources Thermal Effects Assessment

Aquatic Biological Resources Thermal Effects Assessment for the City of Lathrop Consolidated Treatment Facility Surface Water Discharge Project



Prepared for:

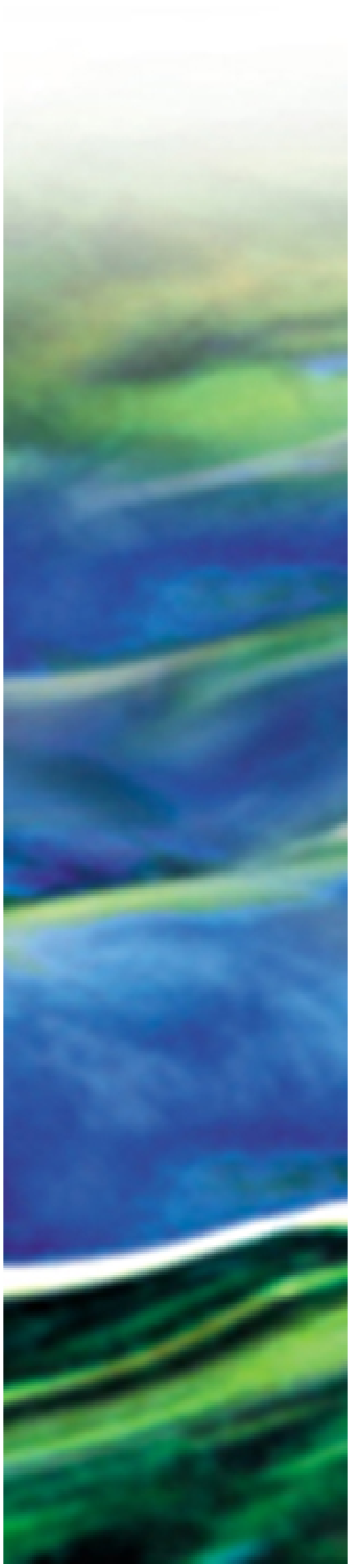
City of Lathrop
Public Works Department

Prepared by:

Robertson - Bryan, Inc.
Solutions for Progress

August 2020

AQUATIC BIOLOGICAL RESOURCES THERMAL EFFECTS ASSESSMENT FOR THE CITY OF LATHROP CONSOLIDATED TREATMENT FACILITY SURFACE WATER DISCHARGE PROJECT



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August 2020

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ACRONYMS AND ABBREVIATIONS

ADWF	average dry weather flow
ºC	Celsius
CDEC	California Data Exchange Center
CDFW	California Department of Fish and Wildlife
cfs	cubic feet per second
City	City of Lathrop
CTM	critical thermal maximum
CTF	Consolidated Treatment Facility
Delta	Sacramento-San Joaquin Delta
DICU	Delta In-Consumptive Use
DPS	Distinct Population Segment
DSM2	Delta Simulation Model II
DWR	California Department of Water Resources
EIR	Environmental Impact Report
ESA	federal Endangered Species Act
ESU	evolutionary significant unit
ºF	Fahrenheit
fps	feet per second
g/L	grams per liter
LT50	median lethal temperature
m	meters
mg/L	milligrams per liter
mgd	million gallons per day
NMFS	National Oceanic and Atmospheric Administration National Marine Fisheries Service
NPDES	National Pollution Discharge Elimination System
PBFs	physical and biological features
SA	Subadult
SRWTP	Sacramento Regional Wastewater Treatment Plant
Thermal Plan	Water Quality Control Plan for the Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California
UILT	upper incipient lethal temperature
USFWS	U.S. Fish and Wildlife Service

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USGS	U.S. Geological Survey
USEPA	U.S. Environmental Protection Agency

1 INTRODUCTION

The City of Lathrop (City) currently disposes of Title 22 disinfected, tertiary 2.2 municipal effluent produced from its Consolidated Treatment Facility (CTF) to land. However, as the land within the City is developed according to General Plan land uses, lands currently permitted for effluent disposal will no longer be available. Thus, at buildout, for periods when demand for recycled water is low or zero (i.e., late fall, winter, and early spring months), the City will need an alternative method for disposal/management of its CTF-generated effluent. Without additional lands for disposal within the City, because lands are designated for development in accordance with its adopted General Plan, a surface water discharge has been determined to be the practicable option (RBI 2019). Consequently, the City has prepared an Environmental Impact Report (EIR) for its CTF Surface Water Discharge Project (Project).

This report serves as a technical appendix to Section 3.4 (Aquatic Biological Resources) of the Project EIR. Specifically, this appendix includes detailed analyses of the thermal effects to the San Joaquin River and to its aquatic biological resources that would result from CTF discharges to the river at rates of 2.5 mgd average dry weather flow (ADWF), the plant's current treatment capacity and 6.0 mgd ADWF, the future cumulative City build-out discharge rate. Section 3.4 (Aquatic Biological Resources) of the Project EIR relies upon the information in this report as the basis for its aquatic biological resources thermal effects impact determinations for the Project.

2 TEMPERATURE ASSESSMENT METHODOLOGY

The greatest CTF discharge effects on San Joaquin River temperatures will occur near the proposed CTF outfall because effluent discharged would typically be warmer than background river temperatures and CTF thermal effects will be attenuated with increasing distance from the outfall due to mixing with river flows and the effects of ambient air temperature on river temperatures. Hence, to ensure a conservative assessment of CTF thermal effects on the aquatic biological resources of the river, this assessment focused on: 1) fully mixed river temperatures at the proposed outfall location and nearby upstream and downstream locations, and 2) the thermal plume that will occur within the channel near the outfall, prior to effluent fully mixing with river flows. Hence, the "action area" within the San Joaquin River is the proposed outfall location itself and a reach extending approximately a couple miles both upstream, due to tidal influence, and downstream of the proposed CTF outfall location (see Section 2.1.1 for further definition of the action area). The proposed outfall location is at approximately San Joaquin River mile 55.8.

The term action area, as used in this report, constitutes the reach of the San Joaquin River that would experience the greatest thermal effects due to CTF discharges. Consequently, if no significant adverse thermal effects to aquatic biological resources are identified for the action area, it is also concluded that no adverse thermal effects to these resources would occur in other reaches of the river where discharge effects on San Joaquin River/San Joaquin-Sacramento Delta (Delta) water temperatures would be only lesser than those evaluated for the action area.

Based on the nature of thermal effects to the San Joaquin River that could potentially occur due to CTF discharges at rates of 2.5 and 6.0 mgd ADWF, the following four potential thermal effects to fish and their prey species were assessed.

1) Blockage or significant delay of thermally sensitive, special-status adult fish immigrations due to the thermal effect of CTF discharges on fully-mixed river temperatures.

2) Mortality or chronic, adverse sublethal effects to special-status fish or their prey organisms (i.e., phytoplankton, zooplankton, or macroinvertebrates) due to the thermal effect of CTF discharges on the fully mixed river temperatures.

3) Blockage or significant delay of special-status adult fish migrations due to the thermal plume created by CTF discharges in the San Joaquin River near the outfall.

4) Mortality or chronic, adverse sublethal effects to special-status fish or their prey organisms (i.e., phytoplankton, zooplankton, or macroinvertebrates) passing through the CTF's thermal plume in the San Joaquin River near the outfall.

The assessment of the above defined aspects of potential thermal effects was based, in part, on temperature modeling. The California Department of Water Resources (DWR)-developed Delta Simulation Model II (DSM2) was used to model river temperatures upon full mixing of the CTF effluent with river water, as well as to model river temperatures assuming no CTF discharge (i.e., existing conditions). In addition, separate modeling was conducted to characterize the thermal plume created by the CTF discharge near the outfall using the USEPA-supported CORMIX model. The approach employed using each of these models is described in detail below.

2.1 DSM2 Modeling (Fully Mixed Temperatures)

The proposed location of CTF discharge into the San Joaquin River is tidally influenced, and occasionally experiences reverse flows at the outfall location, although such reverse flows do not occur in all years. When reverse flows do occur, discharged CTF effluent can be transported in the San Joaquin River downstream only to move back upstream past the outfall and back downstream again during each tidal cycle. With a continuous discharge occurring, portions of the river may receive multiple inputs of effluent. DSM2 simulates Delta hydrodynamics and the continuous discharge scenarios to provide output for river water temperature and CTF effluent fractions at specific locations defined in the model that accounts for this tidally driven multiple dosing of effluent that occurs during specific flow conditions. Thus, DSM2 was used to model effluent flow fractions and river temperatures upon effluent fully mixing with receiving waters at the outfall location and at other nodes (i.e., river locations) within DSM2 at which modeled data can be output from the model.

2.1.1 Model Description

DSM2 is a one-dimensional computer model for simulating hydrodynamics and water quality in the Delta. A model grid representing the network of Delta channels covers major Delta channels, the Sacramento River upstream to the City of Sacramento, and the San Joaquin River upstream to Vernalis. DSM2 was calibrated and validated in 1997 by DWR and in 2000 by a group of agencies, water users, and stakeholders. In 2009, DSM2 was calibrated and validated again to account for morphological changes, such as the flooded Liberty Island, and bathymetry, hydrodynamic, and water quality data collected after the 2000 calibration. DSM2 has been used frequently by DWR, other agencies, and stakeholders to simulate the potential impacts of Delta-related projects.

DSM2 has a HYDRO module and a QUAL module. DSM2-HYDRO models the hydrodynamics of the Delta. DSM2-QUAL models conservative and non-conservative constituents given a flow field simulated by HYDRO, and was used in this assessment for modeling the CTF effluent fraction in the San Joaquin River and river temperature. Both models run on a 15-minute time-step. The conceptual model for portraying the transport of water temperature in DSM2-QUAL is based on equations adopted from QUAL-2E. DSM2 is limited to a single set of meteorological boundary conditions for the entire model domain.

Because node 7 within the standard DSM2 grid is located at the site of the proposed CTF outfall, this node was used to quantify the amount of effluent discharged into the river at this location. To provide a conservative assessment, the DSM2 model assumes that the effluent discharged at the outfall location instantly mixes fully across the channel. Because the modeling assumed no downstream temperature attenuation prior to full effluent mixing across the river channel, which would actually occur, the modeled temperature output at the outfall location is conservative for assessment purposes. The next closest node in the DSM2 model upstream of the outfall location is located 1.9 miles upstream of the outfall. Likewise, the next closest data output node in the DSM2 model downstream of the outfall is located 1.7 miles downstream of the outfall. Temperature output at these nodes accounts for temperature attenuation that occurs between the outfall and these nodes. DSM2 provides simulation output only at the model nodes. Consequently, discharge-related incremental increase in river temperatures in the intervening reaches of river between the outfall location and the above-cited closest other model nodes can be estimated by interpolation. Based on the DSM2 model, the action area assessed for this report is defined as the outfall location itself, and the reach of river extending about 1.9 miles upstream and 1.7 miles downstream, where CTF discharge-related thermal effects on river water temperatures would be greatest.

2.1.2 Scenarios and Input Data

The period modeled by DSM2 was January 1, 2008 through December 31, 2016. This period was selected because climate, hydrologic, and Delta operations data necessary to run DSM2 are available and because it encompasses the 2012–2016 extended drought period, thus providing a basis for assessing the maximum potential effect of the CTF discharges on San Joaquin River water temperatures. Three scenarios were simulated, as follows.

- No Discharge: Historical data for the Delta with no CTF discharge.
- 2.5 mgd ADWF Discharge: Historical data for the Delta, and CTF effluent discharge rates associated with the plant's current 2.5 million gallons per day (mgd) ADWF treatment capacity.
- 6.0 mgd ADWF Discharge: Historical data for the Delta and CTF discharges rates associated with a future cumulative City build-out discharge rate of 6.0 mgd ADWF.

Table 1 summarizes the DSM2 input parameters and sources of the input data used for the DSM2 simulation. Further explanation for the source of each input is provided below.

Table 1. Summary of input to DSM2 and sources of data.

Input Parameter	Description	Data Source
Boundary Flows	Sacramento River, San Joaquin River, Yolo Bypass, Cosumnes River, Mokelumne River, Calaveras River	DSM2 Template/CDEC/USGS
Boundary Stage	Martinez	DSM2 Template/CDEC/USGS
Exports/Diversions	CVP, SWP, CCWD Old River, CCWD Rock Slough, CCWD Victoria Canal, North Bay Aqueduct	DSM2 Template/CDEC/USGS
Gates and Barriers	Grantline Canal, Middle River, Old River, Head of Old River, Delta Cross Channel, Clifton Court Intakes	DWR Supplied File
DICU Flows	DWR DICU Model - 142 Nodes	DWR Supplied File
Climate Data[1]	Stockton Metropolitan Airport	weather.gov
Boundary Temperatures	Sacramento River [2], San Joaquin River, Martinez	CDEC/USGS
DICU Temperature	Average Delta-wide Ag Drains	MWQI Database/Waterfix Methodology [3]
CTF Discharge Rate	Project (2.5 mgd) and Future Project (6.0 mgd)	City, RBI
CTF Effluent Temperature	Historical measured at CTF	City, RBI

1 Wet Bulb Temperature, Dry Bulb Temperature, Sky Condition, Wind Speed, Atmospheric Pressure.
2 Sacramento River Temperatures were used also for East Side Tributaries (Mokelumne, Cosumnes, Calaveras) and Yolo Bypass.
3 See: https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/california_waterfix/exhibits/exhibit107/docs/app_5B_DSM2_att4.pdf.

- Boundary Flows, Boundary Stage, and Exports/Diversions: Boundary river flow, stage data, and exports/diversions were taken from the historical simulation template distributed with DSM2 version 8.1.2, supplemented with more recent data downloaded from the California Data Exchange Center (CDEC) and USGS.
- Gates and Barriers: Data concerning the operation of the Delta Cross Channel Gates, installation and removal of the temporary barriers in the south Delta, and operation of the Clifton Court intakes were provided by DWR.

- DICU Flows: Delta In-Consumptive Use (DICU) flows are the agricultural withdrawals and returns that occur within the Delta. This data set is from a model supplied by DWR, and simulates the island monthly consumptive uses, corresponding island water supplies, and the channel diversion, seepage and return volumes for each of 142 islands in the Delta, using the information on land use, historical precipitation, and agricultural activities.
- Climate Data: Climate data was obtained from a National Oceanic and Atmospheric Administration weather station located at the Stockton Metropolitan Airport, which is located 7.5 miles northeast of the proposed CTF outfall.
- Boundary Temperatures: Boundary river temperatures for the Sacramento River at Freeport, and the San Joaquin River at Vernalis, and Martinez were downloaded from CDEC and USGS.
- DICU Temperature: DICU temperatures were based on values found from methodology documents for DSM2 temperature modeling conducted for the California WaterFix project. The values are static monthly values that apply to all agricultural drains and are based on the average Delta-wide agricultural drain data from 1997–2004 from the Municipal Water Quality Investigations database. This DICU inflow water temperature was specified as a single monthly time series that was repeated for each year of the simulation.
- CTF Discharge Rate: Two CTF discharge rate scenarios were modeled: 1) 2.5 mgd ADWF, and 2) 6.0 mgd ADWF.
- CTF Effluent Temperature: A single CTF effluent temperature scenario was modeled for both modeled discharge rates, based on historical effluent temperatures monitored at the CTF by the City.

The CTF discharge rates modeled were based directly on the CTF's current plant design capacity of 2.5 mgd ADWF, which will be the permitted capacity requested by the City in its initial National Pollutant Discharge Elimination System (NPDES) permit for the CTF. The future discharge rate of 6.0 mgd ADWF was based on reasonably foreseeable cumulative wastewater flows at City buildout. For both scenarios, a seasonal pattern was imposed upon the ADWF to account for infiltration and inflow contributions to the overall wastewater flow, as presented in the City of Lathrop Recycled Water Master Plan (EKI 2019). This annual discharge flow pattern was then input into DSM2 for each year in the January 1, 2008 through December 31, 2016 simulation period.

Final effluent temperatures at the CTF were monitored hourly for the period April 14, 2017 through May 18, 2020. Daily average effluent temperatures were developed from the hourly temperature data. A 365-day dataset of daily average effluent temperatures was developed from the approximately three year daily average effluent temperature dataset by selecting the maximum daily average temperature that occurred for each day in a given year (i.e., effluent temperature for January 1st was the maximum January 1st daily average temperature from the multi-year monitoring dataset). The 365-day daily average effluent temperature dataset was thus conservative and was used for each year that was modeled in DSM2.

2.1.3 Model Validation

The DSM2 modeling required the additional step of model validation to ensure that San Joaquin River stage, flow, and temperature were being adequately modeled for purposes of this assessment. Results of the baseline model run, which simulated the January 1, 2008 through December 31, 2016 historical Delta flows and operations, climate conditions, and CTF effluent discharge flow rates and temperatures, were compared to actual, historical measured data. Modeled results were compared to data for the San Joaquin River at Mossdale, which is located only 0.7 miles from the proposed CTF outfall. Results of this effort showed that flow, stage, and temperature were all adequately simulated (see **Figure 1** through **Figure 3**, and **Table 2** through **Table 4**).

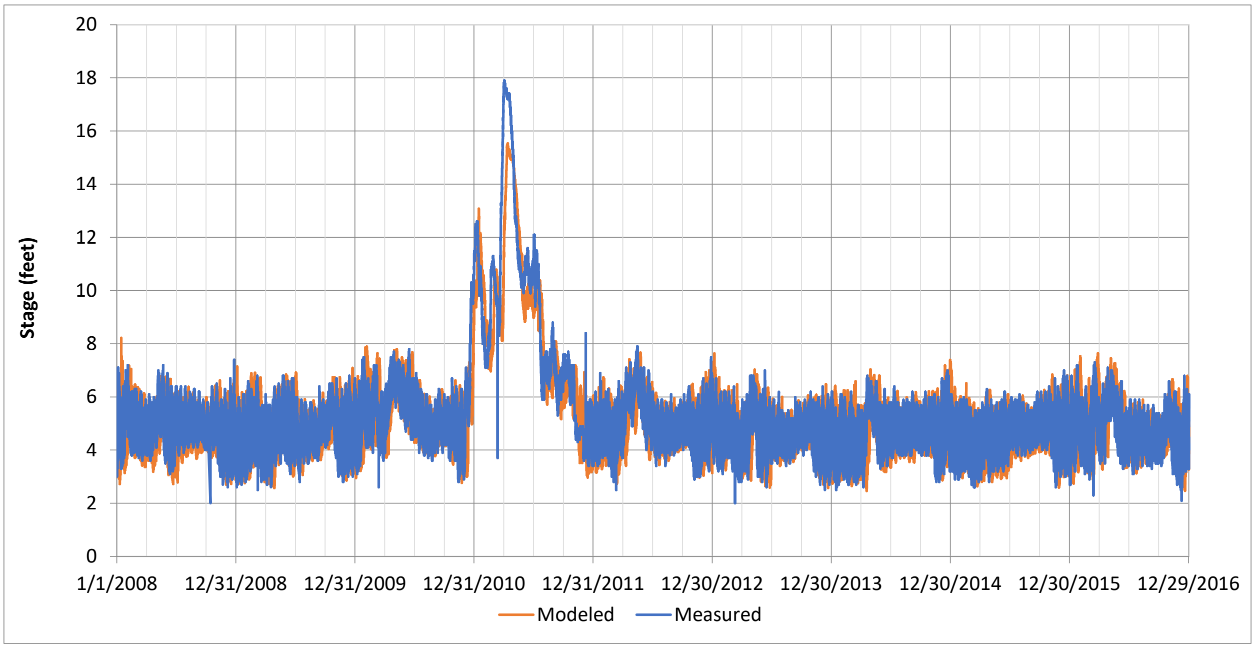


Figure 1. Time-series of San Joaquin River stage (ft NAVD88) at Mossdale as modeled by DSM2 and historical measured stage data from CDEC.

Table 2. Comparison of DSM2-modeled San Joaquin River stage at Mossdale (0.7 miles upstream of outfall) to historical measured stage data from CDEC by month.

Month	Average Difference in Daily Maximum Stage (ft NAVD88) [1]	Average Difference in Daily Minimum Stage (ft NAVD88) [1]
Jan	0.12	-0.08
Feb	0.18	0.02
Mar	-0.11	-0.19
Apr	-0.52	-0.75
May	0.11	0.20
Jun	-0.07	-0.23

Month	Average Difference in Daily Maximum Stage (ft NAVD88) [1]	Average Difference in Daily Minimum Stage (ft NAVD88) [1]
Jul	-0.02	-0.15
Aug	-0.07	-0.14
Sep	-0.07	-0.15
Oct	-0.12	-0.14
Nov	0.18	0.36
Dec	-0.13	-0.27
Overall	**-0.04**	**-0.13**

[1] Positive values are when DSM2 predicts a higher stage than was measured, while negative values are the opposite.

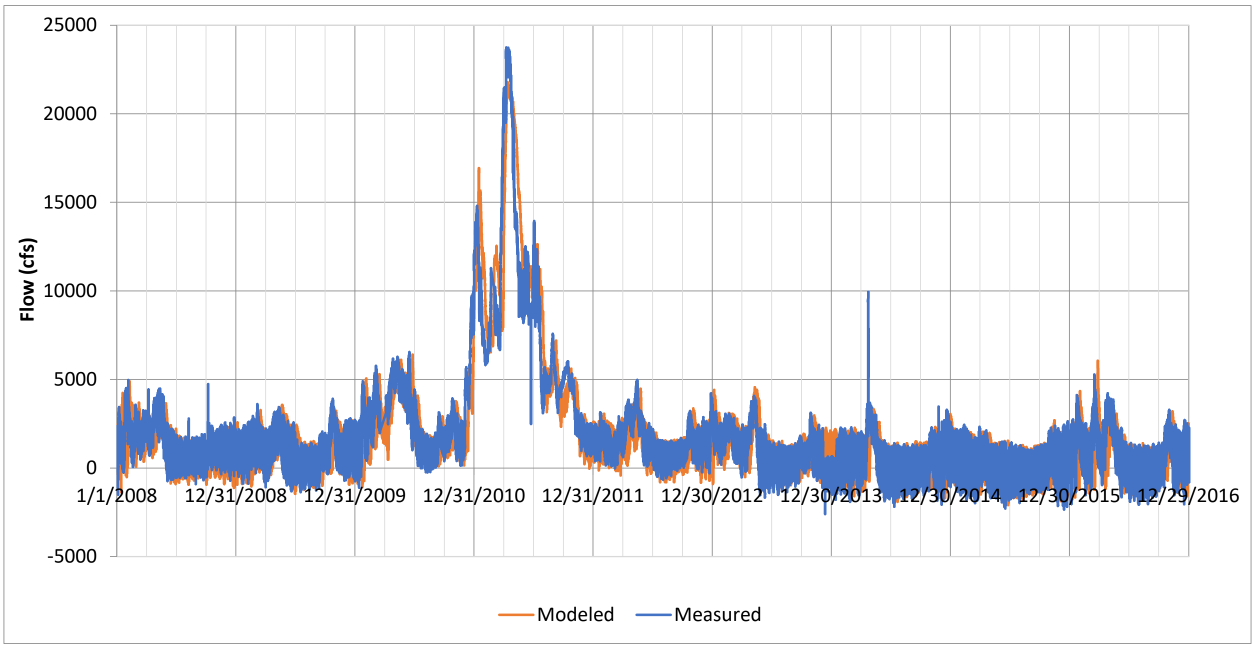


Figure 2. Time-series of San Joaquin River flow at Mossdale as modeled by DSM2 and historical measured flow data from CDEC.

Table 3. Comparison of DSM2-modeled San Joaquin River flow at Mossdale (0.7 miles upstream of outfall) to historical measured flow data from CDEC by month.

Month	Average Difference in Daily Maximum Flow (cfs) [1]	Average Difference in Daily Minimum Flow (cfs) [1]
Jan	177	-10
Feb	108	50
Mar	-225	-215
Apr	-713	-804
May	434	741
Jun	86	343
Jul	213	430
Aug	2	-37

Month	Average Difference in Daily Maximum Flow (cfs) [1]	Average Difference in Daily Minimum Flow (cfs) [1]
Sep	-40	-108
Oct	-413	-524
Nov	231	343
Dec	-305	-439
Overall	**-39**	**-22**
[1] Positive values are when DSM2 predicts a higher flow than was measured, while negative values are the opposite.		

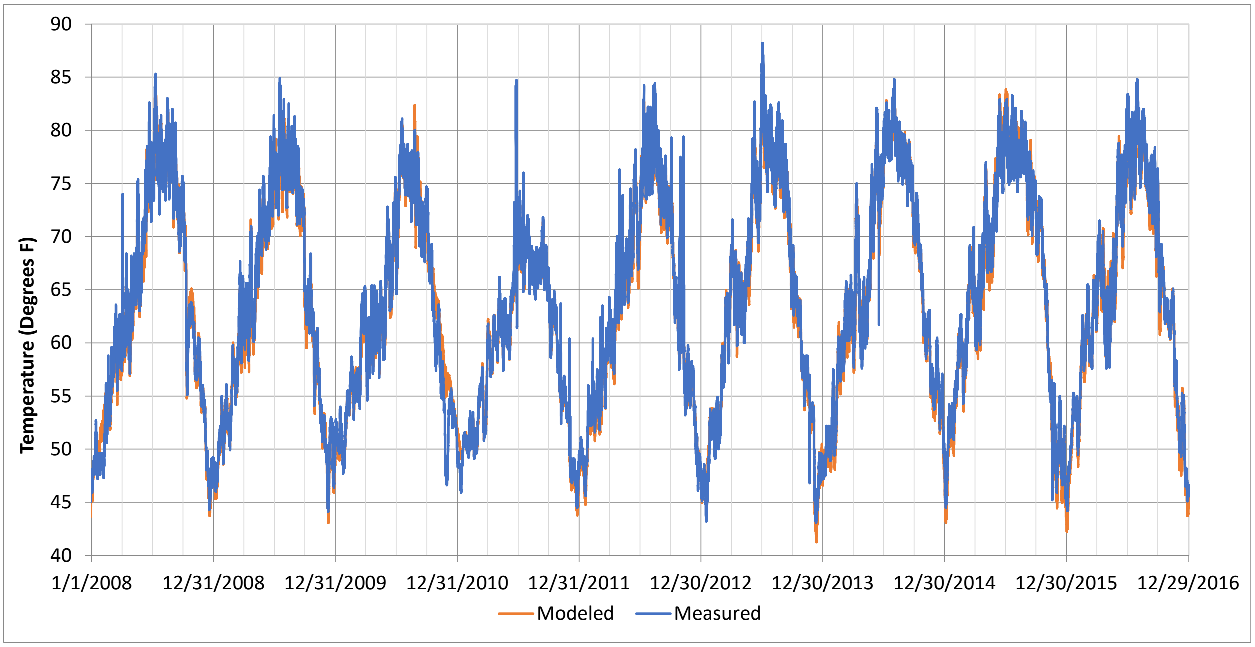


Figure 3. Time-series of San Joaquin River temperature at Mossdale as modeled by DSM2 and historical measured temperature data from CDEC.

Table 4. Comparison of DSM2-modeled daily average San Joaquin River temperature at Mossdale (0.7 miles upstream of outfall) to historical measured temperature data from CDEC by month.

Month	Average Difference in Modeled versus Measured Temperature (°F) [1]
Jan	0.00
Feb	-0.06
Mar	-0.27
Apr	-0.20
May	-0.33
Jun	-0.41
Jul	-0.23
Aug	-0.17

Sep	-0.13
Oct	-0.15
Nov	0.08
Dec	-0.04
Overall	**-0.16**
[1] Positive values are when DSM2 predicts a higher temperature than was measured, while negative values are the opposite.	

2.1.4 Model Output

Output was produced at multiple DSM2 nodes upstream and downstream of the CTF on the San Joaquin River, and is available at other far-field locations. Parameters included flow, stage, percent effluent, and temperature. The 15-minute output was averaged to convert to hourly, daily, or monthly averages for use in the assessments.

Because most water temperature monitoring equipment has reported accuracy of approximately +- 0.3°F, modeled temperature changes of 0.3°F or less are considered to be immeasurable for purposes of this assessment.

2.2 CORMIX MODELING

2.2.1 Model Description

CORMIX is a mixing zone model approved by the USEPA that simulates pollutant discharges into receiving water bodies. CORMIX was chosen to simulate the temperature plume in the river near the outfall, created by the CTF discharge, due to its ability to simulate heated discharges and their thermal effects on receiving water bodies.

CORMIX is able to simulate three discharge types: single port discharges (CORMIX1), submerged multiport discharges (CORMIX2), and buoyant surface discharges (CORMIX3). The proposed CTF outfall is a submerged pipeline discharge; therefore, the CORMIX1 model for single port discharges was used to simulate the effluent discharge to the San Joaquin River.

Within CORMIX1, the model transitions between simulation modules, depending on where the effluent plume is relative to the outfall. The first set of simulations relate to the immediate near-field mixing of the effluent plume, closest to the outfall itself. The first CORMIX1 near-field module, the submerged buoyant jet mixing module, simulates immediate jet mixing of the discharge in which turbulent mixing is the primary mixing method. The model then transitions to a boundary interactions module, in which the effluent plume's interactions with the receiving water boundaries (i.e., river bottom, water surface, and river banks) are simulated. Interactions with the receiving water boundaries can limit the mixing of the effluent plume with the receiving water body due to attachment of the effluent plume to the river bottom or banks. The boundary interactions module also provides the transition from the buoyant jet mixing module and the last CORMIX1 module, the surface buoyant jet mixing module. The surface buoyant jet mixing module simulates vertical and lateral mixing of the plume as it travels through the receiving water body, further from the outfall.

After the immediate near-field simulations discussed above are complete, CORMIX1 transitions to buoyant spreading simulations, in which further vertical and lateral mixing of the effluent plume as it travels downstream are simulated. These simulations utilize buoyant forces (i.e., density differences between the effluent plume and the receiving water) to simulate spreading of the effluent plume. Although the CORMIX model does account for general channel shape (i.e., width and depths), it cannot model effluent moving through downstream bends in the river channel; rather, it assumes a straight channel with a defined width and depth profile.

2.2.2 Outfall Configuration

CORMIX is commonly used as a design tool for new outfalls. As such, CORMIX contains a built-in set of rules that govern the manner in which the outfall is configured in the receiving water. For single port discharges (CORMIX1), discharges are classified as either "deeply submerged" or "slightly submerged." A deeply submerged discharge is a discharge in which the distance between the outfall pipe centerline and the river bottom at the discharge location is less than or equal to one-third of the river depth at the discharge location. A slightly submerged discharge is a discharge in which the distance between the outfall pipe centerline and the river bottom at the discharge location is greater than or equal to two-thirds of the river depth at the discharge location. The proposed CTF outfall is considered deeply submerged, and thus was modeled as such. The set of rules for outfall configurations in CORMIX are as follows:

(a) The river depth at the discharge location must be at least three times greater than the diameter of the outfall pipe.

(b) The distance between the outfall pipe centerline and the bottom of the river channel at the discharge location must be no greater than one-third (deeply submerged) or no less than two-thirds (slightly submerged) of the river depth at the discharge location.

(c) The distance between the outfall pipe centerline and the bottom of the river channel must be no less than the radius of the outfall pipe.

(d) The river depth at the outfall pipe location (i.e., depth at discharge) cannot be more than 30 percent greater than the average river channel depth across the transect at the outfall location.

These CORMIX rules needed to be satisfied in order for the model to run simulations. Hence, these rules which served as outfall design guideline parameters, and CORMIX model simulations, were used to determine the appropriate design depth for the CTF outfall pipe within the river channel, in order to comply with water quality objective 5.A.(1)c contained within the *Water Quality Control Plan for the Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California* (Thermal Plan) (RBI 2020).

2.2.3 Scenarios and Input Data

CORMIX modeling of the CTF discharge to the San Joaquin River was performed for discharge rates of 2.5 mgd ADWF (near-term, initial NPDES permit) and 6.0 mgd ADWF (probably City build-out discharge rate). For both the 2.5 mgd ADWF and 6.0 mgd ADWF discharge rates, plume modeling was performed for a worst-case and median-case scenario for each month of the year, because they "book-end" the worst-case half of all plume conditions that can occur in the river. From an assessment standpoint, if no significant adverse thermal effects to fishes are determined for either the worst-case or median-case scenarios (i.e., the worst-case half of all possible plume conditions), then it could be concluded that there would be no adverse effects caused by the best-case half of plume conditions, where thermal gradients across the plume are lesser than those modeled and assessed for the worst-case half of conditions.

Worst-case and median-case scenarios for the CORMIX modeling were defined as follows.

- Worst-case
  - 100^{th} percentile effluent-river temperature differential. Temperature differential is defined as $\text{Effluent}_{\text{temp.}}$ minus $\text{River}_{\text{temp.}}$
  - 1.3 peaking factor multiplied by monthly average effluent flow rate, capped at 7.55 mgd (maximum discharge capacity of outfall conveyance pipeline) for the 6.0 mgd ADWF scenario
  - Slack-tide river velocity of 0.05 fps for all months
- Median-case
  - Median effluent-river temperature differential
  - Monthly average effluent flow rate corresponding to a 2.5 and 6.0 mgd ADWF
  - Median river velocity for each month

The San Joaquin River velocity, stage and temperature data used to establish the 100^{th} percentile and median river velocity and temperature differentials were from the USGS gage at Mossdale, which records velocity, stage, and temperature on a 15-minute time step, for January 1, 2008 through December 31, 2019. Thus, for each day, there were 96 velocity, stage, and temperature values.

The CTF effluent flow rates used for CORMIX modeling represented peak daily flows associated with 2.5 and 6.0 mgd ADWF discharge rates.

Based on the DSM2 modeling of fully mixed river temperatures, no measurable build-up of temperature would occur over time near the outfall during any month. Therefore, background river temperature inputs to CORMIX plume modeling were not adjusted to account for increasing temperatures due to tidal conditions. The DSM2 modeling does take into account Manteca's upstream discharge because the ambient river temperature dataset is comprised of historical measured data. Consequently, any effects from Manteca's discharge on river temperature is accounted for in the historical monitoring dataset obtained from CDEC. Additionally, the Mossdale CDEC location is about halfway between the Manteca's outfall and the City's proposed outfall location, and the Mossdale station monitoring data were used to validate the accuracy of DSM2 modeling output (see Section 2.1.3).

The CTF effluent discharge temperatures were represented by the historical temperatures measured at the CTF from April 14, 2017 through May 18, 2020. These are hourly values. The effluent-river temperature differentials were determined by taking the difference between the hourly recorded effluent temperature and the river temperature value for the same hour. These "temperature differentials" were aggregated by month and the worst-case (100^{th} percentile) and median differential were selected. All effluent and river datasets underwent QA/QC to remove obvious outliers and data anomalies. Any temperature differential that exceeded 20°F was truncated at 20°F for use in modeling simulations. This was done because the NPDES permit that will be issued for the CTF will require that the temperature of the effluent discharged to the San Joaquin River be no more than 20°F above river background temperatures, based on water quality objective 5.A.(1)a of the Thermal Plan.

All simulations were performed using CORMIX's tidal simulation function, in which CORMIX simulates potential buildup of effluent in the receiving water as the tide reverses. Additionally, due to CORMIX needing some measurable ambient river velocity to conduct the simulations, the slack-tide river velocity was set to 0.05 feet per second, which is the minimum river velocity that will allow CORMIX to run.

2.2.4 Model Output

Output from the CORMIX modeling consisted of plume graphics provided by CORMIX's built-in Corvue three-dimensional graphical model and general plume mixing information provided within CORMIX. Corvue utilizes the CORMIX model output to generate three-dimension graphics depicting the effluent plume's interaction with the receiving water. Corvue was used to generate plume graphics showing the temperature differential between the effluent plume and the receiving water as the plume disperses into the receiving water.

As stated above, the CORMIX model transitions between simulation modules to simulate the thermal plume within the river channel. The Corvue graphic model within CORMIX does not seamlessly graph the plume across the entire modeled domain. Rather, it graphs the output from each CORMIX module in sequence. The result is a graphical depiction of the plume that shows each of the distinct aspects of the plume modeled with clearly observable "seams" between each. Although the plume is not graphed seamlessly by CORMIX, the graphics presented are still adequate for aquatic life thermal effects assessment purposes.

3 TEMPERATURE EFFECTS OF THE PROPOSED PROJECT ON AQUATIC BIOLOGICAL RESOURCES

This section provides detailed assessments of the temperature effects that CTF discharge at rates of 2.5 mgd and 6.0 mgd ADWF would have on the San Joaquin River, and how these river temperature increases would, in turn, impact aquatic biological resources of the San Joaquin

River. It does so by assessing direct and indirect effects of CTF thermal discharges on the species assessed and their habitat, including designated critical habitat for Endangered Species Act (ESA)-listed species. The degree to which aquatic biological resources may be adversely affected by CTF discharge-related temperature increases is a function of:

- existing San Joaquin River temperature conditions,
- species and life-stage specific timing of being within the action area,
- species and life-stage specific thermal tolerances,
- type and degree of species' use of the action area, and
- the Project's direct and indirect effects on river temperature and habitat conditions within the action area.

Many fish species utilize the action area of the San Joaquin River over the course of a year. However, the federal ESA-listed species of Green Sturgeon, steelhead, spring-run and winter-run Chinook Salmon, and Delta Smelt represent species that are: 1) physiologically the most thermally sensitive of all fish species using the affected environment, and 2) most prone to thermal impacts due both to their species- and life-stage-specific thermal sensitivities and their threatened/endangered population status. Consequently, detailed assessments are performed for these four thermally sensitive, ESA-listed species. Although not listed under the federal ESA, fall-run Chinook Salmon also use the action area and thus were included in the assessments. If no significant adverse effects are determined for any of the life stages of these most thermally sensitive fish species, then it will also be concluded that CTF discharges at rates of 2.5 mgd and 6.0 mgd ADWF would cause no significant adverse effects to all other more thermally tolerant fish species using the action area. Separate thermal assessments are made for these fishes' prey organisms, including phytoplankton, zooplankton, and benthic macroinvertebrates.

3.1 CTF Discharge Effects on Fully Mixed River Temperatures

This section characterizes the fully mixed river temperatures modeled to occur at CTF discharge rates of 2.5 mgd and 6.0 mgd ADWF. It also defines incremental temperature increases expected to occur due to the CTF discharge rates modeled, relative to existing conditions where no CTF discharge to the river is occurring. The DSM2 model was used to simulate river temperatures for the January 1, 2008 through December 31, 2016 simulation period (see Section 2.1 for a detailed discussion of the DSM2 modeling methodology).

3.1.1 2.5 mgd ADWF Discharge

Seasonal discharges from the CTF associated with a 2.5 mgd ADWF discharge rate would cause small (i.e., ≤0.2°F) long-term average river temperature increases (for the entire simulation period) at the outfall location September through February, and would cause no long-term average temperature increases for the months March through August (**Table 5**). These incremental increases that would occur at the outfall location would attenuate with increasing distance downstream of the outfall (**Table 6**). Simulated fully mixed river temperature output for the nearest DSM2 node upstream of the outfall location (i.e., 1.9 miles upstream of the outfall) showed no incremental increase in fully mixed river temperatures (**Table 7**).

Table 5. Fully mixed river temperatures near the outfall location for the 2.5 mgd ADWF condition, by month, and differences relative to existing conditions, where no CTF discharge is occurring.

Outfall Location

No Discharge

Statistic	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
	Daily Average Temperature (Degrees F)											
Probability of Exceedance												
0.1%	74.4	63.9	58.9	55.1	61.5	68.3	72.9	75.3	81.6	85.0	81.7	78.4
1%	73.4	63.6	57.9	54.4	61.1	67.6	72.1	74.5	80.9	83.7	81.2	78.0
5%	72.5	62.9	56.6	53.4	60.1	65.5	69.3	72.8	79.8	81.8	80.4	77.7
10%	71.3	62.1	55.7	52.6	59.0	64.3	67.8	70.7	78.6	80.8	79.7	76.8
25%	67.9	60.0	53.3	51.2	56.1	62.4	65.1	67.4	75.9	79.2	78.6	74.8
50%	64.0	56.8	49.1	49.7	53.8	59.1	62.0	65.2	73.0	77.6	77.2	73.0
75%	62.4	54.7	46.9	48.1	52.1	56.9	60.0	62.5	69.0	75.3	75.7	71.2
99.9%	54.5	46.7	42.3	43.2	49.0	50.5	57.0	57.6	58.8	65.9	65.4	64.0
Full Simulation Period[a]	65.0	57.1	50.0	49.6	54.3	59.5	62.8	65.4	72.4	76.8	76.3	72.8
Water Year Types[b]												
Above Normal and Wet (25%)	64.5	58.0	50.9	50.5	52.9	56.3	60.4	61.2	66.1	71.8	71.2	69.9
Below Normal (11%)	64.5	57.9	48.5	49.2	53.4	59.4	62.6	67.5	72.2	76.3	76.9	73.6
Dry and Critical (64%)	65.4	56.4	56.4	49.3	55.0	60.6	63.6	66.4	74.5	78.5	77.8	73.6

2.5 mgd (ADWF)

Statistic	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
	Daily Average Temperature (Degrees F)											
Probability of Exceedance												
0.1%	74.4	64.0	59.0	55.2	61.6	68.3	72.9	75.3	81.6	84.9	81.7	78.5
1%	73.4	63.7	58.0	54.5	61.2	67.6	72.1	74.6	80.9	83.7	81.2	78.0
5%	72.5	63.0	56.6	53.5	60.2	65.5	69.3	72.8	79.8	81.8	80.4	77.8
10%	71.3	62.1	55.8	52.8	59.1	64.3	67.8	70.7	78.6	80.8	79.7	76.8
25%	67.9	60.1	53.4	51.2	56.2	62.5	65.2	67.4	76.0	79.3	78.6	74.9
50%	64.1	56.9	49.3	49.8	53.9	59.1	62.0	65.3	73.0	77.6	77.2	73.1
75%	62.5	54.8	47.0	48.2	52.2	57.0	60.1	62.5	69.1	75.3	75.7	71.3
99.9%	54.5	46.9	42.5	43.4	49.1	50.5	57.1	57.7	58.8	65.9	65.4	64.0
Full Simulation Period[a]	65.1	57.2	50.1	49.7	54.4	59.6	62.8	65.4	72.4	76.8	76.3	72.8
Water Year Types[b]												
Above Normal and Wet (25%)	64.5	58.1	51.0	50.5	52.9	56.3	60.5	61.2	66.1	71.8	71.3	70.0
Below Normal (11%)	64.6	58.0	48.7	49.3	53.5	59.4	62.7	67.5	72.2	76.3	77.0	73.6
Dry and Critical (64%)	65.5	56.5	56.5	49.4	55.0	60.7	63.6	66.5	74.5	78.5	77.9	73.6

2.5 mgd (ADWF) minus No Discharge

Statistic	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
	Daily Average Temperature (Degrees F)											
Probability of Exceedance												
0.1%	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1
1%	0.0	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5%	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1
10%	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
25%	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1
50%	0.1	0.1	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
75%	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.1
99.9%	0.0	0.2	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Full Simulation Period[a]	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Water Year Types[b]												
Above Normal and Wet (25%)	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Below Normal (11%)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1
Dry and Critical (64%)	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1

a Based on the 2008-2016 simulation period.
b As defined by the San Joaquin Valley 60-20-20 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999).
c Positive differences are highted in red color which indicate increase in Temperature.

Table 6. Fully mixed river temperatures 1.7 miles downstream of the outfall for the 2.5 mgd ADWF condition, by month, and differences relative to existing conditions, where no CTF discharge is occurring.

1.7 miles downstream of Outfall

No Discharge

Statistic	Daily Average Temperature (Degrees F)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Probability of Exceedance												
0.1%	74.2	63.9	58.8	55.0	61.5	67.5	72.9	74.9	80.8	85.1	81.4	78.2
1%	73.6	63.6	58.0	54.3	61.2	67.2	71.7	74.5	80.3	83.6	81.1	77.9
5%	72.6	63.0	56.5	53.2	59.9	65.6	69.1	72.8	79.4	81.4	80.3	77.5
10%	71.5	62.1	55.8	52.6	59.2	64.3	67.8	70.9	78.5	80.4	79.8	77.0
25%	68.0	60.0	53.2	51.0	56.0	62.4	65.1	67.6	75.9	79.2	78.6	74.9
50%	64.0	56.7	49.0	49.6	53.8	59.0	62.1	65.4	73.1	77.5	77.3	73.1
75%	62.5	54.6	46.8	48.0	52.0	56.9	60.2	62.6	69.3	75.4	75.8	71.5
99.9%	54.3	47.2	42.2	43.2	48.9	50.4	57.1	57.7	58.8	66.0	65.5	64.1
Full Simulation Period[a]	65.1	57.1	49.9	49.4	54.3	59.5	62.8	65.5	72.4	76.8	76.3	72.9
Water Year Types[b]												
Above Normal and Wet (25%)	64.6	58.0	50.9	50.4	52.9	56.3	60.5	61.3	66.2	72.0	71.3	70.0
Below Normal (11%)	64.5	57.9	48.4	49.0	53.3	59.3	62.7	67.7	72.3	76.1	77.0	73.7
Dry and Critical (64%)	65.5	56.4	56.4	49.2	54.9	60.6	63.6	66.5	74.5	78.5	77.9	73.7

2.5 mgd (ADWF)

Statistic	Daily Average Temperature (Degrees F)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Probability of Exceedance												
0.1%	74.2	63.9	58.9	55.1	61.5	67.5	72.9	74.9	80.8	85.0	81.5	78.3
1%	73.6	63.6	58.1	54.3	61.2	67.3	71.8	74.6	80.3	83.6	81.2	77.9
5%	72.6	63.1	56.5	53.2	60.0	65.6	69.1	72.8	79.4	81.4	80.3	77.5
10%	71.6	62.1	55.8	52.7	59.2	64.3	67.8	70.9	78.5	80.4	79.8	77.1
25%	68.1	60.1	53.2	51.1	56.1	62.4	65.1	67.6	76.0	79.2	78.6	74.9
50%	64.1	56.8	49.1	49.6	53.8	59.1	62.1	65.5	73.1	77.5	77.3	73.1
75%	62.5	54.7	46.9	48.1	52.0	56.9	60.2	62.6	69.3	75.4	75.9	71.5
99.9%	54.4	47.4	42.4	43.4	49.0	50.5	57.1	57.8	58.8	66.0	65.5	64.2
Full Simulation Period[a]	65.1	57.2	49.9	49.5	54.4	59.5	62.9	65.5	72.5	76.8	76.4	72.9
Water Year Types[b]												
Above Normal and Wet (25%)	64.6	58.0	50.9	50.4	52.9	56.3	60.5	61.3	66.2	72.0	71.4	70.1
Below Normal (11%)	64.6	57.9	48.5	49.1	53.4	59.4	62.7	67.7	72.4	76.2	77.1	73.8
Dry and Critical (64%)	65.6	56.5	56.5	49.3	55.0	60.6	63.7	66.6	74.6	78.5	77.9	73.7

2.5 mgd (ADWF) minus No Discharge

Statistic	Daily Average Temperature (Degrees F)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Probability of Exceedance												
0.1%	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1
1%	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1
5%	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1
10%	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
25%	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.1
50%	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
75%	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
99.9%	0.0	0.2	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Full Simulation Period[a]	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Water Year Types[b]												
Above Normal and Wet (25%)	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Below Normal (11%)	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dry and Critical (64%)	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1

a Based on the 2008-2016 simulation period.
b As defined by the San Joaquin Valley 60-20-20 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999).
c Positive differences are highted in red color which indicate increase in Temperature.

Table 7. Fully mixed river temperatures 1.9 miles upstream of the outfall for the 2.5 mgd ADWF condition, by month, and differences relative to existing conditions, where no CTF discharge is occurring.

1.9 miles upstream of Outfall

No Discharge

Statistic	Daily Average Temperature (Degrees F)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Probability of Exceedance												
0.1%	74.2	63.9	59.0	55.4	61.4	68.7	72.7	75.2	82.0	84.7	81.4	78.1
1%	73.3	63.6	58.0	54.5	61.2	67.8	72.5	74.5	81.4	83.7	81.0	77.9
5%	72.2	63.0	56.7	53.5	60.1	65.7	69.1	72.6	79.8	81.9	80.1	77.4
10%	71.2	62.0	55.7	52.9	59.1	64.3	67.8	70.6	78.4	80.7	79.4	76.7
25%	67.8	59.9	53.3	51.2	56.1	62.6	65.2	67.2	75.6	79.0	78.3	74.7
50%	63.8	56.8	49.2	49.7	53.9	59.1	62.0	65.1	72.9	77.3	76.8	73.0
75%	62.3	54.7	46.9	48.1	52.1	56.9	60.1	62.5	69.0	74.9	75.4	71.1
99.9%	54.5	46.4	42.4	43.4	49.1	50.5	57.0	57.6	58.8	65.8	65.3	63.9
Full Simulation Period[a]	64.9	57.1	50.0	49.6	54.4	59.6	62.8	65.3	72.3	76.6	76.1	72.6
Water Year Types[b]												
Above Normal and Wet (25%)	64.4	58.0	51.0	50.5	52.9	56.3	60.4	61.2	66.0	71.8	71.2	69.9
Below Normal (11%)	64.4	57.8	48.6	49.3	53.5	59.4	62.6	67.4	72.1	76.1	76.7	73.3
Dry and Critical (64%)	65.3	56.3	56.3	49.4	55.0	60.7	63.6	66.3	74.4	78.2	77.6	73.4

2.5 mgd (ADWF)

Statistic	Daily Average Temperature (Degrees F)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Probability of Exceedance												
0.1%	74.2	63.9	59.0	55.4	61.4	68.7	72.7	75.2	82.0	84.7	81.4	78.1
1%	73.3	63.6	58.0	54.5	61.2	67.8	72.5	74.5	81.3	83.7	81.0	77.9
5%	72.2	63.0	56.7	53.5	60.1	65.7	69.1	72.6	79.8	81.9	80.1	77.4
10%	71.2	62.0	55.7	52.9	59.1	64.3	67.8	70.6	78.4	80.7	79.4	76.7
25%	67.8	59.9	53.3	51.2	56.1	62.6	65.2	67.2	75.7	79.0	78.3	74.7
50%	63.8	56.8	49.2	49.7	53.9	59.1	62.0	65.1	72.9	77.3	76.8	73.0
75%	62.3	54.7	46.9	48.1	52.1	56.9	60.1	62.5	69.0	74.9	75.4	71.1
99.9%	54.5	46.4	42.4	43.4	49.1	50.5	57.0	57.6	58.8	65.8	65.3	63.9
Full Simulation Period[a]	64.9	57.1	50.0	49.6	54.4	59.6	62.8	65.3	72.3	76.6	76.1	72.6
Water Year Types[b]												
Above Normal and Wet (25%)	64.4	58.0	51.0	50.5	52.9	56.3	60.4	61.2	66.0	71.8	71.2	69.9
Below Normal (11%)	64.4	57.8	48.6	49.3	53.5	59.4	62.6	67.4	72.1	76.1	76.7	73.3
Dry and Critical (64%)	65.3	56.3	56.3	49.4	55.0	60.7	63.6	66.3	74.4	78.2	77.6	73.4

2.5 mgd (ADWF) minus No Discharge

Statistic	Daily Average Temperature (Degrees F)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Probability of Exceedance												
0.1%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
75%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
99.9%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Full Simulation Period[a]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Water Year Types[b]												
Above Normal and Wet (25%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Below Normal (11%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dry and Critical (64%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

a Based on the 2008-2016 simulation period.

b As defined by the San Joaquin Valley 60-20-20 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999).

c Positive differences are highted in red color which indicate increase in Temperature.

Although the river at the outfall location is tidally influenced, full reverse flows do not occur in all years and have shorter upstream excursions when they do occur compared to river locations farther downstream where tidal influences are greater. Due to this phenomenon, simulated fully mixed river temperature output for the DSM2 node located 1.9 miles upstream of the outfall showed no long-term average incremental increases in fully mixed river temperatures (Table 7).

Exceedance plots of fully mixed river temperatures near the outfall for the 2.5 mgd ADWF scenario compared to the no discharge scenario show that the probability with which any given temperature would be exceeded would not differ for the 2.5 mgd condition, relative to the no discharge condition, for any month of the year (**Appendix A**, Figures A-1 through A-12). When fully mixed river temperatures near the outfall are compared between 2.5 mgd ADWF and No discharge conditions on a daily average basis, maximum daily average river temperature increases were modeled to be ≤0.3°F (i.e., immeasurable) for all months of the year (**Appendix B**, Figures B-1 through B-12). Based on the DSM2 modeling of temperature, no measurable build-up of temperature occurs over time in the action area during any month modeled.

In short, the 2.5 mgd ADWF condition would result in very minor effects on fully mixed river temperatures on any given day throughout the year. Moreover, the 2.5 mgd ADWF condition would not increase the maximum fully mixed river temperature that would occur in any month by more than 0.1°F, and would not change the frequency with which any given temperature would occur during any month of the year. This is largely because at 2.5 mgd ADWF, the CTF discharge averages 0.2-0.8 percent of river flow, which corresponds to an average dilution ratio of 455:1 to 125:1, depending upon the month.

3.1.2 6.0 mgd ADWF Discharge

A 6.0 mgd ADWF discharge rate also would cause small (i.e., ≤0.5°F) long-term average river temperature increases (for the entire simulation period) at the outfall location November through February, and ≤0.2°F (i.e., immeasurable) long-term average increases March through October (**Table 8**). These incremental increases that would occur at the outfall location would attenuate with increasing distance downstream of the outfall (**Table 9**). Simulated fully mixed river temperature output for the nearest DSM2 node upstream of the outfall location (i.e., 1.9 miles upstream of the outfall) showed no incremental increase in fully mixed river temperatures (**Table 10**).

Exceedance plots of fully mixed river temperatures near the outfall for the 6.0 mgd ADWF discharge condition show that the probability with which any given temperature would be exceeded would not differ discernably, relative to the no discharge condition, for any month of the year (Appendix A, Figures A-1 through A-12). When fully mixed river temperatures near the outfall are compared between the 6.0 mgd ADWF discharge condition and the no discharge condition on a daily average basis, maximum daily average river temperature increases were modeled to be ≤0.6°F for the months September through March, and ≤0.3°F (i.e., immeasurable)

for the months April through August (Appendix B, Figures B-13 through B-24). No measurable build-up of temperature occurs over time in the action area during any month modeled. At 6.0

Table 8. Fully mixed river temperatures at the outfall location for the 6.0 mgd ADWF condition, by month, and differences relative to existing conditions, where no CTF discharge is occurring.

Outfall Location												
No Discharge												
	Daily Average Temperature (Degrees F)											
Statistic	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
Probability of Exceedance												
0.1%	74.4	63.9	58.9	55.1	61.5	68.3	72.9	75.3	81.6	85.0	81.7	78.4
1%	73.4	63.6	57.9	54.4	61.1	67.6	72.1	74.5	80.9	83.7	81.2	78.0
5%	72.5	62.9	56.6	53.4	60.1	65.5	69.3	72.8	79.8	81.8	80.4	77.7
10%	71.3	62.1	55.7	52.6	59.0	64.3	67.8	70.7	78.6	80.8	79.7	76.8
25%	67.9	60.0	53.3	51.2	56.1	62.4	65.1	67.4	75.9	79.2	78.6	74.8
50%	64.0	56.8	49.1	49.7	53.8	59.1	62.0	65.2	73.0	77.6	77.2	73.0
75%	62.4	54.7	46.9	48.1	52.1	56.9	60.0	62.5	69.0	75.3	75.7	71.2
99.9%	54.5	46.7	42.3	43.2	49.0	50.5	57.0	57.6	58.8	65.9	65.4	64.0
Full Simulation Period[a]	65.0	57.1	50.0	49.6	54.3	59.5	62.8	65.4	72.4	76.8	76.3	72.8
Water Year Types[b]												
Above Normal and Wet (25%)	64.5	58.0	50.9	50.5	52.9	56.3	60.4	61.2	66.1	71.8	71.2	69.9
Below Normal (11%)	64.5	57.9	48.5	49.2	53.4	59.4	62.6	67.5	72.2	76.3	76.9	73.6
Dry and Critical (64%)	65.4	56.4	56.4	49.3	55.0	60.6	63.6	66.4	74.5	78.5	77.8	73.6
6.0 mgd (ADWF)												
	Daily Average Temperature (Degrees F)											
Statistic	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
Probability of Exceedance												
0.1%	74.4	64.1	59.1	55.4	61.7	68.3	72.9	75.4	81.6	84.9	81.7	78.6
1%	73.5	63.7	58.1	54.5	61.3	67.7	72.2	74.6	80.9	83.7	81.2	78.1
5%	72.6	63.1	56.7	53.6	60.3	65.6	69.4	72.8	79.7	81.8	80.4	77.8
10%	71.4	62.2	55.8	52.9	59.2	64.4	67.9	70.8	78.7	80.8	79.8	76.9
25%	67.9	60.2	53.5	51.3	56.3	62.6	65.2	67.5	76.0	79.3	78.7	75.0
50%	64.2	57.0	49.4	49.9	54.0	59.2	62.1	65.3	73.1	77.6	77.2	73.1
75%	62.5	54.9	47.2	48.3	52.2	57.0	60.2	62.6	69.1	75.4	75.8	71.4
99.9%	54.6	47.2	42.8	43.7	49.3	50.5	57.1	57.7	58.8	65.9	65.4	64.1
Full Simulation Period[a]	65.1	57.3	50.2	49.8	54.5	59.7	62.9	65.5	72.4	76.8	76.3	72.9
Water Year Types[b]												
Above Normal and Wet (25%)	64.6	58.2	51.2	50.6	53.0	56.4	60.5	61.2	66.1	71.9	71.3	70.0
Below Normal (11%)	64.7	58.2	48.9	49.5	53.7	59.5	62.8	67.6	72.2	76.3	77.0	73.7
Dry and Critical (64%)	65.5	56.6	56.6	49.6	55.2	60.8	63.7	66.5	74.6	78.5	77.9	73.7
6.0 mgd (ADWF) minus No Discharge												
	Daily Average Temperature (Degrees F)											
Statistic	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
Probability of Exceedance												
0.1%	**0.1**	**0.2**	**0.2**	**0.3**	**0.2**	**0.1**	0.0	0.0	-0.1	-0.1	0.0	**0.2**
1%	**0.1**	**0.1**	**0.2**	**0.1**	**0.2**	**0.1**	0.0	0.0	0.0	-0.1	0.0	**0.1**
5%	**0.1**	**0.2**	**0.2**	**0.3**	**0.3**	**0.1**	**0.1**	**0.1**	0.0	0.0	0.0	**0.1**
10%	**0.1**	**0.1**	**0.1**	**0.3**	**0.2**	**0.1**	**0.1**	0.0	**0.1**	0.0	**0.1**	**0.1**
25%	**0.1**	**0.2**	**0.2**	**0.2**	**0.1**	**0.2**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.2**
50%	**0.2**	**0.3**	**0.3**	**0.3**	**0.2**	**0.1**	0.0	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**
75%	**0.1**	**0.2**	**0.3**	**0.3**	**0.2**	**0.1**	**0.1**	0.0	**0.1**	**0.1**	**0.1**	**0.2**
99.9%	**0.1**	**0.5**	**0.5**	**0.5**	**0.3**	0.0	**0.1**	0.0	0.0	0.0	0.0	**0.1**
Full Simulation Period[a]	**0.1**	**0.2**	**0.3**	**0.2**	**0.2**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**
Water Year Types[b]												
Above Normal and Wet (25%)	**0.1**	**0.2**	**0.2**	**0.1**	**0.1**	0.0	0.0	0.0	0.0	0.0	**0.1**	0.0
Below Normal (11%)	**0.2**	**0.3**	**0.3**	**0.3**	**0.2**	**0.1**	**0.1**	0.0	**0.1**	**0.1**	**0.1**	**0.1**
Dry and Critical (64%)	**0.1**	**0.2**	**0.2**	**0.3**	**0.2**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.2**

a Based on the 2008-2016 simulation period.
b As defined by the San Joaquin Valley 60-20-20 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999).
c Positive differences are highted in red color which indicate increase in Temperature.

Table 9. Fully mixed river temperatures 1.7 miles downstream of the outfall for the 6.0 mgd ADWF condition, by month, and differences relative to existing conditions, where no CTF discharge is occurring.

1.7 miles downstream of Outfall												
No Discharge												
	Daily Average Temperature (Degrees F)											
Statistic	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
Probability of Exceedance												
0.1%	74.2	63.9	58.8	55.0	61.5	67.5	72.9	74.9	80.8	85.1	81.4	78.2
1%	73.6	63.6	58.0	54.3	61.2	67.2	71.7	74.5	80.3	83.6	81.1	77.9
5%	72.6	63.0	56.5	53.2	59.9	65.6	69.1	72.8	79.4	81.4	80.3	77.5
10%	71.5	62.1	55.8	52.6	59.2	64.3	67.8	70.9	78.5	80.4	79.8	77.0
25%	68.0	60.0	53.2	51.0	56.0	62.4	65.1	67.6	75.9	79.2	78.6	74.9
50%	64.0	56.7	49.0	49.6	53.8	59.0	62.1	65.4	73.1	77.5	77.3	73.1
75%	62.5	54.6	46.8	48.0	52.0	56.9	60.2	62.6	69.3	75.4	75.8	71.5
99.9%	54.3	47.2	42.2	43.2	48.9	50.4	57.1	57.7	58.8	66.0	65.5	64.1
Full Simulation Period[a]	65.1	57.1	49.9	49.4	54.3	59.5	62.8	65.5	72.4	76.8	76.3	72.9
Water Year Types[b]												
Above Normal and Wet (25%)	64.6	58.0	50.9	50.4	52.9	56.3	60.5	61.3	66.2	72.0	71.3	70.0
Below Normal (11%)	64.5	57.9	48.4	49.0	53.3	59.3	62.7	67.7	72.3	76.1	77.0	73.7
Dry and Critical (64%)	65.5	56.4	56.4	49.2	54.9	60.6	63.6	66.5	74.5	78.5	77.9	73.7
6.0 mgd (ADWF)												
	Daily Average Temperature (Degrees F)											
Statistic	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
Probability of Exceedance												
0.1%	74.2	64.0	58.9	55.1	61.6	67.6	72.9	75.0	80.9	85.0	81.5	78.4
1%	73.6	63.6	58.2	54.4	61.3	67.3	71.8	74.6	80.3	83.6	81.2	78.0
5%	72.7	63.1	56.6	53.3	60.1	65.6	69.2	72.8	79.4	81.4	80.3	77.6
10%	71.7	62.2	55.9	52.8	59.3	64.3	67.8	70.9	78.5	80.4	79.8	77.1
25%	68.2	60.1	53.3	51.2	56.2	62.5	65.1	67.7	76.0	79.3	78.6	75.0
50%	64.1	56.9	49.3	49.7	53.9	59.1	62.1	65.5	73.1	77.5	77.3	73.2
75%	62.6	54.8	47.0	48.1	52.1	57.0	60.2	62.6	69.3	75.4	75.9	71.6
99.9%	54.4	47.6	42.5	43.6	49.1	50.5	57.1	57.8	58.9	66.0	65.5	64.2
Full Simulation Period[a]	65.2	57.2	50.0	49.6	54.4	59.6	62.9	65.5	72.5	76.8	76.4	73.0
Water Year Types[b]												
Above Normal and Wet (25%)	64.7	58.1	51.0	50.5	52.9	56.4	60.5	61.3	66.2	72.0	71.4	70.1
Below Normal (11%)	64.7	58.0	48.6	49.2	53.4	59.4	62.8	67.7	72.4	76.2	77.1	73.8
Dry and Critical (64%)	65.6	56.6	56.6	49.4	55.1	60.7	63.7	66.6	74.6	78.5	77.9	73.8
6.0 mgd (ADWF) minus No Discharge												
	Daily Average Temperature (Degrees F)											
Statistic	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
Probability of Exceedance												
0.1%	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	0.0	**0.1**	0.0	-0.1	0.0	**0.1**
1%	**0.1**	**0.1**	**0.2**	**0.1**	**0.1**	**0.1**	0.0	0.0	0.0	0.0	0.0	**0.1**
5%	**0.1**	**0.1**	**0.1**	**0.1**	**0.2**	0.0	0.0	**0.1**	0.0	0.0	0.0	**0.1**
10%	**0.2**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	0.0	0.0	0.0	0.0	0.0	**0.1**
25%	**0.2**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	0.0	0.0	**0.1**
50%	**0.1**	**0.2**	**0.2**	**0.2**	**0.1**	**0.1**	0.0	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**
75%	**0.1**	**0.2**	**0.3**	**0.1**	**0.1**	**0.1**	0.0	0.0	0.0	**0.1**	**0.1**	**0.1**
99.9%	**0.1**	**0.4**	**0.3**	**0.4**	**0.2**	0.0	**0.1**	0.0	0.0	0.0	0.0	**0.1**
Full Simulation Period[a]	**0.1**	**0.2**	**0.2**	**0.2**	**0.1**	**0.1**	**0.1**	**0.1**	0.0	0.0	**0.1**	**0.1**
Water Year Types[b]												
Above Normal and Wet (25%)	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Below Normal (11%)	**0.1**	**0.2**	**0.2**	**0.2**	**0.1**	**0.1**	**0.1**	0.0	0.0	**0.1**	**0.1**	**0.1**
Dry and Critical (64%)	**0.1**	**0.2**	**0.2**	**0.2**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	0.0	**0.1**	**0.1**

a Based on the 2008-2016 simulation period.

b As defined by the San Joaquin Valley 60-20-20 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999).

c Positive differences are highted in red color which indicate increase in Temperature.

Table 10. Fully mixed river temperatures 1.9 miles upstream of the outfall for the 6.0 mgd ADWF condition, by month, and differences relative to existing conditions, where no CTF discharge is occurring.

1.9 miles upstream of Outfall												
No Discharge												
	Daily Average Temperature (Degrees F)											
Statistic	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Probability of Exceedance												
0.1%	74.2	63.9	59.0	55.4	61.4	68.7	72.7	75.2	82.0	84.7	81.4	78.1
1%	73.3	63.6	58.0	54.5	61.2	67.8	72.5	74.5	81.4	83.7	81.0	77.9
5%	72.2	63.0	56.7	53.5	60.1	65.7	69.1	72.6	79.8	81.9	80.1	77.4
10%	71.2	62.0	55.7	52.9	59.1	64.3	67.8	70.6	78.4	80.7	79.4	76.7
25%	67.8	59.9	53.3	51.2	56.1	62.6	65.2	67.2	75.6	79.0	78.3	74.7
50%	63.8	56.8	49.2	49.7	53.9	59.1	62.0	65.1	72.9	77.3	76.8	73.0
75%	62.3	54.7	46.9	48.1	52.1	56.9	60.1	62.5	69.0	74.9	75.4	71.1
99.9%	54.5	46.4	42.4	43.4	49.1	50.5	57.0	57.6	58.8	65.8	65.3	63.9
Full Simulation Period[a]	64.9	57.1	50.0	49.6	54.4	59.6	62.8	65.3	72.3	76.6	76.1	72.6
Water Year Types[b]												
Above Normal and Wet (25%)	64.4	58.0	51.0	50.5	52.9	56.3	60.4	61.2	66.0	71.8	71.2	69.9
Below Normal (11%)	64.4	57.8	48.6	49.3	53.5	59.4	62.6	67.4	72.1	76.1	76.7	73.3
Dry and Critical (64%)	65.3	56.3	56.3	49.4	55.0	60.7	63.6	66.3	74.4	78.2	77.6	73.4
6.0 mgd (ADWF)												
	Daily Average Temperature (Degrees F)											
Statistic	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Probability of Exceedance												
0.1%	74.2	63.9	59.0	55.4	61.4	68.7	72.7	75.2	82.0	84.7	81.4	78.1
1%	73.3	63.6	58.0	54.5	61.2	67.8	72.5	74.5	81.3	83.7	81.0	77.9
5%	72.2	63.0	56.7	53.5	60.1	65.7	69.1	72.6	79.8	81.9	80.1	77.4
10%	71.2	62.0	55.7	52.9	59.1	64.3	67.8	70.6	78.4	80.7	79.4	76.7
25%	67.8	59.9	53.3	51.2	56.1	62.6	65.2	67.2	75.7	79.0	78.3	74.7
50%	63.8	56.8	49.2	49.7	53.9	59.1	62.0	65.1	72.9	77.3	76.8	73.0
75%	62.3	54.7	46.9	48.1	52.1	56.9	60.1	62.5	69.0	74.9	75.5	71.1
99.9%	54.5	46.4	42.4	43.4	49.1	50.5	57.0	57.6	58.8	65.8	65.3	63.9
Full Simulation Period[a]	64.9	57.1	50.0	49.6	54.4	59.6	62.8	65.3	72.3	76.6	76.1	72.6
Water Year Types[b]												
Above Normal and Wet (25%)	64.4	58.0	51.0	50.5	52.9	56.3	60.4	61.2	66.0	71.8	71.2	69.9
Below Normal (11%)	64.4	57.8	48.6	49.3	53.5	59.4	62.6	67.4	72.1	76.1	76.7	73.3
Dry and Critical (64%)	65.3	56.3	56.3	49.4	55.0	60.7	63.6	66.3	74.4	78.3	77.6	73.4
6.0 mgd (ADWF) minus No Discharge												
	Daily Average Temperature (Degrees F)											
Statistic	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Probability of Exceedance												
0.1%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
75%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
99.9%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Full Simulation Period[a]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Water Year Types[b]												
Above Normal and Wet (25%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Below Normal (11%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dry and Critical (64%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

a Based on the 2008-2016 simulation period.
b As defined by the San Joaquin Valley 60-20-20 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999).
c Positive differences are highted in red color which indicate increase in Temperature.

mgd ADWF, the CTF discharge averages 0.5-1.9 percent of river flow, which corresponds to an average dilution ratio of 200:1-50:1, depending upon the month.

3.2 FULLY MIXED RIVER TEMPERATURE EFFECTS ON SPECIAL-STATUS FISHES AND CRITICAL HABITAT

This section examines the potential for immigration of adult ESA-listed fish, and fall-run Chinook Salmon, to be blocked or delayed in response to CTF discharge-driven increases in the San Joaquin River temperature. It also examines whether fully mixed river temperatures within the action area will result in lethality or chronic, adverse sublethal effects to thermally sensitive adult fish immigrating through or holding within the action area, or juvenile life stages emigrating through and rearing in the action area. Finally, fully mixed river temperatures are evaluated to determine if they reduce the value of any of the physical and biological features (PBFs) associated with designated critical habitat within the action area for federal ESA-listed Green Sturgeon, steelhead, and Delta Smelt. Critical habitat is not designated for spring-run Chinook Salmon or winter-run Chinook Salmon in the San Joaquin River. Nevertheless, the assessment performed for thermal effects to designated critical habitat for Green Sturgeon, steelhead, and Delta Smelt functionally represent effects to PBFs of the river that could also affect spring-run Chinook Salmon and winter-run Chinook Salmon, and other non-listed species, using the river near the outfall.

Because the 6.0 mgd ADWF discharge condition was shown to have greater thermal effects on the river compared to the 2.5 mgd ADWF discharge condition (see Sections 3.1.1 and 0), the 6.0 mgd ADWF condition will be assessed first for its fully mixed river temperature effects on ESA-listed fishes and critical habitat, as well as other aquatic biological resources. If no impacts to aquatic biological resources are found to occur for the 6.0 mgd ADWF discharge rate, then it can be concluded that no thermal impacts to aquatic biological resources of the San Joaquin River would occur at a CTF discharge rate of 2.5 mgd ADWF.

Similarly, if it is determined that CTF discharges at 2.5 mgd and 6.0 mgd ADWF would result in no significant adverse thermal effects to the most thermally sensitive special-status fish species assessed below, then it can be further concluded that fully mixed river temperatures in the action area with CTF discharges would not result in any significant adverse thermal effects to other fish species using the action area that are less thermally sensitive. With such an analysis outcome, no assessment of other less thermally sensitive species would be warranted.

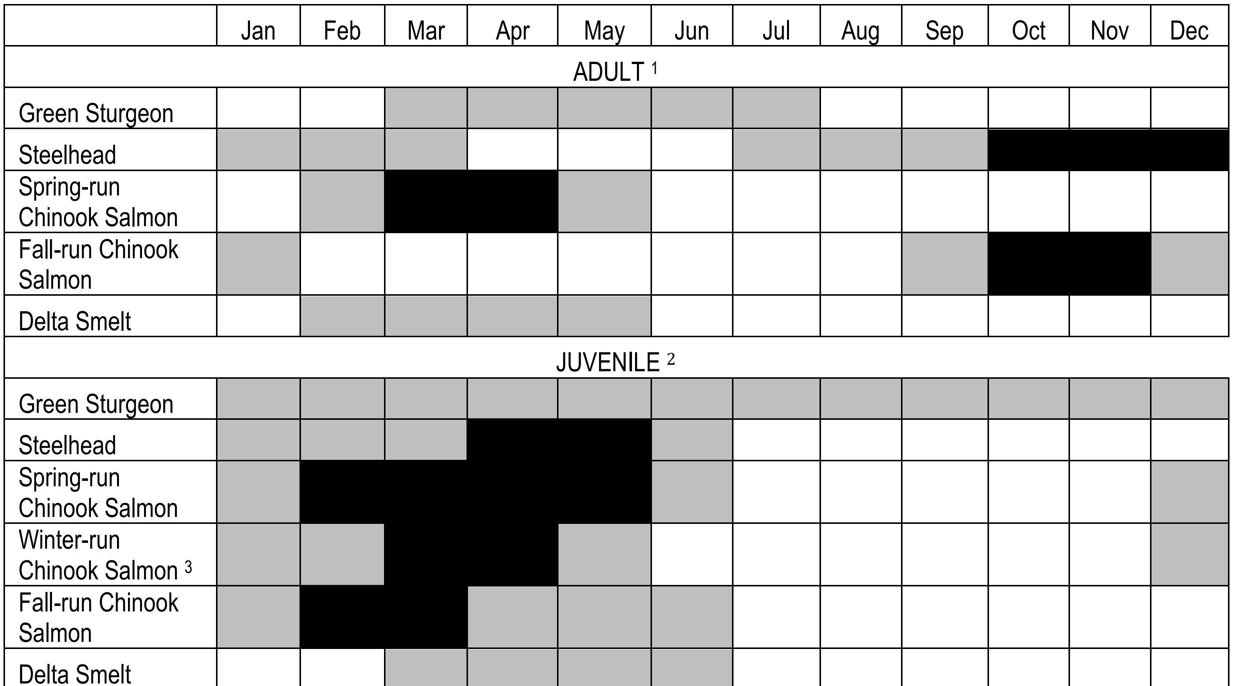
Effects of CTF discharges on fully mixed river temperatures and the effects, in turn, such river temperature increases would have on phytoplankton, zooplankton, and benthic macroinvertebrates populations (i.e., prey organisms) are also assessed. These assessments are made as part of assessing thermal effects on designated critical habitat for Green Sturgeon, steelhead, and Delta Smelt. Because other fish species using the action area rely upon these same prey organisms, findings regarding the thermal effects to phytoplankton, zooplankton, and benthic macroinvertebrates associated with designated critical habitat for these ESA-listed fishes also apply to all other fishes relying upon these prey organisms.

3.2.1 Green Sturgeon

3.2.1.1 Adult Immigration and Holding

Adult Green Sturgeon are believed to have the potential to occur in the action area from March through early July (**Figure 4**). Relatively little information is available in the scientific literature pertaining to the thermal tolerances of different life stages of Green Sturgeon. In fact, no studies were found that addressed river temperatures that will block or delay upstream sturgeon immigration. However, two studies were found where adult White Sturgeon were implanted with acoustic transmitters and tracked through their over-summering period in the San Joaquin River. River temperatures were obtained for the same period which showed that these adult White Sturgeon used river areas that reached temperatures of 80.6–86°F, and migrated elsewhere in the fall (**Table 11**). As a closely related species, it is assumed for the purposes of this assessment that adult Green Sturgeon also can tolerate extended exposure to temperatures in the low to mid 80°F range, when acclimated to warmer temperatures during summer months.

During the period when adult Green Sturgeon have the potential to occur in the action area, fully mixed river temperatures for the 6.0 mgd ADWF condition near the outfall would range from lows of about 50°F in March to highs of about 85°F in July (Table 8). The maximum fully mixed river temperatures that will occur near the outfall during the months March through May will range from about 68°F in March to about 75°F in May. As stated in Section 0, these temperatures generally decline with increasing distance upstream and downstream from the discharge point. Because temperatures at all other times during the 2008–2016 simulation (including drought years) will be lower than the maximum modeled temperatures of 68–75°F for the period March through May, and river temperatures both upstream and downstream of the outfall area will be the same or colder at all times, CTF discharges at 6.0 mgd ADWF will not block or delay Green Sturgeon movement through the action area during the March through May period.



Sources: Moyle 2002, Hanni et al. 2006, NMFS 2014, NMFS 2010, CDFW 2019, Jeff Stuart (NMFS) pers. comm. June 11, 2020, USFWS 2019, Damon et al. 2016, Kimmerer 2008, Nobriga et al. 2008.

[1] No records of adult winter-run Chinook Salmon or adult late fall-run Chinook Salmon within the San Joaquin River basin. As such, adult winter-run and late fall-run Chinook Salmon would not be present at any time of the year in the lower reach of the San Joaquin River.

[2] Juvenile represents post emergent fry, fry, juveniles and smolts.

[3] Winter-run Chinook Salmon use the action area for non-natal rearing only.

The red box indicates the period of time that in-water construction would occur within the San Joaquin River.

█ = Peak Abundance; ░ = Potentially present.

Figure 4. Temporal occurrences of special status fish species in the lower reach of the San Joaquin River.

Table 11. Green Sturgeon thermal tolerance studies.

Species	Locality	Author	Type of Study	Acclimation Temperature (ºF)	Endpoint Temperature (ºF)	Time to endpoint	Endpoint Reported	Lifestage
White Sturgeon	San Joaquin River	Heironimus and Jackson 2017	Field Occurrence	N/A	80.6	N/A	Over-summered	Adult
White Sturgeon	San Joaquin River	Faukner and Jackson 2014	Field Occurrence	68 – 77	86	N/A	Over-summered	Adult
Green Sturgeon	Broodstock from wild Klamath River (laboratory)	Mayfield and Cech 2004	Preference	51.8 66.2 75.2	60.6 ± .3.0 60.3 ± 5.2 68.7 ± 5.6	N/A	Tank location and swimming performance	Age-0
Green Sturgeon	Progeny from fish spawned in laboratory	Allen et al. 2006	Growth	--	66.2 66.2 – 75.2 75.2	N/A	Growth fastest at 75.2 [1]	Age-0
Green Sturgeon	Progeny from fish spawned in laboratory	Sardella et al. 2008	CTM	64.4	93.6 [2] 92.7 [3]	~ 50 min ~ 50 min	Cessation of ventilation	Juveniles
Green Sturgeon	Broodstock from wild Klamath River (laboratory)	Verhille et al. 2015	CTM	65.3 – 66.2	94.1 ± 0.25	~ 50 min	Cessation of ventilation	Juveniles
Green Sturgeon	Broodstock from wild Klamath River (laboratory)	Lee et al. 2016	CTM	65.5 ± 0.9	~ 90.5	~ 45 min	Cessation of ventilation	Juveniles
Green Sturgeon	Broodstock from wild Klamath River (laboratory)	Rodgers et al. 2018	CTM	59.0 [4] 55.4 – 62.6 [5] 51.8 – 69.8 [6]	87.0 ± 0.45 86.7 ± 0.74 89.4 ± 0.45	~50 min ~55 min ~ 65 min	LOE for 10 s	Juveniles

CTM = critical thermal maximum
LOE = loss of equilibrium
N/A = not applicable

[1] With unlimited food over a period of three months
[2] Acclimated to estuarine salinities (10 grams per liter)
[3] Acclimated to either fresh or salt water salinities (0.5 and 24 grams per liter [g/L], respectively)
[4] Stable thermoperiod
[5] Narrowly variable thermoperiod
[6] Widely variable thermoperiod

During June and July, river temperatures naturally reach their seasonal highs of 82–85°F for existing conditions (i.e., no CTF discharge), as well as for the 6.0 mgd ADWF discharge condition (Table 8). This indicates that when the river reaches its seasonal high temperatures in the low-80s°F in June and July, the CTF discharge increases river temperatures little (i.e., ≤ 0.2°F), if at all. This is because peak river background temperatures (Table 8) and the maximum effluent temperatures (**Table 12**) are nearly the same. Because adult White Sturgeon have been documented to over-summer in water temperatures reaching 86°F and are believed to have similar upper thermal tolerances to that of Green Sturgeon, and because the 6.0 mgd ADWF operations would result in little, if any, incremental increase in river temperatures when the river background river temperatures reach the low 80s°F, operation of the CTF at 6.0 mgd ADWF would not be expected to block or delay Green Sturgeon movement through the action area during June or July.

Adult Green Sturgeon may experience chronic exposure to river temperatures if they hold within the action area rather than simply moving through the area. Action area temperatures will remain suitable for adult Green Sturgeon holding from March through May, and likely into subsequent months in most years. Nevertheless, adult fish will only be expected to hold in the action area for extended periods of time if temperatures there are suitable. Adults will not hold in the action area if temperatures reached unsuitable levels during June and July, for example, but rather would be expected to move through the action area in search of more suitable holding areas at or near upstream spawning sites in the Sacramento River when on spawning runs or further into the western Delta upon returning from spawning runs. Consequently, action area temperatures will not cause lethality or adverse chronic, sublethal effects to adult green Sturgeon holding in the action area.

Table 12. Maximum, median, and minimum CTF daily effluent temperatures, by month. Data are for the April 14, 2017 through May 18, 2020 period of record.

Month	Minimum	Median	Maximum
January	68.5	70.6	73.2
February	65.9	69.9	73.4
March	68.6	71.4	74.6
April	71.4	73.3	76.7
May	72.6	75.0	78.5
June	74.5	77.8	81.8
July	77.2	80.3	81.8
August	79.0	80.7	83.4
September	77.9	80.1	84.3
October	72.9	78.1	79.9
November	72.2	75.0	77.4
December	68.1	72.0	74.6

Based on the above findings, the CTF effects on fully mixed river temperatures in the action area during the March through July period, when discharging 6.0 mgd ADWF, would not be expected to block or delay immigration or cause lethality or any chronic, adverse sublethal effects to adult Green Sturgeon holding or moving through the action area.

3.2.1.2 Juvenile Emigration/Rearing

Juvenile Green Sturgeon may be found in or near the action area year-round. The extent to which juvenile Green Sturgeon use the action area for rearing is unknown, but primary rearing areas are believed to be in the western Delta and Suisun Marsh where the thermal effects of the CTF would be attenuated to zero. Nevertheless, some rearing could occur in the action area throughout the year.

Allen et al. (2006) showed age-0 Green Sturgeon growth rates to be greater at water temperatures of 75.2°F compared to lower exposure temperatures. Sardella et al. (2008), Verhille et al. (2015), and Rodgers et al. (2018) showed that when acclimated to water temperatures in the 50s°F and 60s°F, the CTM temperature determined for juvenile Green Sturgeon were 86.7–94.1°F (Table 11). These CTMs are notably higher than those reported for steelhead or Chinook Salmon (see **Table 13** and **Table 14,** respectively). This indicates that Green Sturgeon are a more thermally tolerant fish species compared to steelhead and Chinook Salmon.

As presented in Section 3.1, seasonal maximum action area water temperatures of about 82–85°F occur in the June through August period of the year for both CTF discharge and no discharge conditions (Table 8). As such, the 6.0 mgd ADWF discharge has little, if any, incremental increase in river temperature when background temperatures reach the low 80s°F, and in fact can occasionally reduce river temperatures during the June through August period (Table 8; Appendix B, Figures B-18 through B-20). This is because maximum seasonal effluent temperatures during the summer months also are in the low 80°F range (Table 12). With the thermal studies literature identifying high growth rates for juvenile Green Sturgeon at 75.2°F, and CTMs in the 86.7–94.1°F range, it is expected that juvenile Green Sturgeon will experience no mortality or any chronic adverse sublethal effects when exposed to maximum action area temperatures in the low 80s°F during the summer months. For the infrequent times that action area temperatures would reach the mid 80°F range during summer months, which could approach unsuitable temperatures levels for juvenile Green Sturgeon rearing, such temperatures would occur under existing conditions (i.e., no discharge conditions) and a 6.0 mgd ADWF CTF discharge would not make them measurably worse. Although CTF operations would result in larger incremental increases in action area temperatures, relative to existing conditions, during other months of the year, resulting river temperatures remain in the suitable range for juvenile Green Sturgeon rearing during these months.

Based on the above findings, 6.0 mgd ADWF CTF discharge effects on fully mixed river temperatures in the action area throughout the year will not cause lethality or chronic adverse sublethal effects (e.g., reduced growth rates) to juvenile Green Sturgeon rearing in the action area. Moreover, such CTF discharges would not increase the frequency with which action area water temperature during summer months may approach upper thermal limits for juvenile rearing. Because no adverse effects to adult or juvenile Green Sturgeon would occur for a CTF discharge rate of 6.0 mgd ADWF, none would occur at a lower discharge rate of 2.5 mgd ADWF. Also, because no adverse effects are expected to individual fish, CTF thermal effects on fully mixed river temperatures in the action area would not adversely affect the Central Valley Green Sturgeon population.

Table 13. Steelhead thermal tolerance studies.

Species	Locality	Author	Type of Study	Acclimation Temperature (ºF)	Endpoint Temperature (ºF)	Time to Endpoint	Endpoint Reported	Lifestage
Steelhead	Various	Washington State Department of Ecology 2002	Preference		69.8 – 75.2		Avoidance behavior and migration blockage	Adult
Steelhead	American River, CA	Myrick and Cech 2005	CTM	51.8 59 66.2	81.5 83.1 85.3	55 min 45 min 35 min	LOE	Age-0
Steelhead	Feather River, CA	Myrick and Cech 2000a	CTM	60.8	84.9	45 min	LOE	Juveniles – Hatchery Fish
				60.8	87.8	50 min	LOE	Juveniles – Wild Fish
Steelhead [1]	Tuolumne River	Verhille et al. 2016	Thermal Tolerance	54.5	76.3	~ 6 h	maintained 95% of their peak aerobic scope	Juveniles
Rainbow Trout	Eagle Lake, CA	Myrick and Cech 2000b	CTM	50 57.2 66.2 71.6 77	81.7 83.5 86.2 87.8 89.6	59 min 49 min 37 min 29 min 22 min	LOE	Age-0
Rainbow Trout	Mt. Shasta, CA	Myrick and Cech 2000b	CTM	50 57.2 66.2 71.6 77	81.9 83.1 85.3 87.3 88.7	59 min 48 min 35 min 29 min 22 min	LOE	Age-0
Rainbow Trout	WA	Coutant and Dean 1972 as reported in Coutant 1972a	UILT	59	86.9	15.5 min	LT50	Juveniles
Rainbow Trout	WA	Coutant 1972b	Exposure	59	78.8	32 min	Vulnerability to predation	Juveniles

CTM = critical thermal maximum
LOE = loss of equilibrium
LT50 = median lethal temperature
UILT = upper incipient lethal temperature

[1] Wild juvenile *Oncorhynchus mykiss* with no distinction made between resident and anadromous life history forms, but for permitting purposes the fish were considered Central Valley ESU steelhead

Table 14. Chinook Salmon thermal tolerance studies.

Run	Locality	Author	Type of Study	Acclimation Temperature (ºF)	Endpoint Temperature (ºF)	Time to endpoint	Endpoint Reported	Lifestage
Fall-run Chinook	Klamath River, CA	Boles 1988	Preference		76		No effect on migration	Adult
Fall-run Chinook	Deer Creek, CA	Cramer and Hammack 1952	Preference		80		Rested in pools	Adult
					81 – 82		Lethality	Adult
Spring-run Chinook	Columbia River, OR	McCullough 1999	Preference		77		Tolerated short-term exposure	Adult
Spring-run Chinook	Sacramento and San Joaquin Rivers, CA	Moyle 2002	Preference		69.8 – 77		Over-summered	Adults
Fall-run Chinook	Mokelumne Hatchery Fish in Laboratory	Poletto et al. 2017	Physiological Performance	59 and 66.2	73.4 [1]		Absolute aerobic scope	Juveniles
Fall-run Chinook	Sacramento River, CA	Orsi 1971 as cited in Boles 1988	UILT	73 73 70 70 65 60 70	87 87 88 84 83 70 76.8	6 min 2 min 4 – 6 min 4 – 6 min 4 – 6 min 48 hr 48 hr	LT100 LT30 LT100 LT10 LT50 LT50 LT50	Juveniles
Fall-run Chinook	Snake River, ID	Geist et al. 2010	Modified CTM	50 53.6 57.2	80.2 80.6 81.1	11.2 Hr [2] 10 Hr 8.9 Hr	LOE	Juveniles
				50 53.6 57.2	81.5 81.3 82.2	11.7 hr 10.3 hr 9.3 hr	LT50	Juveniles
Fall-run Chinook	Columbia River, WA	Snyder and Blahm 1971	Modified CTM UILT	50 50	65 70	1 hr 1 hr	No Mortality No Mortality	Juveniles
				50 50	80 90	4 min 6 sec	LT50 LT50	Juveniles

Table 14. Chinook Salmon thermal tolerance studies.

Run	Locality	Author	Type of Study	Acclimation Temperature (ºF)	Endpoint Temperature (ºF)	Time to endpoint	Endpoint Reported	Lifestage
Fall-run Chinook	Big Qualicum River, British Columbia	Muñoz et al. 2014	CTM	50	79.7 ± 1.8	~ 35 min [2]	Lost equilibrium and a righting response [3]	Juveniles
Fall-run Chinook	Columbia River, WA	Mesa et al. 2002	CTM	53.6 53.6	78.8 80.6	2 – 2.5 hr [4] 2 – 2.5 hr	LT25 LT35	Juveniles
				53.6	78.8	10 – 120 min	Vulnerability to Predation – No effect	Juveniles
Fall-run Chinook	Mokelumne River, CA	Hanson 1997	UILT	53.6	64.4	10,000 min	No LOE	Juveniles
				53.6	69.8	7,799 min	50% Mortality	Juveniles
				53.6	80.6	21 min	50% Mortality	Juveniles
Fall-run Chinook	Mokelumne River, CA American River, CA	Cech and Myrick 1999 as reported in Myrick and Cech 2004	CTM	66.2	83.8	Not Reported	LOE	Juveniles
Fall-run Chinook	Columbia River, WA	Coutant and Dean 1972 as reported in Coutant 1972a	UILT	59	82.4	22.5 min	LT50	Juveniles

CTM = critical thermal maximum.
UILT = upper incipient lethal temperature.
LOE = Loss of equilibrium.
LTXX = Lethal temperature at which XX% of fish died. For example, LT10 is temperature at which 10% of fish died, whereas LT100 is temperature at which 100% of fish died.

[1] Endpoint was the same for both acclimation temperatures.
[2] Total time to physiological endpoint, including time from acclimation temperature to endpoint temperature.
[3]: An associated loss of a directed locomotor capacity and an inability to escape from high temperatures.
[4] Time to physiological endpoint after reaching the temperature endpoint.

3.2.2 Steelhead

3.2.2.1 Adult Immigration

Steelhead are believed to immigrate through the action area from July through March, with peak immigration occurring October through December (Figure 4). During this period, fully mixed river temperatures at the proposed CTF outfall, when discharging 6.0 mgd ADWF, would range from lows in the low-40s°F in January to highs of about 85°F in July (Table 8).

No studies were identified that reported temperature threshold values for blockage or avoidance behavior for steelhead in rivers in the Central Valley of California. In a review of numerous studies, Washington State Department of Ecology (2002) concluded that daily average temperatures of 69.8–75.2°F are associated with avoidance behavior and migration blockage in adult steelhead in rivers located in the Pacific Northwest (Table 13). However, as noted above none of the reviewed studies took place in the Central Valley of California, where ambient river temperatures often exceed the values cited in the review, especially in the early portion of the steelhead immigration period (i.e., July through September). Moreover, Washington studies that identified temperatures as low as 69.8°F as blocking adult steelhead immigration were in situations where one water course connected to another and the water course in which steelhead were migrating was substantially colder than the 69.8°F or greater temperatures in the water course they avoided entering. This is not the situation in the action area.

The thermal tolerances of adult steelhead are similar to, and possibly somewhat greater (i.e., somewhat more thermally tolerant) than that of Chinook Salmon. For example, Verhille et al. (2016), in their study of California's Tuolumne River adult and juvenile steelhead, determined their upper thermal performance limit to be greater than 77°F. Based on the thermal studies compiled for steelhead, lethal temperatures for chronic exposure periods are believed to be in the low 80°F range for adults and likely similar for juveniles, when acclimated to higher temperatures. Literature derived thermal tolerances values for steelhead are summarized in Table 13.

As shown in Section 0, when fully mixed river temperatures reach seasonal highs in the low to mid 80s°F in July and August, a 6.0 mgd ADWF discharge would increase river temperatures little (i.e., ≤ 0.2°F), if at all, and can reduce the temperature of the river by up to 0.1°F (Appendix B, Figures B-19 and B-20). When action area temperature reach the high 70°F to low 80°F range in the months of July and August of some years, adult steelhead are believe to either remain in coolers waters of the Delta, thus avoiding early immigration through the action area during these months, or possibly immigrate through the action area (and downstream reaches) rapidly, thereby avoiding chronic exposure to such high temperatures. Immigration through the action area itself, as well as a reach extending a number of miles downstream of the action area, can be completed by immigrating adult steelhead in a matter of hours.

In the event that adult steelhead choose to immigrate through high temperatures within and immediately upstream and downstream of the action area during July and August, these fish will be expected to move through these river reaches in a few hours or less. As such, they will not have an exposure duration sufficiently long for these river temperatures to be lethal or cause any chronic adverse physiological effects. This short, exposure duration also will not be sufficiently long to adversely affect reproductive success of adult fish once they reach their upstream spawning/holding habitats.

In July and August, median increases in river temperature at the outfall location due to CTF discharges at 6.0 mgd ADWF are less than 0.1°F with maximum modeled increases being about 0.25°F (Table 8; Appendix B, Figures B-19 and B-20). Project incremental increases on a daily average basis are ≤0.4°F in September, with resulting median river temperatures being in the low 70s°F and a modeled maximum river temperature being 78.6°F (Table 8; Appendix B, Figure B-21).

During the peak immigration months of October through December, as well as later immigration through March, river temperatures at the outfall location for the 6.0 mgd ADWF condition would be in the mid 70°F range or lower (Table 8; Appendix A, Figures A-1 through A-3 and A-10 through A-12) and thus would not block or delay adult steelhead immigrating through the area nor would river temperatures during these months cause lethality or chronic, adverse sublethal effects to immigrating steelhead.

Based on the above findings, 6.0 mgd ADWF CTF discharge effects on fully mixed river temperatures in the action area during the July through March period would not block or delay immigration or cause lethality or chronic, adverse sublethal effects to adult steelhead moving through the action area.

Adult fall-run Chinook salmon, which is not an ESA-listed species, has an adult immigration period of September through January (Figure 4) which is completely contained within the steelhead immigration period of July through March assessed above. Moreover, adult Chinook Salmon and adult steelhead have similar thermal tolerances (Table 13 and Table 14). Consequently, the same thermal effect conclusions for the 6.0 mgd ADWF CTF discharge condition determined for adult steelhead immigration above also apply to fall-run Chinook Salmon adult immigration through the action area.

3.2.2.2 Juvenile Emigration/Rearing

Juvenile steelhead use the action area for their seaward emigrations and for limited rearing January through June (Figure 4). Based on the 6.0 mgd ADWF CTF discharge effects on action area temperatures January through May (Table 8; Appendix A, Figures A-1 through A-5), maximum action area temperatures will not exceed about 75.4°F during these months, and will be in the 40s, 50s, and 60s°F all the time January through March, 98 percent of the time in April, and 90 percent of the time in May. In June, maximum action area temperatures near the outfall reach 81.6°F (Table 8), but such maximum temperatures would not be caused by the CTF discharge. Rather, the CTF's effects on June river temperatures are typically insignificant and immeasurable throughout the action area (Table 8; Appendix B, Figure B-18; Appendix A, Figure A-6).

Verhille et al. (2016) found that juvenile steelhead maintained 95 percent of their peak aerobic scope when exposed to 76.3°F when acclimated to 54.5°F. Other thermal tolerance studies for juvenile steelhead found that loss of equilibrium can occur at temperatures of 81.5°F to 87.8°F (at acclimation temperatures between 51.8°F to 66.2°F) when exposed to rapidly increasing temperatures for time periods between 35 and 55 minutes (Myrick and Cech 2005, Myrick and Cech 2000a). Such studies indicate that when acclimated to high river temperatures, juvenile steelhead can tolerate extended exposures to temperatures in the upper 70s°F and short exposures to temperatures in the low 80s°F (Table 13).

River temperatures within the action area for the 6.0 mgd ADWF CTF discharge condition during the January through May period would remain below adverse effects levels for juvenile steelhead, particularly when considering fish would be acclimated to similar temperatures upon emigrating into the action area. Although June action area river temperatures can reach 81.6°F, the CTF discharge contribution to such temperatures would be insignificant and immeasurable, and may even be in the cooling direction. Late emigrating juvenile steelhead that move through the action area in June generally do so in years when flow and ambient temperature conditions maintain action area and upstream temperatures in the mid-70s°F or lower (i.e., cooler, high water years). In years when action area temperatures reach 80–82°F in June, the vast majority of emigrating steelhead would be expected to have already migrated through the action area in search of Delta rearing habitat. The rare steelhead that may emigrate through the action area in June, when temperatures approach or have reached the low 80s°F, would not experience temperatures measurably higher due to 6.0 mgd ADWF CTF discharges because effluent and river temperatures will be at very similar levels under such conditions (Table 12).

Based on CTF 6.0 mgd ADWF discharge effects on fully mixed river temperatures and thermal tolerances of juvenile steelhead summarized above, the CTF discharge effects on river temperatures in the action area throughout the January through May period would not cause lethality or adverse chronic, sublethal effects (e.g., increased vulnerability to predation) to juvenile steelhead emigrating through or rearing in the action area. River temperatures in the action area in June can reach unsuitably high levels for emigrating juvenile steelhead. Nevertheless, a 6.0 mgd ADWF CTF discharge would have insignificant effects on the frequency with which any given temperature occurs in June and, therefore, would have insignificant effects on the ability of juvenile steelhead to use the action area as a migratory corridor or for rearing in June.

Because no adverse effects would occur to steelhead for a CTF discharge rate of 6.0 mgd ADWF, none would occur at a lower discharge rate of 2.5 mgd ADWF. Also, because no adverse effects are expected to individual fish, CTF thermal effects on fully mixed river temperatures in the action area would not adversely affect the Central Valley steelhead population.

3.2.3 Spring-run Chinook Salmon

3.2.3.1 Adult Immigration

Effects of fully mixed river temperatures in the action area on Chinook Salmon adult immigration are assessed in two ways. First, fully mixed river temperatures for the modeled 6.0 mgd ADWF discharge condition are compared to upper thermal tolerances reported in the scientific literature for adult fish. Second, the potential for the fully mixed river temperatures to exceed about 66°F when river dissolved oxygen concentrations are below 5 mg/L more often than under baseline conditions, or would cause this set of river conditions to occur when such conditions would not occur without the Project, also was assessed. This second assessment is performed based on Hallock et al. (1970). Based on their studies, these researchers concluded that adult Chinook Salmon may avoid water temperatures exceeding about 66°F when dissolved oxygen concentrations were concurrently less than 5 mg/L. Should CTF discharges not cause such concurrent conditions in the river to occur more frequently than it occurs under existing conditions, then it will be determined that CTF discharge effects on river temperature and dissolved oxygen would not itself cause greater potential to block or delay Chinook Salmon immigration. Findings from this second assessment could also be applied to steelhead, due to their thermal tolerances being similar to that of Chinook Salmon. Thermal tolerances for Chinook Salmon derived from the scientific literature are summarized in Table 14.

Spring-run Chinook Salmon adults immigrate through the action area February through May (Figure 4). Maximum daily average fully mixed river temperatures at the outfall for the 6.0 mgd ADWF discharge condition are about 62°F in February, 68°F in March, 73°F in April, and 75°F in May (Table 8; Appendix A, Figures A-2 through A-5).

Based on studies of the movement of Chinook Salmon in Deer Creek, a tributary to the Sacramento River, Cramer and Hammack (1952) reported that adult Chinook Salmon rested in deep pools when daily maximum temperatures approached 80°F. River temperatures approaching 76°F in the lower Klamath River reportedly had no observable effect on the upstream migration of adult Chinook Salmon (Boles 1988). McCullough (1999) reported that adult spring-run Chinook Salmon were found to tolerate short-term exposures of temperatures approaching 77°F when properly acclimated. Moyle (2002) noted that adult spring-run Chinook Salmon in the Sacramento River and San Joaquin River tributaries spent summer months in deep holes of upstream areas, where river temperatures ranged from 69.8–77°F (Table 14).

The maximum fully mixed river temperature within the action area during the period February through May adult immigration period, with a 6.0 mgd ADWF discharge, was modeled to be 75.4°F (Table 8). Based on the thermal tolerances of adult Chinook Salmon summarized above and in Table 14, action area temperatures during these months would not block or delay adult immigration.

Turning to the second assessment approach for immigration blockage or delay, a 6.0 mgd ADWF CTF discharge would not cause river dissolved oxygen levels to fall below 5 mg/L more frequently than they have done so historically (see Section 3.9, Hydrology and Water Quality, of the EIR). Rather, river dissolved oxygen levels below 5 mg/L would occur with the same frequency for both existing (no discharge) and 6.0 mgd ADWF discharge conditions. Also, insignificant differences would occur in the frequency with which fully mixed river temperatures in the action area at the outfall would be above 66°F for the Project compared to existing conditions (Appendix A, Figures A-2 through A-5). Based on these dissolved oxygen and temperature findings, a 6.0 mgd ADWF CTF discharge would not increase the frequency with which the San Joaquin River will experience the co-occurrence of temperatures above 66°F with river dissolved oxygen concentrations below 5 mg/L in or near the action area. Consequently, based on this assessment, a 6.0 mgd ADWF CTF discharge would have an insignificant effect, or no effect, on adult immigration of spring-run Chinook Salmon through the action area.

Based on the above findings, it is concluded that the effects of the CTF discharging 6.0 mgd ADWF on fully mixed river temperatures would have insignificant effects on adult spring-run Chinook Salmon immigration through the action area during the February through May period of the year.

3.2.3.2 Juvenile Emigration/Rearing

Juvenile spring-run Chinook Salmon use the action area for their seaward emigration and for limited rearing December through June (Figure 4). Based on 6.0 mgd ADWF discharge effects on action area temperatures December through May (Table 8; Appendix A, Figures A-1 through A-5 and A-12; Appendix B, Figures B-13 through B-17 and B-24), maximum action area temperatures would not exceed about 75.4°F during these months, and would be in the 40s, 50s, and 60s°F at all times December through March, 98 percent of the time in April, and 90 percent of the time in May. In June, maximum action area temperatures near the outfall were modeled to reach 81.6°F for the 6.0 mgd ADWF discharge condition, but such maximum temperatures would not be caused by the CTF discharge. Rather, the CTF discharge effects on June river temperatures are typically insignificant and immeasurable throughout the action area (Table 8; Appendix A, Figure A-6; Appendix B, Figure B-18).

When acclimated to warmer ambient temperatures (i.e., 70–73°F), juvenile fall-run Chinook Salmon from the Sacramento River can withstand short exposures to temperatures in the high 70s°F without adverse effects (Orsi 1971 as reported in Boles 1988). The aerobic capacity of fall-run juvenile Chinook Salmon from the Mokelumne River Hatchery was unaffected at 73.4°F (Poletto et al. 2017) and juvenile spring-run Chinook Salmon acclimated to conditions in the San Joaquin River (i.e., temperatures of 54–58°F) successfully performed swimming trials at 75.2°F (Lehman et al. 2017). Based on these and other thermal tolerance study findings for juvenile Chinook Salmon summarized in Table 14, it can be concluded that juvenile Chinook Salmon, when acclimated to higher temperatures, can tolerate chronic exposures to temperatures in the low to mid 70°F range.

Because maximum action area temperatures for the 6.0 mgd ADWF discharge would not exceed 75.4°F December through May, would be in the 40s, 50s, and 60s°F 90-100 percent of the time, and the discharge would have insignificant effects on temperatures when they exceed 70°F (Appendix A, Figures A-1 through A-5 and A-12; Appendix B, Figures B-13 through B-17 and

B-24), the 6.0 mgd ADWF discharge would have insignificant effects on juvenile spring-run Chinook Salmon immigration through the action area December through May.

Similar to that discussed above for steelhead, late emigrating spring-run Chinook Salmon that move through the action area in June generally do so in years when flow and ambient temperature conditions maintain action area temperatures in the mid-70s°F or lower (i.e., cooler, high water years). In years when action area temperatures reach the low 80s°F in June, the vast majority of emigrating spring-run Chinook Salmon would be expected to have already migrated through the action area in search of Delta rearing habitat. The rare fish that may emigrate through the action area in June, when temperatures approach or have reached the low 80s°F, would not experience temperatures measurably higher due to the CTF discharge because effluent and river temperatures will be at very similar levels under these conditions.

Based on the 6.0 mgd ADWF discharge effects on fully mixed river temperatures and thermal tolerances of juvenile spring-run Chinook Salmon, the discharge effects on river temperatures in the action area throughout the December through May period would not cause lethality or chronic, adverse sublethal effects to juvenile spring-run Chinook Salmon emigrating through or rearing in the action area. River temperatures in the action area in June can reach unsuitably high levels for emigrating juvenile spring-run Chinook Salmon. Nevertheless, the 6.0 mgd ADWF discharge would have insignificant effects on the frequency with which any given temperature occurs in June and, therefore, would have insignificant effects on the ability of juvenile spring-run Chinook Salmon to use the action area as a migratory corridor or for rearing in June.

Because no adverse effects would occur for a CTF discharge rate of 6.0 mgd ADWF, none would occur at a lower discharge rate of 2.5 mgd ADWF. Because no adverse effects are expected to individual fish, CTF thermal effects on fully mixed river temperatures in the action area would not adversely affect the Central Valley spring-run Chinook Salmon population.

3.2.4 Winter-run Chinook Salmon

3.2.4.1 Adult Immigration

Adult winter-run Chinook Salmon do not immigrate through the San Joaquin River to upstream spawning areas so they do not immigrate through the action area. Consequently, there will be no exposure of this species and life stage to the action area and thus no assessment of CTF temperature effects on their immigration is necessary.

3.2.4.2 Juvenile Rearing

Juvenile winter-run Chinook Salmon spawned in the Sacramento River watershed are believed to carry-out non-natal rearing throughout much of the Delta December through May, potentially including use of the action area. The same assessment and findings provided above for spring-run Chinook Salmon juveniles (see Section 3.2.3.2) also applies to winter-run Chinook Salmon juveniles, and thus is not repeated here.

Because no adverse effects to winter-run Chinook Salmon would occur for a CTF discharge rate of 6.0 mgd ADWF, none would occur at a lower discharge rate of 2.5 mgd ADWF. Because no adverse effects are expected to individual juvenile fish, CTF discharge effects on fully mixed river temperatures in the action area would have no effect on the Central Valley winter-run Chinook Salmon population.

3.2.5 Delta Smelt

3.2.5.1 Adult Immigration/Spawning

The southern Delta has several habitat attributes that are not conducive to Delta Smelt use including too much coverage by submerged plants, low turbidity, and warm summer water temperatures (USFWS 2019). Delta Smelt prefer shallow, cooler water (50–60°F range) with gravel or sand substrate for spawning (USFWS 2019). Although it is possible for adults to spawn in the southern Delta or upstream of the action area, the 2019 state of scientific understanding indicates that most adult fish aggregate around Grizzly Island (in Suisun Marsh), Sherman Island (western Delta), and in the Cache Slough Complex (Northwest portion of the Delta). Nevertheless, because Delta Smelt are an ESA-listed species, because their designated critical habitat includes all areas within the legal boundary of the Delta (including the action area), and because there is some potential (albeit low) for them to use the action area near the proposed CTF outfall, the thermal effects of CTF discharges on their potential use of the action area is assessed below.

Kimmerer (2008) showed that Delta Smelt no longer occupied the south Delta during July and August and Nobriga et al. (2008) stated that habitat changes in the central and south Delta have rendered it seasonally unsuitable to Delta Smelt during the summer. Therefore, adult Delta Smelt could be present in the proposed project vicinity from February through May (Figure 4).

For the February through May period, maximum daily average fully mixed river temperatures in the vicinity at the outfall for the 6.0 mgd ADWF discharge condition are about 62°F in February, 68°F in March, 73°F in April, and 75°F in May (Table 8; Appendix A, Figures A-2 through A-5). This is the same period of adult immigration for spring-run Chinook Salmon (Figure 4). The thermal tolerance of adult Delta Smelt (**Table 15**) is very similar to that of spring-run Chinook Salmon (Table 14) and, therefore, the thermal effects findings stated above for adult immigrating spring-run Chinook Salmon during the February through May period also apply to adult immigrating Delta Smelt, and will not be repeated here.

When acclimated to river temperatures in the mid to upper 60s, studies showed adult Delta Smelt to have chronic lethal thermal thresholds in the high 70°F to low 80°F range. Consequently, maximum action area river temperatures for the project condition of ≤75°F during the Delta Smelt immigration period of February through May would not be expected to block or substantially delay adult fish immigration, nor would it be expected to cause any chronic, adverse sublethal effects to adult fish moving through the action area to upstream spawning habitats. That said, temperature may be too warm for Delta Smelt spawning (i.e., above 68°F) in the action area at the outfall location 10% of the time in April and 20% of the time in May under existing (i.e., no discharge) conditions. CTF operations at a 6.0 mgd ADWF discharge rate would not change these percentages because CTF discharges have negligible, if any (0.0–0.25°F), effect on fully mixed river temperatures at the outfall location during April and May (Table 8; Appendix A, Figures A-4 and A-5; Appendix B, Figure B-16 and B-17).

Table 15. Delta Smelt thermal tolerance studies.

Author	Type of Study	Acclimation Temperature (ºF)	Endpoint Temperature (ºF)	Time to Endpoint	Endpoint Reported	Lifestage
Swanson and Cech 1995	CTM [1]	53.6 62.6 69.8	69.8 77.0 82.4	90 min 80 min 70 min	LOE	Subadult (SA) and adult Juvenile, SA, and adult Juvenile and SA
Swanson et al. 2000	CTM [1]	62.6	77.0	80 min	LOE	40-70 mm SA and adults
Komoroske et al. 2014	CTM [2]	53.4 ± 0.2 53.6 ± 0.4 54.3 ± 0.2	80.8 80.8 75.4	50.7 min 50.3 min 39.0 min	LOE	Juvenile (140–164 dph) Adult (200–250 dph) Post-spawn adults (>300 dph)
		61.5 ± 0.5 61.5 ± 0.5 60.3 ± 0.2 61.9 ± 0.2 59.5 ± 0.2	85.8 84.4 82.8 83.1 79.3	45.0 min 42.3 min 41.7 min 39.3 min 36.7 min	LOE	Larvae (30–32 dph) Late-larvae (60–64 dph) Juvenile (140–164 dph) Adult (200–250 dph) Post-spawn adults (>300 dph)
		67.5 ± 0.4 65.7 ± 0.4 65.7 ± 0.4	84.0 82.9 80.8	30.7 min 32.0 min 28.0 min	LOE	Juvenile (140–164 dph) Adult (200–250 dph) Post-spawn adults (>300 dph)
	CLT_{max} [3]	65.7	81.3 79.7 77.2	8.7 days 7.8 days 6.4 days	CLT_{50} [4]	Juvenile (140–164 dph) Adult (200–250 dph) Post-spawn adults (>300 dph)
			82.6 81.3 79.9	9.4 days 8.7 days 7.9 days	CLT_{95} [5]	Juvenile (140–164 dph) Adult (200–250 dph) Post-spawn adults (>300 dph)
Jeffries et al.2016	CTM [3]	57.2	81.7	~ 45.0 min	LOE	Juvenile (50 dph)
Davis et al. 2019	CTM [3]	60.8	85.5 ± 0.36 [6]	~ 45.0 min	LOE	Juvenile (145 dph)

CTM = critical thermal maximum.
LOE = Loss of equilibrium.
CLT_{max} = Chronic lethal thermal maximum
dph = days post-hatch

[1] Temperatures were increased by 6ºC (10.8ºF) per hour until loss of equilibrium (LOE) was observed.
[2] Temperatures were increased by 0.3ºC (0.54ºF) per minute until loss of equilibrium (LOE) was observed.
[3] Temperatures were increased by 1ºC (1.8ºF) per day until lethality occurred.
[4] CLT_{50}: temperature at which 50% lethality was observed.
[5] CLT_{95}: temperature at which 95% lethality was observed.
[6] Acclimated to waters with 2.4 ppt salinity

3.2.5.2 Larval/Juvenile Emigration

Upon hatching, larval Delta Smelt have a large oil globule, which is semi-buoyant and allows them to stay suspended in the water column just above the river bottom. Delta Smelt larvae begin feeding 4-5 days after hatching. Because they maintain a position near the channel bottom, they are usually not swept downstream by high flows until they are several weeks old and their swim bladder has developed (Moyle 2002). At this stage, the larvae are able to fill the swim bladder with gas, which makes them more buoyant and allows them to move higher in the water column, where higher river velocities carry them downstream to the low salinity mixing zone in the Delta (Moyle 2002). Delta Smelt larvae are transported downstream by river currents to zones of freshwater/saltwater mixing. It is during this period that larval Delta Smelt spawned in or upstream of the action area would be carried downstream to the low salinity zone within the Delta and Suisun Marsh, and potentially exposed to elevated temperatures within the action area.

Because larval Delta Smelt could be transported through the action area on their way to the low salinity zone in the far western Delta and Suisun Marsh, where this species seeks salinity levels near 2 ppt for rearing, they are not expected to rear in the action area or upstream areas. Rather, they are expected to move through the action area March through June (Figure 4) on their way to the low salinity zone as larval or very early juvenile life stages. As stated above, maximum action area temperature with the CTF 6.0 mgd ADWF discharge during the March through May period would be ≤75°F. Thermal tolerance studies for larval, late-larval and juvenile life stages of Delta Smelt acclimated to temperatures in the 60°F range show them to have CTMs ranging from 77.0°F to 85.8°F, with the larval life stage showing the highest thermal tolerances in the mid-80s°F (Table 15). This indicates that temperatures ≤75°F in the action area for the 6.0 mgd ADWF discharge condition from March through May would be sufficiently low to allow larval/early juvenile Delta Smelt to emigrate through the area without experiencing lethality or any chronic, adverse sublethal effects.

Delta Smelt would only be expected to emigrate through the action area in June in years when river flow and ambient temperature conditions maintain action area river water temperatures in the mid-70s°F or lower (i.e., cooler, high water years) during these months, thereby enabling Delta Smelt spawning to potentially occur this late into the year. In drier, warmer years, Delta Smelt would not attempt to spawn in or upstream of the action area as late as June, when action area temperatures have already reached sufficiently high levels to preclude spawning activity in this reach of the San Joaquin River. The rare fish that may emigrate through the action area in June, when temperatures approach or have reached the low 80s°F, will not experience temperatures measurably higher due to the CTF discharge because effluent and river background temperatures will be at very similar levels under these conditions (Table 8, Table 12).

Based on the above findings, CTF 6.0 mgd ADWF discharge effects on river temperatures in the action area throughout the March through June period would not cause lethality or chronic, adverse sublethal effects to larval or juvenile Delta Smelt emigrating through the action area. River temperatures in the action area in June can reach unsuitably high levels for emigrating Delta Smelt. Nevertheless, the CTF 6.0 mgd ADWF discharge would have insignificant effects on the frequency with which any given temperature occurs in June and, therefore, would have insignificant effects on the ability of larval and juvenile Delta Smelt to use the action area as a migratory corridor in June.

Because no adverse effects would occur for a CTF discharge rate of 6.0 mgd ADWF, none would occur at a lower discharge rate of 2.5 mgd ADWF. Because no adverse effects are expected to individual larval/juvenile fish, CTF discharge effects on fully mixed river temperatures in the action area would have no effect on the Delta Smelt population.

3.2.6 Effects to Critical Habitat

The PBFs designated for Green Sturgeon that could be affected by fully mixed river water temperatures are food resources, water quality, and migratory corridor. Regarding the food resources PBF, this assessment will evaluate how the Project's thermal effects on the river could affect Green Sturgeon prey organisms, which are consumed by juvenile Green Sturgeon that rear in the action area and adults that move through and hold in the action area. Because this assessment is limited to temperature, the water quality PBF is evaluated relative to temperature. The migratory corridor PBF of critical habitat is assessed in terms of whether CTF discharges would cause river temperature increases that would cause adverse effects to Green Sturgeon when they immigrate or emigrate through the Action Area. For steelhead, the PBFs potentially affected are freshwater migration corridors and freshwater rearing sites, which are assessed as identified above for Green Sturgeon. For Delta Smelt, PBFs potentially affected by elevated river water temperature is "water," which represents suitable water quality conditions including appropriate temperatures and also food availability.

Project-related temperature effects on use of critical habitat within the action area as a migratory corridor and rearing from a thermal effects to the listed species perspective is discussed in detail in Sections 3.2.1, 3.2.2, and 3.2.5. As concluded in these sections, CTF discharge effects on fully mixed river temperatures would not block or delay migration through the action area for Green Sturgeon, steelhead, or Delta Smelt. In addition, Project thermal effects would not create temperature conditions that would cause lethality or chronic, adverse sublethal effects to migrating adults, juveniles, larvae, or for juveniles rearing within the action area. When background (i.e., without any CTF discharge) San Joaquin River temperatures within the action area reach levels during the summer months that may preclude use of the action area by steelhead, Delta Smelt, and possibly Green Surgeon, the CTF discharges would have insignificant effects on the frequency and magnitude of such summer-time temperatures. As such, CTF discharges would have insignificant effects on the frequency with which action area temperatures reach levels during the summer months that may limit or preclude ESA-listed fish use of the area.

To evaluate the effects that CTF discharge-related incremental increases on fully mixed river temperatures have on the PBF of food resources for Green Sturgeon, the food resources aspect of freshwater rearing sites for steelhead, and water for Delta Smelt, an assessment of the effects that CTF discharge-related incremental temperature increases (and resulting river temperatures) have on phytoplankton, zooplankton, and benthic macroinvertebrates (the prey base for these species) is provided below.

The range of river temperatures modeled to occur seasonally in the action area near the outfall for CTF discharge rates of 2.5 mgd and 6.0 mgd ADWF is within the suitable range for supporting the river's phytoplankton, zooplankton, and benthic macroinvertebrate communities. This conclusion is supported by the following literature review of the thermal tolerances for phytoplankton, zooplankton, and benthic macroinvertebrates.

Langford (1990) concluded short-term exposures to temperatures below 95°F do not cause substantial damage to entrained freshwater phytoplankton. However, long-term exposure to such temperatures is potentially harmful. At temperatures of 104°F and above, even short-term exposures may be lethal (Langford 1990). In a review of growth rates of algae, Eppley (1972) concluded that there is a gradual and exponential increase in growth up to approximately 104°F. In a study that evaluated the influence of temperature on twenty-one various common planktonic freshwater species, substantial growth inhibition occurred for some phytoplankton species at 86°F (Butterwick et al. 2005).

In 2014, a study was conducted adjacent to, upstream, and downstream (to below Isleton) of the Sacramento Regional Wastewater Treatment Plant (SRWTP) to determine if effluent from the SRWTP affected phytoplankton abundance or shifted species composition (Kraus et al. 2017). Benthic diatoms dominated most samples (collected in June and October) and no significant difference was found in phytoplankton abundance or species compositions between samples that included SRWTP effluent versus samples that did not include any SRWTP effluent. The SRWTP has effluent temperatures similar to those modeled for the CTF, but has less receiving water dilution than the CTF discharges will have.

Based on the study findings summarized above, the range of water temperatures that occur seasonally in the action area, including near the proposed CTF outfall, is well within the suitable range for supporting the river's phytoplankton community. Consequently, the incremental thermal effects of CTF discharges at rates of 2.5 mgd and 6.0 mgd ADWF would not cause fully mixed water temperature increases in the action area that would cause adverse effects to the river's phytoplankton community, which serves at the base of the food web for all fishes, including ESA-listed fishes.

Most freshwater invertebrates, including zooplankton, are tolerant of high water temperatures. The lethal temperature threshold for most freshwater invertebrates occurs from 86–104°F (Pennak 1978, Thorp and Covich 1991). It is generally known that copepods are able to reduce their metabolic rate and enter diapause under harsh environmental conditions. Adaptations such a diapause result in an ability to live at sustained temperatures in excess 82.4°F (Thorp and Covich 1991). Two cladocerans, *Ceriodaphnia* and *Diaphanosoma*, inhabit waters with temperatures of 80.6–86°F (Thorp and Covich 1991). Furthermore, reproduction of some rotifers (e.g., *Brachionus* species) can continue successfully in water temperatures of 104°F (Thorp and Covich 1991).

The range of water temperature that occur seasonally in the action area is well within the suitable range for supporting the river's zooplankton community. Consequently, CTF discharges at rates of 2.5 and 6.0 mgd ADWF would not cause fully mixed water temperatures in the action area that would cause adverse effects to the river's zooplankton community.

Many of the benthos taxa occurring in the lower San Joaquin River are found commonly throughout valley floor warm water bodies of the Central Valley. For example, the widely distributed oligochaete worm *Tubifex* can utilize waters with temperatures up to 80.6°F with minimal, if any, effect on growth and production (Oplinger et al. 2011). These researchers did not evaluate temperatures higher than 80.6°F. Pandolfo et al. (2012) found the mean LT50 (median lethal temperature) for seven juvenile freshwater mussel species was 91.6°F. The 96-hour LT50 for the oligochaete worm *Limnodrilus hoffmeisteri* is between 93.2 and 98.6°F (Birtwell and Arthur 1980, as cited by Environment Canada 2014). Similar to fish, benthic organisms also can tolerate short-term exposures to large temperature increases above their acclimation temperatures (Wood et al. 1996). Mattice and Dye (1976) reported the Asiatic clam *Corbicula manilensis* as having an upper incipient lethal temperature of 93.2°F. Castañeda et al. (2018) found that water temperatures above 86°F in the St. Lawrence River slowed the growth of *Corbicula fluminea* in the summer.

Based on the thermal tolerances of benthic macroinvertebrates and action area temperatures for the CTF discharge conditions, CTF discharges at rates of 2.5 mgd and 6.0 mgd ADWF would not result in fully mixed water temperatures in the action area that would cause adverse effects to the river's benthic macroinvertebrate community.

Based on the above findings, it is concluded that CTF discharges at 2.5 mgd and 6.0 mgd ADWF would not cause fully mixed water temperature increases in the action area that would cause mortality or chronic, adverse sublethal effects (e.g., reproductive effects) to phytoplankton, zooplankton, or benthic macroinvertebrates within the action area. Consequently, the prey base for Green Sturgeon, steelhead, and Delta Smelt, as well as other non-ESA-listed fish species using the action, would not be adversely affected by the CTF discharge effects on fully mixed river temperatures.

Based on the findings above, fully mixed river temperatures within the action area for the CTF discharge conditions would not reduce the quantity or quality and thus value of the food resources, water quality, or migration corridor PBFs designated for Southern DPS Green Sturgeon. Similarly, the insignificant Project temperature effects to the river within the action area would not be of sufficient magnitude to reduce the quantity or quality and thus value of the freshwater migration corridors or freshwater rearing sites PBFs designated for Central Valley DPS steelhead, or the water PBF designated for Delta Smelt.

3.3 Thermal Plume Effects on Special-status Fishes and Critical Habitat

This section analyses the effects that the thermal plume, created by the CTF discharges prior to effluent fully mixing across the river channel, could have on special-status adult fish immigration (Section 3.3.1) and juvenile fish emigration (Section 3.3.2). In addition, this section analyses plume thermal effects on designated critical habitat (Section 3.3.3) for ESA-listed Green Sturgeon, steelhead, and Delta Smelt.

As stated above for the fully mixed river temperature analysis, if the CTF's thermal plume is determined to not cause any significant adverse effects to the most thermally sensitive special status species assessed below, then it can be further concluded that the thermal plume would not result in any significant adverse thermal effects to other fish species that are less thermally sensitive when they move past/through the thermal plume. Also, because effects of the CTF thermal plume on phytoplankton, zooplankton, and benthic macroinvertebrates populations (i.e., fish prey organisms) are assessed as part of assessing plume thermal effects on designated critical habitat, and because other fish species using the action area rely upon these same prey organisms, findings regarding the CTF's thermal plume effects to phytoplankton, zooplankton, and benthic macroinvertebrates apply to all fishes relying upon these prey organisms, and not just ESA-listed fishes.

Because the plume occupies a relatively small portion of river within the action area, and an even smaller portion of critical habitat occupied by any given adult and juvenile ESA-listed fish species over time, fish exposure to the plume is brief. Typically, exposures are anticipated to last seconds to minutes and thus constitute short-term acute exposures as they migrate through the plume rather than long-term, chronic thermal exposure scenarios as was considered and assessed for the fully mixed river condition (Section 3.2). As such, this section analyzes effects on adult and juvenile (as well as the larval life stage for Delta Smelt) fish migration through the plume itself within the action area.

Despite exposures being brief, fish lethality, loss of equilibrium, or short-term energetic and metabolic effects could theoretically occur if plume temperatures reach sufficiently high levels relative to the species' and life stage thermal tolerance limits as they relate to plume exposure durations. Should plume temperatures and exposure times not exceed effect thresholds, then fish that migrate through the plume will not be expected to experience any chronic adverse physiological or behavioral effects because the short exposure time to elevated plume temperatures will not be sufficiently long to result in such adverse chronic effects.

Adult special-status fishes immigrating upstream and downstream past the proposed CTF outfall and juvenile/larval fishes emigrating downstream may encounter the thermal plume at and near the outfall, where they may encounter a gradient of elevated water temperatures, relative to river background temperature, across a portion of the channel cross-section occupied by the thermal plume. Graphical model output produced by CORMIX for 2.5 mgd and 6.0 mgd ADWF CTF discharge rates are assessed to determine whether CTF worst-case and median-case thermal plumes (which book-end the worst-case half of all possible CTF thermal plume scenarios) would cause blockage or delay of adult immigration, juvenile/larval emigration, or cause lethality or any chronic, adverse sublethal thermal effects to fish passing the plume.

Should neither the worst-case nor median-case plumes cause adverse effects to migrating fishes, then it can also be concluded that the other "best-case" half of plume conditions also will have no adverse effects on migrating fishes. This focus of the assessment on the "worst-case half" of all possible plume conditions allows for fewer scenarios to be presented, yet analysis conclusions cover all possible plume scenarios under all possible effluent and river flow and temperature combinations. Likewise, for efficiency and because plume characteristics are often similar across months, modeling output are discussed in detail for select months within seasons and effect conclusions drawn from such detailed analyses are extended to other months within that season where modeling shows that plume thermal characteristics are highly similar.

Worst-case and median-case scenarios for the CORMIX modeling were defined as follows:

- Worst-case
  - 100^{th} percentile effluent-river temperature differential for the month modeled
  - 1.3 peaking factor multiplied by monthly average effluent flow rate, capped at 7.55 mgd (maximum discharge capacity of outfall conveyance pipeline) for the 6.0 mgd ADWF scenario
  - Slack-tide river velocity of 0.05 fps for all months
- Median-case
  - Median effluent-river temperature differential for each month
  - Monthly average effluent flow rate corresponding to a 2.5 and 6.0 mgd ADWF discharge rates
  - Median river velocity for each month

The median-case and worst-case conditions were modeled for both the 2.5 mgd and 6.0 mgd ADWF scenarios for each month of the year. Certain of these plume graphics are presented and analyzed below with all plume graphics presented in **Appendix C**. For October, the first month assessed below for plume effects, both the 2.5 mgd and 6.0 mgd ADWF discharge scenarios are presented and analyzed, in part to demonstrate the similarity in plume thermal characteristics between these CTF discharge rates. Detailed plume analyses for all other months will focus primarily on the 6.0 mgd ADWF discharge scenario. This is because if no significant adverse effects to fishes or their prey organisms are found for a CTF discharge rate of 6.0 mgd ADWF, then it can be concluded that no significant adverse effects would occur to these species when the CTF is discharging at a lower rate of 2.5 mgd ADWF. Nevertheless, both median-case and worst-case 2.5 mgd ADWF discharge plume scenarios modeled for all months are presented in Appendix C.

For more details on how the CORMIX plume modeling was conducted, see Section 2.2. Temperature differentials (i.e., effluent temperature minus river temperature) for each month are presented in **Table 16**, and provide context for the thermal gradients that would occur in the warmest portion of the plume closest to the outfall pipe, where the most rapid attenuation of effluent temperatures occur.

Table 16. Differences between background river temperature and effluent temperature (temperature differential) at the outfall pipe for the Project condition. Calculated as $temperature_{effluent}$ minus $temperature_{river}$ for the April 14, 2017, through June 26, 2020 period of record.

Month	Minimum	Median	Maximum
January	14.2	18.5	20.0
February	13.3	16.8	20.0
March	8.7	14.7	18.1
April	4.6	13.8	17.0
May	4.3	13.4	17.4
June	0.8	9.3	15.2
July	-2.3	7.9	15.8
August	-0.3	10.7	17.2
September	2.2	10.0	17.3
October	6.8	16.0	20.0
November	13.6	18.6	20.0
December	16.4	20.0	20.0

Temperature differentials for the CTF are not expected to exceed 20°F in the fall and winter months because this will be a requirement of the CTF's NPDES permit. In the fall, the river cools down more rapidly than does the effluent due to cold ambient air temperatures, which is what drives the larger temperature differentials in the fall and early winter period. Maintaining effluent-river temperature differentials at or below 20°F will be achieved operationally at the CTF by continuously monitoring effluent and river temperatures. When the temperature differential approaches 20°F, effluent will be diverted into Pond C where it will experience cooling due to low ambient air temperatures. From Pond C, effluent will flow into and across Pond B and then into and across Pond A where further cooling would occur before it would be discharged to the river. As much as 5–10°F of effluent cooling could be accomplished in this manner, depending upon effluent discharge rates, pond levels, pond detention times, ambient air temperatures, wind speeds and other ambient conditions. Moreover, additional cooling is expected to occur in the 1.5 mile pipeline between the CTF and the river when the ground surrounding the pipeline, and thus the pipeline itself, is colder than the effluent passing through it. This has been demonstrated at other facilities in the region that have long pipelines between the facility and the receiving water body, where effluent has cooled as much as 8°F per mile, depending upon effluent and ambient temperature conditions.

3.3.1 Adult Immigration

3.3.1.1 Fall and Winter (October through January)

Based on the ESA-listed fish periodicity within the action area, as well as that for fall-run Chinook Salmon – a thermally sensitive, recreationally important species (Figure 4), steelhead and fall-run Chinook Salmon are the only species among those assessed herein that immigrate as adults through the action area during the months October through January. Peak steelhead immigration occurs October through December and peak fall-run Chinook Salmon immigration occurs October and November in the San Joaquin River.

3.3.1.1.1 October – 2.5 mgd ADWF, Median-case Scenario

As adult steelhead and fall-run Chinook Salmon approach the outfall from downstream areas (where effluent is fully mixed with the river flow), they eventually encounter a plume that does not cover the entire river cross-section. When fish initially encounter the downstream most portion of the plume, plume temperatures would be less than 1°F above river background temperatures. Fish would be expected to simply move through this region of the plume because the absolute temperatures would be in the 50s°F, 60s°F, and low 70s°F and temperature differences (from river background) within the plume would not be sufficiently large to alter their migration routes.

Nevertheless, when adult fish get close to the outfall (i.e., within tens of meters), temperatures within the plume would increase. Should immigrating fish seek lower temperatures, they can move laterally or vertically within the river channel until they encounter either more preferred temperatures or an unaffected zone of passage that is outside the plume where they can continue their upstream migration. Numerous studies have shown that, when presented with a range of temperatures, fish will seek a temperature that is preferred, and will not submit themselves to temperatures sufficiently high to cause adverse physiological effects (Cherry et al. 1975, Gray et al. 1977, Biro 1998). In doing so, they could continue along a selected channel migration route that will expose them to temperatures less different, or even no different, from river background. In either case, should fish "drift" back toward the affected area of the plume before passing the outfall, the same behavioral response will be repeated until the migrating fish is past the outfall.

Figure 5 provides a graphic depiction of the median-case 2.5 mgd ADWF thermal plume scenario for October. The temperature differential (calculated as $\text{temperature}_{\text{effluent}}$ minus $\text{temperature}_{\text{river}}$) primarily dictates the thermal gradient that exists within the initial tens of meters from the outfall pipe. For this median October scenario, the temperature differential is 16°F (Table 16). Effluent and river flows primarily affect the shape of the plume within the channel. It should be noted that CORMIX does not model the bend in the San Joaquin River that exists approximately 280 m downstream of the proposed CTF outfall location. Rather, it accounts for basic channel bathymetry (i.e., width and depths), depth and diameter of the outfall pipe within the channel, temperature differentials and effluent and river flows, but assumes a simple straight channel. Nevertheless, the graphical depictions of the plume are adequate for assessment purposes.

Figure 5 (top graphic) shows that a substantial zone of passage (i.e., area of the river unaffected by the plume) exist along the western half of the river channel, within about 300 meters of the outfall, and a substantial zone of passage unaffected by the plume exists in the lower portion of the water column to a distance of about 300 m downstream (middle graphic). Hence, adult fish immigrating within the lower portion of the water column will pass underneath the plume as they pass the outfall location.

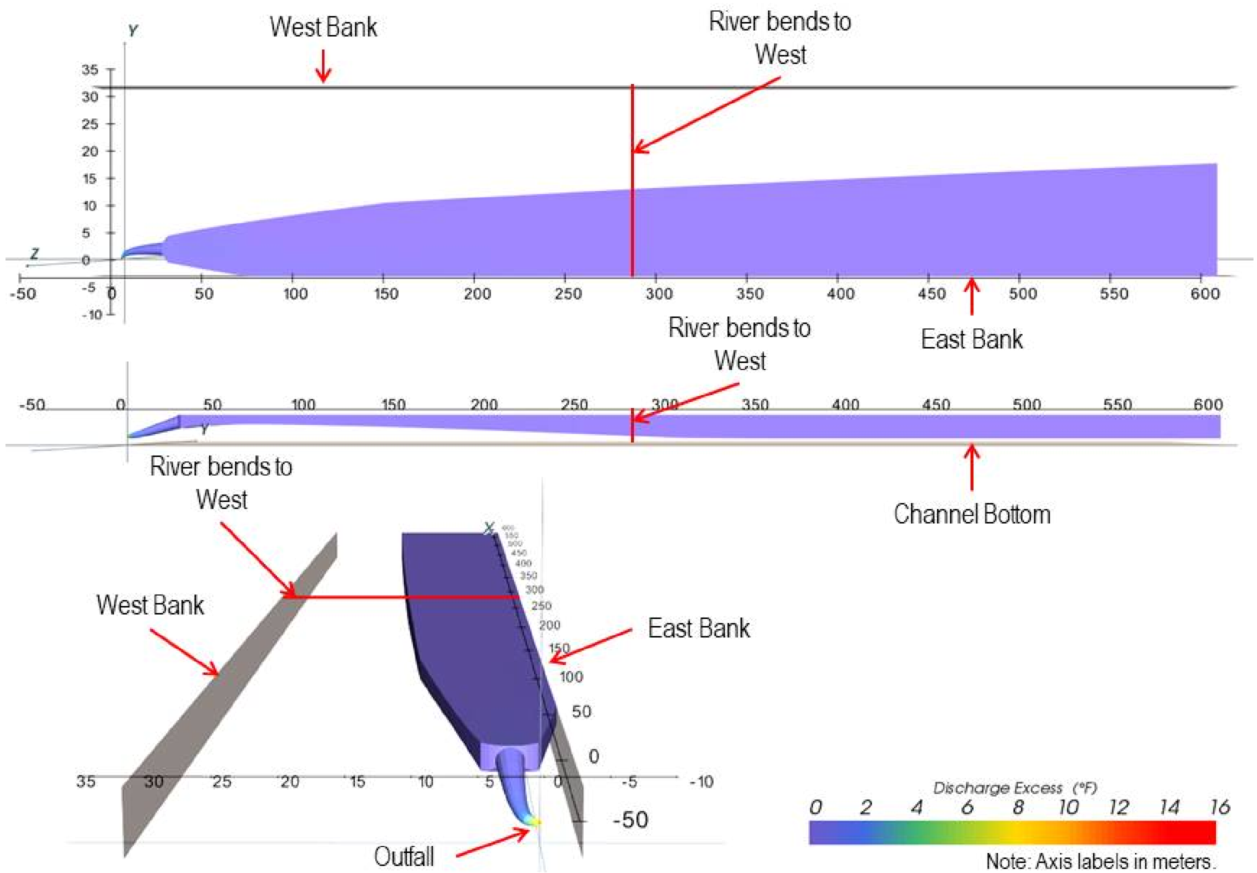


Figure 5. October 2.5 mgd median-case thermal plume scenario, based on effluent temperature of 79.2°F, river temperature of 63.2°F (16.0°F temperature differential), effluent flow of 2.6 mgd, and river velocity of 1.16 fps.

The longitudinal cross-section portion of Figure 5 (middle graphic) shows that the plume reaches the river surface about 35 m downstream of the outfall. The plume remains in the approximate top half of the water column for the initial 200 meters downstream. This occurs because the effluent plume is warmer than river temperatures and thus is buoyant. Once the plume temperature has attenuated to near background river temperature, it mixes vertically into the water column, reaching the river bottom at about 300 m downstream of the outfall, as the river enters the large bend.

All three panels in Figure 5 show that the plume temperature is rapidly attenuated within the initial 20 m from the outfall pipe, to within about 1°F or less of river background. Adult fish immigrating through the plume at distances greater than about 20 m from the outfall pipe would experience temperatures in the low to mid 60s°F, which would result in no blockage or adverse thermal effects because such temperatures are within about 1°F of river background temperatures to which these fish are acclimated, and the low to mid 60°F range is suitable for immigrating steelhead and fall-run Chinook Salmon (Table 13 and Table 14).

Where the most rapid initial temperature attenuation occurs, within about 10—15 m of the outfall, the plume occupies a very small portion of the water column, leaving the vast majority of the channel cross-section unaffected by the plume and thus easily avoided by immigrating adult fish. Most immigrating adult fish will never be exposed to plume temperatures that are substantially above river background temperatures nearest the outfall due to zones of passage that exist within the channel below, above, and to the west of the outfall pipe. For example, most immigrating adult steelhead and fall-run Chinook Salmon are expected to immigrate in the lower portion of the water column and thus would pass underneath the plume near the outfall. Those fish immigrating in the upper portion of the water column, but in the western 90% of the channel also would never encounter the warmest portion of the plume closest to the outfall pipe.

Nevertheless, should immigrating steelhead and Chinook Salmon swim through the plume within about 15 m of the outfall pipe, where temperatures are substantially higher than river background temperatures, fish would pass through the small footprint of the plume that would exist here in a matter of seconds because the plume would be ≤ 5 meters in diameter this close to the outfall (Figure 5). River background temperature for this median scenario in October is in the low 60s°F. Adult fish that swim through the plume close to the outfall would encounter plume temperatures up to about 6–8°F above river background temperatures and thus in the high 60s°F or low 70s°F (see yellow color closest to outfall pipe in Figure 5). Hence, even the warmest portion of the plume shown in Figure 5 would remain in the high 60s°F to low 70s°F. Based on steelhead and fall-run Chinook Salmon thermal tolerances (Table 13 and Table 14), no blockage or adverse thermal effect to immigrating adult fish acclimated to temperatures in the low 60s°F would occur when these fish swim through a small plume of water in the high 60s°F/low 70s°F, and pass through this portion of the plume in a matter of seconds.

3.3.1.1.2 October – 6.0 mgd ADWF, Median-case Scenario

The CORMIX model was also used to simulate this same median-case October scenario (i.e., same effluent and river temperatures, temperature differential, and river velocity), for a CTF discharge rate of 6.0 mgd ADWF, which results in a median discharge in October of 6.3 mgd (**Figure 6**). At the higher CTF rate of discharge, the plume mixes laterally across the river more rapidly, thus reducing the width of the zone of passage along the west bank several hundred meters downstream of the outfall pipe. The plume reaches the river surface about 35 m downstream of the outfall, which is the same as that for the lower discharge scenario. However, the plume remains in the approximate top half of the water column for about another 50 m further from the outfall, to about 250 meters downstream, and would not reach the river bottom by the time the plume enters the large river bend about 280 m downstream of the outfall. Once the plume enters the large river bend, the effluent would be rapidly mixed throughout the water column. As shown above for the 2.5 mgd ADWF scenario, effluent temperatures beyond the discharge pipe are rapidly attenuated to within about 1°F of river background within about 20 m from the outfall pipe. Based on the size, shape, and thermal gradients that would exist across the median-case thermal plume that would occur in October for the 6.0 mgd ADWF scenario, which are all very similar to that discussed above in greater detail for the 2.5 mgd ADWF scenario, the thermal effects findings made for steelhead and fall-run Chinook Salmon for the 2.5 mgd ADWF scenario also apply for October when the CTF would discharge 6.0 mgd ADWF.

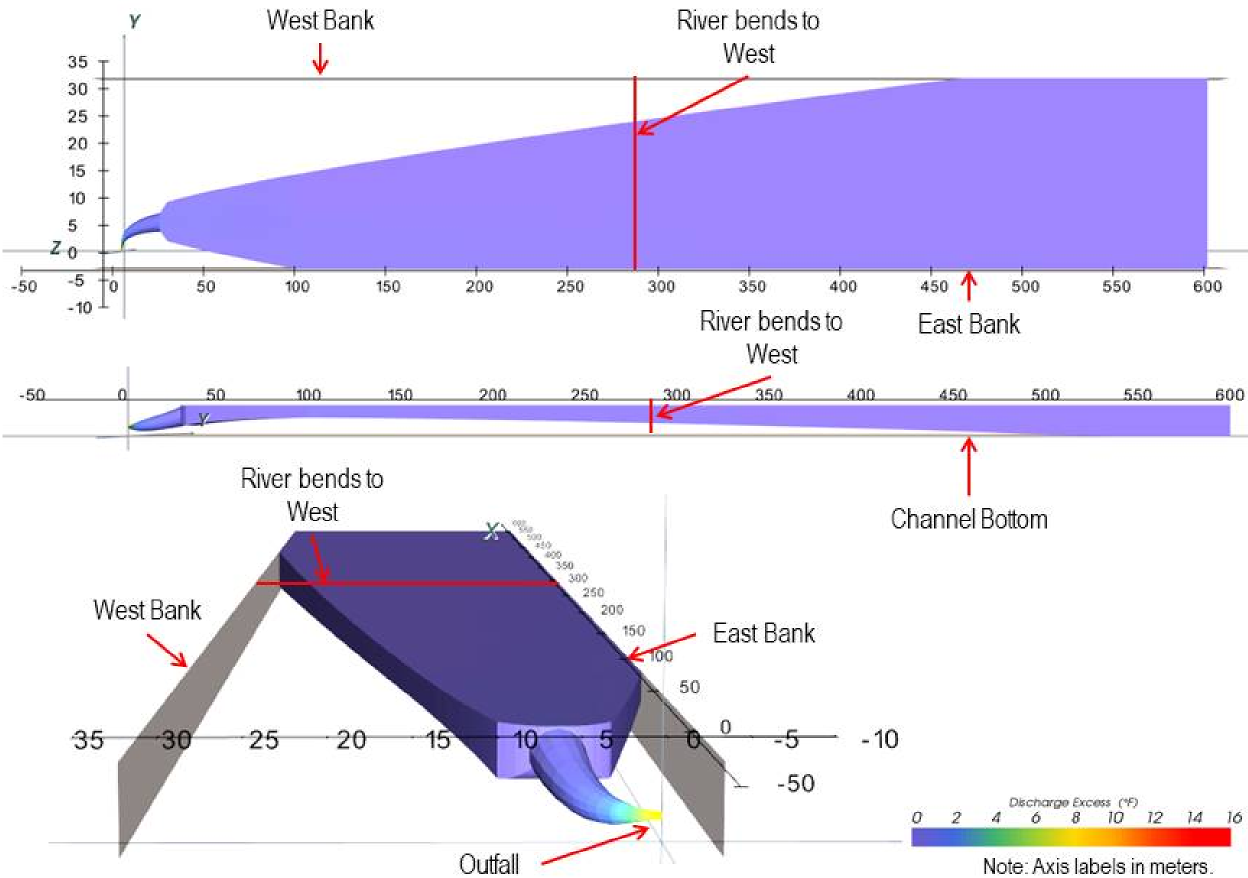


Figure 6. October 6.0 mgd median-case thermal plume scenario, based on effluent temperature of 79.2°F, river temperature of 63.2°F (16.0°F temperature differential), effluent flow of 6.3 mgd, and river velocity of 1.16 fps.

3.3.1.1.3 October – Worst-case Scenarios

Figure 7 and **Figure 8** provide depictions of the "worst-case" October thermal plume that would occur for the 2.5 mgd and 6.0 mgd ADWF discharge scenarios, respectively. The CORMIX model requires a positive flow rate for the model to run. Hence, to model slack-tide conditions, a river flow rate of 0.05 fps was selected for all worst-case plume modeling scenarios. Also evident in Figure 7 and Figure 8 is that CORMIX's graphical depiction of the plume stops at approximately 30 meters from the outfall. This is because when river directional velocity falls below a minimum threshold, the model is no longer able to simulate plume dispersion and mixing within the channel. Nevertheless, the warmest portion of the worst-case plumes are shown and thus used for assessment purposes.

Because the river velocity modeled is approaching zero, the velocity of the effluent leaving the pipe pushes the effluent plume straight across the channel toward the west bank. This occurs because there is insufficient river flow velocity in a downstream direction to "bend" the plume downstream, as is shown in the October median-case scenario, where river velocity was 1.16 fps

(Figure 5). Due to the high temperature differential of 20°F, the plumes would be highly buoyant and would stay in the upper portion of the water column, leaving a large zone of passage underneath the plume as was discussed above for the median-case October scenario.

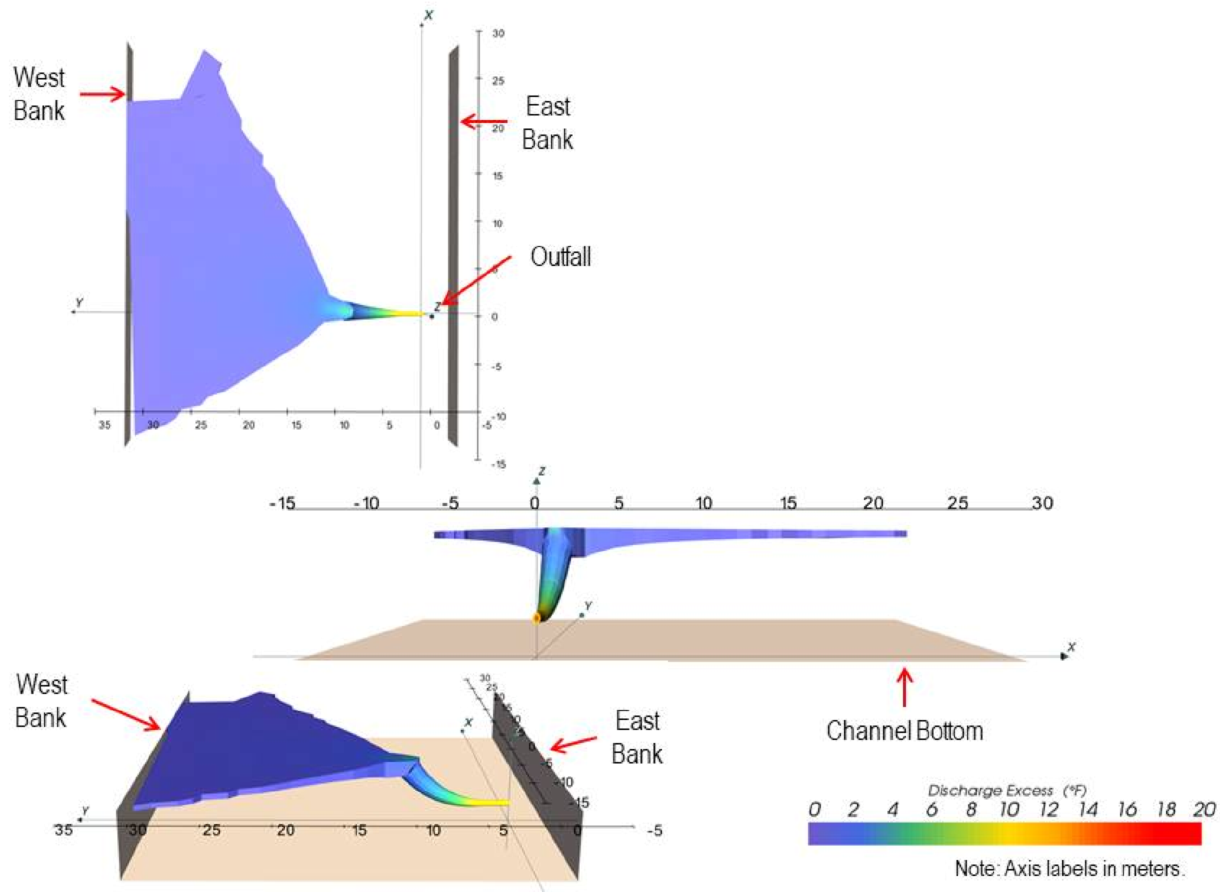


Figure 7. October 2.5 mgd worst-case thermal plume scenario, based on effluent temperature of 75.6°F, river temperature of 55.6°F (20.0°F temperature differential), effluent flow of 3.38 mgd, and river velocity of 0.05 fps.

The plume reaches the surface about 10 m from the outfall pipe for the 2.5 mgd discharge scenario (Figure 7) and about 15 m from the outfall pipe for the 6.0 mgd discharge scenario (Figure 8). Once at the surface, the effluent will disperse rapidly in all directions, forming a "mushroom-like" plume near the outfall during such slack-tide conditions. The effluent continues to cool rapidly as it mixes with river water and becomes exposed to ambient air temperatures at the surface, attenuating to within about 1°F of river background 20 m from the outfall for both the 2.5 mgd discharge scenario (Figure 7) and the 6.0 mgd discharge scenario (Figure 8).

The initial portion of the plume, closest to the outfall pipe, shown in Figure 7 is ≤ 5 m in diameter and temperatures in the plume cool to within about 10°F of river background within the initial 5 m from the outfall pipe, and to within just a few degrees of river background within 10 m from the outfall pipe. Based on a river background temperature of 55.6°F, absolute temperatures within this initial portion of the plume would be in the mid 60°F range nearest the outfall and upper 50s°F at 10 m from the outfall. The thermal gradients in the warmest portion of the plume closest to the outfall pipe are similar for the 6.0 mgd discharge scenario, with the primary difference being they stretch over an additional 5 m or so of distance compared to the 2.5 mgd scenario. Immigrating adult steelhead and fall-run Chinook Salmon approaching this plume at slack-tide from downstream will move through the portion of the plume where temperatures have already attenuated to within 1°F or less of river background temperatures (i.e., temperatures in the mid-50s°F) and thus would experience no blockage, delays, lethality, or chronic adverse thermal effects. As these fish get to within about 30 m of the outfall, the majority of the channel will be unaffected by the plume, as show in Figure 7 and Figure 8 (middle and lower graphics). Fish immigrating near the surface may encounter a portion of the plume that is within about 1°F of river background for both discharge scenarios.

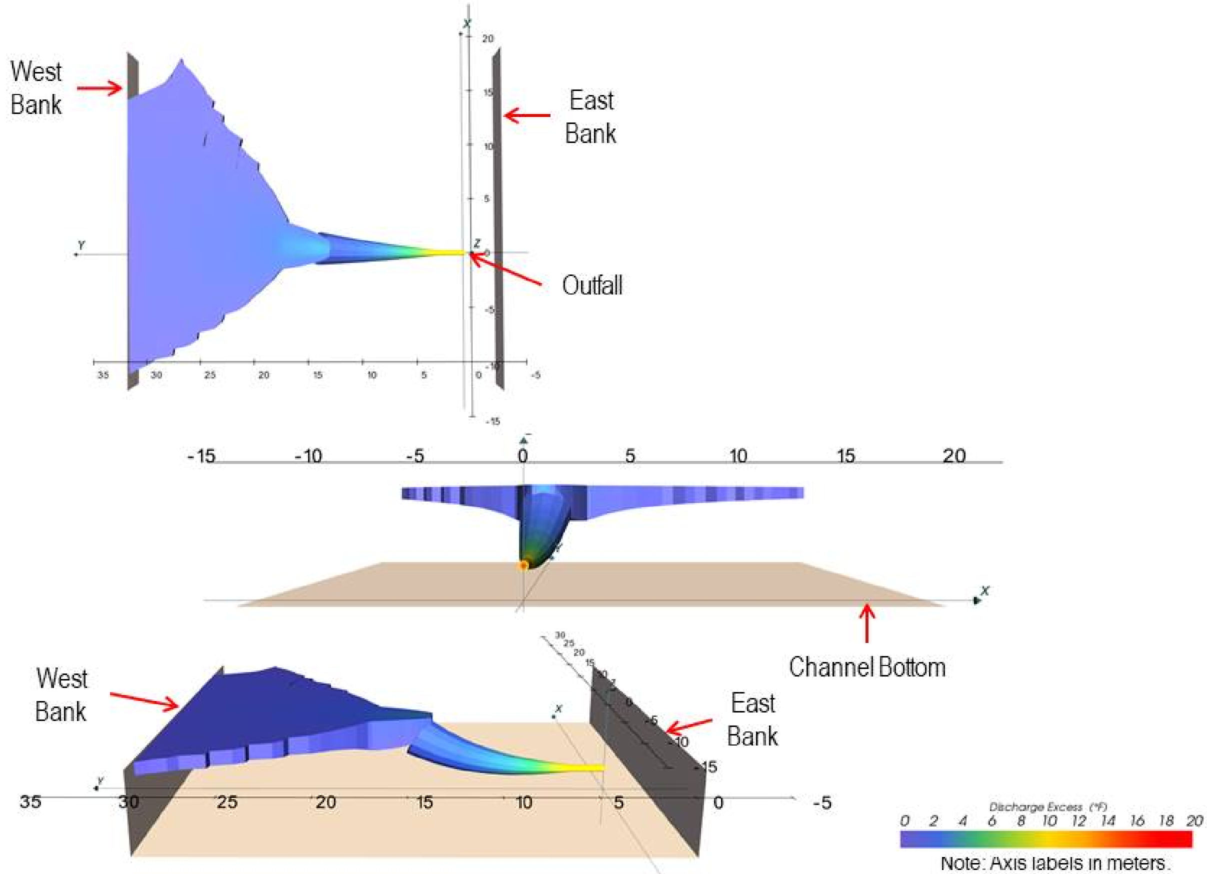


Figure 8. October 6.0 mgd Project worst-case thermal plume, based on effluent temperature of 75.6°F, river temperature of 55.6°F (20.0°F temperature differential), effluent flow of 7.55 mgd, and river velocity of 0.05 fps.

Should adult immigrating steelhead or fall-run Chinook Salmon swim through the plume within about 10 meters of the outfall pipe, where temperatures are substantially higher than river background temperatures, fish will pass through the small footprint of the plume that exists here in a matter of seconds because the plume is ≤ 5 m in diameter this close to the outfall (Figure 7 and Figure 8). Adult fish that swim through the plume close to the outfall would encounter plume temperatures up to about 6–10°F above river background temperatures for both discharge scenarios and thus in the low to mid 60s°F (see yellow and green color closest to outfall pipe in Figure 7 and Figure 8). Hence, even the warmest portion of the plume shown in the graphic would remain in the low to mid 60s°F. Based on steelhead and fall-run Chinook Salmon thermal tolerances (Table 13 and Table 14), no blockage or adverse thermal effect to immigrating adult fish acclimated to temperatures in the mid-50s°F would occur when these fish swim through a small plume of water in the low to mid 60s°F, and pass through this portion of the plume in a matter of seconds. This is the case for both the 2.5 and 6.0 mgd ADWF discharge scenarios. Hence, despite the worst-case thermal plume under near slack-tide conditions occupying a different shape within the channel near the outfall, compared to the plume that occurs under median-case temperature and flow conditions, adult immigrating steelhead and fall-run Chinook Salmon would be able to pass the worst-case thermal plume in October in much the same manner as they would pass the median-case scenario plume for October.

3.3.1.1.4 Tidal Considerations

Because the river is tidal at the outfall location, the river can flow in a downstream (north) or upstream (south) direction. For the same temperature differentials and effluent and river flow conditions presented and discussed above for net flow in the downstream (north) direction, the plume will look virtually the same if the net river flow were to be in the upstream (south) direction. The plume will simply exist upstream of the outfall pipe rather than downstream. Although channel topography differs somewhat upstream of the outfall versus downstream of the outfall, they are sufficiently similar that topography will not change the plume footprint upstream of the outfall substantially from that presented and discussed downstream of the outfall. Consequently, the above assessments for the median-case scenarios when net river flow is in the downstream (north) direction under an ebb tide also reasonably represents the plume for the same temperature differential and effluent and river flows when the net river flow is in the upstream (south) direction under a flood tide, assuming similar river velocities. At lower river velocities, the plume will spread both horizontally (toward the west bank) and vertically in the water column somewhat closer to the outfall compared to when river velocities are higher.

Following full tidal reversal, and movement of river and effluent in the upstream direction, the previously discharged effluent that has fully mixed with the river flow downstream of the outfall now becomes "river background" for the upstream plume. This river water already has effluent fully mixed and thus may be warmer than river water several miles upstream of the outfall. This was evaluated as follows. First, as stated in Section 3.1, there is no "build-up" of temperature in the action area that needed to be accounted for, relative to unaffected river background temperature. Discharge-related temperature increases were zero 1.9 miles upstream of the outfall (Table 10). At the outfall location, DSM2 modeling showed an average incremental increase in river temperature of about 0.1°F in October (Table 8) for the 6.0 mgd ADWF discharge scenario.

At a distance of 1.7 miles downstream of the outfall (Table 9), the average incremental increase in river temperature remained at 0.1°F in October.

Hence, on average, river background temperatures during October would be elevated on tidal reversals by only 0.1°F. Because river temperatures October through January at the outfall location for the 6.0 mgd ADWF discharge scenario were modeled to range from the mid-50s°F to the mid-70s°F, adding 0.1°F to river background temperatures to account for the tidal effects on background river temperature results in no change to the thermal effects findings made above.

There is no similar change for the worst-case plume presented for slack-tide conditions. This plume will look the same under slack-tide, regardless of the prior direction of net river flow. As such, only one worst-case, slack-tide condition exists for each month.

3.3.1.1.5 November through January

Similar thermal plumes to those discussed in detail above for October would exist near the outfall in November (Appendix C, Figures C-41 through C-44), December (Appendix C, Figures C-45 through C-48) and January (Appendix C, Figures C-1 through C-4). This is because median temperatures differentials modeled for these months are 18.6°F, 20.0°F, and 18.5°F, respectively, and only slightly higher than the 16.0°F modeled for October (Table 16). Worst-case temperature differentials were modeled to be 20°F for October as wells as November through January. River velocities are also similar during these months to that of October (**Appendix D**). In short, the minor differences in plume size, shape, and thermal gradients that occur for the worst-case half of plume conditions November through January do not differ sufficiently from that already assessed for October to warrant further assessments for these months. Zones of passage and thermal exposure scenarios would be similar November through January to that assessed above for October, with colder river background and plume temperatures occurring during the November through January winter months. Thermal exposures, including those near the outfall pipe, would remain well within the thermal tolerances of steelhead (Table 13) and fall-run Chinook Salmon (Table 14).

Hence, the assessment findings that October median-case and worst-case thermal plumes for the 2.5 mgd and 6.0 mgd ADWF discharge scenarios would not block or delay steelhead or fall-run Chinook Salmon immigration, cause lethality to individuals, or cause any chronic, adverse sublethal effects also apply for thermal plumes that could occur November through January for the 2.5 mgd and 6.0 mgd ADWF discharge scenarios.

Based on the above assessment findings, adult steelhead and fall-run Chinook Salmon would not be blocked or delayed by any CTF thermal plume that could occur October through January, nor would any thermal plume that could occur during these months for the 2.5 or 6.0 mgd ADWF discharge scenarios cause thermally induced lethality or any chronic, adverse sublethal effects to immigrating adult steelhead or fall-run Chinook Salmon.

3.3.1.2 February

In February, Steelhead immigration continues to occur through the action area, fall-run Chinook Salmon immigration has ceased to occur, and spring-run Chinook Salmon and Delta Smelt immigration through the action area is initiated and continued through May for both species (Figure 4).

River background temperatures in February range from the high 40sºF to the low 60sºF (Table 8). Modeled thermal plumes for the 6.0 mgd ADWF median-case (**Figure 9**) and worst-case (**Figure 10**) discharge scenarios are presented and assessed below.

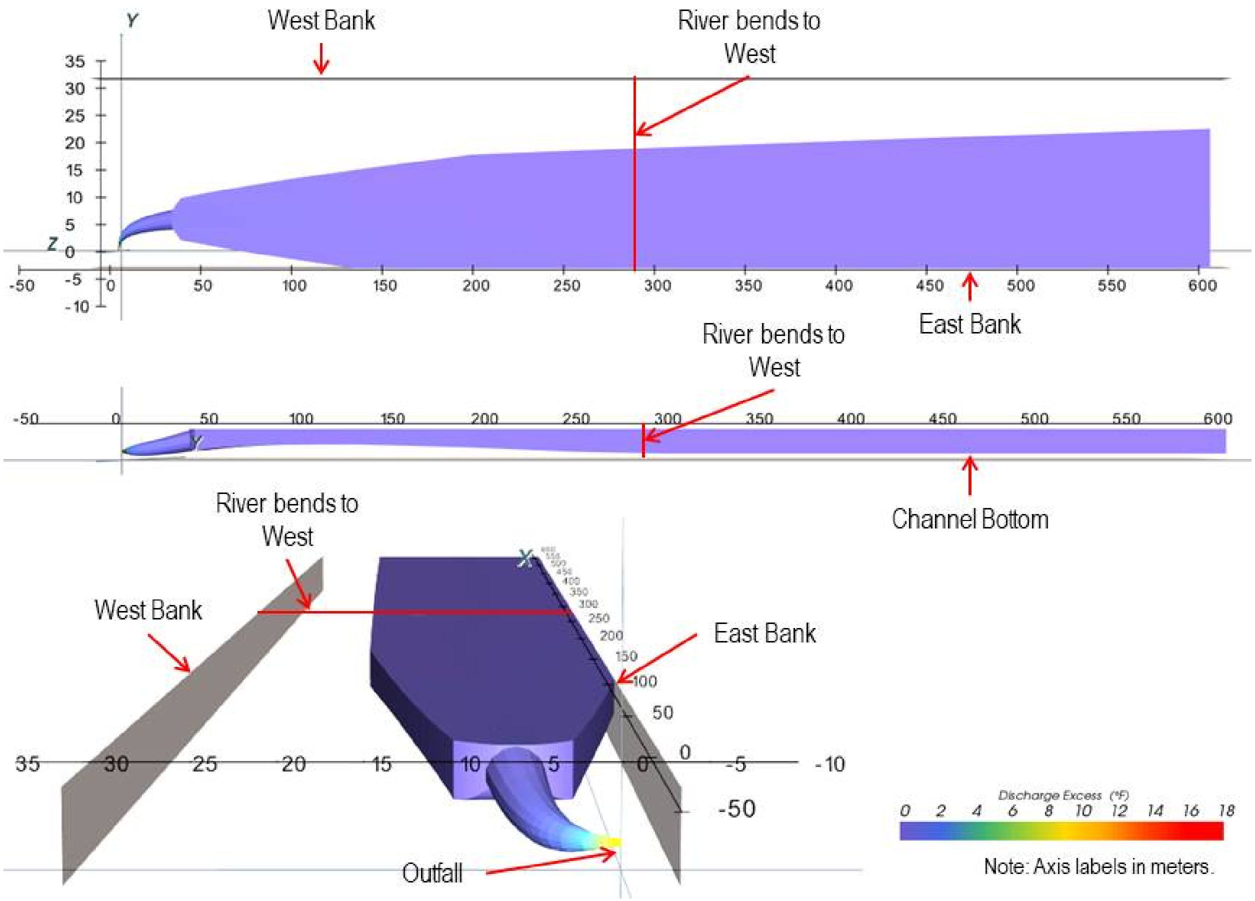


Figure 9. February 6.0 mgd Project median-case thermal plume, based on effluent temperature of 72.9°F, river temperature of 56.1°F (16.8°F temperature differential), effluent flow of 7.30 mgd, and river velocity of 1.37 fps.

The thermal plumes that would occur in February are highly similar in shape and thermal gradients to those presented and discussed in detail above for October, as well as November through January (Appendix C, Figures C-37 through C-48 and C-1 through C-4). This is because the CTF is discharging a relatively small volume of effluent into a large river, the fact that the median-case and worst-case CORMIX input parameters do not vary widely across these fall and winter months (Appendix D), and the fact that river channel remains constant in its bathymetry. The result is that substantial zones of passage exist around the plume—similar to those discussed in detail above for October. In both median and worst-case scenarios for the 6.0 mgd ADWF discharge, plume temperatures are attenuated to within about 1ºF of river background within approximately 20–25 m from the outfall pipe. Hence, immigrating adult steelhead, spring-run Chinook salmon and Delta Smelt that pass through portions of the plume more than 25 m from the outfall pipe would experience plume temperatures within about 1ºF of river background, which would not block or delay their movements or cause any adverse thermal effects because both river background and plume temperatures here would be in the low to mid-50sºF for the scenarios modeled.

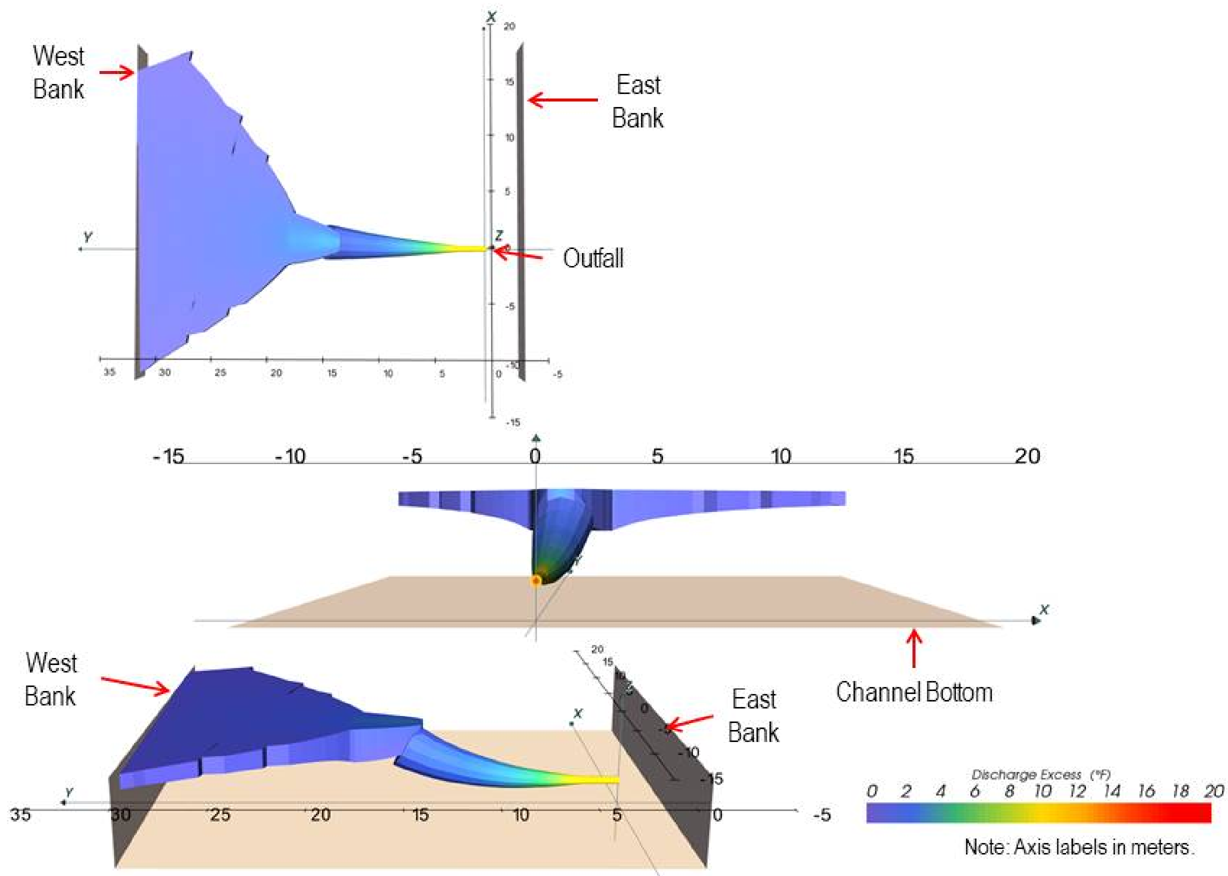


Figure 10. February 6.0 mgd Project worst-case thermal plume, based on effluent temperature of 71.0°F, river temperature of 51.0°F (20.0°F temperature differential), effluent flow of 7.55 mgd, and river velocity of 0.05 fps.

Fish that pass through the warmest portion of the plume, within about 10 m of the outfall pipe, would encounter plume temperatures up to about 6–10°F above river background temperatures and thus in the high 50s°F to mid-60s°F. Hence, even the warmest portion of the plume shown in Figure 9 and Figure 10 would remain in the high 50s°F to mid-60s°F. Based on steelhead

(Table 13), spring-run Chinook Salmon (Table 14), and Delta Smelt (Table 15) thermal tolerances, no blockage/delay, lethality, or adverse thermal effects to immigrating adult fish acclimated to temperatures in the low to mid-50s°F would occur when these fish swim through a small plume of water in the high 50s°F to mid-60s°F, and pass through this portion of the plume in a matter of seconds.

Because of the similarity of the thermal plumes that would occur in the river near the proposed CTF outfall in February for a discharge rate of 2.5 mgd ADWF (Appendix C, Figures C-5 and C-7), the same thermal effects findings made above for steelhead, spring-run Chinook Salmon, and Delta Smelt for the higher 6.0 mgd ADWF discharge rate also apply to the lower 2.5 mgd ADWF discharge rate.

Based on the above findings, adult immigrating steelhead, spring-run Chinook Salmon, and Delta Smelt would experience no blockage/delay, lethality, or chronic, adverse sublethal thermal effects from passing through any thermal plume that could occur in the San Joaquin River near the proposed CTF outfall in February for discharge rates of 2.5 or 6.0 mgd ADWF.

3.3.1.3 Spring (March, April, and May)

3.3.1.3.1 March

Figure 11 and **Figure 12** show the median-case and worst-case thermal plume scenarios, respectively, for the 6.0 mgd ADWF discharge scenario in March – a key month of adult immigration for Green Sturgeon, Steelhead, spring-run Chinook salmon, and Delta Smelt. Appendix D summarizes the differences in CORMIX input parameters modeled for all months and thus allows comparison of modeled input parameters for March versus October and February assessed in detail above. Model input parameters are very similar between October and March for the 6.0 mgd ADWF modeled scenarios, including similar river background temperatures. The result is that the median-case (Figure 11) and worst-case (Figure 12) condition thermal plumes in March are very similar in size, shape, and thermal gradients to the median-case and worst-case thermal plume conditions already analyzed above for October. Differences in plume characteristics are slight, and include distance downstream at which the plume spreads across the entire width of the channel at the surface and the exact distance downstream to reach specified temperatures within the plume.

Based on this high degree of similarity between modeled March and October thermal plumes at both 2.5 mgd and 6.0 mgd ADWF discharge rates, the assessment findings regarding thermal plume effects on adult immigration blockage/delay, lethality, and chronic adverse effects made for the October plumes assessed for steelhead also apply for this species and adult life stage during March.

Other ESA-listed fishes immigrating through the action area during March are Green Sturgeon, spring-run Chinook Salmon, and Delta Smelt. The plume remains along the east bank until it reaches the large bend in the river about 280 m downstream of the proposed outfall location. The plume reaches the water surface about 50 m downstream of the outfall pipe and mixes to the river bottom at about 200 m downstream of the outfall (Figure 11).

River background temperature for the median scenario in March is 59.6°F. Adult fish that swim through the plume within about 5 m of the outfall will encounter plume temperatures up to about 6–8°F above river background temperatures and thus in the mid to high 60s°F (Figure 11). Hence, even the warmest portion of the plume shown in Figure 11 will remain in the 60s°F. Based on Green Sturgeon, spring-run Chinook Salmon, and Delta Smelt thermal tolerances (Table 11, Table 14, and Table 15), no blockage/delay of immigration or adverse thermal effect to immigrating adult fish of these species would occur when fish would be acclimated to temperatures in the high 50s°F would swim through a small plume of water in the mid to high 60s°F in a matter of seconds. Because the thermal plume in March would be highly similar under median effluent and river flow and temperature conditions when the CTF is discharging 2.5 mgd ADWF (Appendix C, Figure C-9), the same thermal effect conclusions reached above for the 6.0 mgd median-case scenario for these species also apply to the lower 2.5 mgd ADWF median-case discharge scenario.

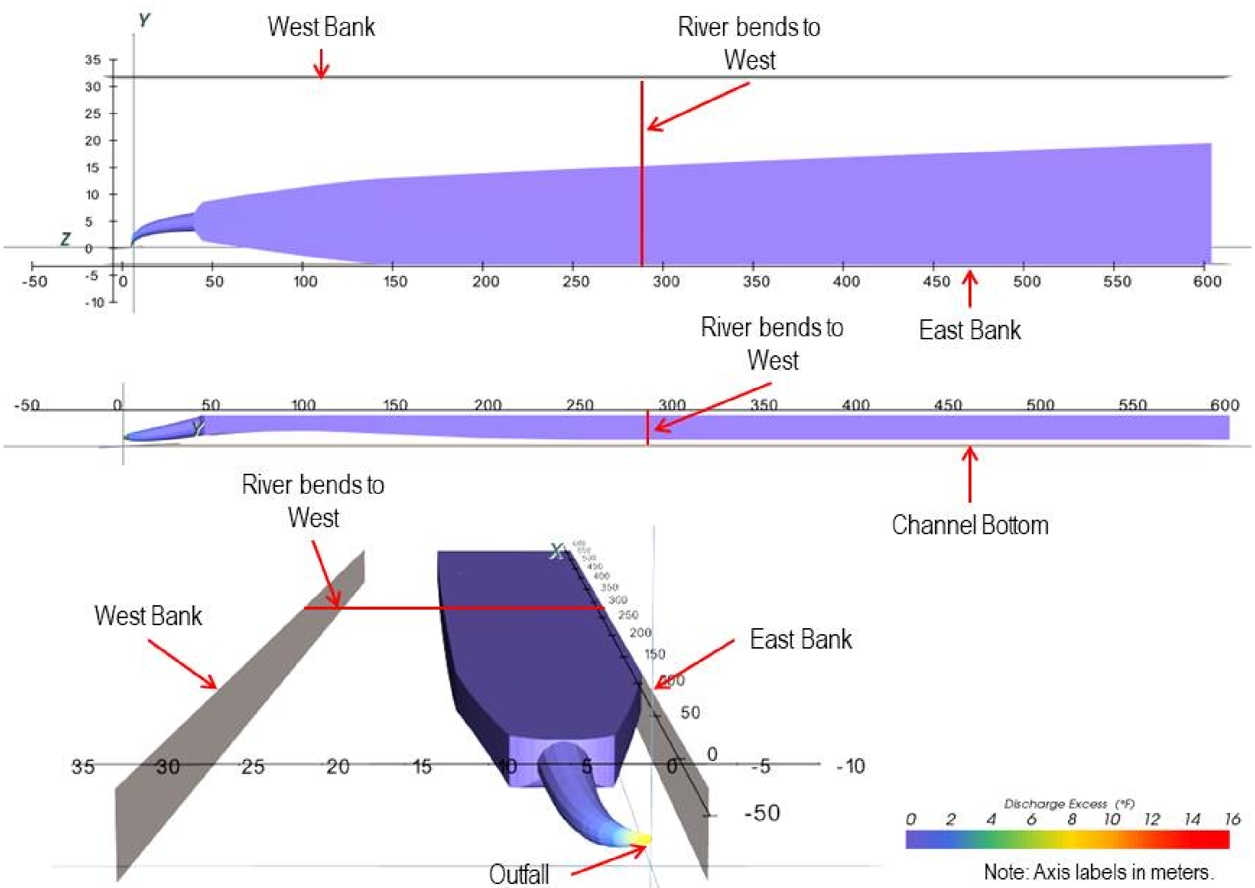


Figure 11. March 6.0 mgd median-case thermal plume scenario, based on effluent temperature of 74.3°F, river temperature of 59.6°F (14.7°F temperature differential), effluent flow of 6.70 mgd, and river velocity of 1.49 fps.

Similarly, the worst-case thermal plume that would occur in March for the 6.0 mgd ADWF discharge rate would be very similar to that which was assessed in detail above for October. This can be seen by comparing Figure 12 (March) to Figure 8 (October). River background temperature for the worst-case scenario in March is 54.5°F. Most fish would immigrate past the outfall via the ample zones of passage and thus would never encounter the plume close to the outfall pipe where river temperatures are most elevated above background. Nevertheless, adult fish that do swim through the plume close to the outfall will encounter plume temperatures up to about 8–10°F above river background temperatures and thus in the low to mid 60s°F (Figure 12). Based on Green Sturgeon, spring-run Chinook Salmon, and Delta Smelt thermal tolerances (Table 11, Table 14, and Table 15), no blockage/delay of immigration or adverse thermal effect to immigrating adult fish acclimated to temperatures in the mid-50s°F will occur when these fish swim through a small plume of water in the low to mid 60s°F, and pass through this portion of the plume in seconds. Because the thermal plume in March would be highly similar under worst-case effluent and river flow and temperature conditions when the CTF is discharging 2.5 mgd ADWF (Appendix C, Figure C-12), the same thermal effect conclusions reached above for the 6.0 mgd worst-case scenario for these species also apply to the lower 2.5 mgd ADWF worst-case discharge scenario.

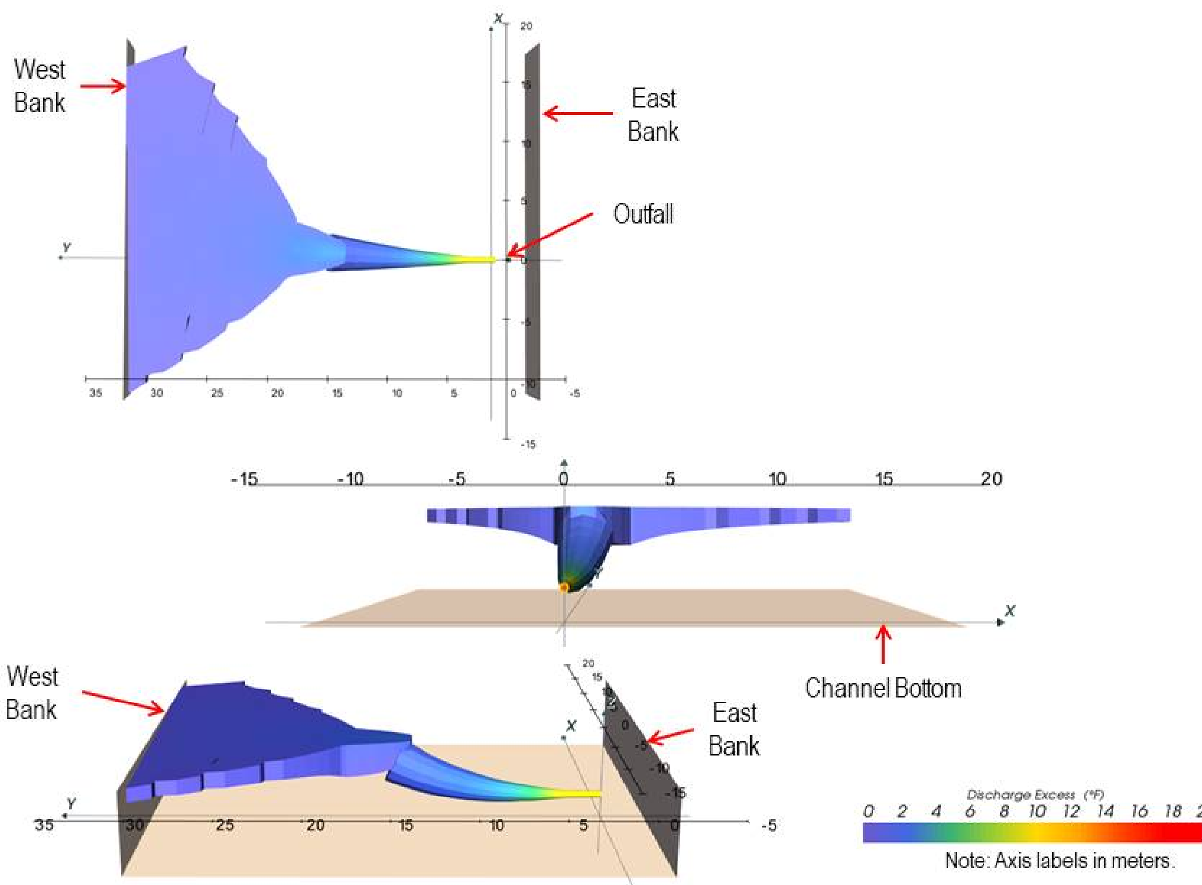


Figure 12. March 6.0 mgd worst-case thermal plume scenario, based on effluent temperature of 72.6°F, river temperature of 54.5°F (18.1°F temperature differential), effluent flow of 7.55 mgd, and river velocity of 0.05 fps.

3.3.1.3.2 April and May

The median-case and worst-case thermal plumes that would occur when the CTF is discharging at 6.0 mgd and 2.5 mgd ADWF in April (Appendix C, Figures C-13 through C-16) and May (Appendix C, Figures C-17 through C-20) differ little from those presented above for March. The primary difference being the exact distance from the outfall pipe that effluent mixes to the river bottom for the median-case scenario (i.e., about 200 m in March versus 125 m in April and May). The distance from the outfall where plume temperatures are attenuated to within about 1°F of river background temperatures would be about 20–30 m for both CTF discharge rates for all three months. The minor differences in plume configurations are driven by the minor differences in median-case and worst-case temperature differentials, CTF discharge rates, and river velocities modeled for the months March through May (Table 16; Appendix D, Tables D-3 through D5 for 2.5 mgd and D-15 through D-17 for 6.0 mgd). Consequently, the thermal effect conclusions stated above for Green Sturgeon, spring-run Chinook Salmon, and Delta Smelt immigrating past median-case and worst-case CTF thermal plumes that would occur for both 6.0 mgd and 2.5 mgd ADWF discharge rates in March also apply to these same discharge scenarios and species in April and May.

Based on the above assessment findings, adult immigrating steelhead (through March), spring-run Chinook Salmon, Green Sturgeon, and Delta Smelt would experience no blockage/delay, lethality, or chronic, adverse sublethal thermal effects from passing through any thermal plume that could occur in the San Joaquin River near the proposed CTF outfall March through May for CTF discharge rates of 2.5 or 6.0 mgd ADWF.

3.3.1.4 Summer (June through September)

In June and July, Green Sturgeon may immigrate through the Action Area. Steelhead may immigrate through the action area July through September, and fall-run Chinook Salmon immigration can begin as early as September (Figure 4).

Although adult steelhead are reported to initiate their upstream spawning immigration through the action area as early as July, they are believed to only do so in July (as well as August and September) when hydrologic and temperature conditions are conducive to do so.

3.3.1.4.1 June

Figure 13 and **Figure 14** provide graphics depicting the thermal plumes that would occur in the river near the proposed CTF outfall in June for the median-case and worst-case conditions for the 6.0 mgd ADWF discharge rate.

In the warm months of summer, the median temperature differentials are much smaller than they are in the winter months, ranging from 7.9°F to 10.7°F for the months June through September (Appendix D).

River flows and thus velocities, CTF discharge rates, and channel bathymetry remain similar or the same to the months previously discussed, so size and shape of the thermal plume remains similar to previous months. However, due to the lower temperature differential of 9.3°F for June, the distance from the outfall pipe to where plume temperatures would be attenuated to within about 1°F of river background temperatures is reduced from the 20–30 m described for previous months to about 15 m in June. Plume temperatures would be attenuated further with increasing distance downstream from the outfall pipe. This is the case for both the median-case and worst-case discharge scenarios for the 6.0 mgd ADWF discharge rate (Figure 13 and Figure 14).

Such small temperature increases within much of the plume would be expected to have little to no effect on the migration route of adult Green Sturgeon. Ample zones of passage exist underneath the plume and within the western half of the river channel near the outfall for immigrating fish to select their preferred route past the outfall. The warmest portion of the plume closest to the outfall would be ≤ 5°F above river background temperatures for the median-case condition, which results in absolute temperatures in this portion of the plume being about 76–78°F when river background temperatures are at the median for June (i.e., 72.7°F) (Figure 13).

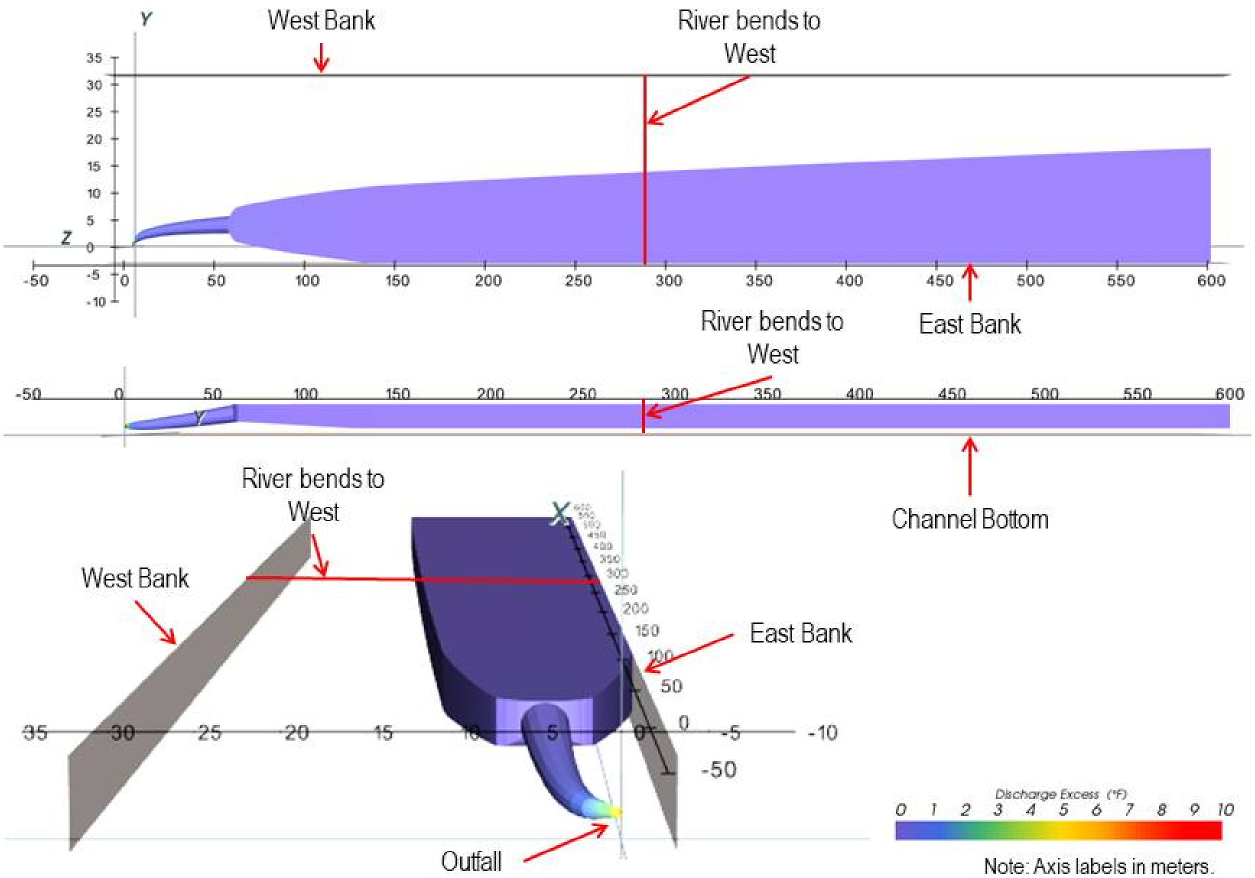


Figure 13. June 6.0 mgd median-case thermal plume scenario, based on effluent temperature of 82.0°F, river temperature of 72.7°F (9.3°F temperature differential), effluent flow of 6.1 mgd, and river velocity of 1.84 fps.

Immigration by adult Green Sturgeon through the warmest portion of the plume near the outfall, where the plume diameter is ≤ 5 m, will take just seconds. Exposure of adult Green Sturgeon acclimated to temperatures in the low 70s°F to temperatures in the warmest portion of the plume that are 76–78°F for just seconds will have no effect on their immigration, will not be lethal, and will not result in any chronic, adverse sublethal thermal effects to immigrating fish (Table 11). Moreover, adult Green Sturgeon typically move along the river bottom, thus using a zone of passage unaffected by the thermal plume, and would never encounter the warmest portion of the plume near the outfall pipe.

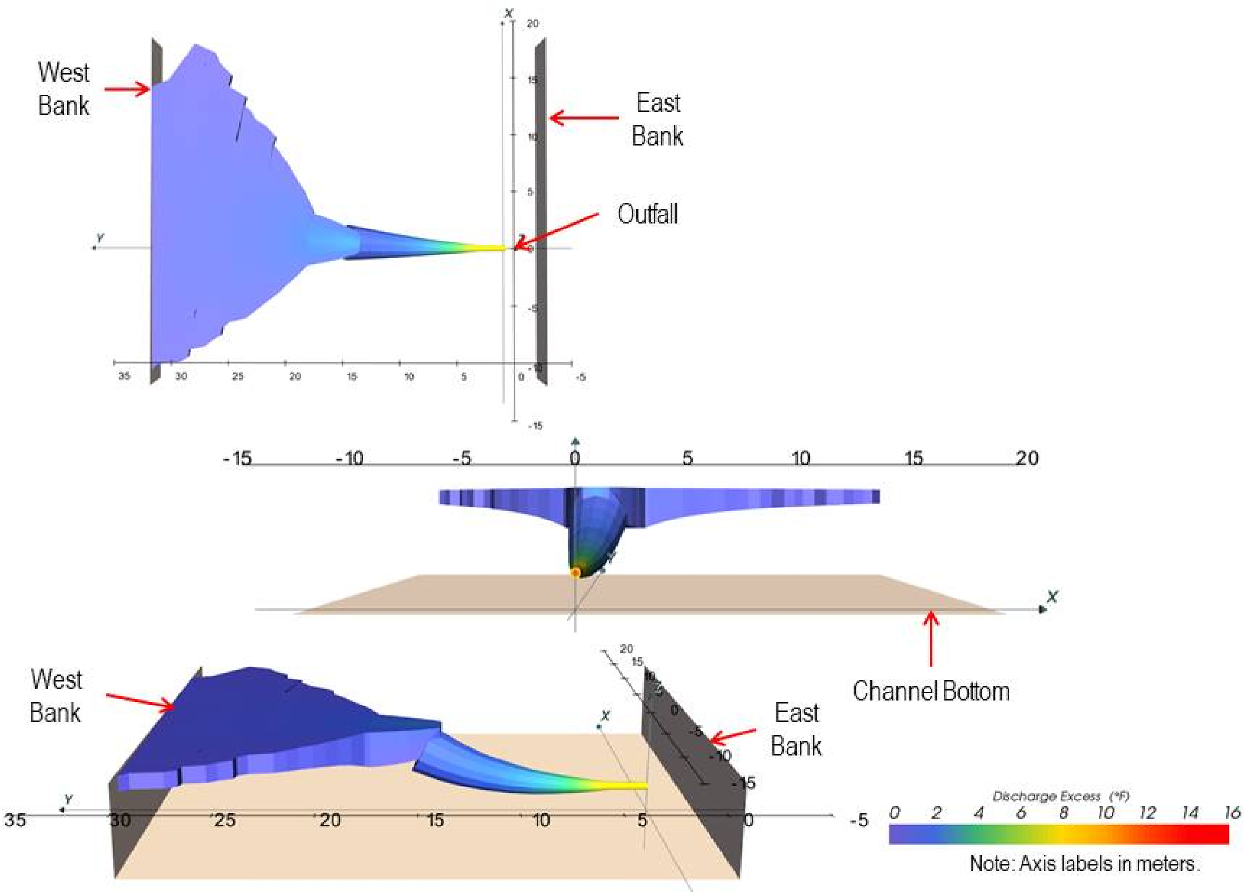


Figure 14. June 6.0 mgd worst-case thermal plume scenario, based on effluent temperature of 77.3°F, river temperature of 62.1°F (15.2°F temperature differential), effluent flow of 7.55 mgd, and river velocity of 0.05 fps.

Based on the similarity of the thermal plumes for the median-case and worst-case conditions at the lower 2.5 mgd ADWF discharge rate (Appendix C, Figures C-21 and C-23, respectively), the findings made above for adult Green Sturgeon for the 6.0 mgd ADWF discharge scenarios also apply for this adult life stage for the 2.5 mgd ADWF discharge scenarios.

3.3.1.4.2 July through September

July through September San Joaquin River and CTF effluent conditions modeled for the median-case and worst-case scenarios for both 6.0 mgd and 2.5 mgd ADWF discharge rates are very similar to that presented above for June (Appendix D, Tables D-6 through D-9 for 2.5 mgd, and D-18 through D-21 for 6.0 mgd), which results in very similar thermal plumes in July (Appendix C, Figures C-25 through C-28), August (Appendix C, Figures C-29 through C-32), and September (Appendix C, Figures C-33 through C-36) compared to June. Consequently the same thermal effects conclusions reached for adult Green Sturgeon immigration for June are applicable to these species and life stage in July, which is the final month of their immigration through the action area.

Although adult steelhead are reported to immigrate through the action area as early as July, they are believed to only do so in July, August, and September when hydrologic and temperature conditions are conducive to do so. Because CTF discharges during these months elevate river temperatures little, if at all (Table 8), CTF discharges would not significantly reduce the percentage of time that river temperatures are conducive for adult steelhead immigration during these months. When river background temperatures during these months are in the mid to upper 70s°F, little steelhead immigration through the action area is expected to occur. Nevertheless, should any steelhead immigrate through the action area under such conditions, the thermal plume that exists under these conditions would be of a similar shape and size to those presented and discussed above for June.

The CTF thermal plumes would be within about 1°F of river background within 5-15 m of the outfall pipe, and would differ from river background by just tenths of a degree at greater distances from the outfall July through September. Such small temperature increases within much of the plume would be expected to have little, if any, effect on the migration route of adult steelhead. Immigration by adult steelhead through the warmest portion of the plume near the outfall, where the plume diameter is ≤ 5 m, would take just seconds. Exposure of adult steelhead acclimated to temperatures in the mid-60s to low 70s°F July through September (Appendix D) to temperatures in the warmest portion of the plume that are in the upper 60s°F to upper 70s°F for just seconds would have no effect on their immigration, would not be lethal, and would not result in any chronic, adverse sublethal thermal effects to immigrating fish (Table 13).

Finally, fall-run Chinook Salmon initiate their upstream spawning immigration during September. Like discussed above for steelhead, the amount of fall-run Chinook Salmon immigration that occurs in September is correlated to river conditions, particularly temperature conditions. The CTF discharges have negligible (i.e., ≤ 0.3°F) effects on fully mixed river temperatures in September and thus would not significantly reduce the percentage of time that river temperatures are conducive for adult fall-run Chinook Salmon immigration during September.

Based on the plume temperatures in September discussed above for steelhead, exposure of adult fall-run Chinook Salmon acclimated to temperatures in the mid-60s to low 70s°F in September (Appendix D) to temperatures in the warmest portion of the plume that would be in the upper 60s°F to upper 70s°F for just seconds would have no effect on their immigration, would not be lethal, and would not result in any chronic, adverse sublethal thermal effects to immigrating fish (Table 14).

Based on the above findings, adult immigrating Green Sturgeon, steelhead, and fall-run Chinook salmon would experience no blockage/delay, lethality, or chronic, adverse sublethal thermal effects from passing through any thermal plume that could occur in the San Joaquin River near the proposed CTF outfall July through September for discharge rates of 2.5 or 6.0 mgd ADWF.

3.3.1.5 Energetic Effects of Plume Avoidance on Adult Fishes

Effluent discharges from the CTF into the San Joaquin River would undergo rapid thermal attenuation with distance from the outfall, typically resulting in plume temperature being within about 1ºF of river background within about 30 m from the outfall pipe year-round. Moreover, the portion of the plume closest to the outfall pipe where plume temperatures would be most elevated would be small in geographic size. Hence, large zones of passage, unaffected or minimally affected (thermally) by the discharge, exist around the outfall pipe. Any fish that were to pass through the warmest portion of the plume would do so quickly due to the plume's small size nearest the outfall pipe. Consequently, most fish immigrating past the proposed CTF outfall and associated thermal plume would not be expected to alter their migration route past the outfall due to the thermal plume. Nevertheless, should the thermal plume cause immigrating adult Green Sturgeon, steelhead, spring-run and fall-run Chinook Salmon, or Delta Smelt to alter their migration route past the outfall, such course change(s) within the channel would be small in nature (i.e., tens of meters or less). The extra energetic output immigrating adult fish may expend to make such an alteration to their migration route within the channel near the outfall would be negligible and thus insignificant relative to the energetic expenditures these fish make for their overall immigration to upstream spawning areas. As such, any minor alteration to adult fish migration routes would result in insignificant effects on the metabolic energy reserves of the fish that are utilized for their immigration to upstream spawning grounds. These insignificant additional energetic expenditures would not affect the survival of individual adult fish immigrating past the outfall, nor would such movements adversely affect immigrating adult fish in sublethal ways (e.g., fecundity). Consequently, the insignificant effects on immigrating adult fish energetic expenditures would have no population-level effects to these fishes.

3.3.2 Juvenile Emigration

3.3.2.1 Possible Plume Exposures for Emigrating fishes

Like upstream immigrating adult fish, most juvenile fish emigrating downstream would pass the outfall via a zone of passage that is unaffected or minimally affected (i.e., ≤1–2°F above background temperatures) by the thermal discharge. Such zones of passage cover the majority of the water column, as shown in the monthly plume graphics in Appendix C. Only those fish that move past the outfall within about 10–15 m of the outfall pipe would encounter the greatest thermal gradients that exist within the plume nearest the outfall. Fish migrating through the portion of the plume having the largest thermal gradient would be subjected to one of three possible thermal exposures. The first is when there is net flow is in a downstream (north) direction. In this case, fish coming from the south (upstream) would be subjected briefly to an abrupt and substantial increase in temperature upon encountering the warmest portion of the plume, followed by a gradient of rapidly decreasing temperatures as the thermal plume mixes with river water, thereby causing temperatures to become attenuated, rapidly returning to within 1°F of background temperatures within ≤ 30 m of the outfall pipe in all months, with further temperature attenuation occurring with increasing distance downstream. This type of exposure, commonly referred to as thermal shock when the temperature increase is substantial, could have adverse effects to emigrating fish if the exposure temperatures are outside the range of the thermal tolerance for the species and life stage.

The second exposure scenario exists at slack tide. Under slack-tide conditions, most emigrating fish would pass the outfall via the ample zones of passage that are either unaffected or minimally affected thermally by the plume. The portion of the plume within about 15 m of the pipe, where the largest thermal gradients occur, is oriented perpendicular to the river channel at slack tide. Consequently, fish emigrating in a downstream direction would move through the warmest portion of the plume in just a few seconds because it is only a few meters wide near the outfall, and thus once through several meters of water having elevated temperatures nearest the outfall, fish would then enter into unaffected waters on the downstream side of the plume. As these fish continue to move downstream, they may re-encounter portions of the plume, but plume temperatures farther downstream would be ≤1°F above river background temperatures.

The third exposure scenario exists on a flood tide when the thermal plume moves upstream (south) of the outfall on a reverse-flow and emigrating fish are coming from the south. These fish will initially encounter the far reaches of the plume where temperatures are elevated only tenths of a degree above background. As fish move closer to the outfall, they likely will encounter zones of passage and avoid passing through the warmest portion of the plume nearest the outfall pipe along the eastern and central portions of the river channel. Those fish migrating near the eastern bank of the river at or just above the depth of the outfall pipe would experience increasing temperatures as they get closer to the outfall, followed by a rapid return to background temperatures once past the outfall.

3.3.2.2 Assessment Approach

Although the three thermal exposure scenarios identified above differ, they can all be similarly evaluated herein primarily because the length of time that fish would be exposed to plume temperatures is short, and the time exposed to plume temperatures multiple degrees above river background nearest the outfall would be very short – on the order of tens of seconds or less.

Thermal shock and upper incipient lethal temperature (UILT) studies typically expose fish to abrupt changes in water temperatures. However, many published UILT studies expose test organisms to periods of elevated constant temperatures for long periods (e.g., hours or days). In the absence of short-term acute thermal shock data for a given species or life stage, thresholds derived from UILT or CTM studies may be considered as a conservative estimate of the potential risk associated with short-term (e.g., seconds or even minutes) exposure to a given temperature or temperature difference.

Hart (1947, 1952; as cited by Hokanson et al. 1977) reported that most fish species can tolerate short-term increases in temperature of 27–32ºF above acclimation temperature, provided that the higher exposure temperature is below the lethal threshold for the species. USEPA (1973) states that moderate temperature fluctuations can generally be tolerated as long as a maximum upper limit is not exceeded for long periods. This is supported by more recent work conducted by Cech et al. (1990), where several species of native California fishes were acclimated to certain temperatures (i.e., 50ºF, 59ºF, 68ºF, 77ºF, 86ºF) and then exposed to a 9ºF temperature increase over a 3–5 hour period. Findings from this study showed that fish metabolic rates were generally, but not always, elevated following such rapid changes in temperature, but that mortality did not occur unless the elevated temperature to which fish were rapidly exposed was at or higher than their UILT.

As was done above for assessing the effects of the CTF thermal plume on immigrating adult special-status fishes, the assessments for the juvenile life stage (and larval life stage for Delta Smelt) are focused primarily on the 6.0 mgd ADFW discharge rate, knowing that the potential for thermal effects to the species would be equal or lesser for the lower discharge rate of 2.5 mgd ADWF.

3.3.2.3 <u>November through February</u>

Green Sturgeon is the only species to potentially use the action area as juveniles year-round for rearing. Spring-run Chinook Salmon and winter-run Chinook Salmon juveniles can use the action area December through February. Steelhead juveniles emigrate through the action area to rearing areas in the Delta and on their way to ocean entry in January and February (Figure 4).

Based on the assessments provided above for adult immigration, and the monthly thermal plumes presented in Appendix C for both 2.5 mgd and 6.0 mgd ADWF discharge rates, it is apparent that the November thermal plumes conservatively represent median-case and worst-case thermal plumes at the proposed CTF outfall throughout the November through February period. They are conservative in the sense that both river background and effluent temperatures are highest in November compared to December through February, and yet the temperature differentials modeled are the same as the other months for the worst-case scenario (i.e. 20°F for all months) and similar for the median-case scenario (i.e., 18.6°F in November vs. 16.8°F–20°F for December through February) (Appendix D). The colder river and effluent temperatures in December through February are less likely to present thermal exposures that reach or exceed species' UILTs or CTMs. As such, the November plumes are evaluated for effects to juveniles passing the outfall during these late fall/winter months of the year. If no lethality or chronic, adverse sublethal effects are found to occur for any of the species assessed for November, no adverse effects would be expected to occur December through February, when both river and effluent temperatures are notably colder.

Most juvenile fish emigrating downstream past the outfall would travel through zones of passage that are either unaffected or minimally affected thermally by the plume (i.e., only pass through portions of the channel where the plume doesn't exist or plume areas where temperatures are ≤1°F above river background temperatures). Such zones of passage cover the vast majority of the channel cross-section, with the area of substantial thermal gradients restricted to a limited area within about 10–15 m of the outfall pipe (See Appendix C, Figures C-41 through C-48 and C-1 through C-8). As such, the majority of Green Sturgeon and spring-run Chinook Salmon emigrants (as well as winter-run Chinook Salmon emigrants moving past the outfall) would never encounter the warmest portion of the plume within about 10–15 m of the outfall. As juveniles continue moving downstream, they may eventually encounter the plume (due to its spreading across the channel), but plume temperatures beyond about 30 m away from the outfall differ from river background by less than 1°F (Appendix C, Figures C-41 through C-48 and C-1 through C-8). Because background river temperature during the November through February period are always in the 40s, 50s, and 60s°F, plume temperatures beyond about 10 m from the outfall would remain in this range and thus would have no thermal effects on juveniles passing the outfall.

Juveniles acclimated to river temperatures in the high 50s°F that swim into the warmest portion of a median-case November plume (Appendix C, Figure C-42), within about 10 m of the outfall, would encounter plume temperatures in the mid to high 60s°F. Likewise, juveniles acclimated to temperatures in the mid-50s°F that pass through the warmest portion of the worst-case plume would initially encounter plume temperatures in the mid to upper 60s°F, which rapidly attenuate to within about 1°F of river background over the initial 15 m of the plume. The diameter of the thermal plume nearest the outfall pipe where plume temperatures are highest is ≤5 meters for both median-case and worst-case thermal plumes (Appendix C, Figure C-42 and C-44).

Robertson-Bryan, Inc. (2013, Study Element 5) showed through an acoustic tagging study that juvenile Chinook Salmon emigrated through the lower Sacramento River at a rate of about 1.1 miles per hour or 0.49 meters per second. Because the warmest portion of the plume nearest the outfall is ≤5 m in diameter, and because San Joaquin River velocities modeled for the median-case conditions are about half that of average lower Sacramento River velocities, juvenile Chinook Salmon (and likely steelhead as well) are estimated to emigrate through this portion of the plume in about 15 to 20 seconds. Because current is lacking at slack tide, fish emigration rates may be lower, but fish would still be expected to move through the ≤5 m dimeter plume close to the outfall in 1 minute or less. Although Green Sturgeon emigration rates may be different, they also would be expected to pass through the warmest portion of the plume in about 1 minute or less. In fact, if emigrating near the river bottom, juvenile Green Sturgeon would move through a zone of passage underneath the warmest portion of the plume closest to the outfall.

Hence, juvenile fish passing through the warmest part of the median and worst-case plumes would be exposed to temperatures ≤10°F higher than their acclimation temperatures (Appendix C, Figure C-42 and C-44) for about 1–2 minutes or less. Myrick and Cech (2005) and similar CTM studies showed that exposure to increasing temperatures over 22–59 minutes, with maximum exposure temperatures being 19–32°F above acclimation temperatures, was required before juvenile steelhead lost equilibrium. Also, Verhille et al. (2016) exposed juvenile steelhead acclimated to 54.5°F to 76.3°F (21.8°F higher than acclimation temperature) for about 6 hours and showed the juveniles maintained 95 percent of the peak aerobic scope (Table 13).

Similarly, juvenile Chinook Salmon collected from the Columbia River showed no lethality and no vulnerability to predation after being acclimated to 53.6°F and then exposed to 78.8°F (a 25.2°F temperature differential) for up to 120 minutes (Mesa et al. 2002). In a study of the thermal impacts of Sacramento Regional County Sanitation District's SRWTP discharge on the aquatic life of the lower Sacramento River, Robertson-Bryan, Inc. (2013) found no increased predation of hydroacoustic-tagged juvenile Chinook Salmon smolts as they emigrated past the thermal plume associated with the SRWTP diffuser outfall in the Sacramento River near Freeport. This SRWTP had similarly high temperature differentials to that of the CTF. However, due to the larger plume size for the SRWTP versus the much smaller CTF plume, fish exposure time to the warmest portion of the SRWTP plume was on the order of 5-20 minutes compared to ≤1–2 minutes for the CTF thermal plume.

Regarding Green Sturgeon, Allen et al. (2006) found juvenile Green Sturgeon can handle temperatures of 75.2°F without compromising swimming performance. Sardella et al. (2008) reported that juvenile Green Sturgeon acclimated to 64.4ºF in freshwater (0.5 g/L salinity) had a CTM (until branchial ventilation ceased) of 92.7ºF. Studies by Verhille et al. (2016) and Rodgers et al. (2018) found the CTM was similar to that identified by Sardella et al. (2008). Such juvenile CTMs in the high 80s and low 90s°F suggest that juvenile Green Sturgeon (Table 11) are more thermally tolerant than juvenile steelhead (Table 13) and Chinook Salmon (Table 14).

The project median-case and worst-case thermal plumes that would exist in the action area during November are conservatively representative of the worst-case half of plume conditions that would occur November through February. This is because temperature differentials are already near seasonal maximums in November and both river and effluent temperatures in November are higher than those that will occur December through February. Based on the juvenile life stage thermal tolerance literature summarized above for Green Sturgeon, steelhead, and Chinook Salmon, and the acclimation temperatures and thermal exposure scenarios that emigrating juvenile fish would encounter near the proposed CTF outfall where plume temperatures are most elevated, it is concluded that juvenile fish thermal exposures to plume temperatures near the outfall during these months would not exceed the species' thermal tolerance range.

At greater distances away from the outfall, the effluent continues to mix with receiving water flows and thus plume temperatures are reduced rapidly with increasing distance from the outfall. Hence, fish exposure to plume temperatures at greater distances away from the outfall as they continue their emigration also will not exceed the species' thermal tolerances. Consequently, exposures of outmigrating juveniles to the thermal plumes that will occur in the action area November through February for CTF discharges of 2.5 and 6.0 mgd ADWF would not block or delay emigration nor cause lethality or any chronic adverse sublethal thermal effects to juvenile steelhead, Green Sturgeon, or Chinook Salmon. This would be the case whether the thermal plume exists downstream (north) of the outfall under normal river flow conditions, upstream (south) of the outfall under reverse flow conditions, or moves in both directions under slack-tide conditions.

3.3.2.4 March, April and May

One or more months of the March through May period are peak emigration months for steelhead, spring-run Chinook salmon, and fall-run Chinook Salmon. These are also peak months of non-natal rearing in the action area for winter-run Chinook salmon and emigration/rearing for Green Sturgeon (Figure 4).

Delta Smelt emigration in the south Delta begins in March and continues through June (Figure 4), Delta Smelt, which have swimming speeds lower than that of salmonids and likely Green Sturgeon as well, would be expected to move through the warmest portion of the plume closest to the outfall in about 1-2 minutes or less. The thermal tolerances of Delta Smelt are greatest for the larval life stage and decrease somewhat for each older life stage (Komoroske et al. 2014). These researchers acclimated larval and juvenile Delta Smelt to temperatures in mid-50s°F to low 60s°F and determined their CTMs to be 84.4°F–85.8°F for the larval life stage and 80.8°F–82.8°F for the juvenile life stage (Table 15).

Worst-case (Figure 12) and median-case (Figure 11) 6.0 mgd ADWF condition plumes in March differ relatively little from that modeled for November (Appendix C, Figures C-44 and C-42, respectively). As such, findings stated above for effects of the November plume (which characterized the worst-case half of thermal plume conditions for the late fall and winter period) on juvenile fish emigration past the plume conservatively address March plume effects as well, as modeled river background temperatures are similar in March to those in November (both months being in mid to upper 50s°F) and plume thermal gradients are either similar or lesser in March (14.7°F–18.1°F) compared to November (18.6°F–20.0°F) (Table 16).

In April and May, plume size and shape remains similar to that of November and March, but thermal gradients within the plume are lesser still due to the lower temperatures differentials (i.e., 13.4°F–17.4°F) during these spring months (Table 16). River background temperatures have increased from the high 50s°F for the median-case plume condition in November and March to the low to mid-60s°F for April and May. Nevertheless, the warmest temperatures within the plume nearest the outfall pipe remain in the mid-70s°F or lower 80s°F (Appendix C, Figures C-42 and C-44 for November, C-10 and C-12 for March, C-14 and C-16 for April, and C-18 and C-20 for May). Hence, exposure of juvenile Green Sturgeon, steelhead, Chinook Salmon, and larval/juvenile Delta Smelt acclimated to temperatures in the low to mid-60s°F to temperatures ≤75°F for 1—2 minutes of less, followed by temperatures rapidly returning to near background levels as juvenile fish move away from the outfall, would not block or delay emigration nor cause lethality or any chronic, adverse sublethal effect to these fish.

Because the worst-case thermal plumes for a 6.0 mgd ADWF discharge rate were modeled as the maximum temperatures differential that occurred in the simulation period for each month (which were all between 17.0°F and 20°F March through May (Table 16)) and slack-tide condition in the river, the worst-case thermal plume conditions differed little among these months (Appendix C). Consequently, the findings made above regarding the thermal effects of the worst-case November plume on juvenile migration of the four special-status species in the late fall and winter months also cover any possible effect from worst-case thermal plumes during April and May, when the plumes are of similar size and shape within the channel but their thermal gradients are only lesser than those in the fall, winter, and early spring months.

3.3.2.5 June

Steelhead, spring-run Chinook Salmon, fall-run Chinook Salmon and Delta Smelt may emigrate through the action area as late as June. In addition, juvenile Green Sturgeon may be present in the action Area in June (Figure 4). Such emigration for steelhead, spring-run Chinook Salmon, fall-run Chinook Salmon, and Delta Smelt this late in the year tends to occur in cooler, wetter years where upstream river temperature have been sufficiently cool to allow Delta Smelt spawning to occur into late May/early June and have remained sufficiently cool to allow juvenile steelhead and Chinook Salmon to remain in upstream reaches of the river rather than emigrating to the Delta to escape high upstream river temperatures. In drier years when flows are lower and river temperatures are higher, upstream river temperature generally encourage earlier steelhead, Chinook Salmon, and Delta Smelt emigration, which tends to be completed by June in such years.

Juvenile Green Sturgeon thermal tolerances were summarized above in Section 3.3.2.3, and thus will not be repeated here. In addition, Heironimus and Jackson (2017) and Faukner and Jackson (2014) reported adult over-summering in temperatures that occasionally reached 86°F (Table 11). Although this latter study was for adults, adult and juvenile life stages are expected to have similar thermal maxima. These thermal tolerance studies suggest that Green Sturgeon juveniles are able to tolerate temperatures in the low to mid-80s°F for extended periods of time.

The median-case thermal plume in June would have smaller thermal gradients across the warmest portion of the plume nearest the outfall compared to May (Appendix C, Figure C-22). This is because the median temperature differential is 9.3°F in June versus 13.4°F in May (Table 16). Median river background temperatures in June are about 73°F (Table 8).

Based on the 6.0 mgd ADWF median-case plume modeled for June (Appendix C, Figure C-22), temperatures within the warmest portion of the plume nearest the outfall pipe are estimated to be about 78°F or less, which would attenuate to within 1°F within 15 m of the outfall and to within ≤0.3°F of background temperatures within about 50 m of the outfall. Based on the thermal tolerances of juvenile Green Sturgeon inferred from the literature cited above, Green Sturgeon acclimated to temperatures in the low to mid-70s°F that move through the warmest portion of the plume that is in the high 70s°F in a matter of seconds, and then rapidly return to waters in the low to mid-70s°F would not be blocked or delayed, nor would they experience lethality or any chronic adverse thermal effects. Moreover, juvenile sturgeon that would migrate past the outfall near the river bottom would pass underneath the warmest portion of the plume, and thus would experience temperatures that differ little, or not at all, from river background in the vicinity of the outfall. The same is true for emigrating steelhead (Table 13) and spring-run/winter-run Chinook Salmon (Table 14) based on the thermal tolerances of these species as juveniles.

It is uncertain whether Delta Smelt would use the action area as late as June when median river background temperatures are in the low 70s°F. However, it is possible that they move through the action area as larval or juvenile life stages under such June conditions. As stated above, Komoroske et al. (2014) acclimated larval and juvenile Delta Smelt to temperatures in mid-50s°F to low 60s°F and determined their CTMs to be 84.4°F–85.8°F for the larval life stage and

80.8°F-82.8°F for the juvenile life stage. Swanson and Cech (1995) provide the only thermal tolerance data for juvenile acclimated to a much higher temperature, 69.8°F, and determined their CTM to be 82.4°F, which is similar to that found by Komoroske et al. (2014) for juvenile with lower acclimation temperatures (Table 15). Based on this literature, larval or juvenile Delta Smelt acclimated to temperatures in the low to mid-70s°F that move through the warmest portion of the plume that is in the high 70s°F in a matter of seconds, and then rapidly return to waters in the low to mid-70s°F would not be blocked or delayed, nor would they experience lethality or any chronic adverse thermal effects beyond that which may be caused by river background temperatures under such conditions.

The worst-case temperature differential for June is 15.2°F, which is similar to that for May (17.4°F) (Table 16). Temperature differentials this large in June would occur in colder, wetter years when June river temperatures are in the low 60s°F. This would result in a worst-case plume very similar to that discussed above for May, and would result in river temperatures in the warmest part of the plume being in the high 60s°F to low 70s°F. Emigrating Green Sturgeon acclimated to temperatures in the 60s°F that pass through the warmest portion of the plume that is in the high 60s°F to low 70s°F in tens of seconds or less would not be blocked or delayed, nor would this plume cause lethality of any chronic adverse effects to juvenile Green Sturgeon. The same is true for emigrating steelhead (Table 13), spring-run/winter-run Chinook Salmon (Table 14), and Delta Smelt (Table 15) based on the thermal tolerances of these species as juveniles (and larvae as well for Delta Smelt).

3.3.2.6 <u>July through September</u>

Green Sturgeon are the only species of the four assessed that are believed to occur as juveniles within the action area during the July through September period of the year (Figure 4).

The median-case and worst-case thermal plumes that would occur in the river near the proposed CTF outfall for 2.5 mgd and 6.0 mgd ADWF discharge rates in the months July through September (Appendix C, Figures C-25 through C-36) would be highly similar to that assessed above for June. This is because both effluent and river temperatures reach there seasonal highs during the summer June through September period. As such, the same finding reached above for June CTF thermal plume effects to Green Sturgeon also apply for Green Sturgeon using the action area July through September.

3.3.2.7 <u>October</u>

Green Sturgeon are the only species of the four assessed that are believed to occur within the action area as juveniles during October (Table 4). The median-case and worst-case thermal plumes that would occur in October at a CTF discharge rate of 6.0 mgd ADWF are shown above in Figure 6 and Figure 8, respectively.

With October median-case river background temperatures being 63.2°F, the warmest portion of the plume closest to the outfall would be in the high 60s°F to low 70s°F. Plume temperature would be within 1°F or less of river background temperatures within about 20 meters of the outfall. Green Sturgeon acclimated to temperatures in the low 60s°F that pass through the warmest portion of the plume that is in the high 60s°F to low 70s°F in tens of seconds or less would not be blocked or delayed, nor would this plume cause lethality of any chronic adverse sublethal effects to juvenile Green Sturgeon. Juvenile green sturgeon moving along the river bottom would pass underneath the warmest portion of the plume and thus would not be exposed to the warmest portion of the plume near the outfall pipe.

With October worst-case river temperatures being 55.6°F, the warmest portion of the plume closest to the outfall would be in the mid-60s°F. Plume temperature are expected to be within 1°F or less of river background temperatures within about 20 m (Figure 8). Green Sturgeon acclimated to temperatures in the mid-50s°F that pass through the warmest portion of the plume that is in the mid-60s°F in tens of seconds or less would not be blocked or delayed, nor would this plume cause lethality of any chronic adverse effects to juvenile Green Sturgeon. As stated above for the median-case plume, juvenile Green Sturgeon moving along the river bottom would pass underneath, thereby avoiding the warmest portion of the worst-case October plume.

Because the median-case and worst-case thermal plumes the would occur in October at a CTF discharge rate of 2.5 mgd would be similar or lesser than those assessed above for a 6.0 mgd ADWF discharge rate, the thermal effect conclusion reached for Green Sturgeon passing the CTF plumes in October at 6.0 mgd ADWF also apply to the 2.5 mgd ADWF discharge condition.

3.3.2.8 Energetic Effects of Plume Avoidance on Juvenile Fishes

Should a thermal plume cause emigrating juvenile fish to alter their migration route past the outfall, such course change(s) within the channel would be small in nature (i.e., tens of meters or less). Any minor increase in fish metabolic rate that could occur from the short-term exposure to elevated plume temperatures would quickly return to baseline levels upon fish reaching the downstream portions of the plume and fully mixed condition where temperatures have returned to near background levels. The extra energetic output emigrating juvenile fish may expend to make such an alteration to their migration route within the channel near the outfall would be insignificant relative to the energetic expenditures these fish make for their overall emigration to downstream rearing areas. As such, any minor alteration to juvenile fish migration routes would result in either an insignificant effect or no effect on the metabolic energy reserves of the fish that are utilized for their emigration to downstream rearing areas, and would have no effect on juvenile fish survival or predation avoidance. Any insignificant additional energetic expenditures to alter migration route past the plume would not contribute to any population-levels effects to any of the thermally sensitive, special-status species assessed.

3.3.3 Effects to Critical Habitat

The PBFs designated for Green Sturgeon that could be affected by project thermal plumes near the outfall are food resources, water quality, and migratory corridor. For steelhead, the PBFs potentially affected are freshwater migration corridors and freshwater rearing sites. For Delta

Smelt, PBFs potentially affected by elevated river water temperature is "water," which represents suitable water quality conditions including appropriate temperatures and also food availability.

To evaluate the effects that project thermal plumes have on the PBF of food resources for Green Sturgeon and the food resources aspect of freshwater rearing sites for steelhead and water for Delta Smelt, an assessment of the effects that project-related thermal plumes have on phytoplankton, zooplankton, and benthic macroinvertebrates (the prey base for these species) that may drift through the warmest portion of the plume is provided below.

The range of project temperatures modeled to occur within the warmest portion of the thermal plumes is within the suitable range for the river's phytoplankton, zooplankton, and benthic macroinvertebrate communities. The thermal tolerances of these prey organisms was identified and discussed in Section 3.2.6 and thus will not be repeated here.

Phytoplankton, zooplankton, and detached and drifting benthic macroinvertebrates all move downstream with the currents, and do not have the ability to choose their migration pathway like mobile swimming adult and juvenile fishes. Downstream drifting organisms in the San Joaquin River (or organisms in the upstream tidal flow) may be briefly exposed to instantaneous increases in temperature within the CTF thermal plume.

The vast majority of these organisms will not encounter the CTF thermal plume where temperatures gradients are multiple degrees above river background due to the small size within the CTF thermal plume where such elevated temperature gradients would exist (i.e., only within 10–20 m of the outfall pipe). Nevertheless, some fraction of these organisms will drift through the warmest portion of the plume near the outfall pipe. The amount of time that drifting organisms would take to pass through the plume's gradient of temperatures would vary based on river flow rate but is estimated to be seconds to minutes until they reach downstream areas where mixed river temperatures would differ little from river background temperatures.

When organisms are rapidly exposed to elevated temperatures, several factors are important in determining whether the organism will experience lethality or adverse sublethal effects. These include the temperature to which the organisms were acclimated, time of exposure to elevated temperature(s), whether temperatures are increasing or decreasing over time, and the absolute temperatures to which organisms are exposed as compared to their upper incipient lethal temperatures. Studies conducted for such thermal exposures are commonly referred to as thermal shock studies, and they assess the tolerance of organisms exposed to instantaneous and short-term changes in temperature. Finding from such studies are key to understanding the effects on aquatic organisms that may pass through the CTF thermal plume for the project condition, and thus a number of such study findings are presented below for various fish prey organisms.

Langford (1990) concluded that irrespective of experimental data, short-term exposures to maximum temperatures that are below 95°F do not cause significant damage to entrained freshwater algae. Rajadurai et al. (2005) concluded that the growth rate of a diatom, *Amphora coffeaeformis*, cultured in 82.4°F waters was not significantly affected by temperature shock to 107.6°F for up to 45 minutes and a second diatom, *Chaetoceros wighami*, also cultured at 82.4°F had a minimal reduction in growth when subjected to 107.6°F for 15 minutes (97 percent of control growth), 30 minutes (94 percent of control growth), and 45 minutes (89 percent of control growth). Kivivuori and Lahdes (1996) found that a water flea (*Daphnia magna*) cultured at 68°F had a LT50 value (i.e., the temperature that resulted in lethality to 50 percent of experimental organisms) of 94.6°F when subjected to an acute 24-hour heat exposure, and 100.0°F following a thermal shock for 15 minutes. Goss and Bunting (1976) determined that *Daphnia pulex* acclimated from 41 to 86°F and *Daphnia magna* acclimated from 50 to 86°F can withstand immersion for 48 hours or more in temperatures that differed from acclimation temperatures by 18°F or more without experiencing any appreciable mortality directly attributable to the temperature change.

Benthic organisms can acclimate to changes in temperature and taxa, including those that are considered intolerant to mildly tolerant of environmental perturbation, are generally resistant to short-term, rapid changes in temperature. Wood et al. (1996) tested caddis and mayfly larvae for their response to rapid changes in temperature and found that with acclimation at 82.4°F *Helicopsyche borealis*, a caddisfly, could withstand one-hour thermal shocks of up to 101.3°F (LT50). This represents a temperature change of 19°F for a one-hour exposure. Wood et al. (1996) suggested that the magnitude of the change in temperature is not as important as the acclimation of the insects, the duration of the exposure to the higher temperature, and the absolute maximum temperature to which the BMIs are exposed.

Based on the above-cited scientific literature regarding thermal shock studies for aquatic life that serve as the prey base for the special-status fish species assessed herein, it is determined that the small portion of the San Joaquin River's phytoplankton, zooplankton, and invertebrate populations that would drift through the CTF thermal plume for the project condition would not experience lethality or chronic, adverse sublethal effects. This is because the time to move through the largest temperature gradient portion of the plume (near the outfall) would be only seconds to minutes, based primarily on river velocity. In addition, the absolute temperatures to which phytoplankton, zooplankton, and invertebrates would be exposed would always be below their upper thermal tolerances. Benthic invertebrates such as clams would not experience temperatures notably higher than background temperatures near the outfall because the plume does not interact with the river bottom near the outfall where plume temperatures are highest.

Based on the above findings, CTF thermal plumes that would exist within the Action Area would not cause mortality or chronic, adverse effects to phytoplankton, zooplankton, or benthic macroinvertebrates exposed to the plume. Consequently, the prey base for Green Sturgeon, steelhead, and Delta Smelt would not be adversely affected by the CTF discharge effects on plume temperatures within the action area. CTF thermal plumes would not reduce the quantity or quality and thus value of the food resources PBFs for southern DPS Green Sturgeon. For the same reasons, project plume temperatures would not be of sufficient magnitude to reduce the quantity or quality and thus value of the food resources aspect of the freshwater rearing sites PBF designated for Central Valley DPS steelhead or the water PBF for Delta Smelt. Because all other non-special status fishes also rely upon the river's phytoplankton, zooplankton, and benthic macroinvertebrate populations as their prey base, and because the thermal plumes associated with CTF discharges would not cause adverse thermal effects to individual prey organisms or to their populations, the CTF thermal plumes would not adversely affect the prey base for any fish species using the action area.

3.4 SUMMARY OF THERMAL EFFECTS DETERMINATIONS FOR AQUATIC BIOLOGICAL RESOURCES

Effluent discharges from the CTF into the San Joaquin River at rates of 2.5 mgd and 6.0 mgd ADWF would have minor effects (i.e., ≤0.6°F on a daily average basis in any month and ≤0.3°F on a long-term average basis for any month) on fully mixed river temperatures throughout the year. The minor effects on river temperatures would not block or delay upstream migration of steelhead, Chinook Salmon, Green Sturgeon, or Delta Smelt past the proposed CTF outfall. Moreover, the minor effects of the 2.5 mgd and 6.0 mgd ADWF discharges on fully mixed river temperatures would not cause lethality or any chronic, adverse sublethal effects to adults of these thermally sensitive, special-status species as they immigrate past the proposed CTF outfall or juvenile life stages of these species emigrating through, rearing, or holding within the action area. Likewise, fully mixed river temperatures with CTF discharges at rates of 2.5 mgd and 6.0 mgd ADWF would not cause lethality or any chronic, adverse sublethal effects (e.g., growth, biomass) to San Joaquin River phytoplankton, zooplankton, or benthic macroinvertebrates which serve as prey organisms for the thermally sensitive, special status fish species assessed as well as other fishes and aquatic organisms using the river.

CTF discharges at rates of 2.5 mgd and 6.0 mgd ADWF would create a thermal plume near the outfall prior to effluent fully mixing with river flows. The worst-case half of all possible thermal plumes was assessed regarding effects on adult upstream immigration and downstream larval/juvenile emigration through the action area. Fish moving through the thermal plume near the outfall would experience short-term exposures to elevated plume temperatures. Under no condition would the CTF thermal plume block or delay adult immigration or juvenile emigration through the action area. Moreover, neither the worst-case nor median-case thermal plumes for either 2.5 mgd or 6.0 mgd ADWF CTF discharge rates (which characterize the worst-case half of all possible plume conditions) would cause lethality or any chronic, adverse sublethal effects to adult or juvenile Green Sturgeon, steelhead, Chinook Salmon, Delta Smelt, or their prey organisms passing through the plumes in any month of the year. Based on the thermal sensitivity of these species, CTF thermal plumes would not cause lethality or any chronic, adverse sublethal effects to adult or juvenile fishes of any species moving past the outfall. Likewise, the CTF thermal plumes that would occur in the river channel near the outfall at rates of 2.5 mgd and 6.0 mgd ADWF would not cause lethality or any chronic, adverse sublethal effects (e.g., growth, biomass) to San Joaquin River phytoplankton, zooplankton, or benthic macroinvertebrates.

Should immigrating adult fish or emigrating juvenile fish alter their migration route past the proposed CTF outfall, such course change(s) within the channel would be small in nature (i.e., tens of meters). Larval Delta Smelt would drift past the proposed CTF outfall with the currents and would not alter their migration routes due to the thermal plume. The extra energetic output adult or juvenile fish may expend to make an alteration to their migration route within the channel near the outfall would be negligible and thus result in insignificant effects on the metabolic energy reserves of the fish that are utilized for their adult immigration or juvenile emigration. These insignificant additional energetic expenditures would not affect the survival of individual adult or juvenile fish migrating past the outfall. Moreover, such movements would not adversely affect migrating adult or juvenile fish in sublethal ways (e.g., fecundity for adults; growth and predation avoidance for juvenile).

Because no significant adverse thermal effects would occur to any individual fish or fish prey species using the San Joaquin River from CTF discharges at 2.5 mgd and 6.0 mgd ADWF, the CTF's thermal effects on the river would result in no adverse population-level effects to any fish or fish prey organism. Because aquatic macrophytes within the river are similarly or more thermally tolerant compared to the fish and fish prey organisms assessed, the CTF's minor thermal effects on the river also would not adversely affect the emergent and submerged macrophyte populations near the outfall. Because no significant, adverse thermal effects would occur due to CTF discharges at the individual or population levels for fish, phytoplankton, zooplankton, benthic macroinvertebrates, or macrophytes, no aquatic biological community levels effects would occur due to CTF discharges at rates of 2.5 mgd or 6.0 mgd ADWF.

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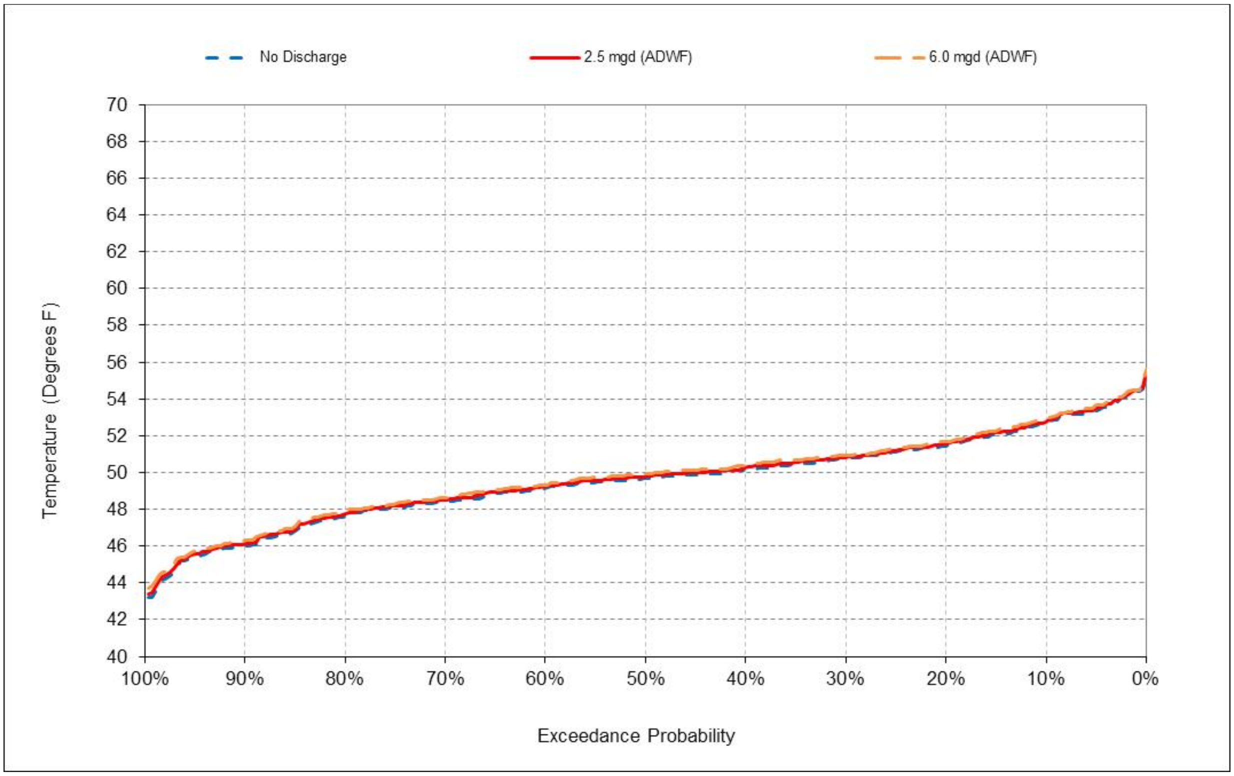


Figure A-1. January – Probability of exceeding specified fully mixed temperatures in the San Joaquin River at the CTF outfall location for no discharge (i.e., existing conditions) and 2.5 mgd and 6.0 mgd ADWF discharge conditions.

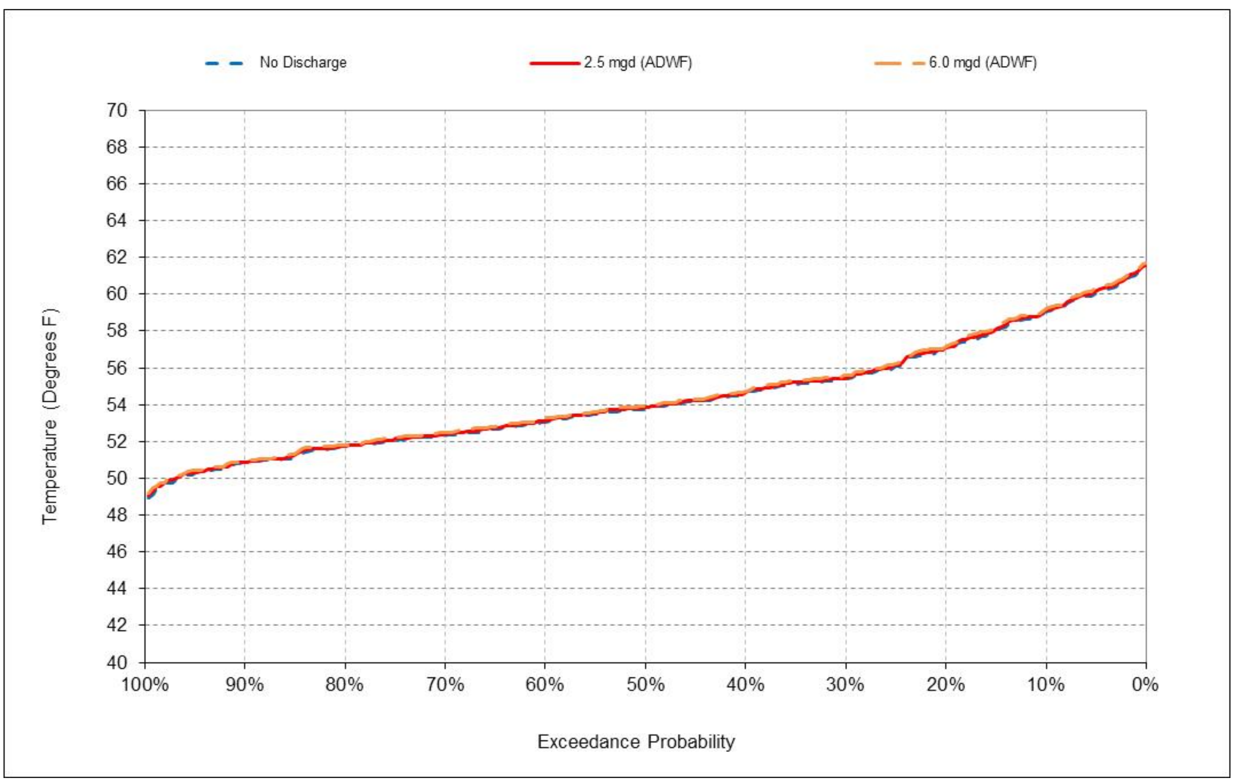


Figure A-2. February – Probability of exceeding specified fully mixed temperatures in the San Joaquin River at the CTF outfall location for no discharge (i.e., existing conditions) and 2.5 mgd and 6.0 mgd ADWF discharge conditions.

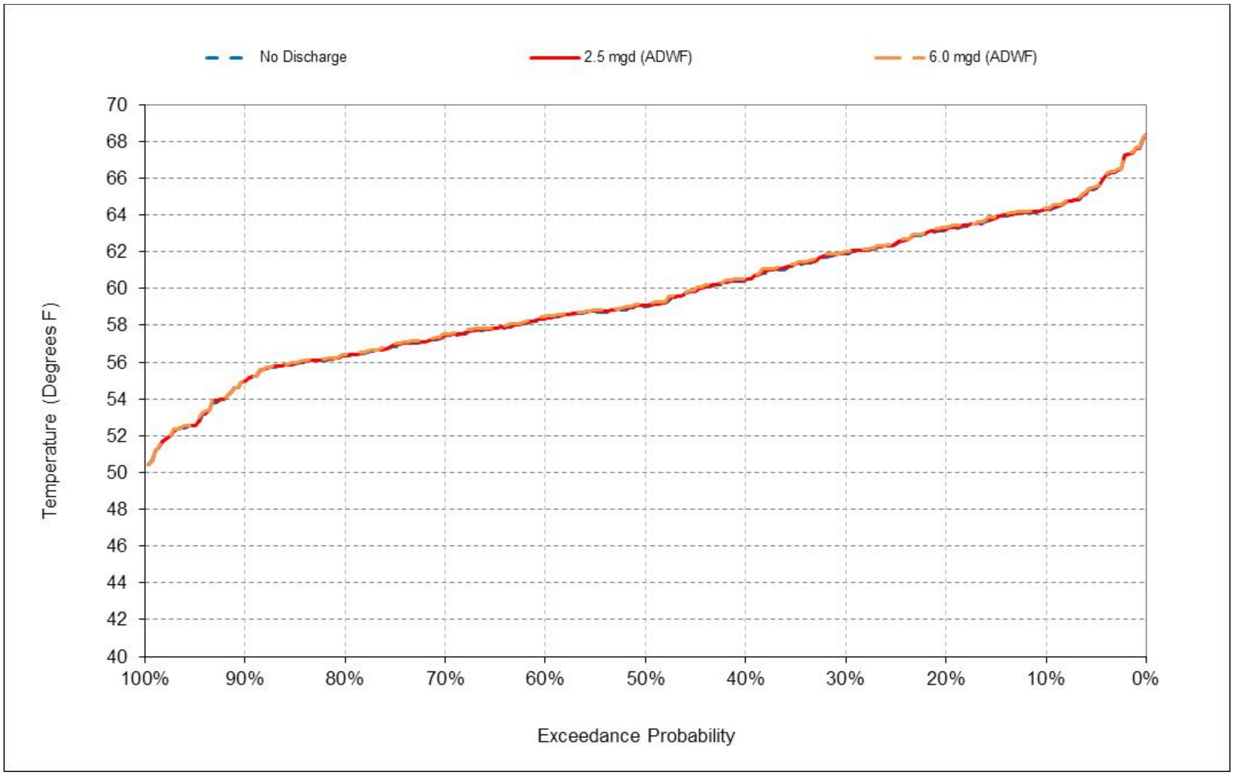


Figure A-3. March – Probability of exceeding specified fully mixed temperatures in the San Joaquin River at the CTF outfall location for no discharge (i.e., existing conditions) and 2.5 mgd and 6.0 mgd ADWF discharge conditions.

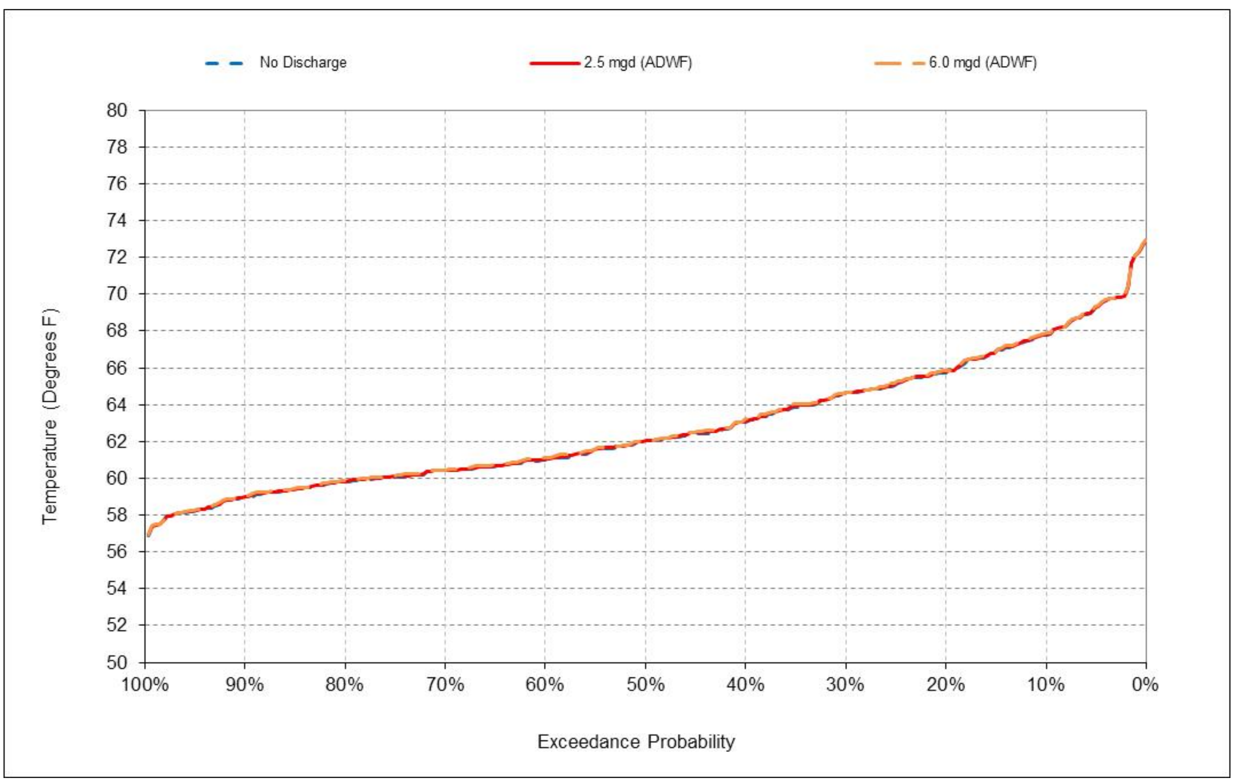


Figure A-4. April – Probability of exceeding specified fully mixed temperatures in the San Joaquin River at the CTF outfall location for no discharge (i.e., existing conditions) and 2.5 mgd and 6.0 mgd ADWF discharge conditions.

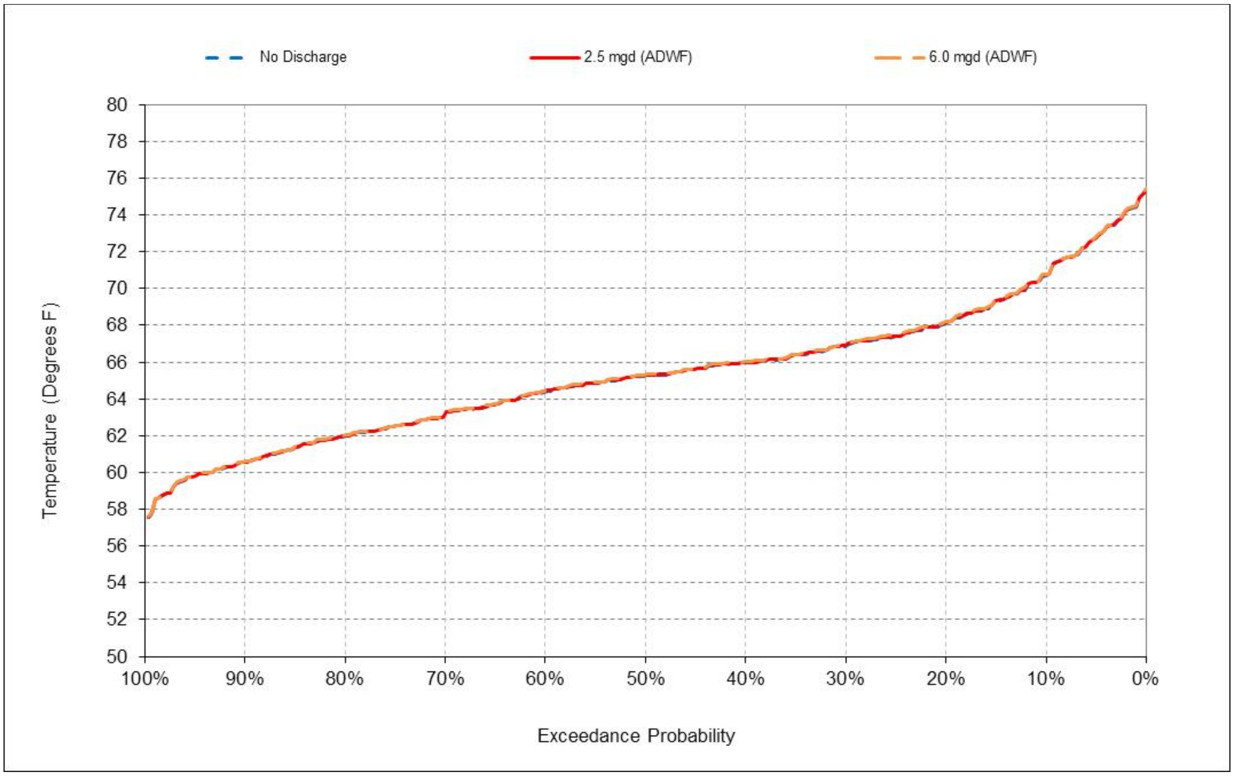


Figure A-5. May – Probability of exceeding specified fully mixed temperatures in the San Joaquin River at the CTF outfall location for no discharge (i.e., existing conditions) and 2.5 mgd and 6.0 mgd ADWF discharge conditions.

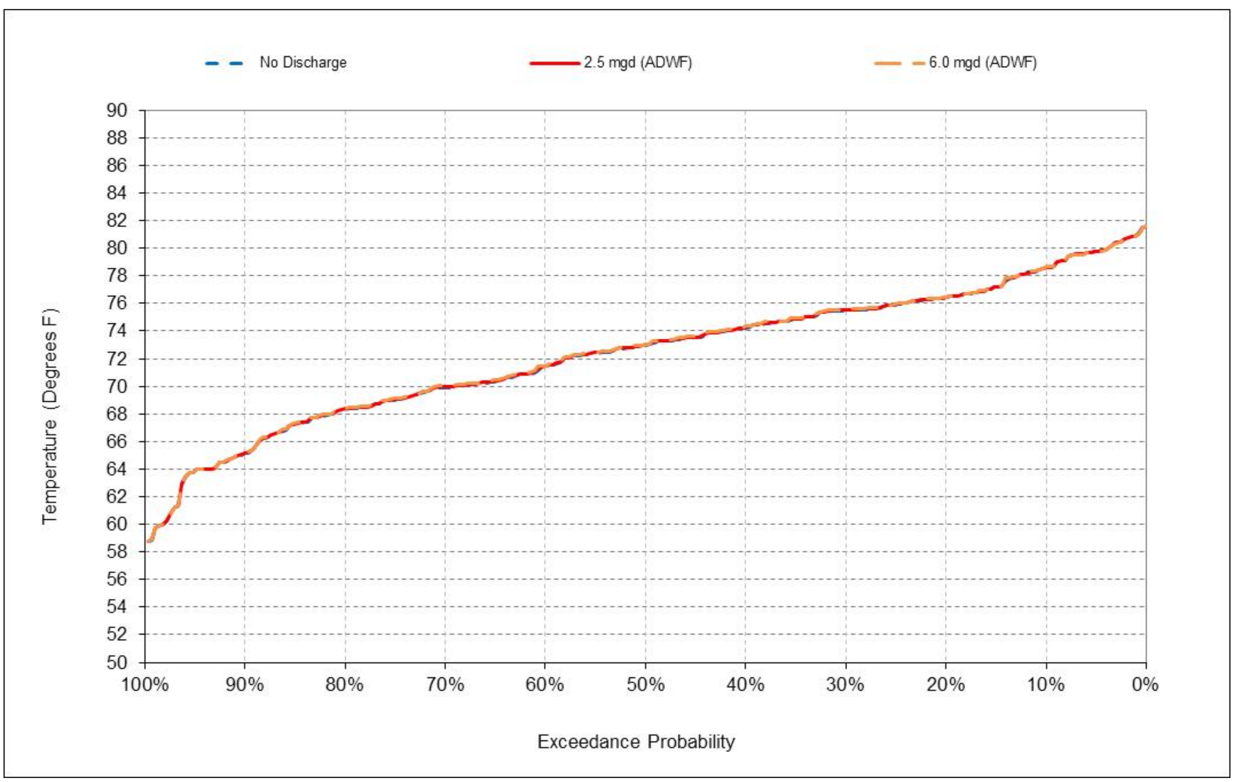


Figure A-6. June – Probability of exceeding specified fully mixed temperatures in the San Joaquin River at the CTF outfall location for no discharge (i.e., existing conditions) and 2.5 mgd and 6.0 mgd ADWF discharge conditions.

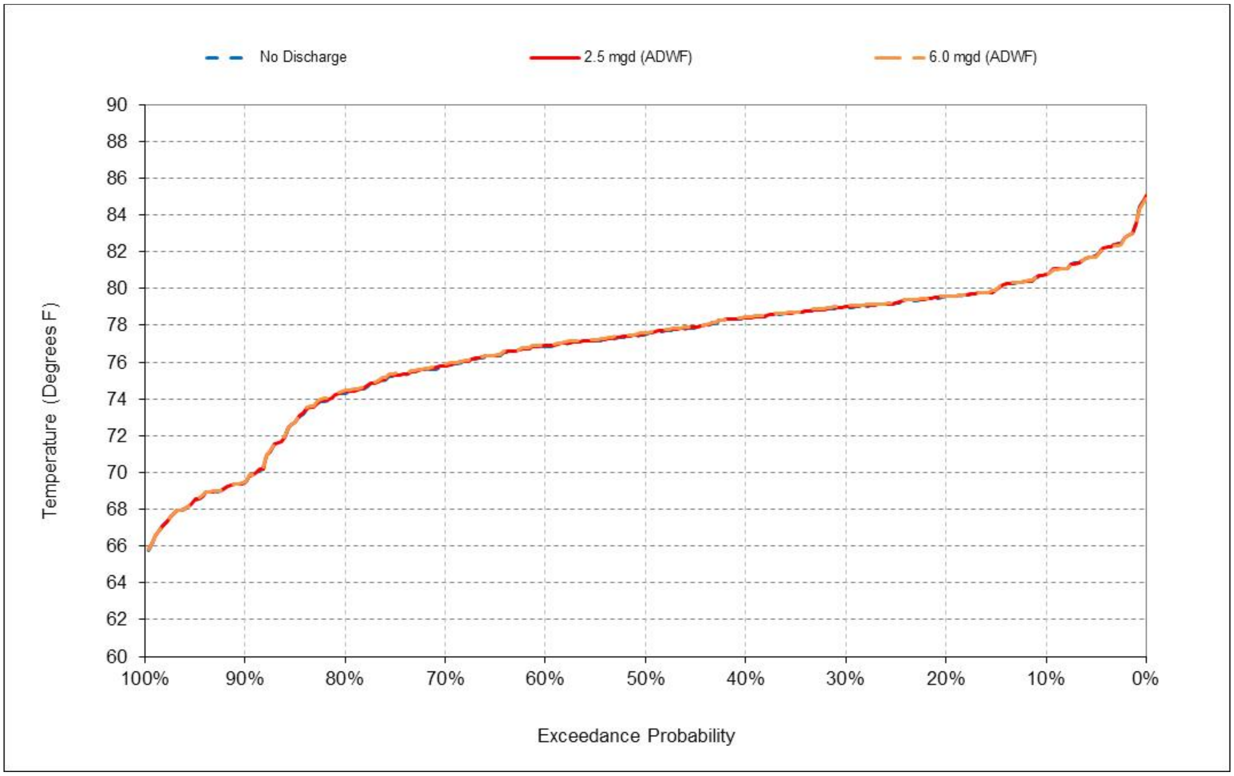


Figure A-7. July – Probability of exceeding specified fully mixed temperatures in the San Joaquin River at the CTF outfall location for no discharge (i.e., existing conditions) and 2.5 mgd and 6.0 mgd ADWF discharge conditions.

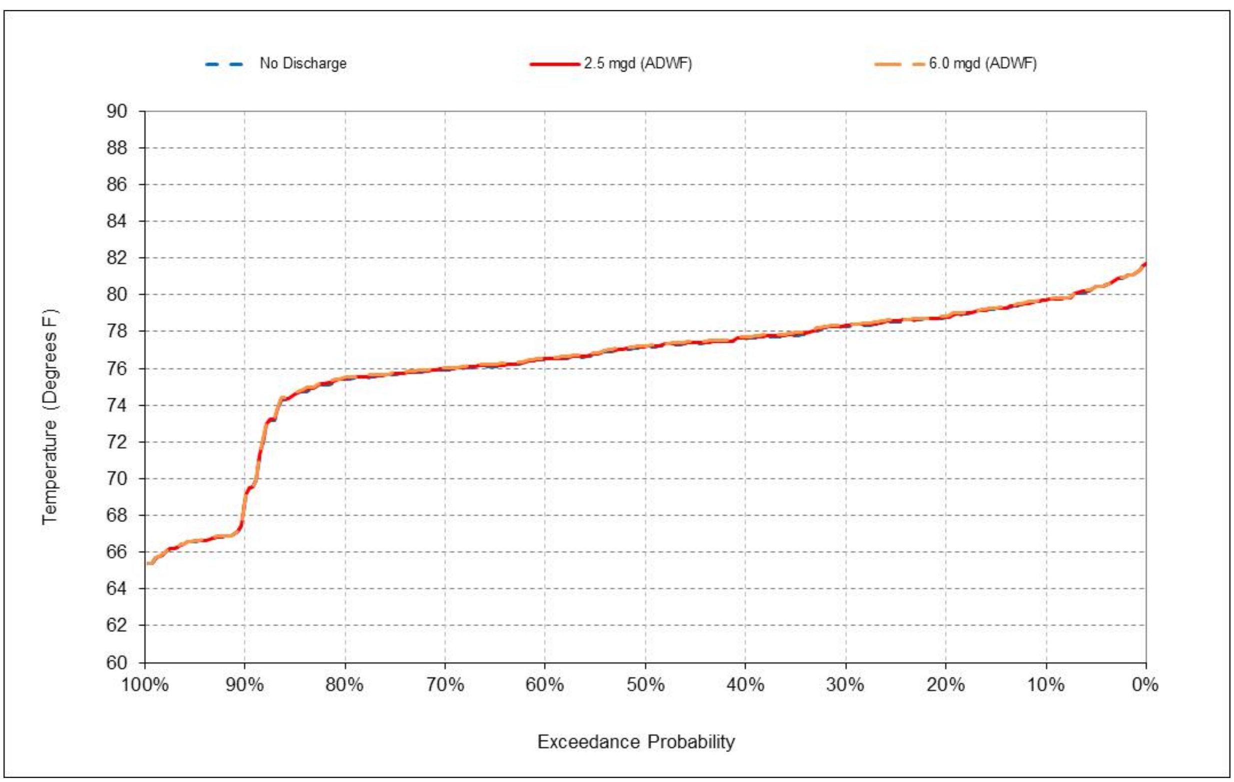


Figure A-8. August – Probability of exceeding specified fully mixed temperatures in the San Joaquin River at the CTF outfall location for no discharge (i.e., existing conditions) and 2.5 mgd and 6.0 mgd ADWF discharge conditions.

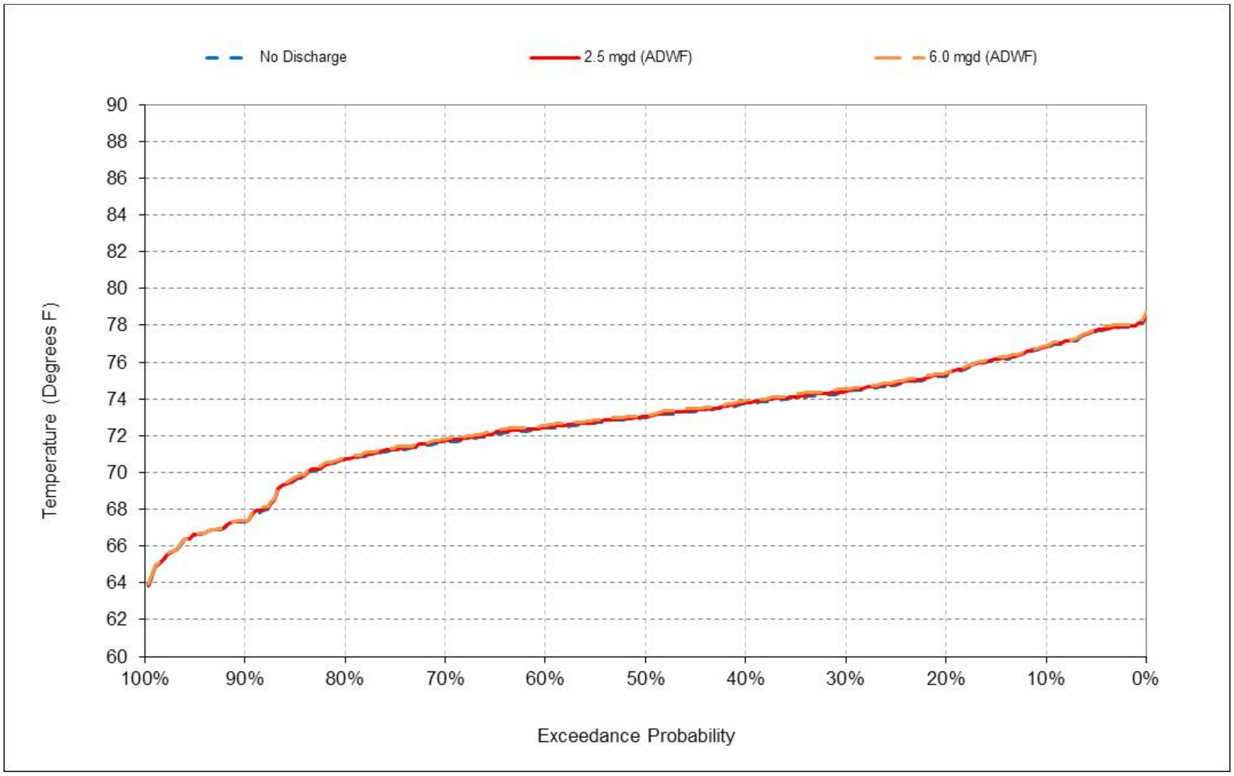


Figure A-9. September – Probability of exceeding specified fully mixed temperatures in the San Joaquin River at the CTF outfall location for no discharge (i.e., existing conditions) and 2.5 mgd and 6.0 mgd ADWF discharge conditions.

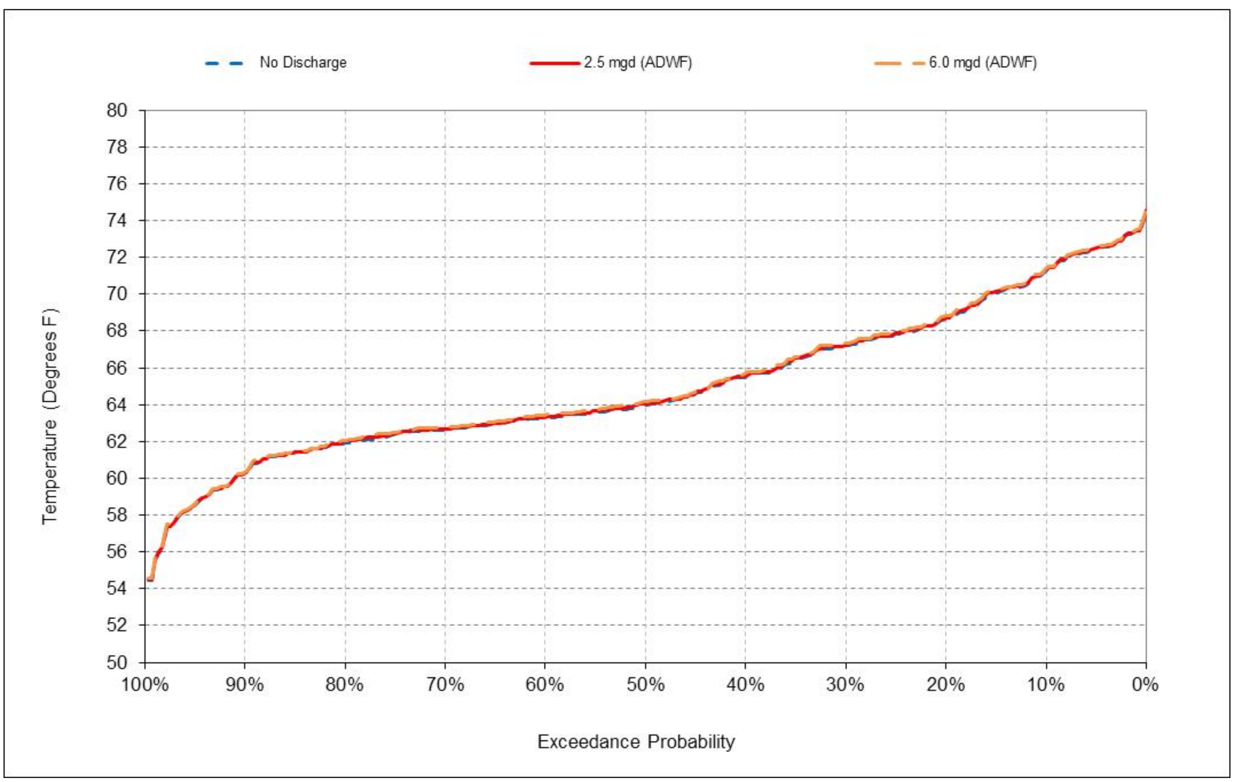


Figure A-10. October – Probability of exceeding specified fully mixed temperatures in the San Joaquin River at the CTF outfall location for no discharge (i.e., existing conditions) and 2.5 mgd and 6.0 mgd ADWF discharge conditions.

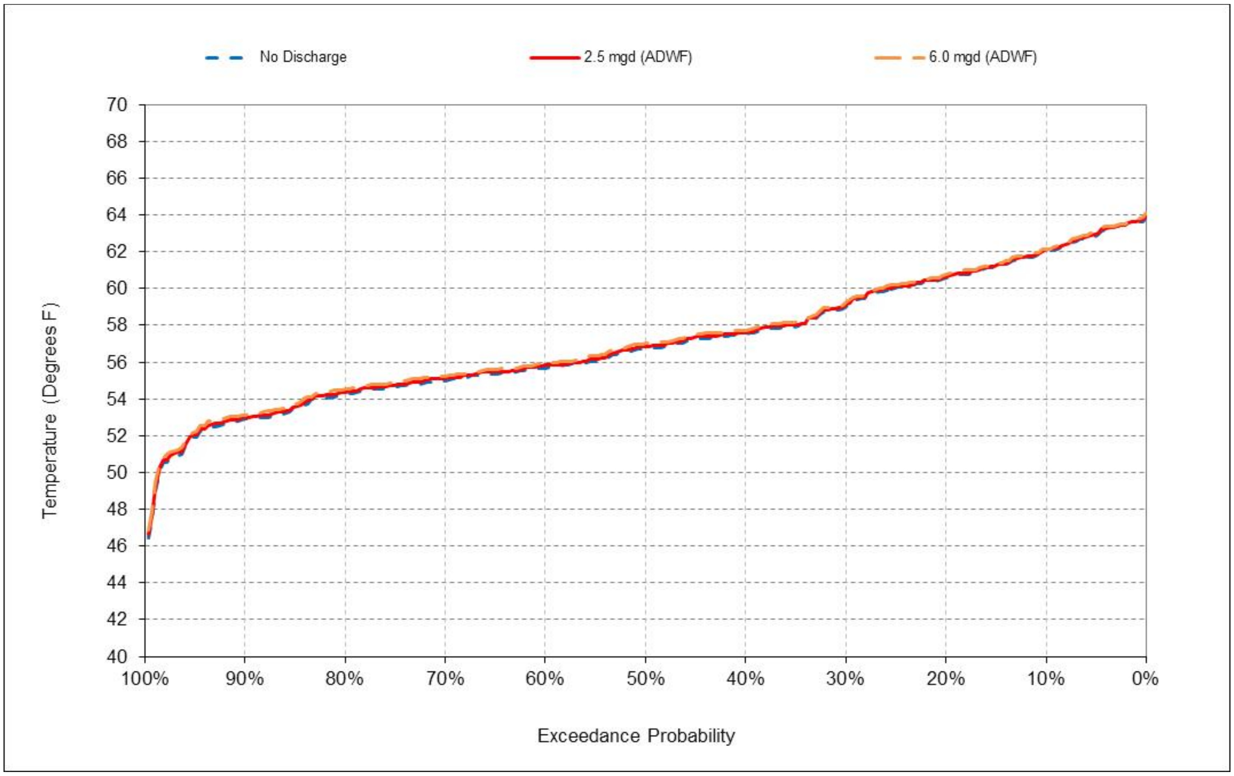


Figure A-11. November – Probability of exceeding specified fully mixed temperatures in the San Joaquin River at the CTF outfall location for no discharge (i.e., existing conditions) and 2.5 mgd and 6.0 mgd ADWF discharge conditions.

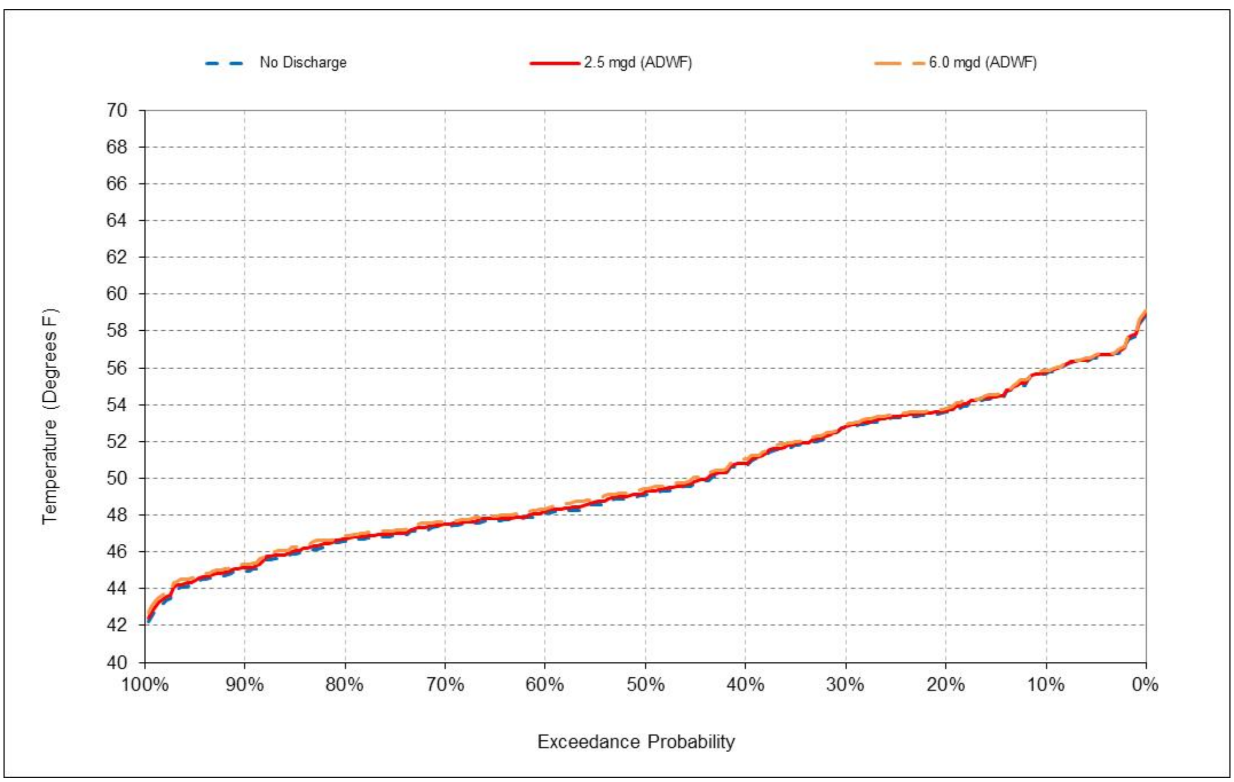


Figure A-12. December – Probability of exceeding specified fully mixed temperatures in the San Joaquin River at the CTF outfall location for no discharge (i.e., existing conditions) and 2.5 mgd and 6.0 mgd ADWF discharge conditions.

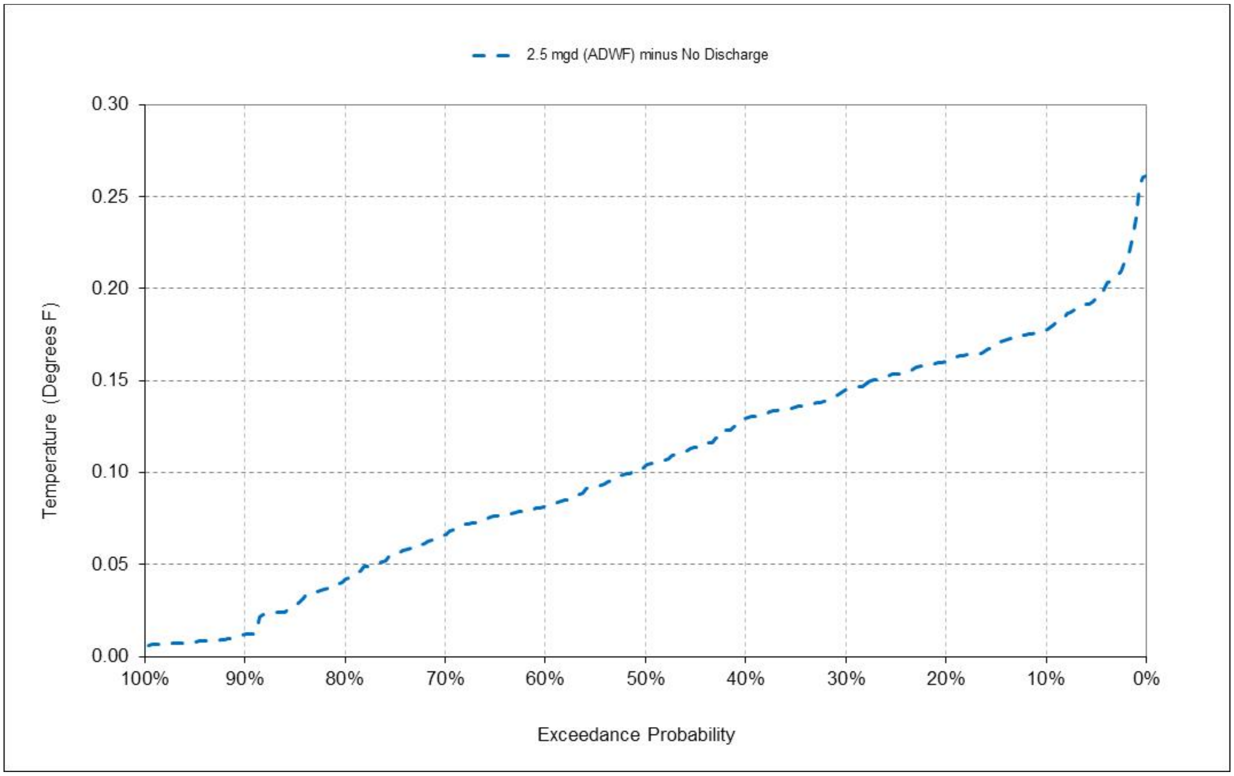


Figure B-1. January – Incremental increase in fully mixed river temperature at the outfall location for a CTF discharge rate of 2.5 mgd (ADWF).

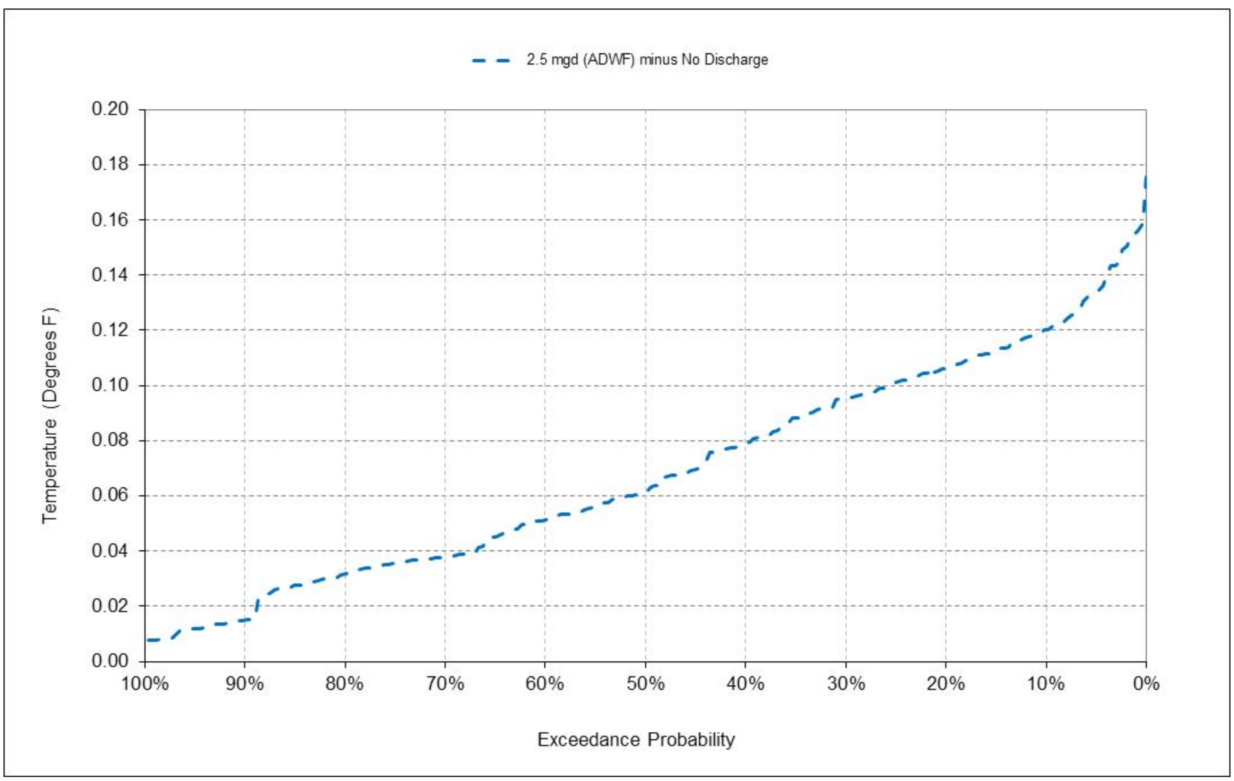


Figure B-2. February – Incremental increase in fully mixed river temperature at the outfall location for a CTF discharge rate of 2.5 mgd (ADWF).

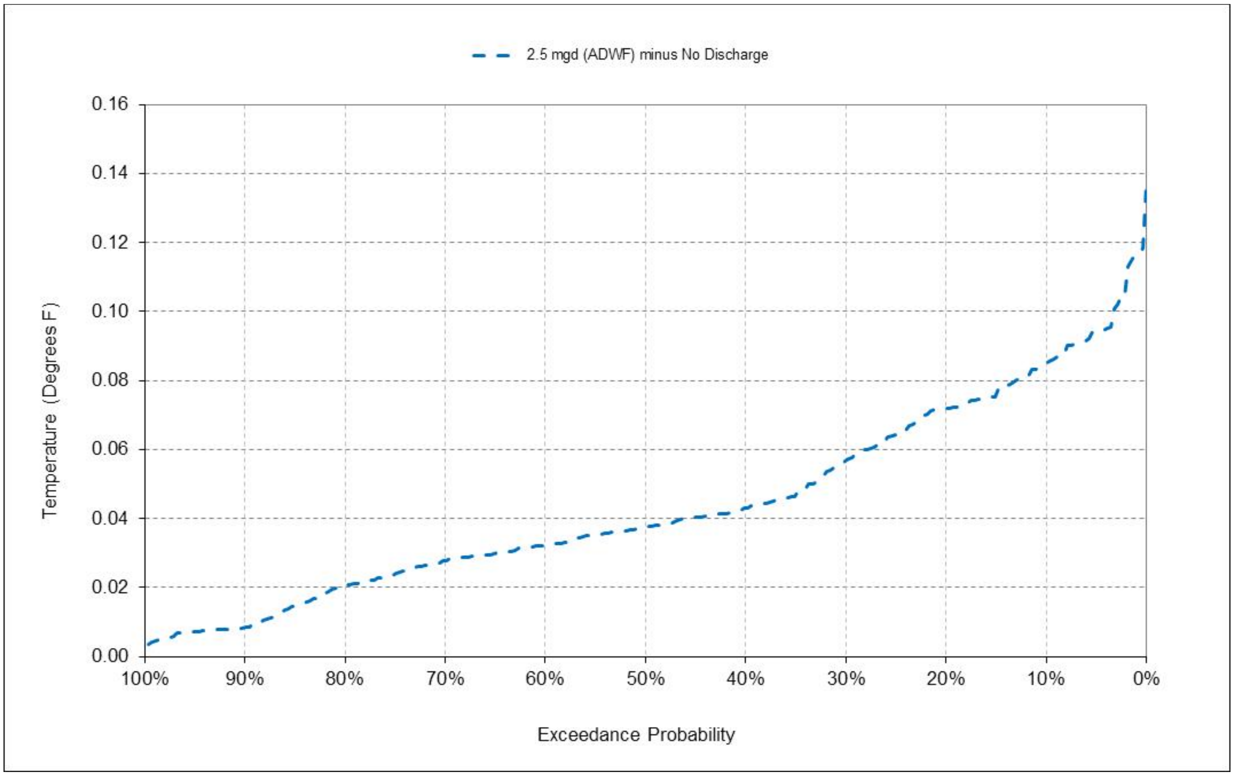


Figure B-3. March – Incremental increase in fully mixed river temperature at the outfall location for a CTF discharge rate of 2.5 mgd (ADWF).

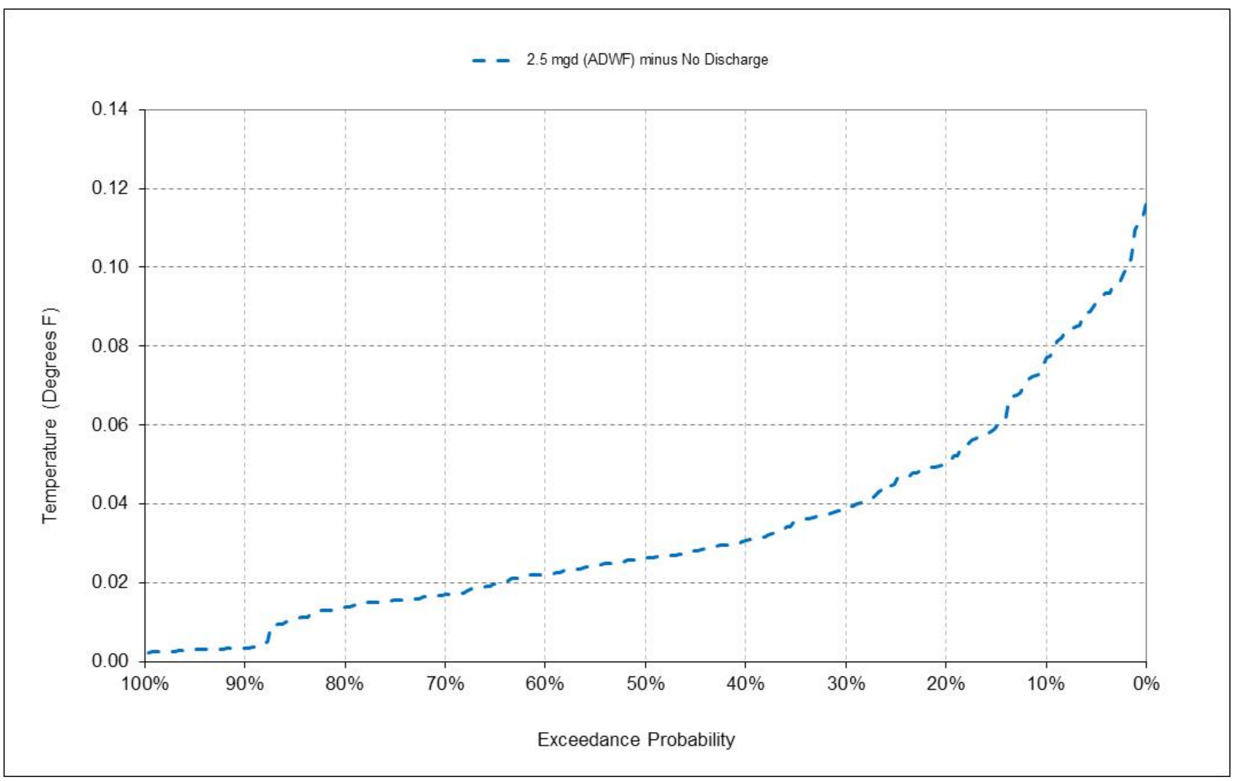


Figure B-4. April – Incremental increase in fully mixed river temperature at the outfall location for a CTF discharge rate of 2.5 mgd (ADWF).

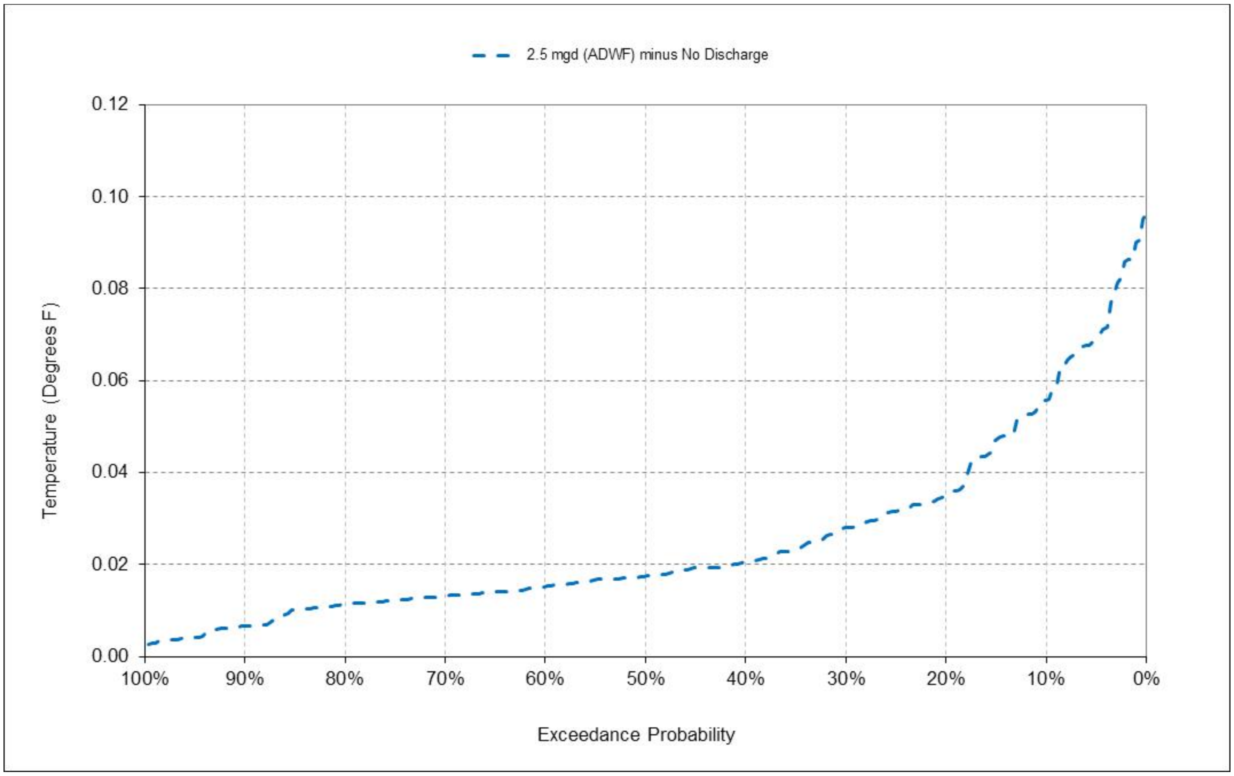


Figure B-5. May – Incremental increase in fully mixed river temperature at the outfall location for a CTF discharge rate of 2.5 mgd (ADWF).

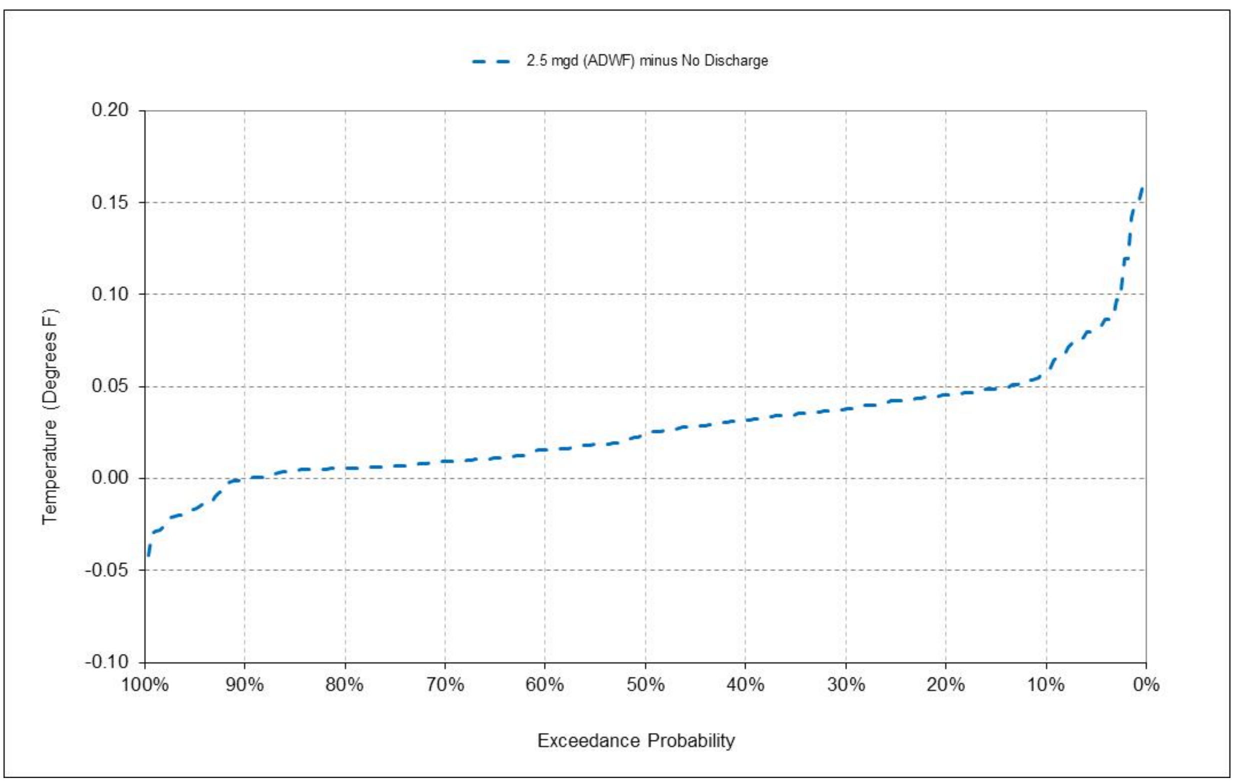


Figure B-6. June – Incremental increase in fully mixed river temperature at the outfall location for a CTF discharge rate of 2.5 mgd (ADWF).

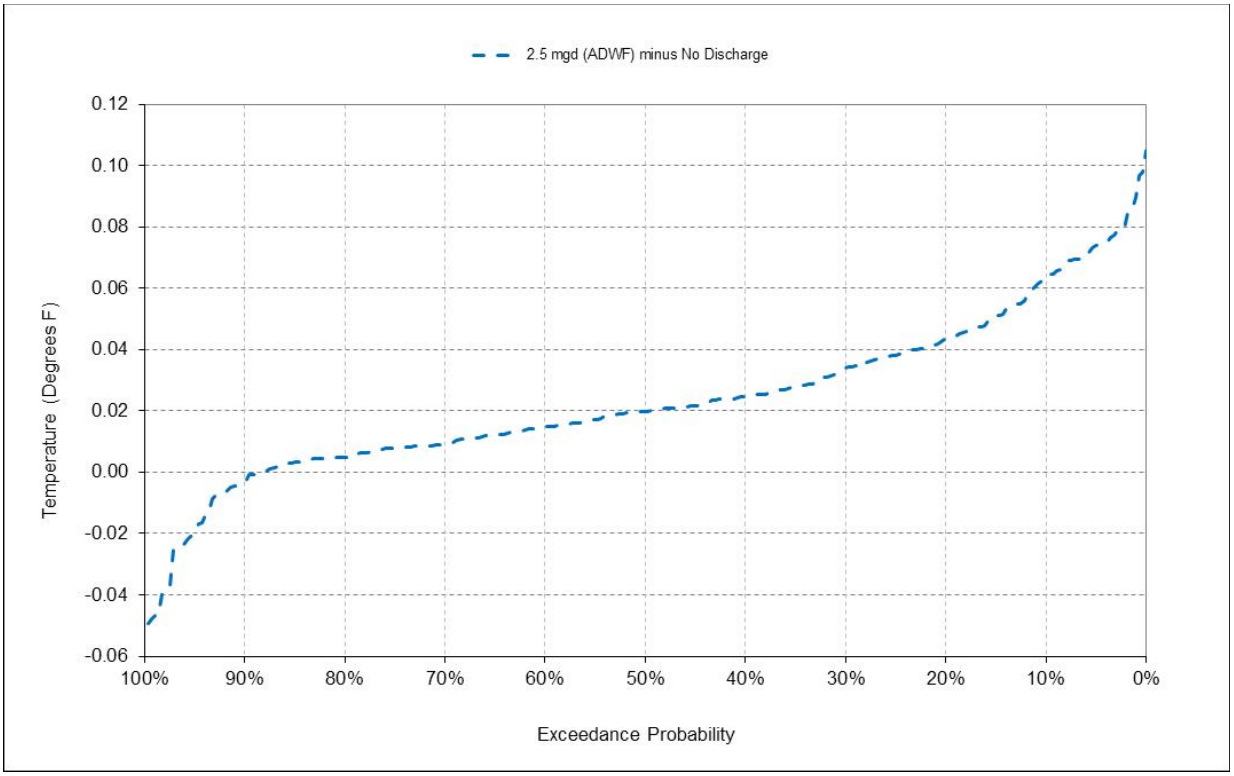


Figure B-7. July – Incremental increase in fully mixed river temperature at the outfall location for a CTF discharge rate of 2.5 mgd (ADWF).

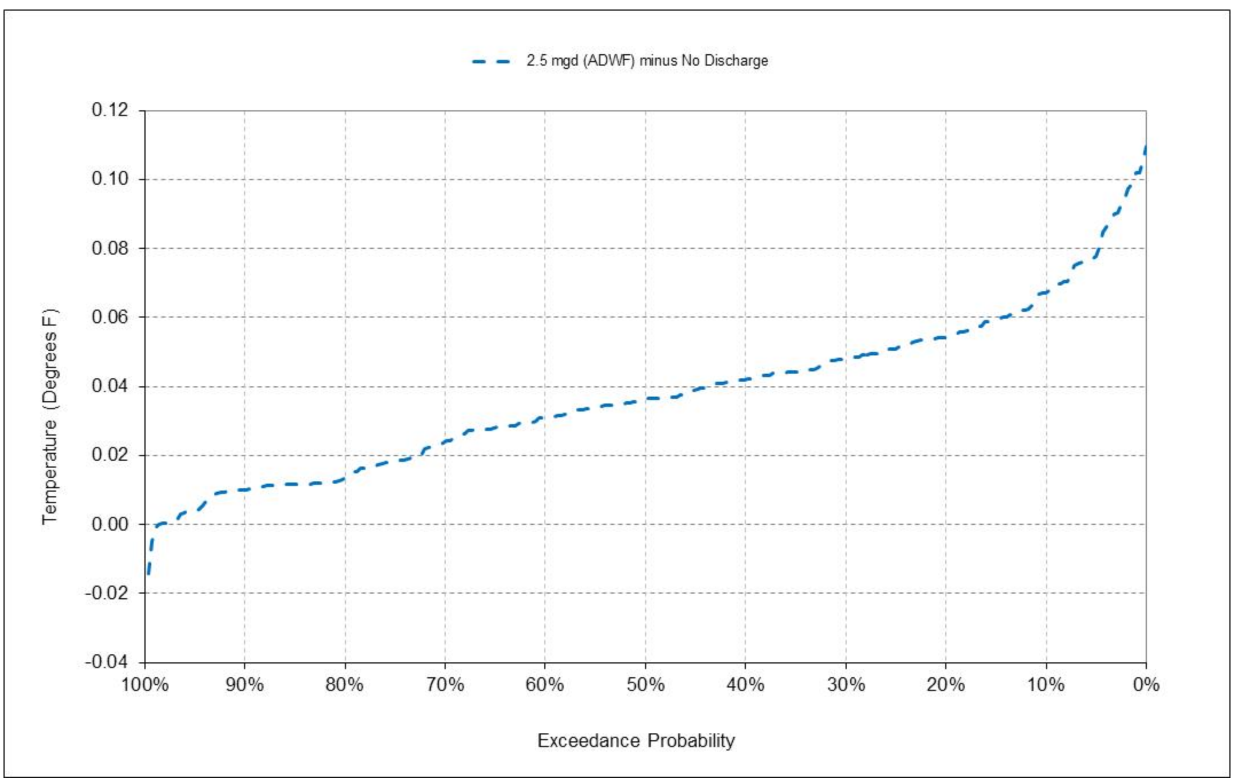


Figure B-8. August – Incremental increase in fully mixed river temperature at the outfall location for a CTF discharge rate of 2.5 mgd (ADWF).

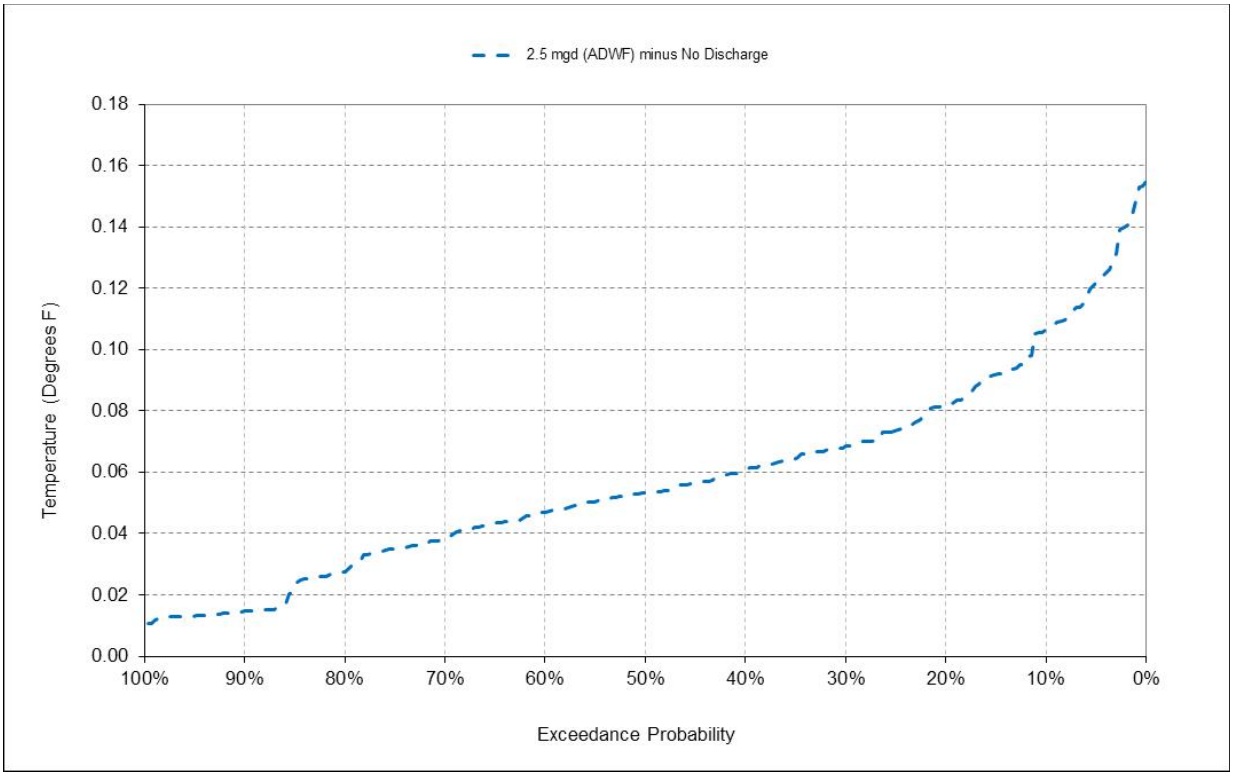


Figure B-9. September – Incremental increase in fully mixed river temperature at the outfall location for a CTF discharge rate of 2.5 mgd (ADWF).

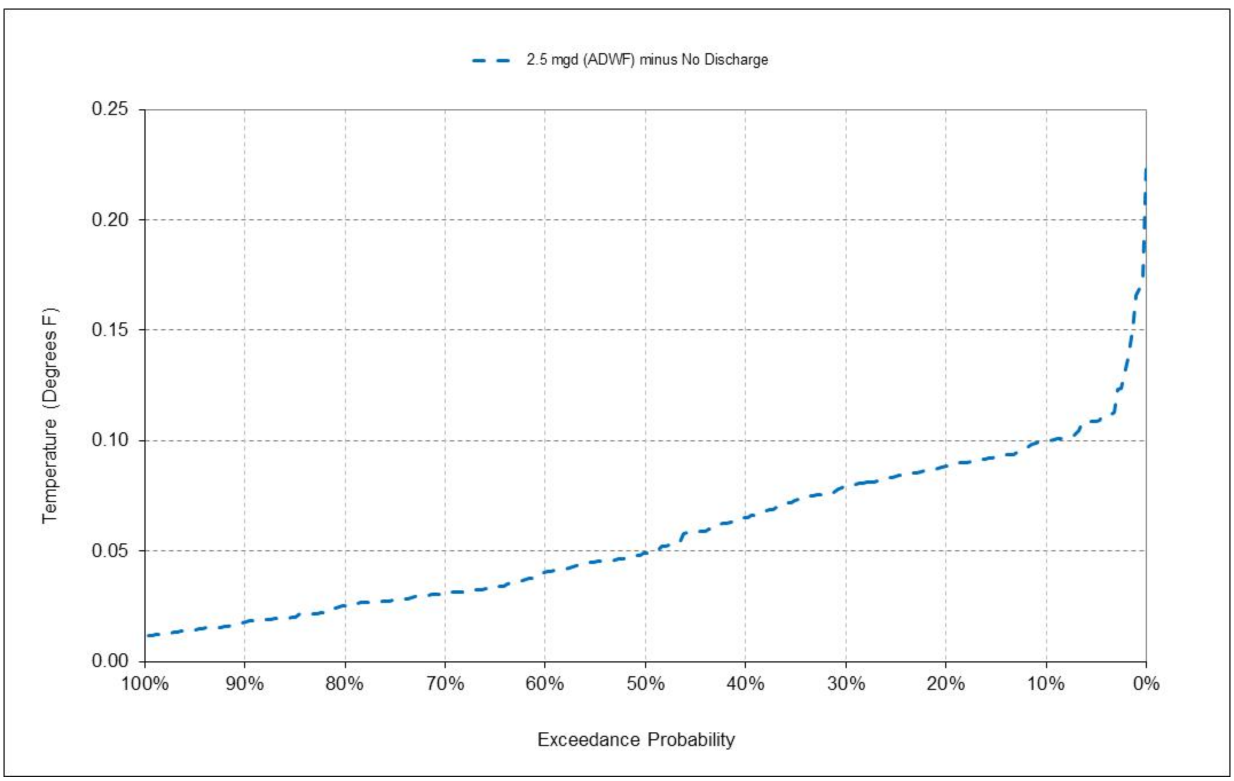


Figure B-10. October – Incremental increase in fully mixed river temperature at the outfall location for a CTF discharge rate of 2.5 mgd (ADWF).

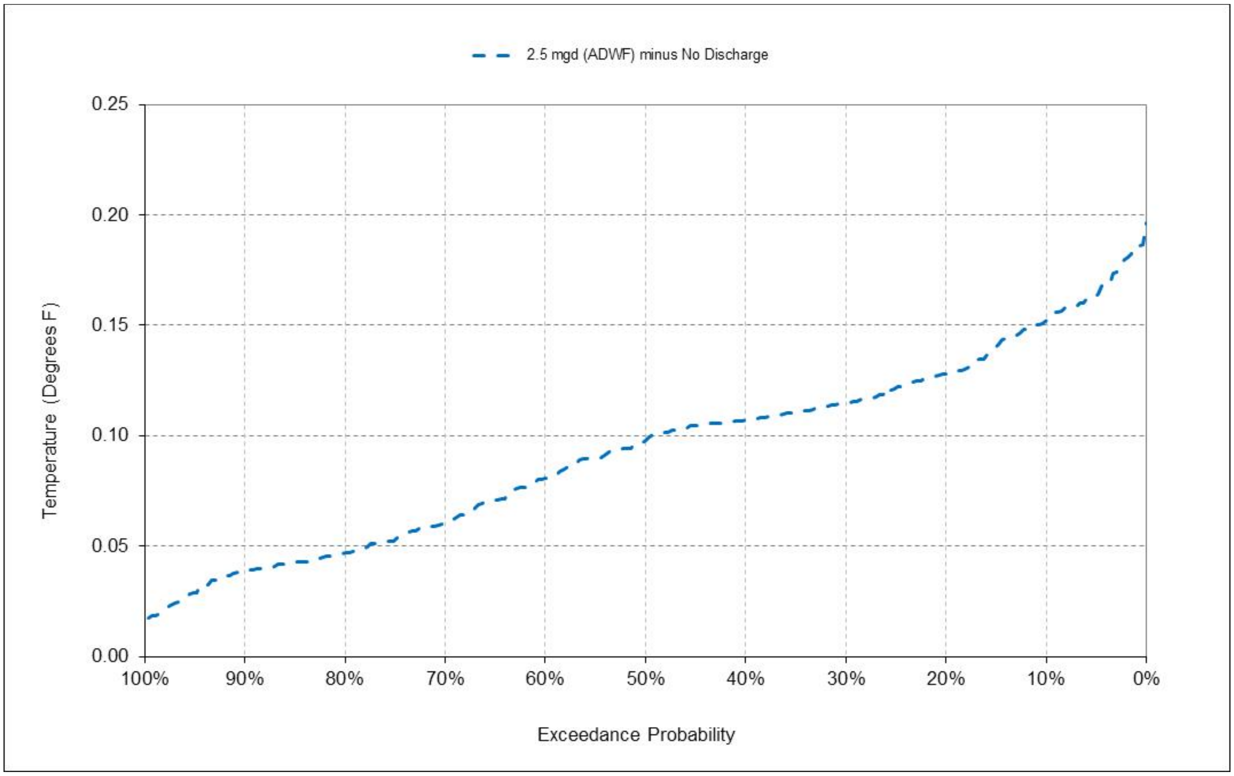


Figure B-11. November – Incremental increase in fully mixed river temperature at the outfall location for a CTF discharge rate of 2.5 mgd (ADWF).

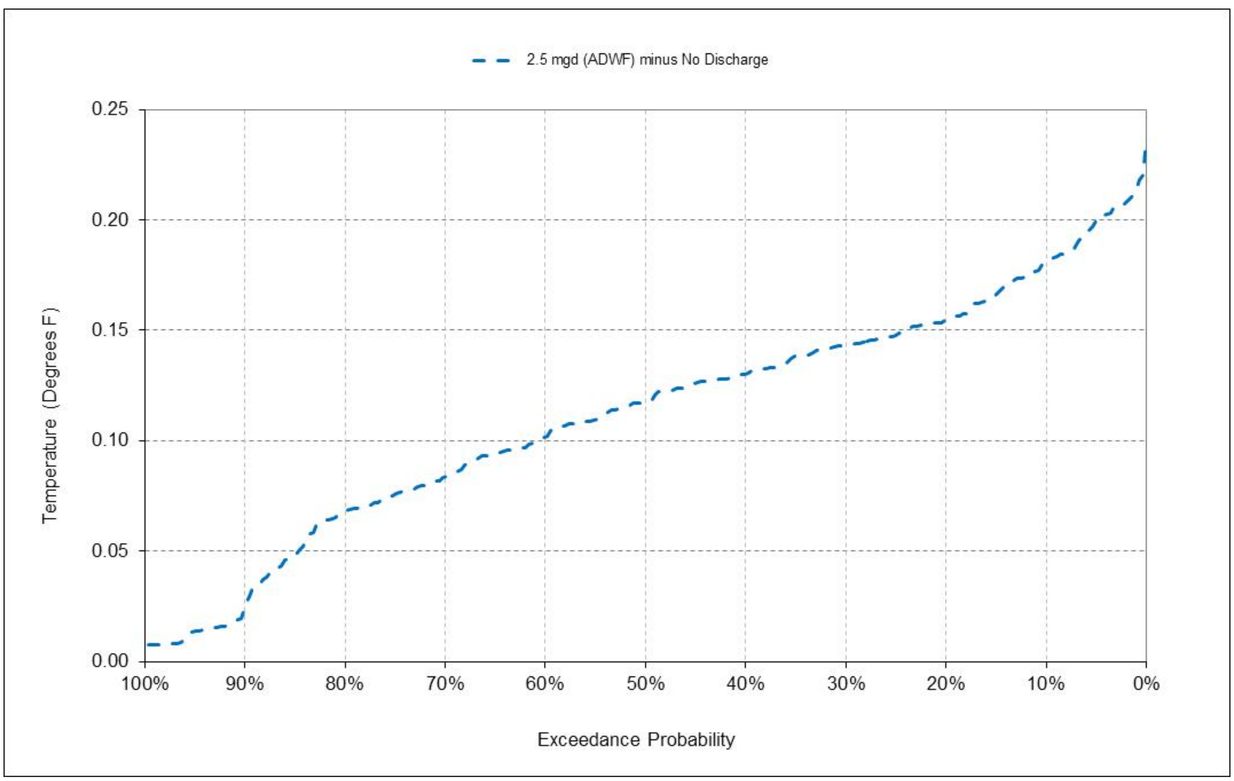


Figure B-12. December – Incremental increase in fully mixed river temperature at the outfall location for a CTF discharge rate of 2.5 mgd (ADWF).

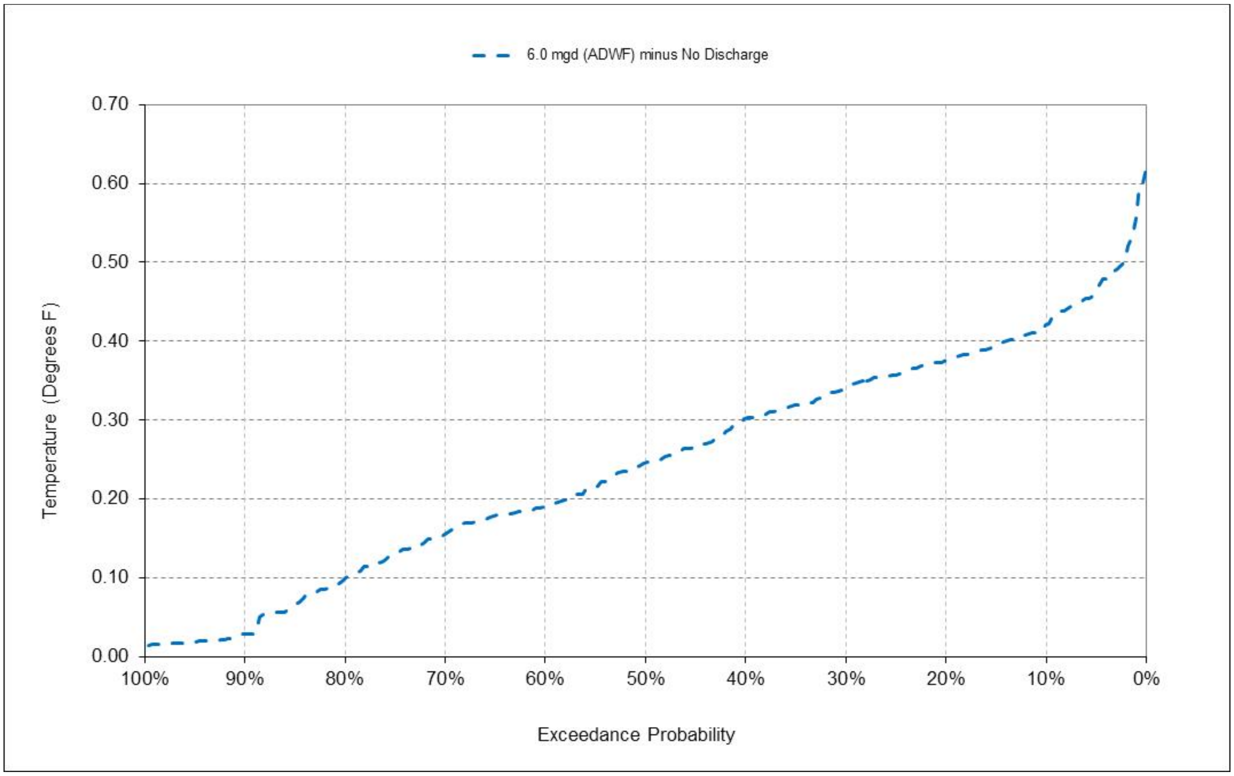


Figure B-13. January – Incremental increase in fully mixed river temperature at the outfall location for a CTF discharge rate of 6.0 mgd (ADWF).

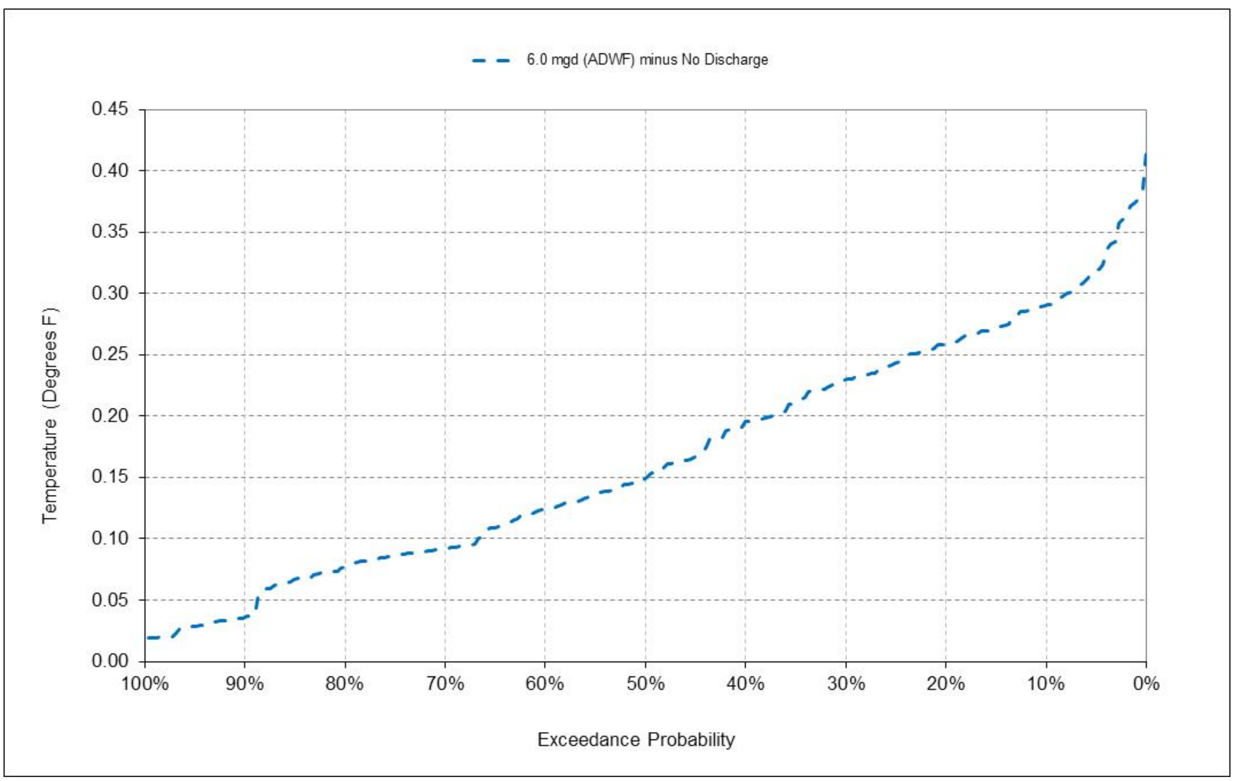


Figure B-14. February – Incremental increase in fully mixed river temperature at the outfall location for a CTF discharge rate of 6.0 mgd (ADWF).

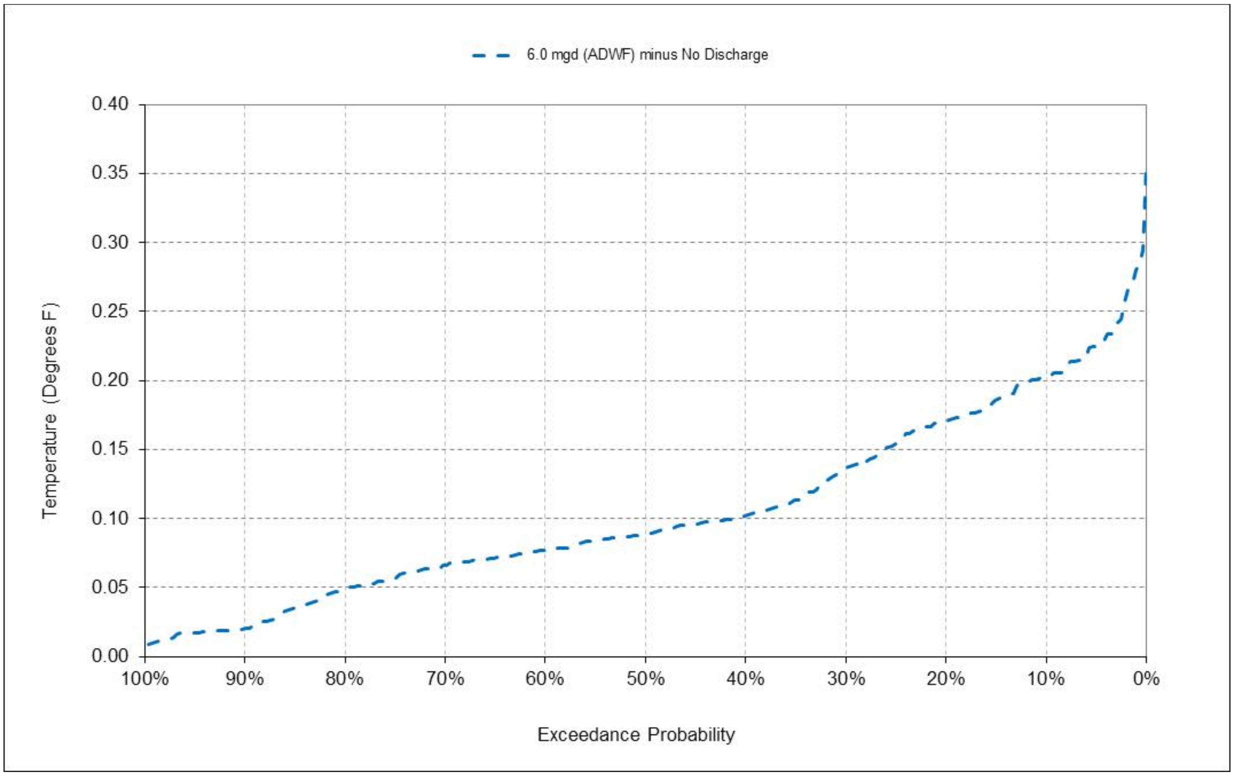


Figure B-15. March – Incremental increase in fully mixed river temperature at the outfall location for a CTF discharge rate of 6.0 mgd (ADWF).

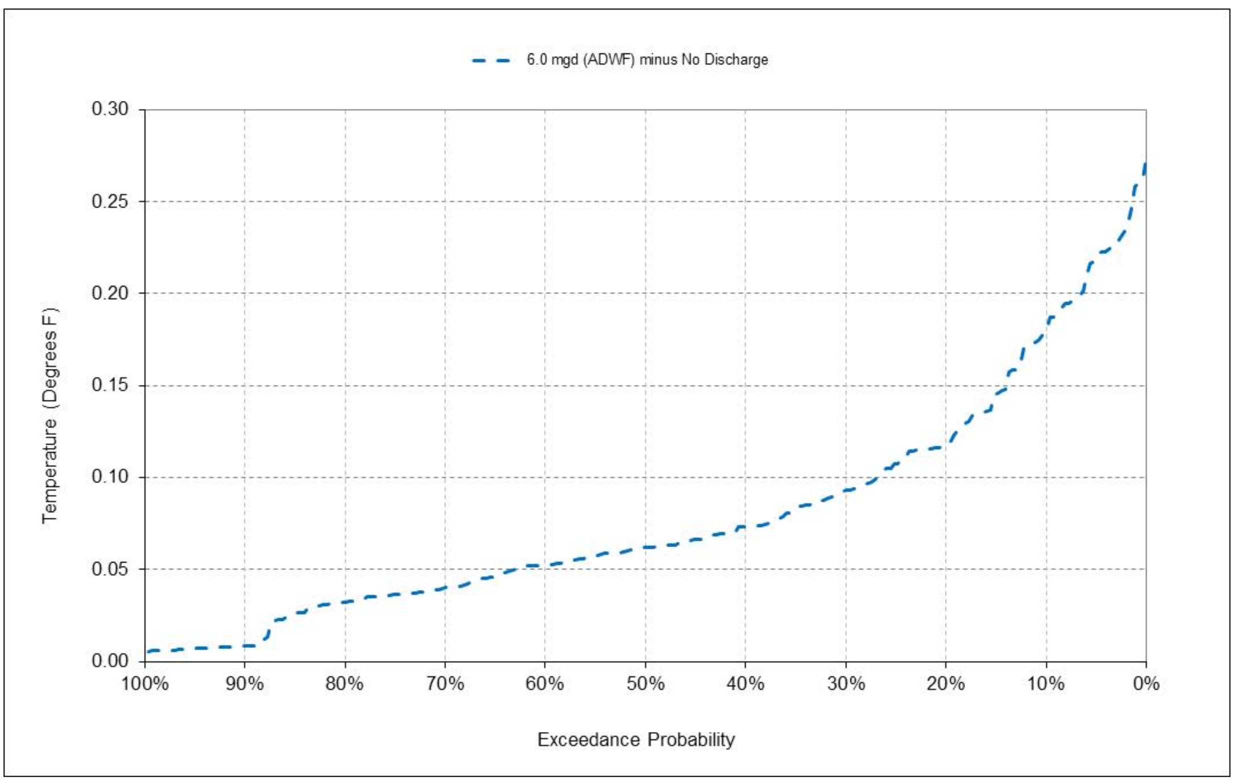


Figure B-16. April – Incremental increase in fully mixed river temperature at the outfall location for a CTF discharge rate of 6.0 mgd (ADWF).

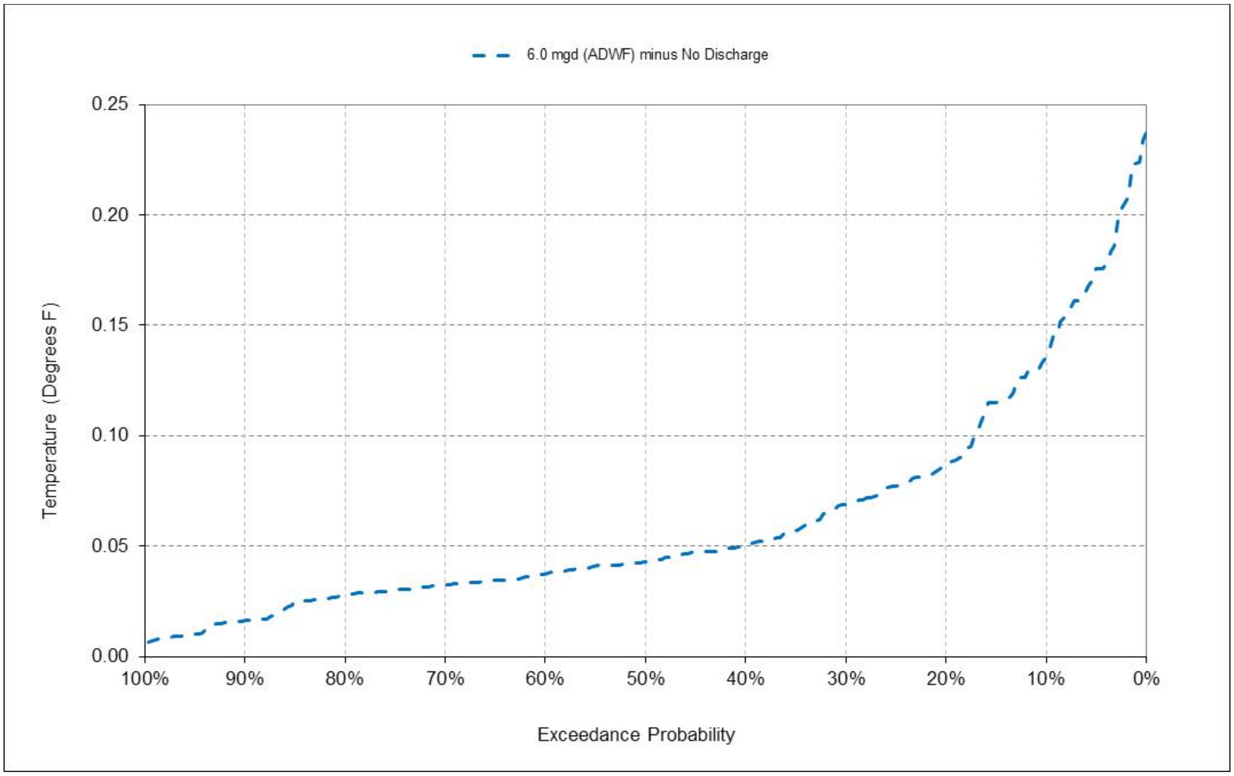


Figure B-17. May – Incremental increase in fully mixed river temperature at the outfall location for a CTF discharge rate of 6.0 mgd (ADWF).

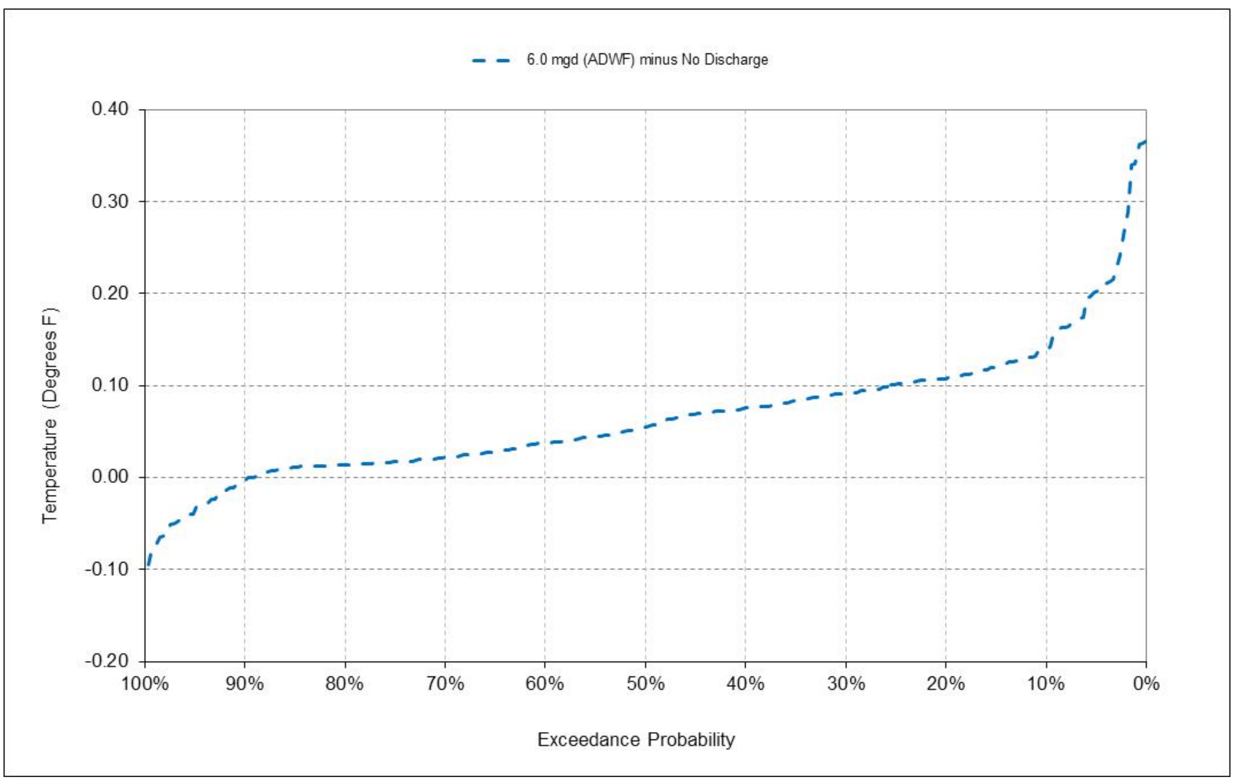


Figure B-18. June – Incremental increase in fully mixed river temperature at the outfall location for a CTF discharge rate of 6.0 mgd (ADWF).

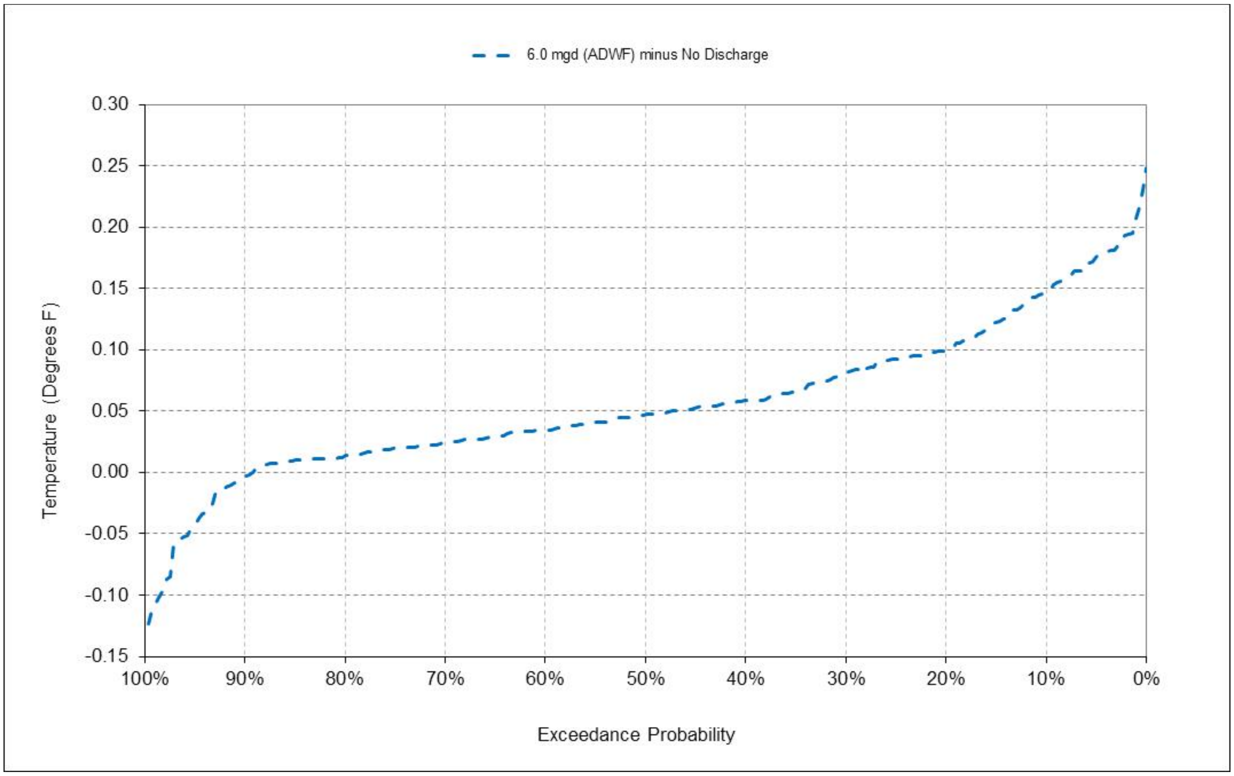


Figure B-19. July – Incremental increase in fully mixed river temperature at the outfall location for a CTF discharge rate of 6.0 mgd (ADWF).

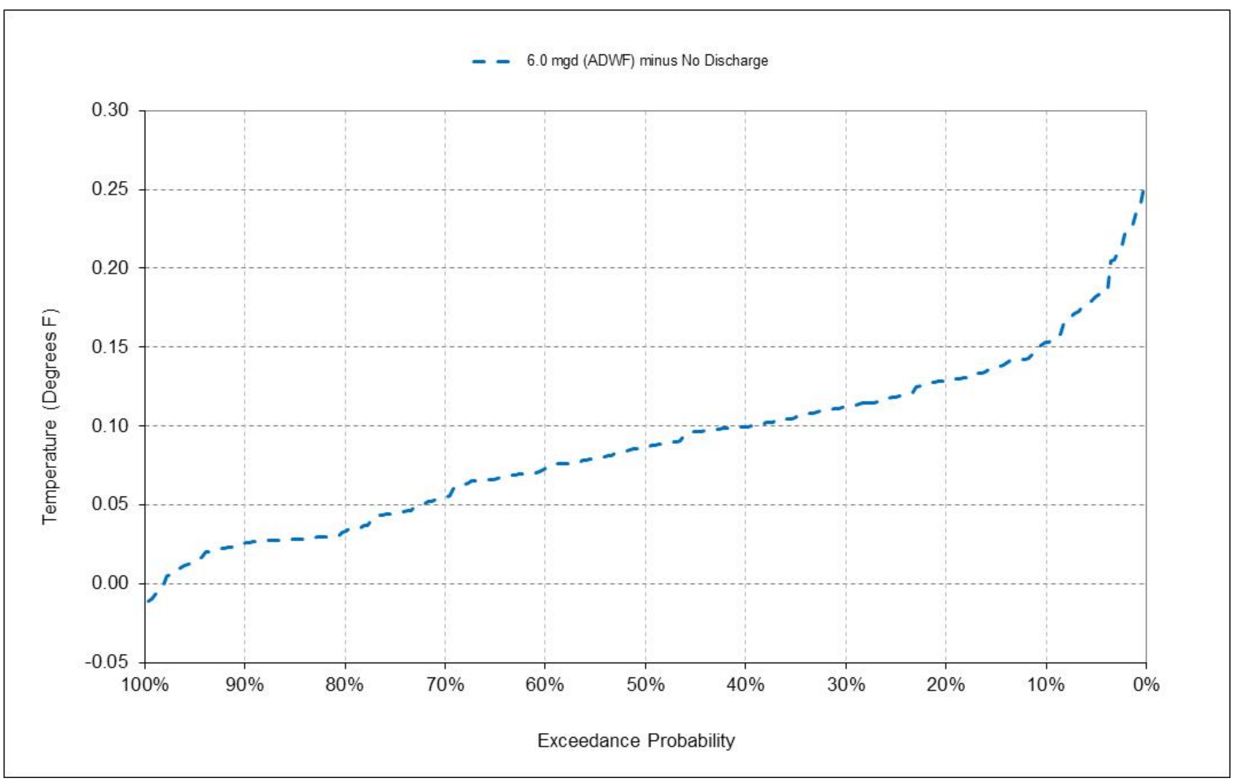


Figure B-20. August – Incremental increase in fully mixed river temperature at the outfall location for a CTF discharge rate of 6.0 mgd (ADWF).

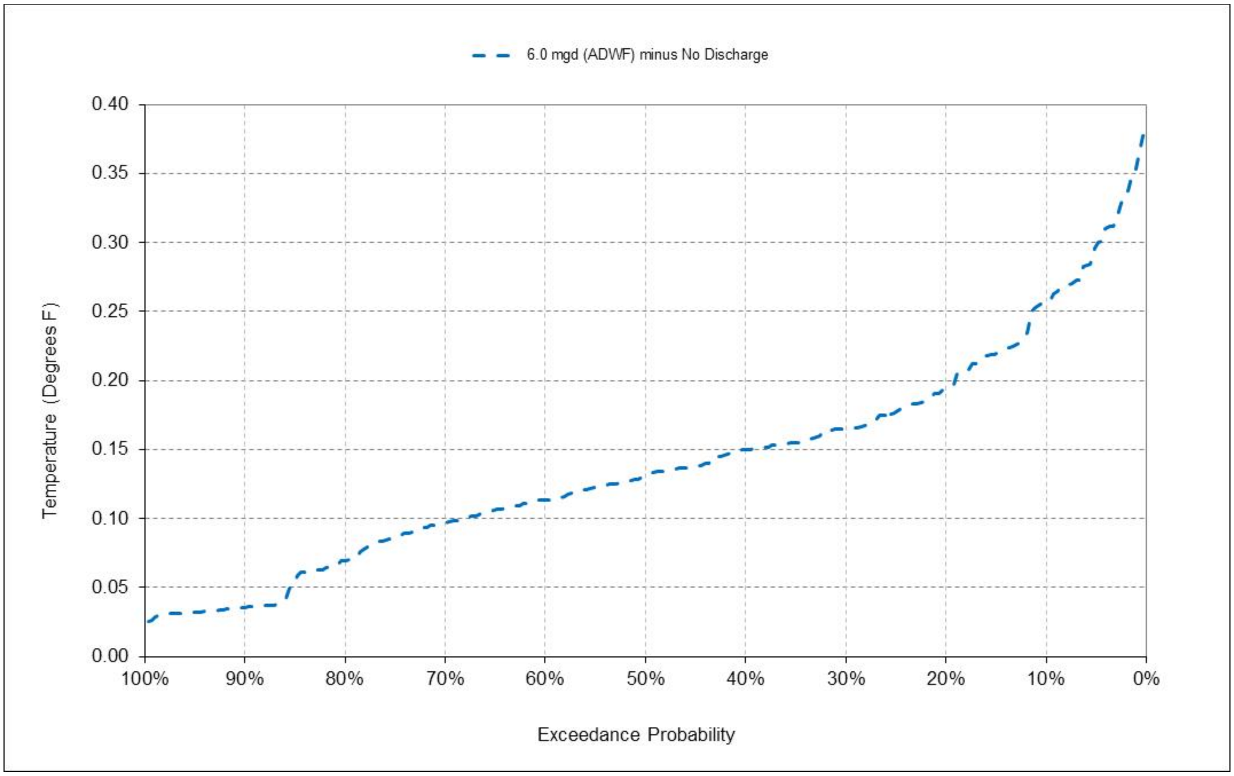


Figure B-21. September – Incremental increase in fully mixed river temperature at the outfall location for a CTF discharge rate of 6.0 mgd (ADWF).

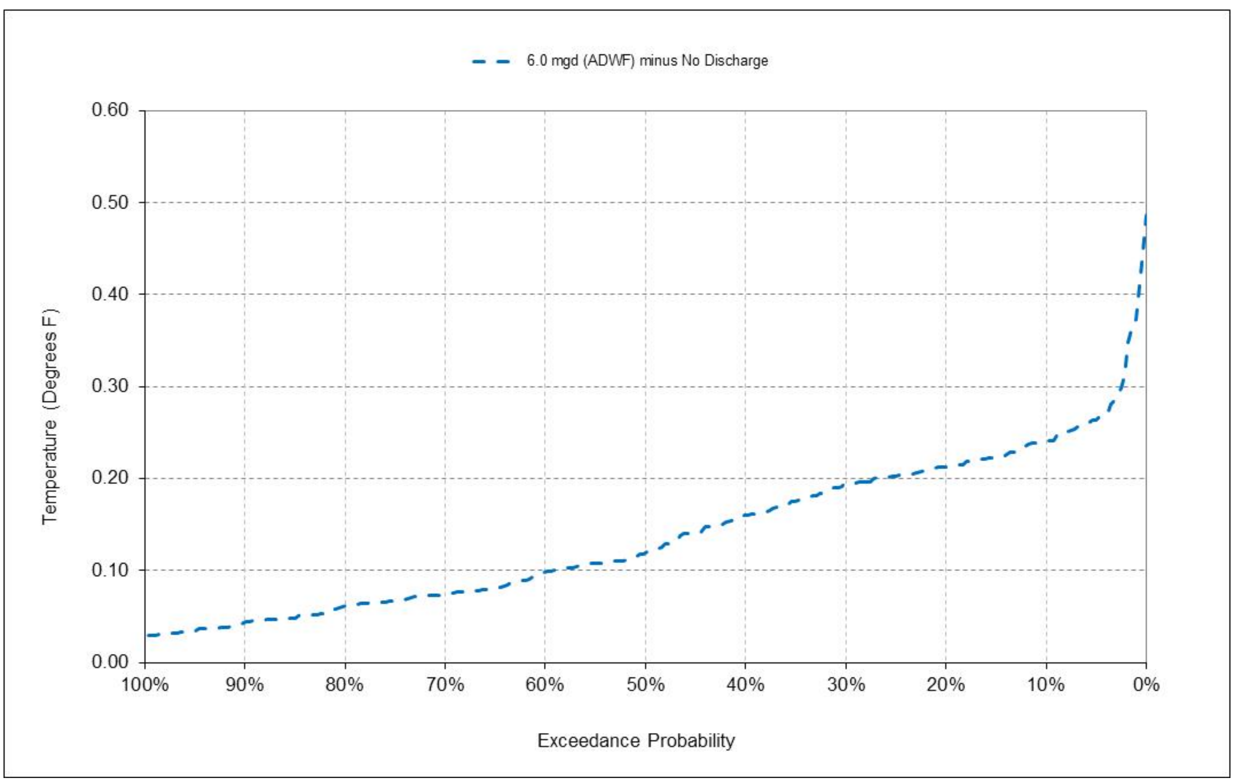


Figure B-22. October – Incremental increase in fully mixed river temperature at the outfall location for a CTF discharge rate of 6.0 mgd (ADWF).

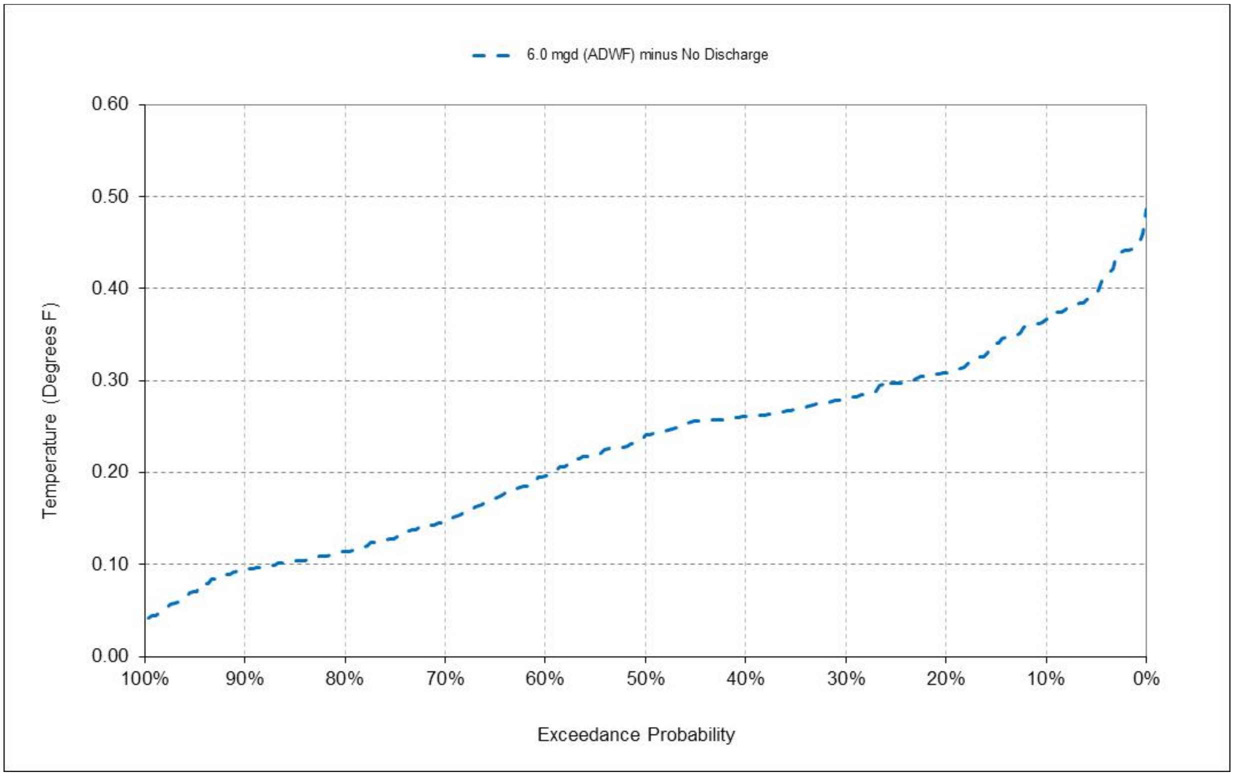


Figure B-23. November – Incremental increase in fully mixed river temperature at the outfall location for a CTF discharge rate of 6.0 mgd (ADWF).

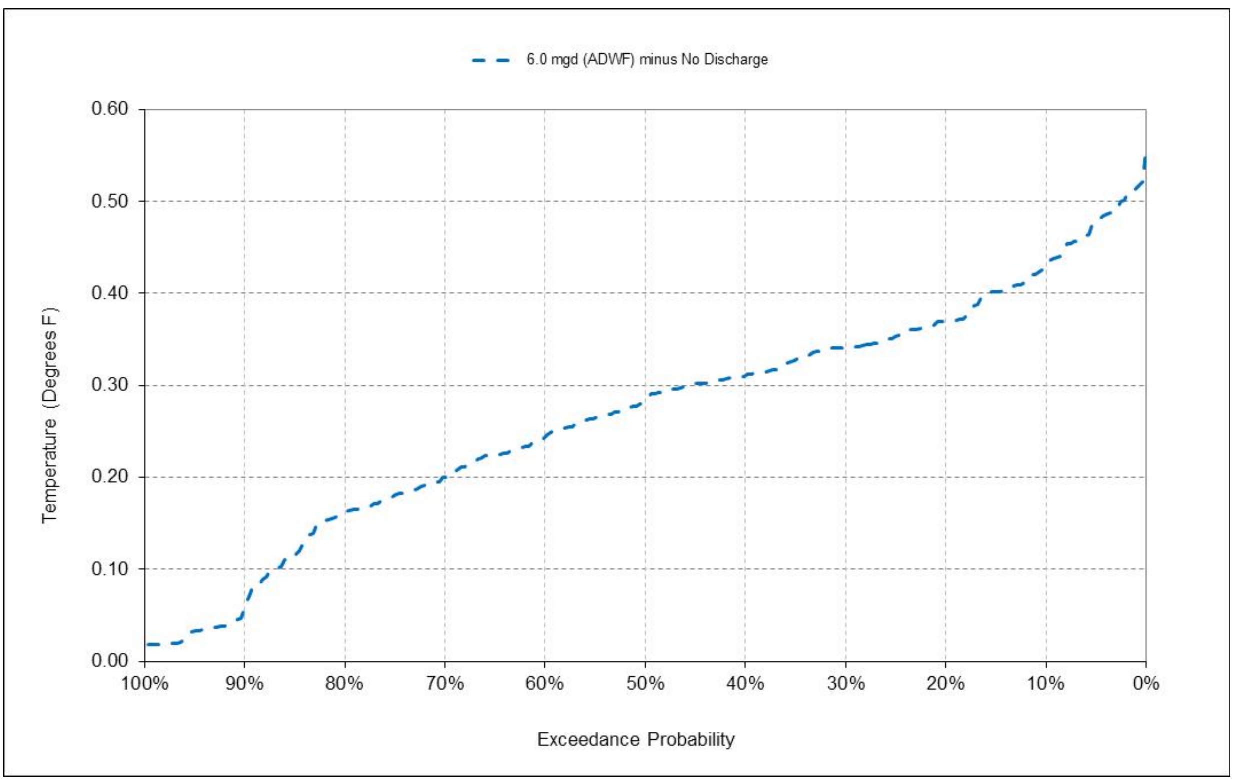


Figure B-24. December – Incremental increase in fully mixed river temperature at the outfall location for a CTF discharge rate of 6.0 mgd (ADWF).

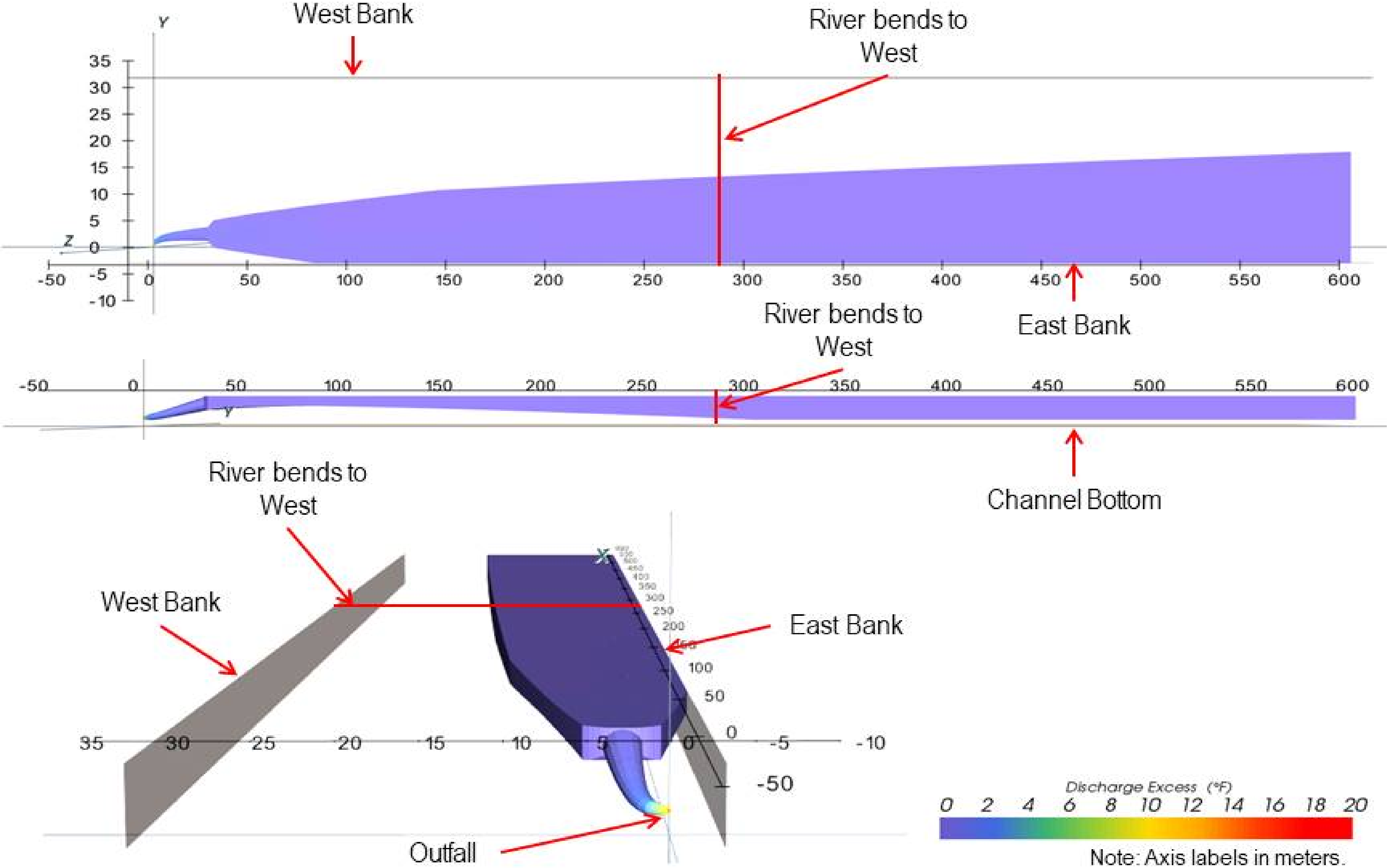


Figure C-1. January 2.5 mgd median-case thermal plume scenario, based on effluent temperature of 72.2°F, river temperature of 53.7 °F (18.5°F temperature differential), effluent flow of 3.10 mgd, and river velocity of 1.19 fps.

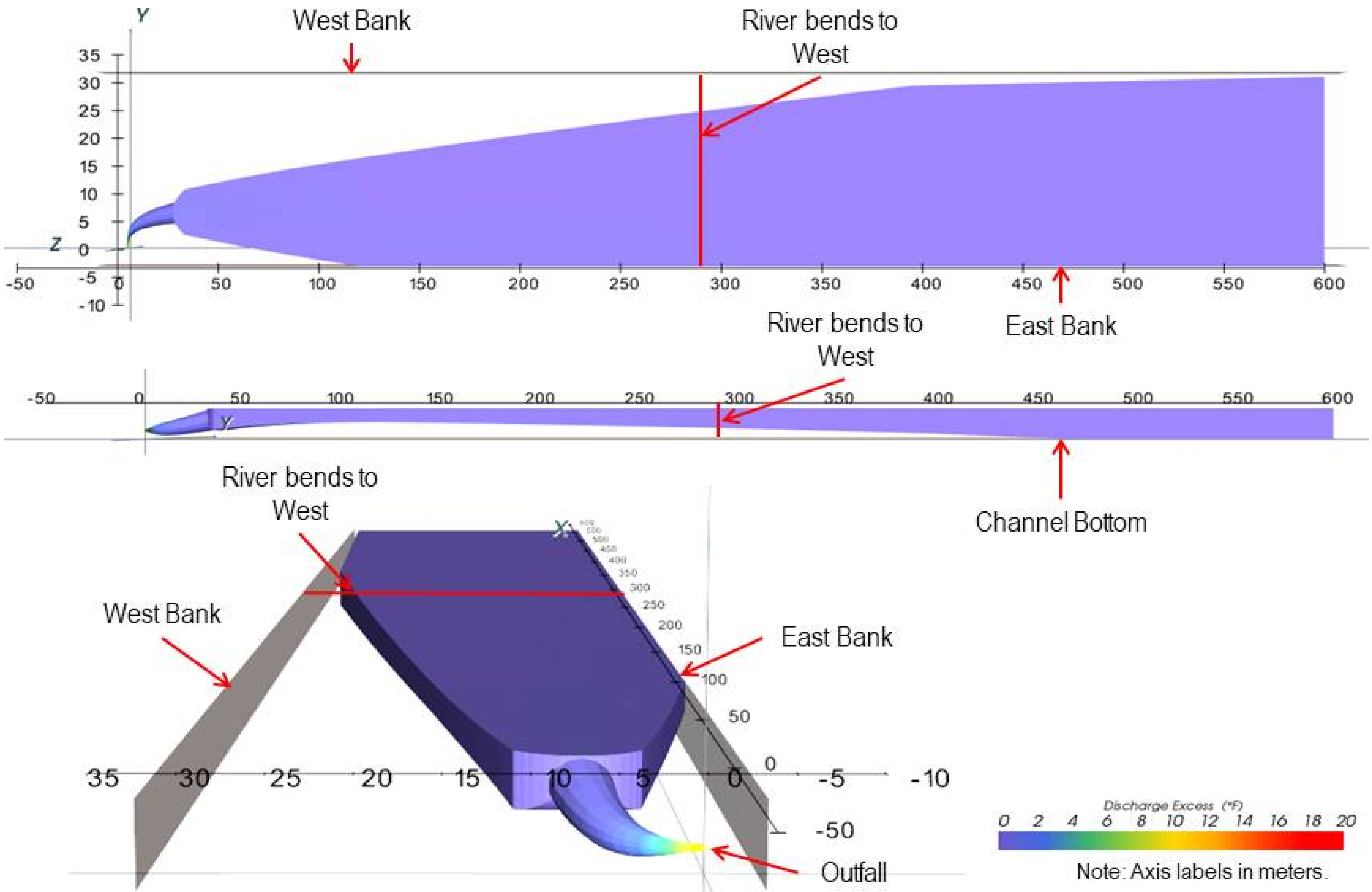


Figure C-2. January 6.0 mgd median-case thermal plume scenario, based on effluent temperature of 72.2°F, river temperature of 53.7°F (18.5°F temperature differential), effluent flow of 7.30 mgd, and river velocity of 1.19 fps.

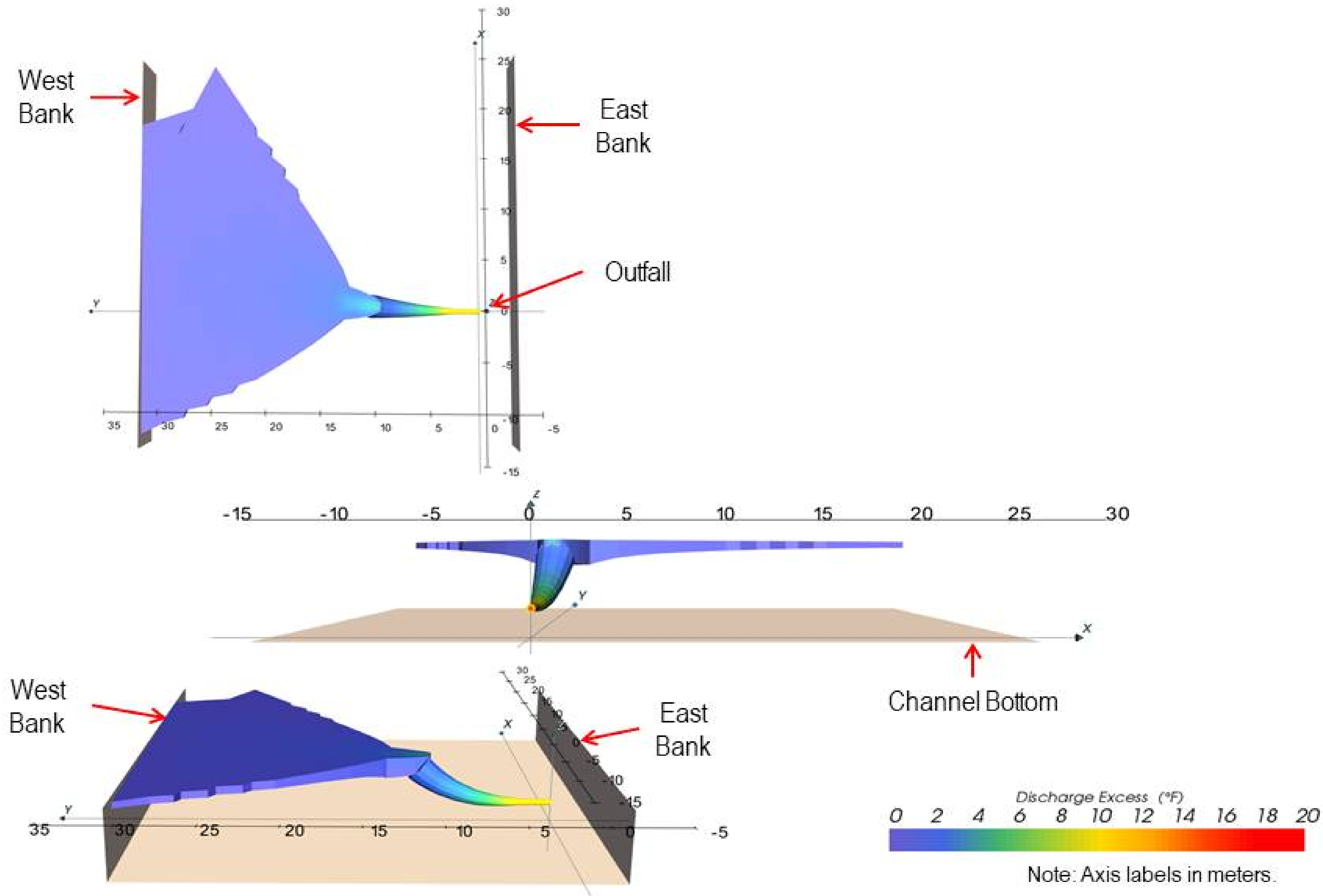


Figure C-3. January 2.5 mgd worst-case thermal plume scenario, based on effluent temperature of 71.2°F, river temperature of 51.2°F (20.0°F temperature differential), effluent flow of 4.0 mgd, and river velocity of 0.05 fps.

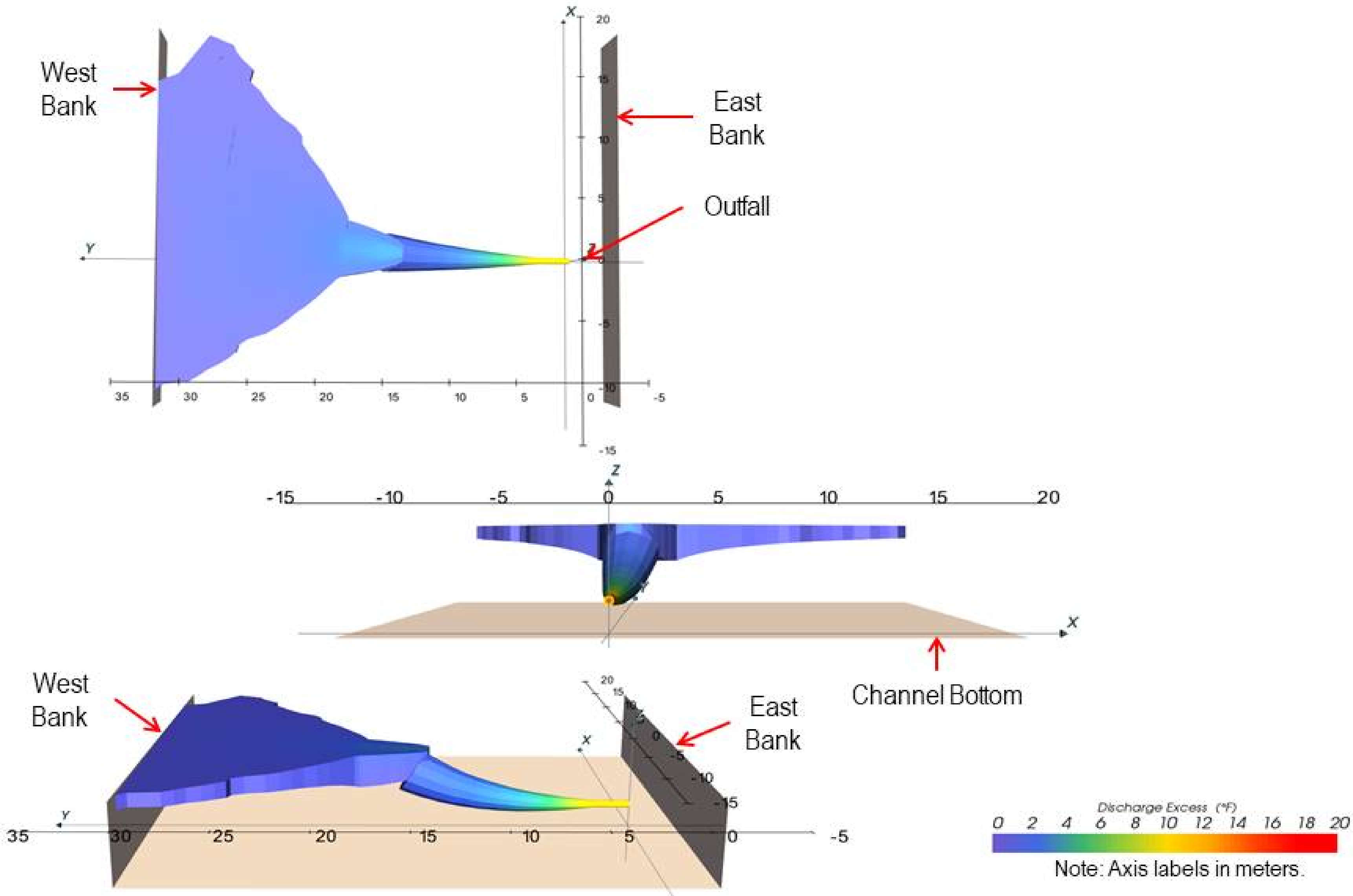


Figure C-4. January 6.0 mgd worst-case thermal plume scenario, based on effluent temperature of 71.2°F, river temperature of 51.2°F (20.0°F temperature differential), effluent flow of 7.55 mgd, and river velocity of 0.05 fps.

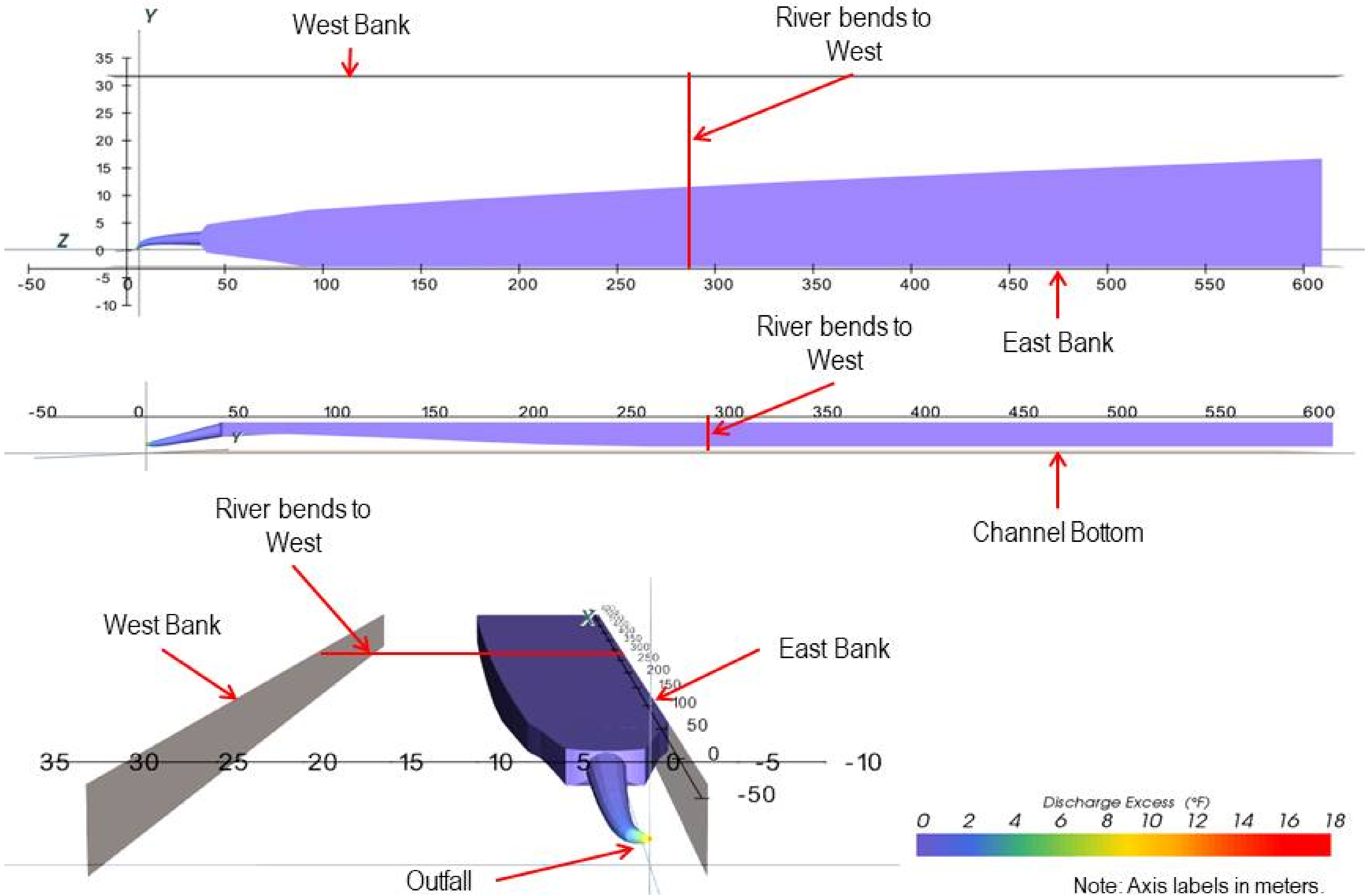


Figure C-5. February 2.5 mgd median-case thermal plume scenario, based on effluent temperature of 72.9°F, river temperature of 56.1°F (16.8°F temperature differential), effluent flow of 3.0 mgd, and river velocity of 1.37 fps.

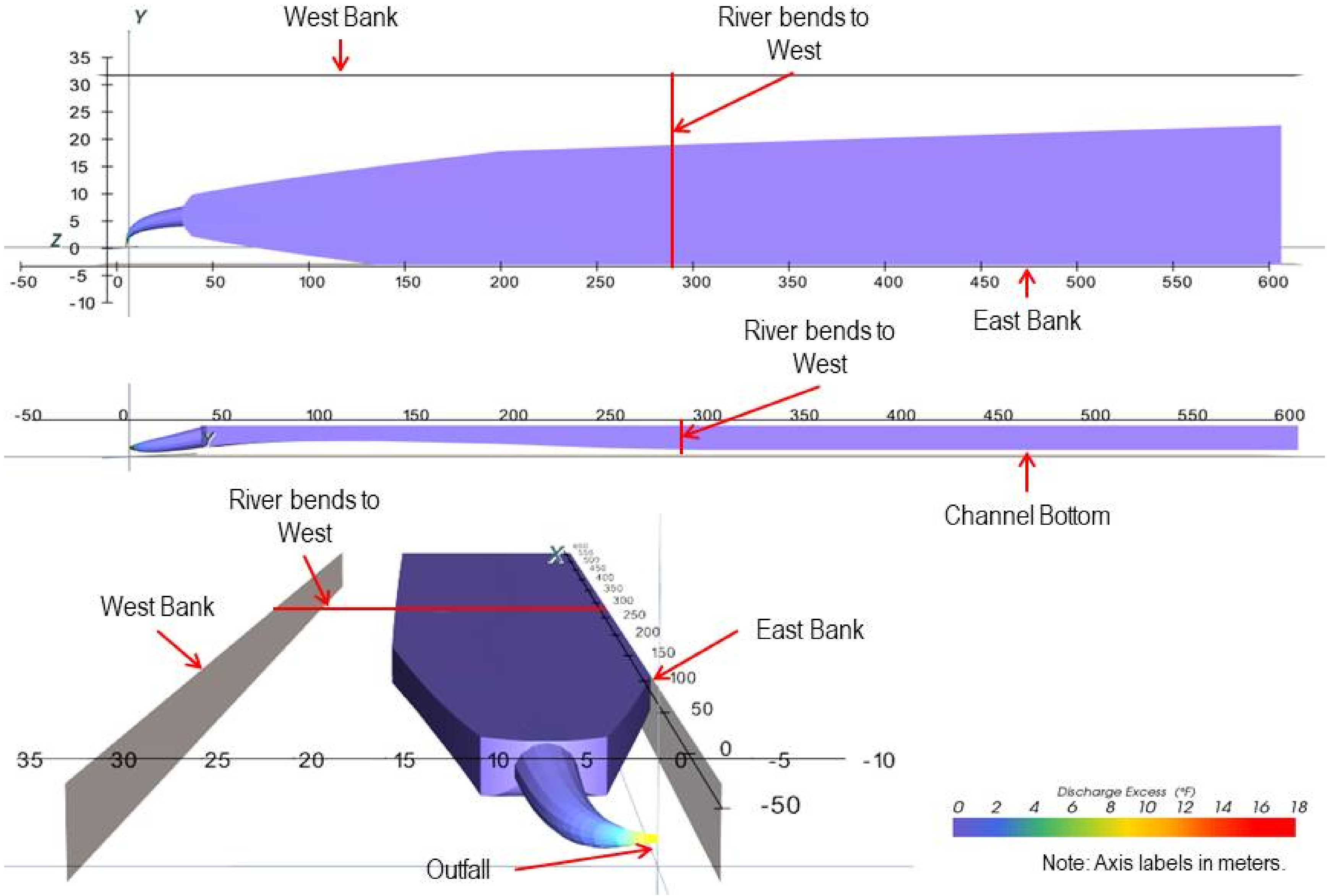


Figure C-6. February 6.0 mgd median-case thermal plume scenario, based on effluent temperature of 72.9°F, river temperature of 56.1°F (16.8°F temperature differential), effluent flow of 7.30 mgd, and river velocity of 1.37 fps.

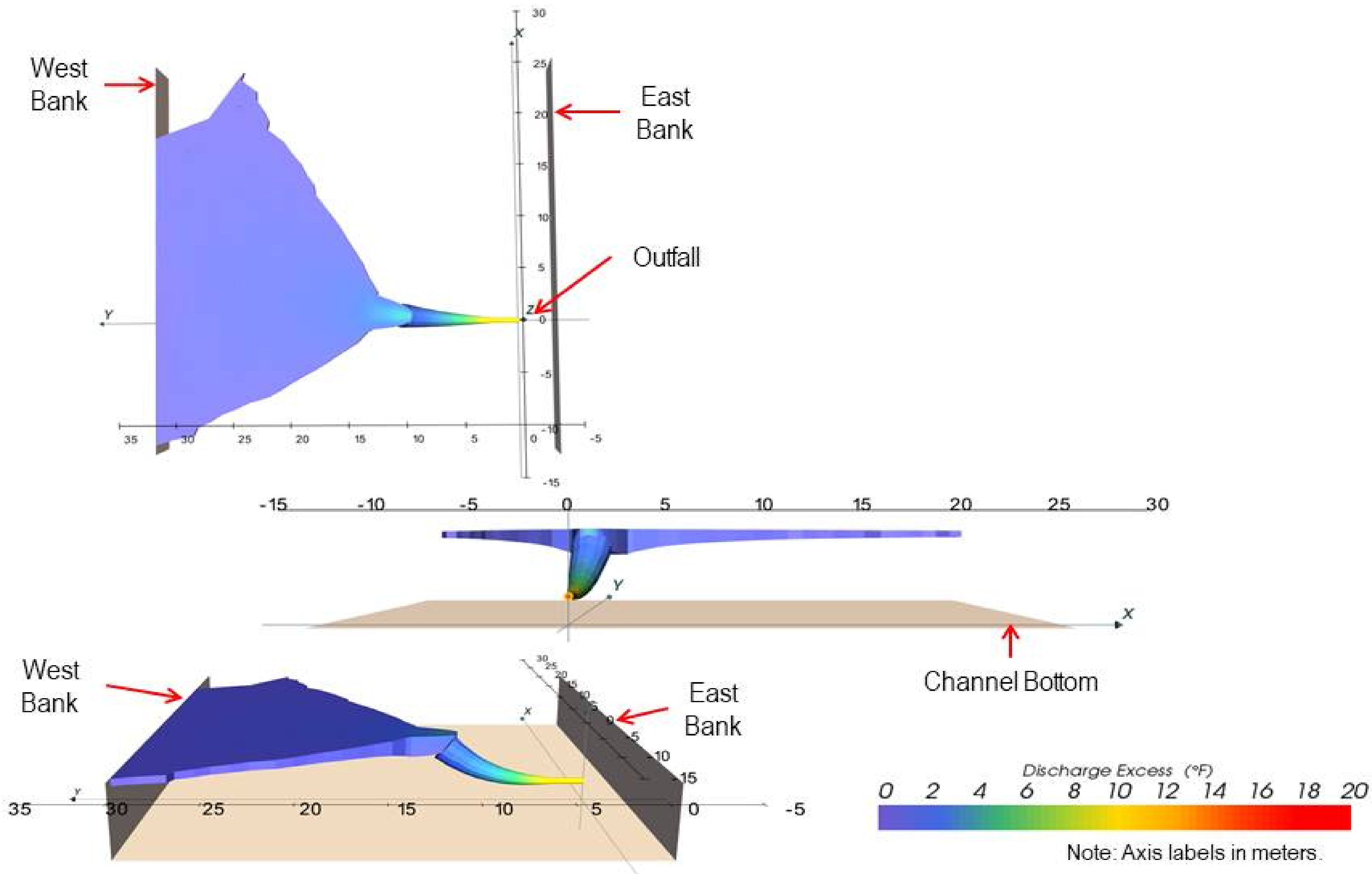


Figure C-7. February 2.5 mgd worst-case thermal plume scenario, based on effluent temperature of 71.0°F, river temperature of 51.0°F (20.0°F temperature differential), effluent flow of 3.90 mgd, and river velocity of 0.05 fps.

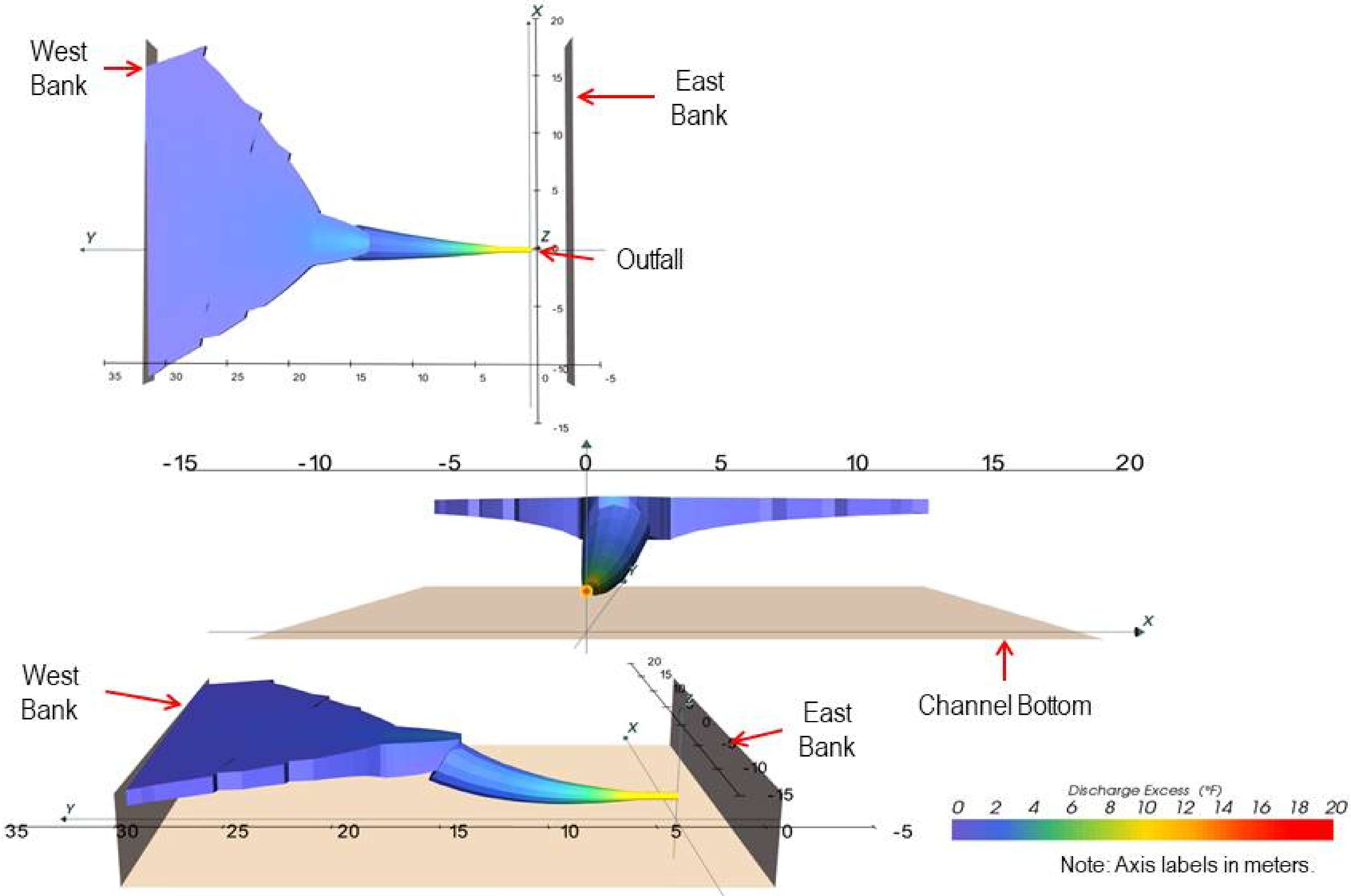


Figure C-8. February 6.0 mgd worst-case thermal plume scenario, based on effluent temperature of 71.0°F, river temperature of 51.0°F (20.0°F temperature differential), effluent flow of 7.55 mgd, and river velocity of 0.05 fps.

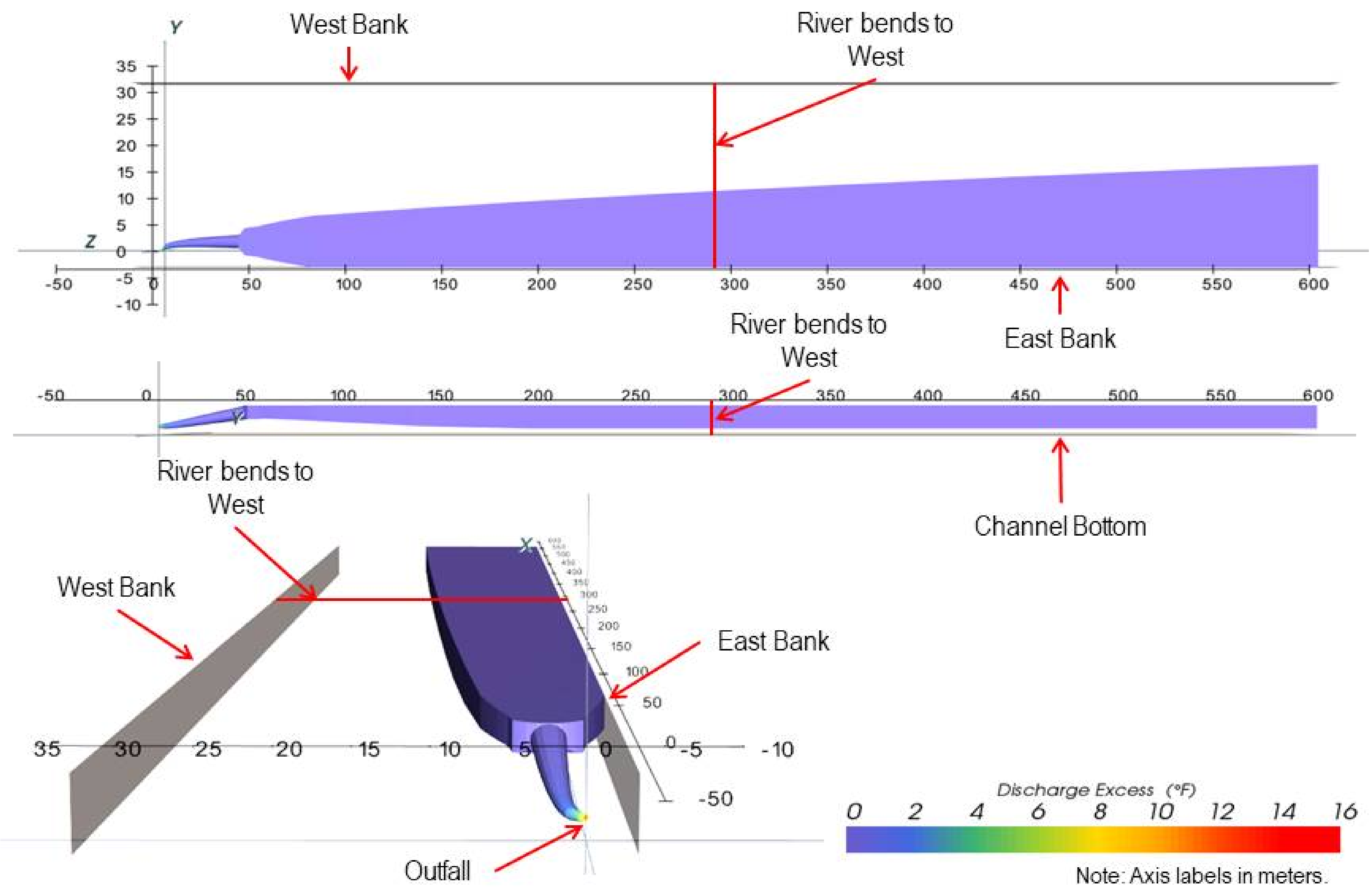


Figure C-9. March 2.5 mgd median-case thermal plume scenario, based on effluent temperature of 74.3°F, river temperature of 59.6°F (14.7°F temperature differential), effluent flow of 2.80 mgd, and river velocity of 1.49 fps.

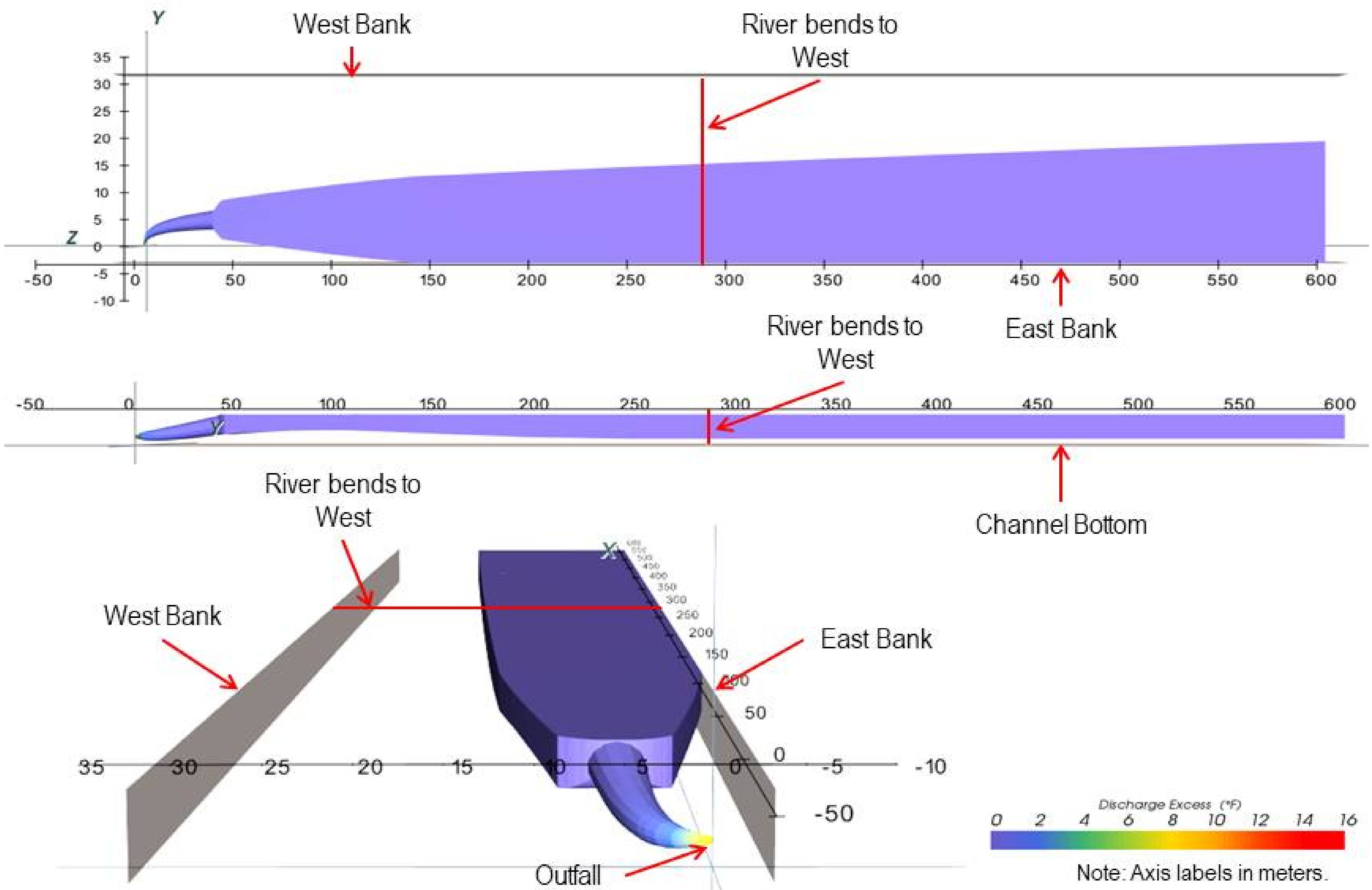


Figure C-10. March 6.0 mgd median-case thermal plume scenario, based on effluent temperature of 74.3°F, river temperature of 59.6°F (14.7°F temperature differential), effluent flow of 6.70 mgd, and river velocity of 1.49 fps.

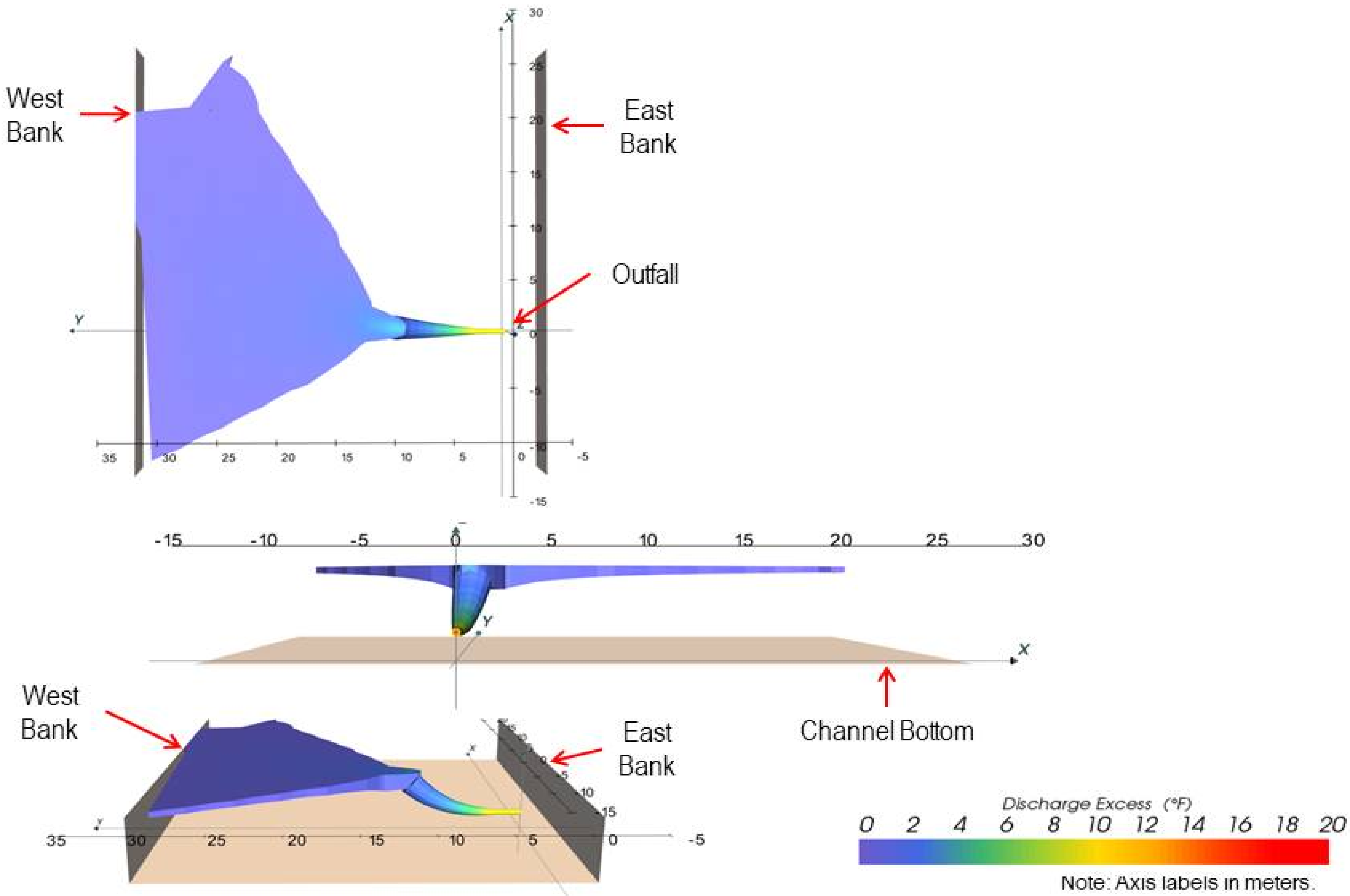


Figure C-11. March 2.5 mgd worst-case thermal plume scenario, based on effluent temperature of 72.6°F, river temperature of 54.5°F (18.1°F temperature differential), effluent flow of 3.64 mgd, and river velocity of 0.05 fps.

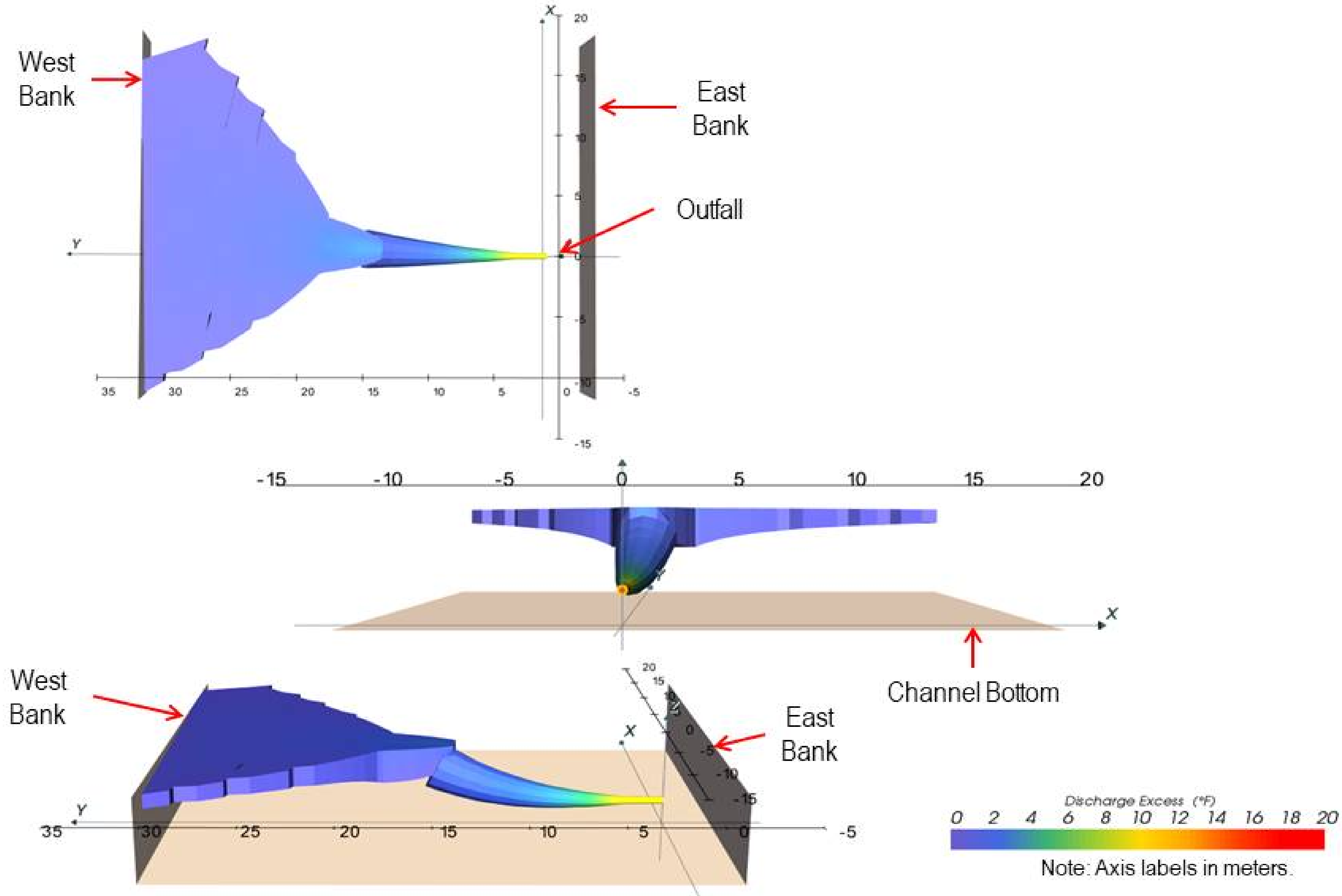


Figure C-12. March 6.0 mgd worst-case thermal plume scenario, based on effluent temperature of 72.6°F, river temperature of 54.5°F (18.1°F temperature differential), effluent flow of 7.55 mgd, and river velocity of 0.05 fps.

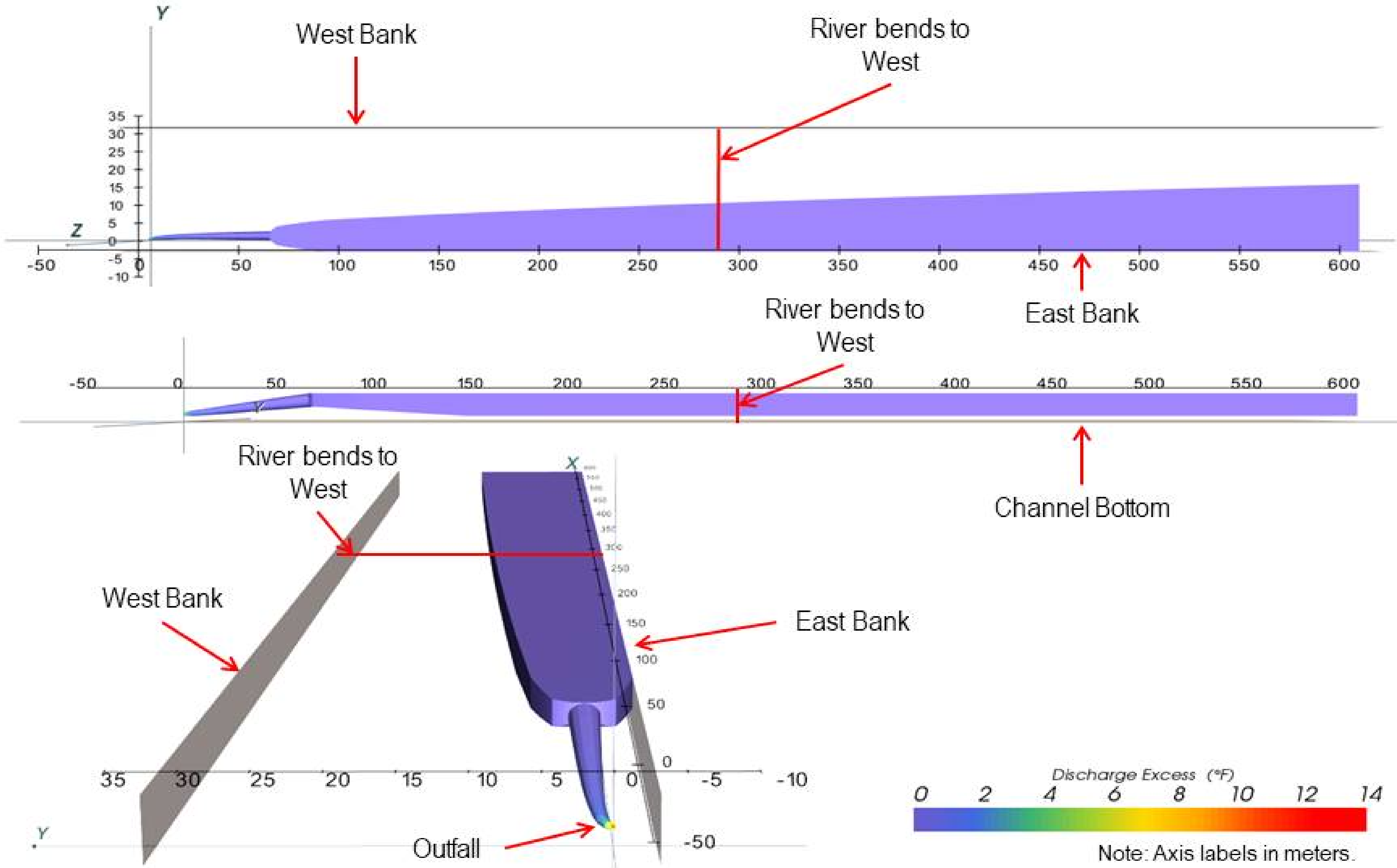


Figure C-13. April 2.5 mgd median-case thermal plume scenario, based on effluent temperature of 76.3°F, river temperature of 62.5°F (13.8°F temperature differential), effluent flow of 2.70 mgd, and river velocity of 1.92 fps.

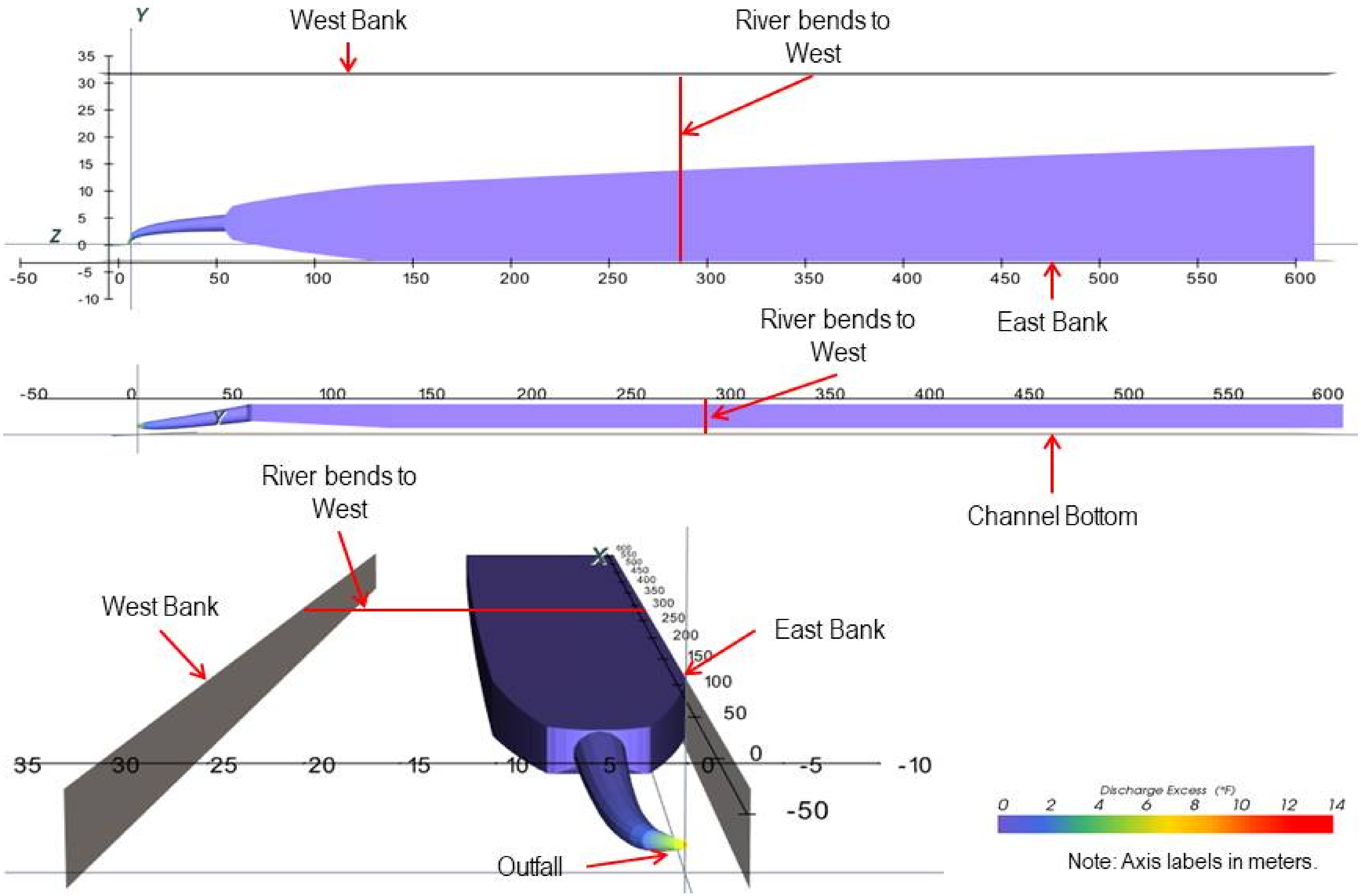


Figure C-14. April 6.0 mgd median-case thermal plume scenario, based on effluent temperature of 76.3°F, river temperature of 62.5°F (13.8°F temperature differential), effluent flow of 6.40 mgd, and river velocity of 1.92 fps.

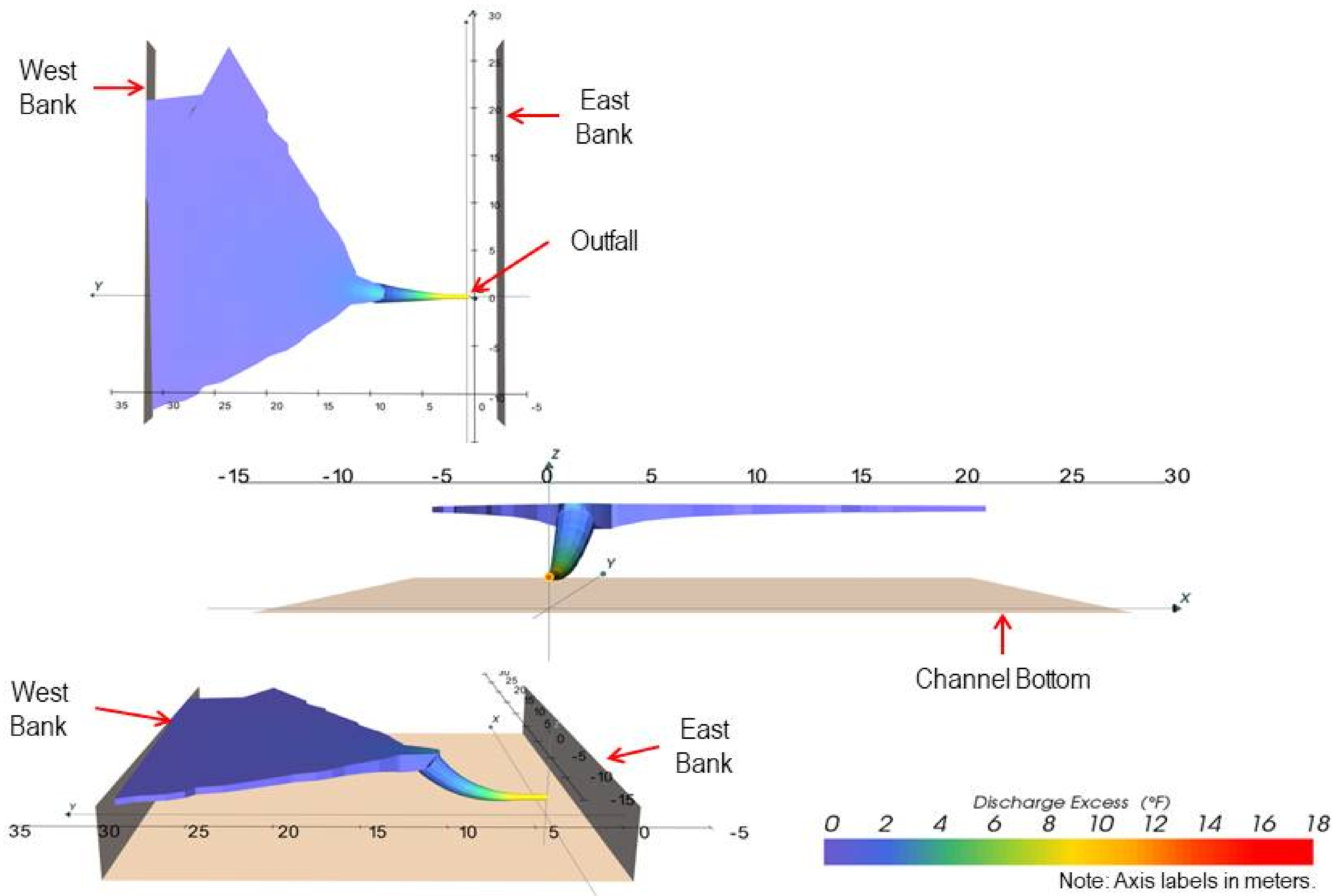


Figure C-15. April 2.5 mgd worst-case thermal plume scenario, based on effluent temperature of 74.6°F, river temperature of 57.6°F (17.0°F temperature differential), effluent flow of 3.51 mgd, and river velocity of 0.05 fps.

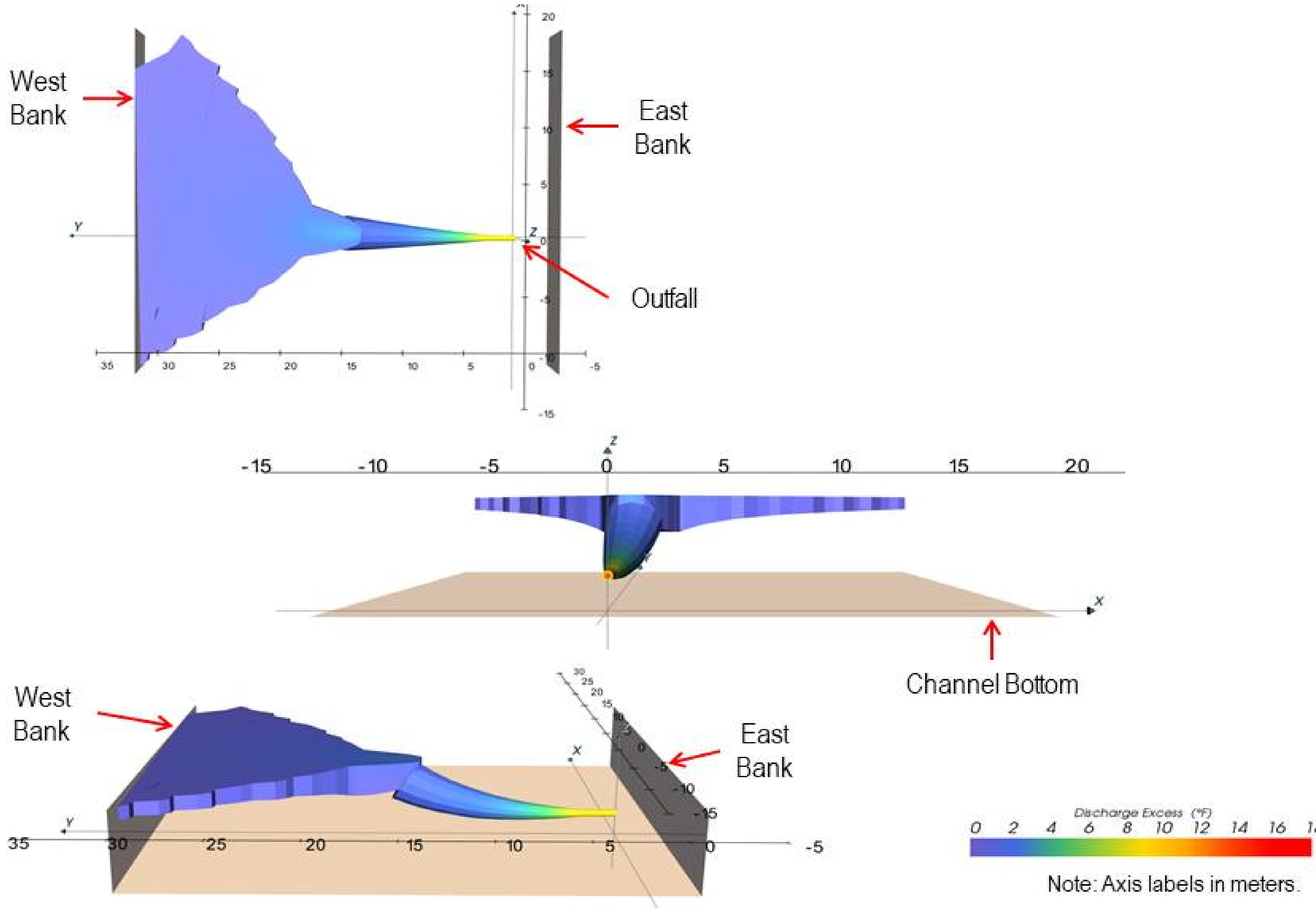


Figure C-16. April 6.0 mgd worst-case thermal plume scenario, based on effluent temperature of 74.6°F, river temperature of 57.6°F (17.0°F temperature differential), effluent flow of 7.55 mgd, and river velocity of 0.05 fps.

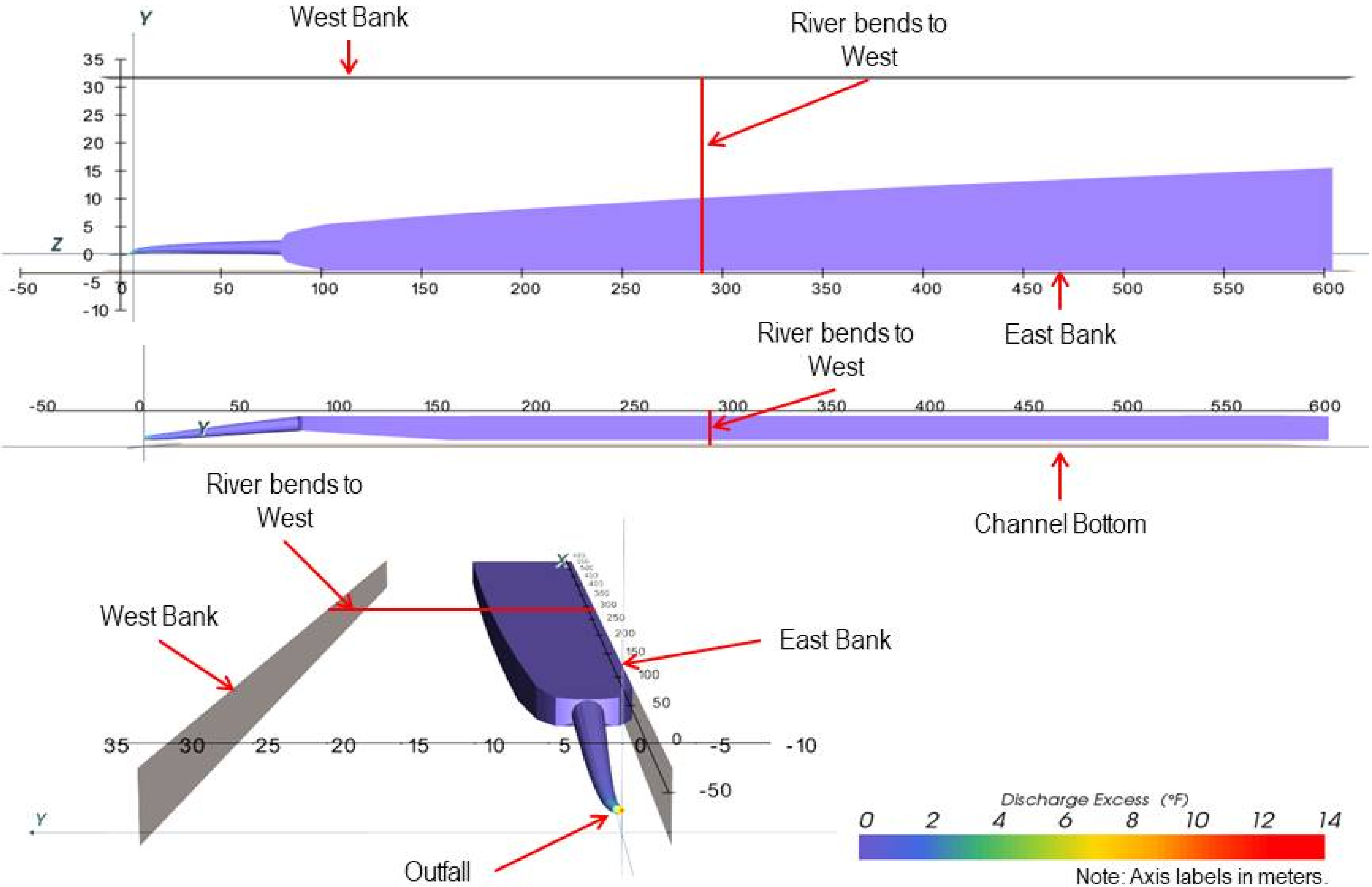


Figure C-17. May 2.5 mgd median-case thermal plume scenario, based on effluent temperature of 78.3°F, river temperature of 64.9°F (13.4°F temperature differential), effluent flow of 2.60 mgd, and river velocity of 2.18 fps.

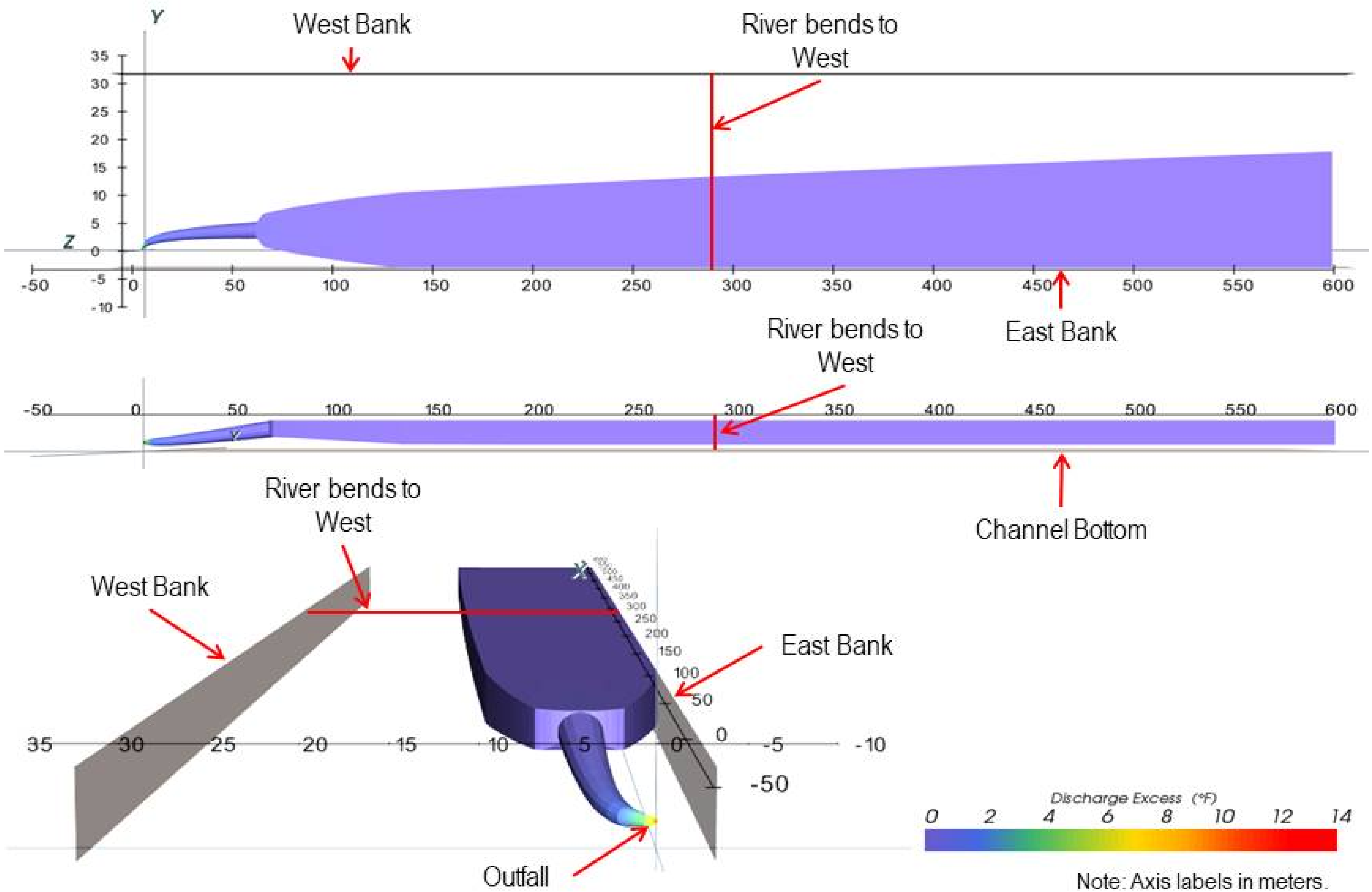


Figure C-18. May 6.0 mgd median-case thermal plume scenario, based on effluent temperature of 78.3°F, river temperature of 64.9°F (13.4°F temperature differential), effluent flow of 6.40 mgd, and river velocity of 2.18 fps.

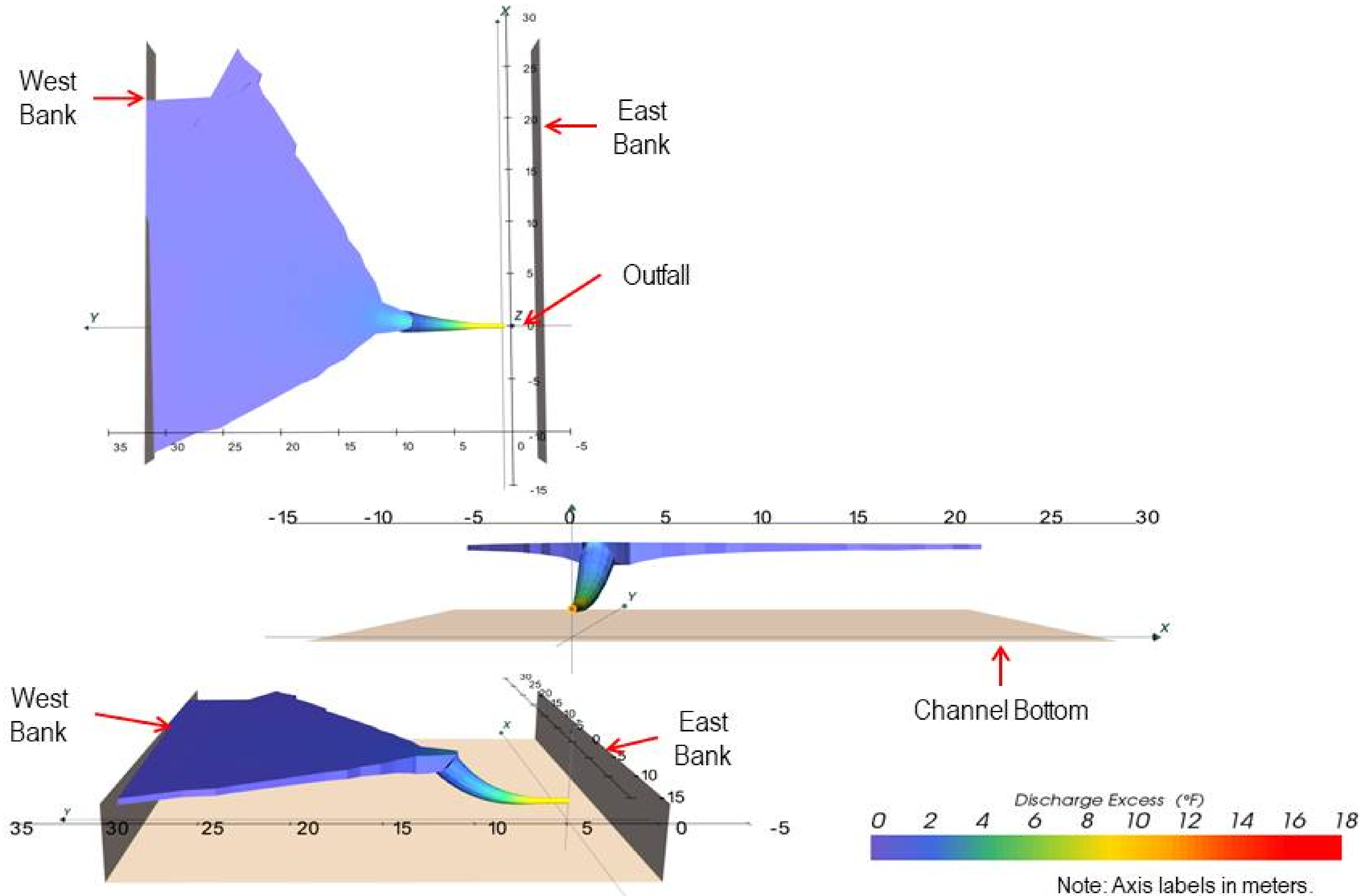


Figure C-19. May 2.5 mgd worst-case thermal plume scenario, based on effluent temperature of 73.5°F, river temperature of 56.1°F (17.4°F temperature differential), effluent flow of 3.38 mgd, and river velocity of 0.05 fps.

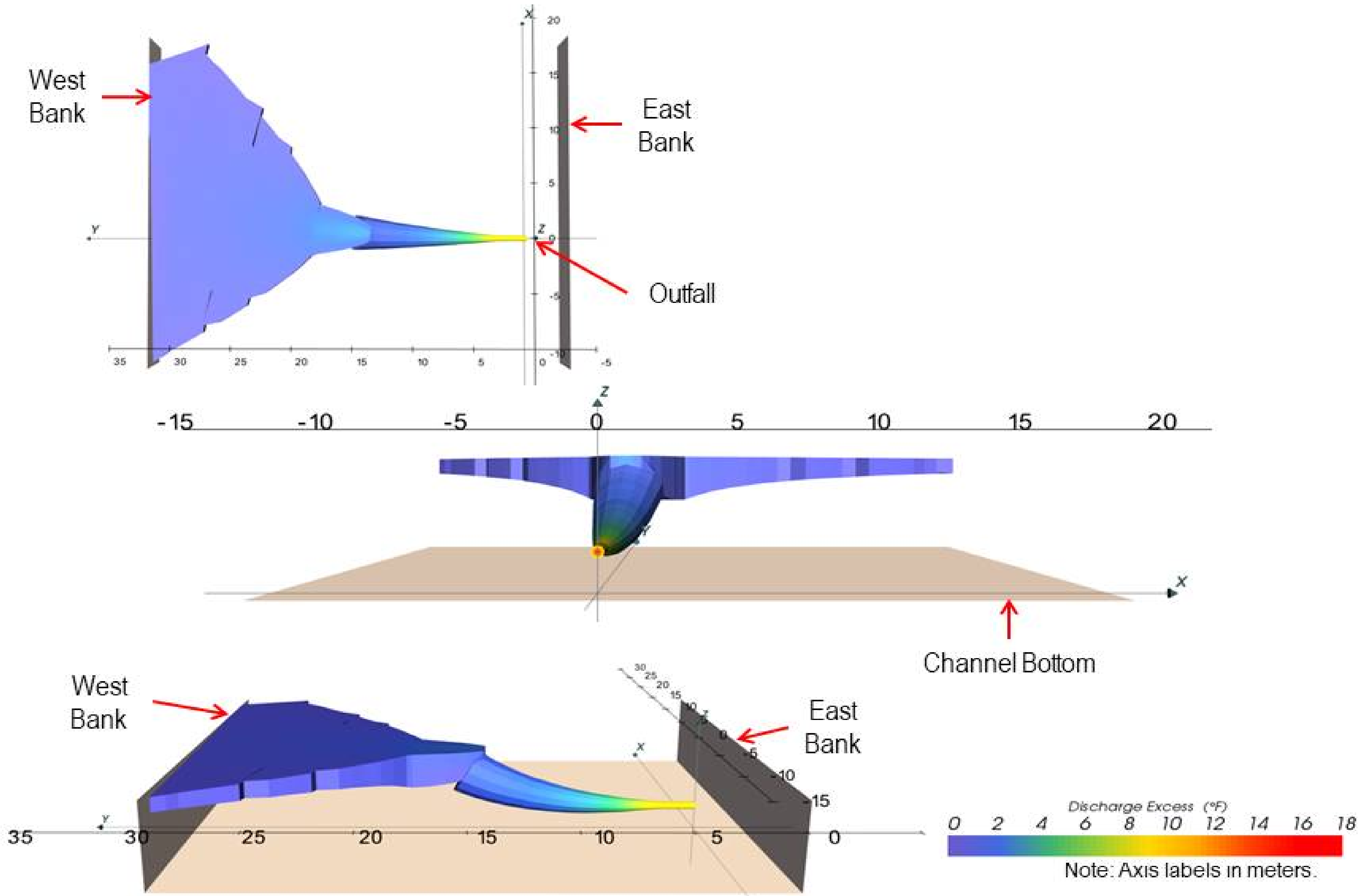


Figure C-20. May 6.0 mgd worst-case thermal plume scenario, based on effluent temperature of 73.5°F, river temperature of 56.1°F (17.4°F temperature differential), effluent flow of 7.55 mgd, and river velocity of 0.05 fps.

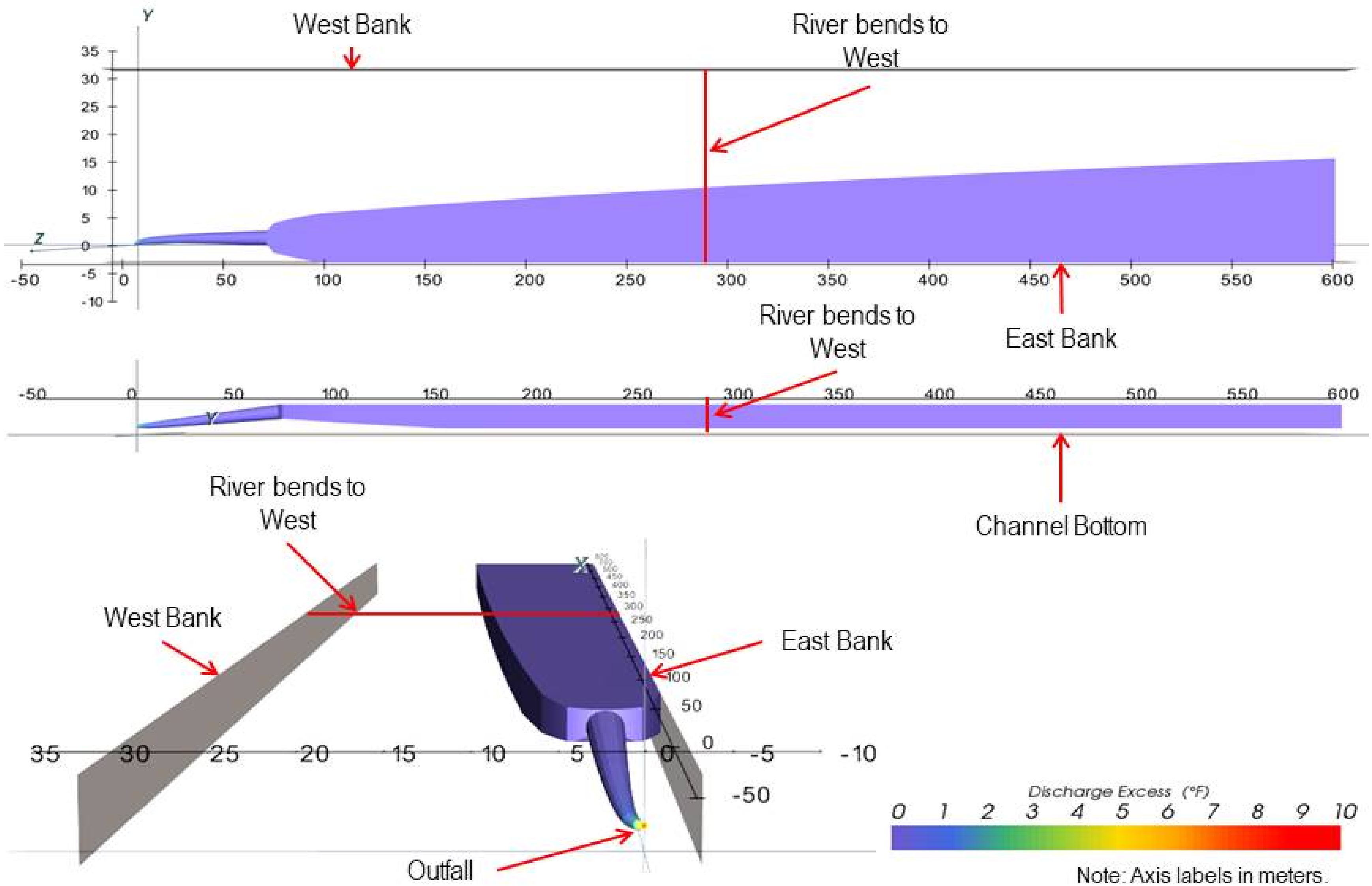


Figure C-21. June 2.5 mgd median-case thermal plume scenario, based on effluent temperature of 82.0°F, river temperature of 72.7°F (9.3°F temperature differential), effluent flow of 2.50 mgd, and river velocity of 1.84 fps.

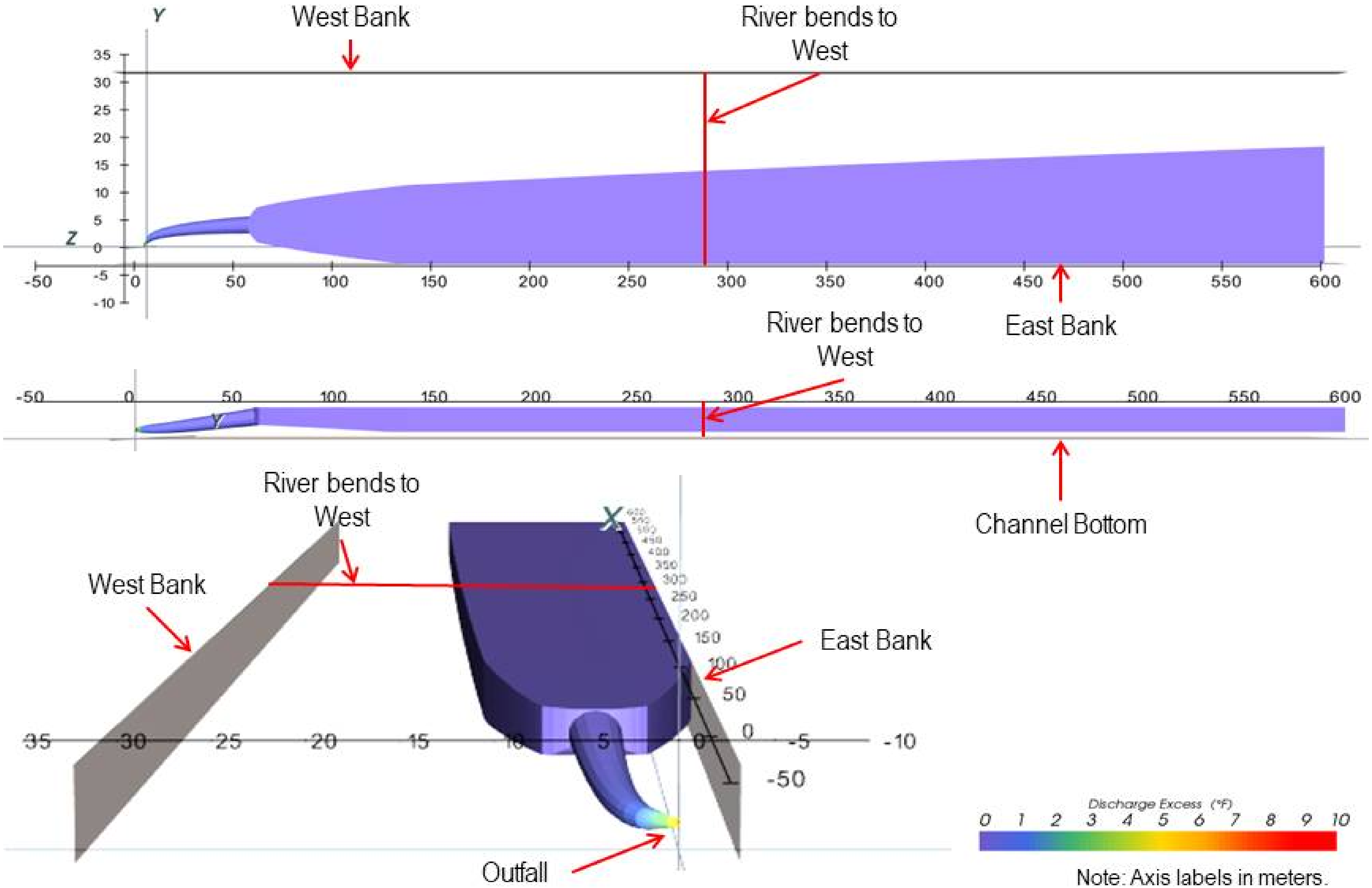


Figure C-22. June 6.0 mgd median-case thermal plume scenario, based on effluent temperature of 82.0°F, river temperature of 72.7°F (9.3°F temperature differential), effluent flow of 6.10 mgd, and river velocity of 1.84 fps.

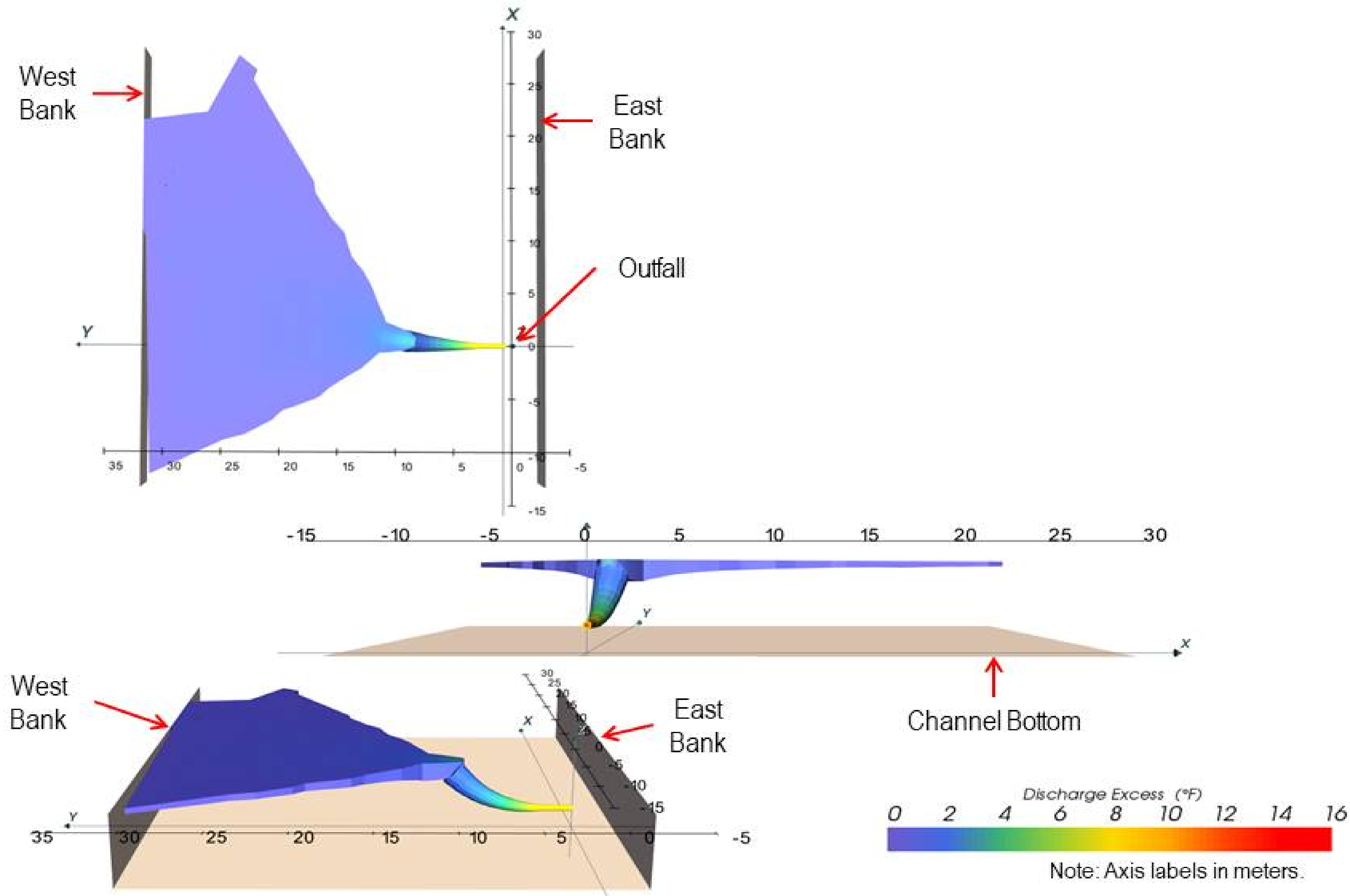


Figure C-23. June 2.5 mgd worst-case thermal plume scenario, based on effluent temperature of 77.3°F, river temperature of 62.1°F (15.2°F temperature differential), effluent flow of 3.25 mgd, and river velocity of 0.05 fps.

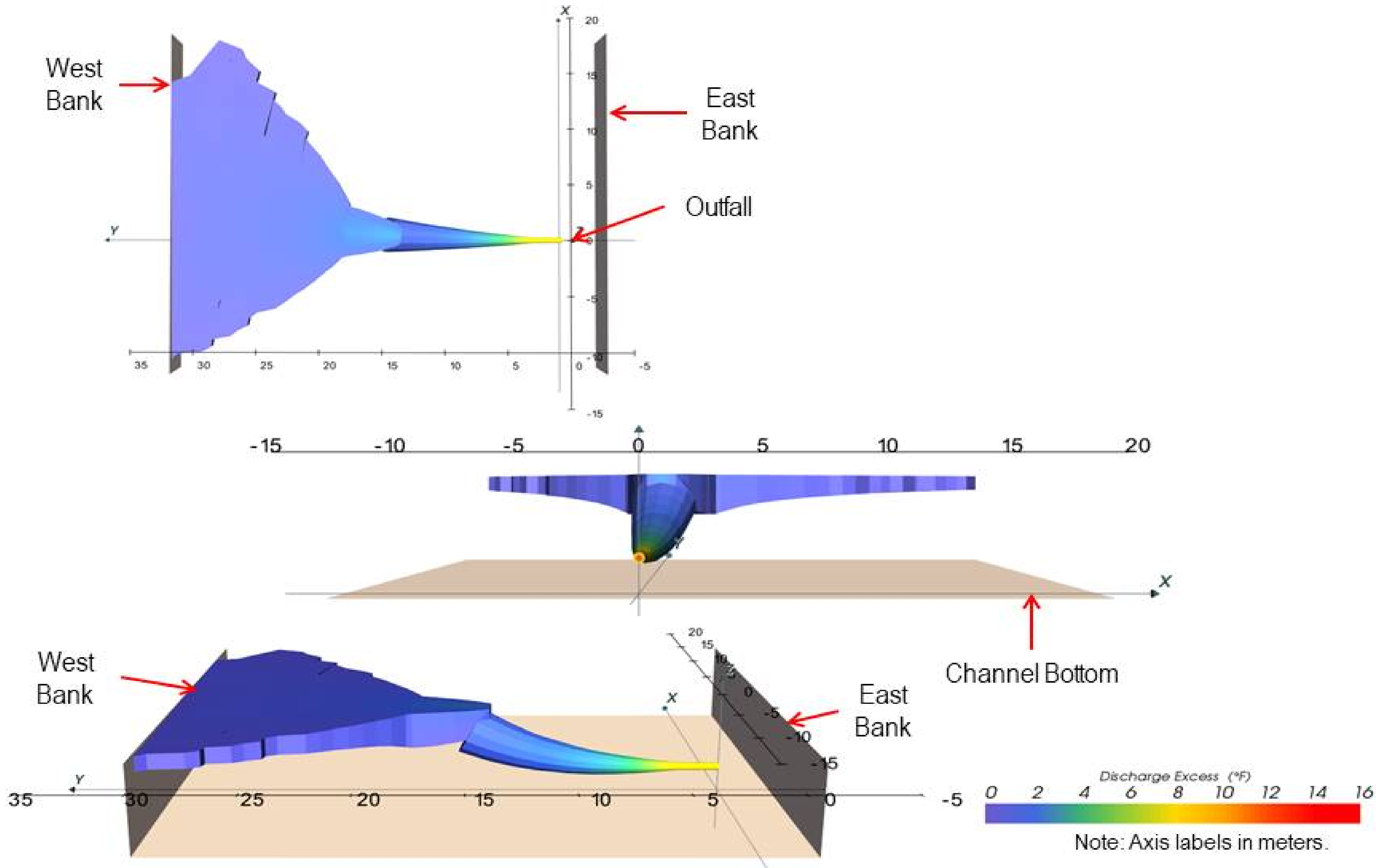


Figure C-24. June 6.0 mgd worst-case thermal plume scenario, based on effluent temperature of 77.3°F, river temperature of 62.1°F (15.2°F temperature differential), effluent flow of 7.55 mgd, and river velocity of 0.05 fps.

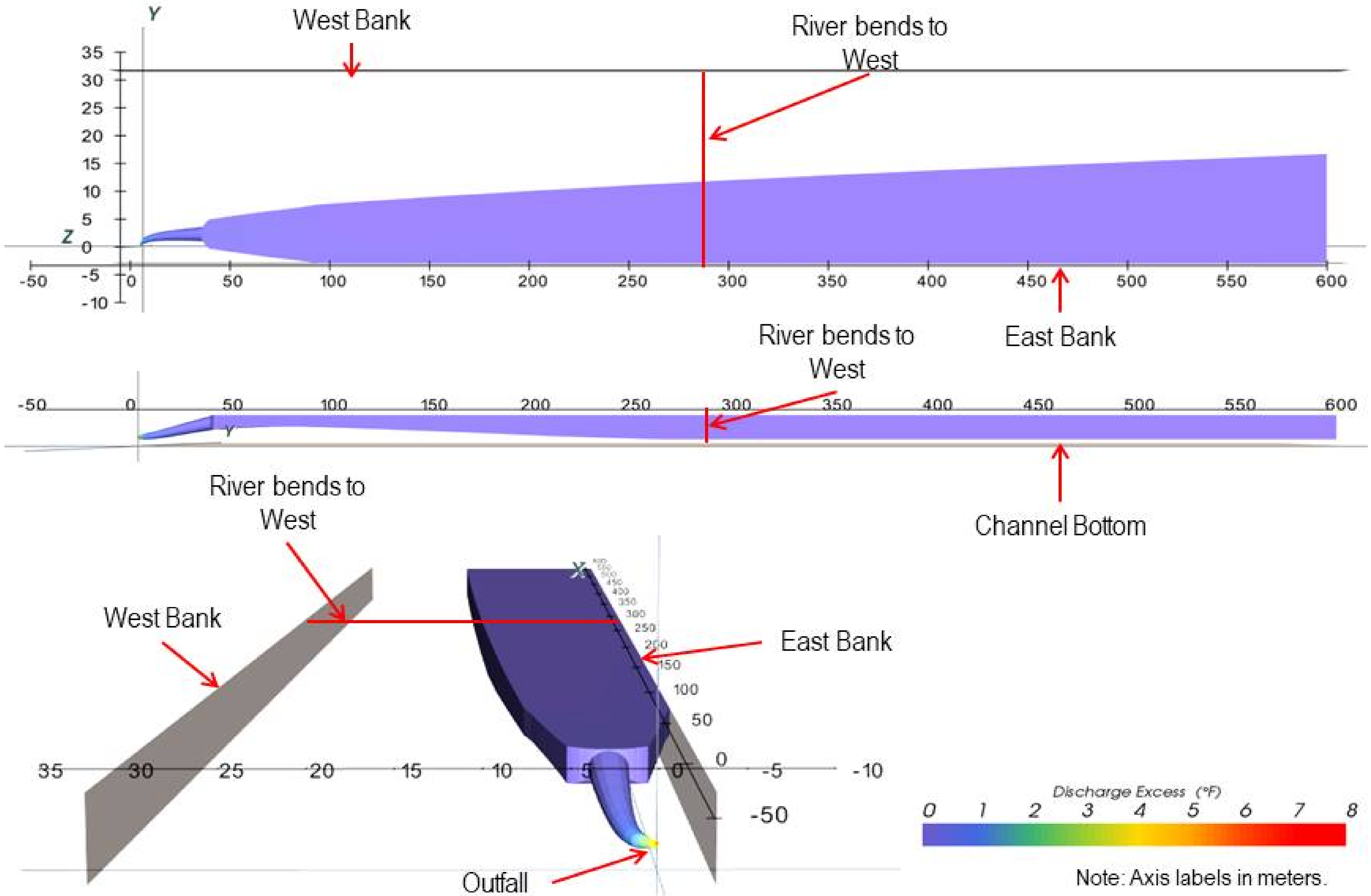


Figure C-25. July 2.5 mgd median-case thermal plume scenario, based on effluent temperature of 80.0°F, river temperature of 72.1°F (7.9°F temperature differential), effluent flow of 2.50 mgd, and river velocity of 1.07 fps.

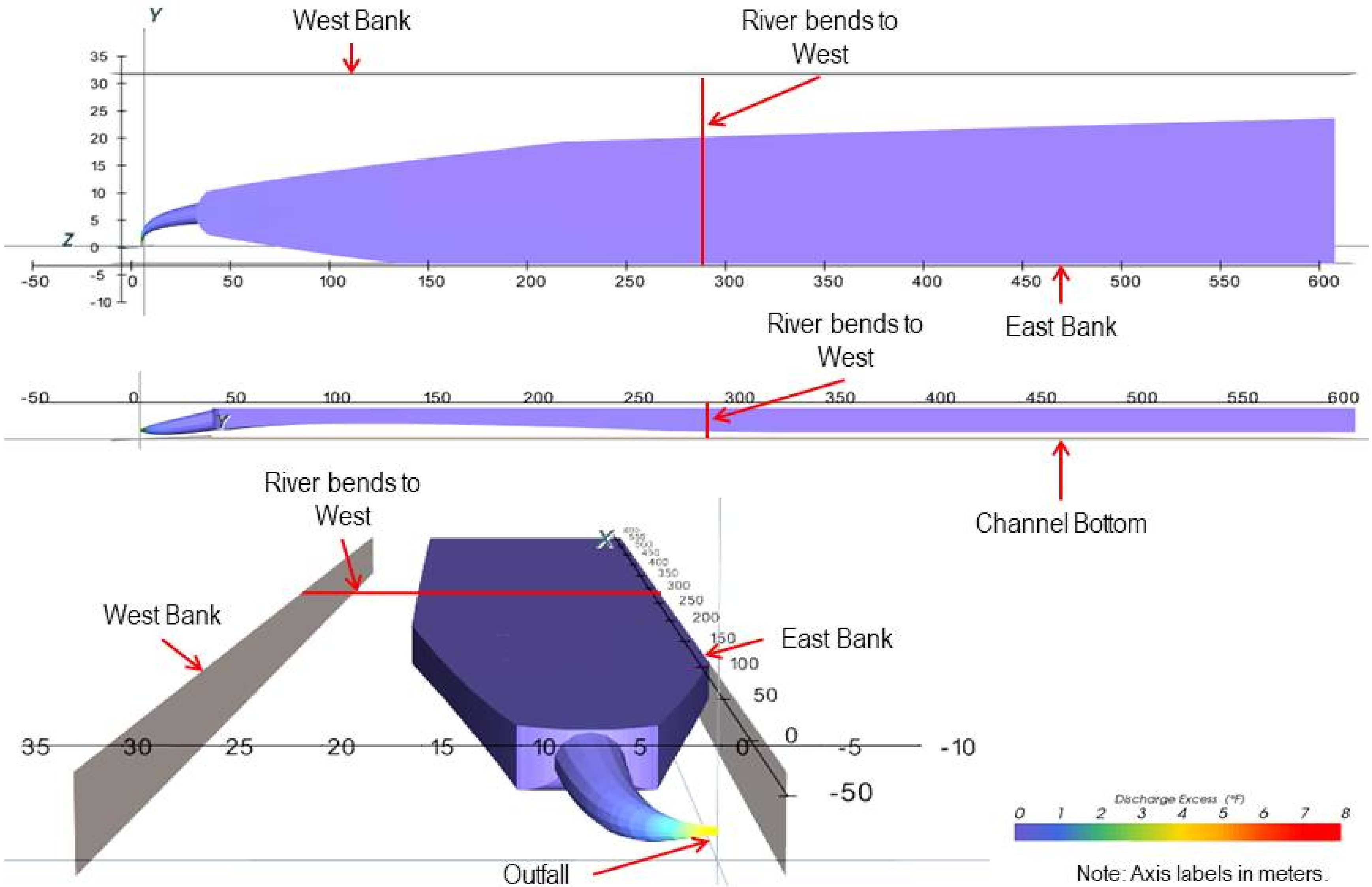


Figure C-26. July 6.0 mgd median-case thermal plume scenario, based on effluent temperature of 80.0°F, river temperature of 72.1°F (7.9°F temperature differential), effluent flow of 6.0 mgd, and river velocity of 1.07 fps.

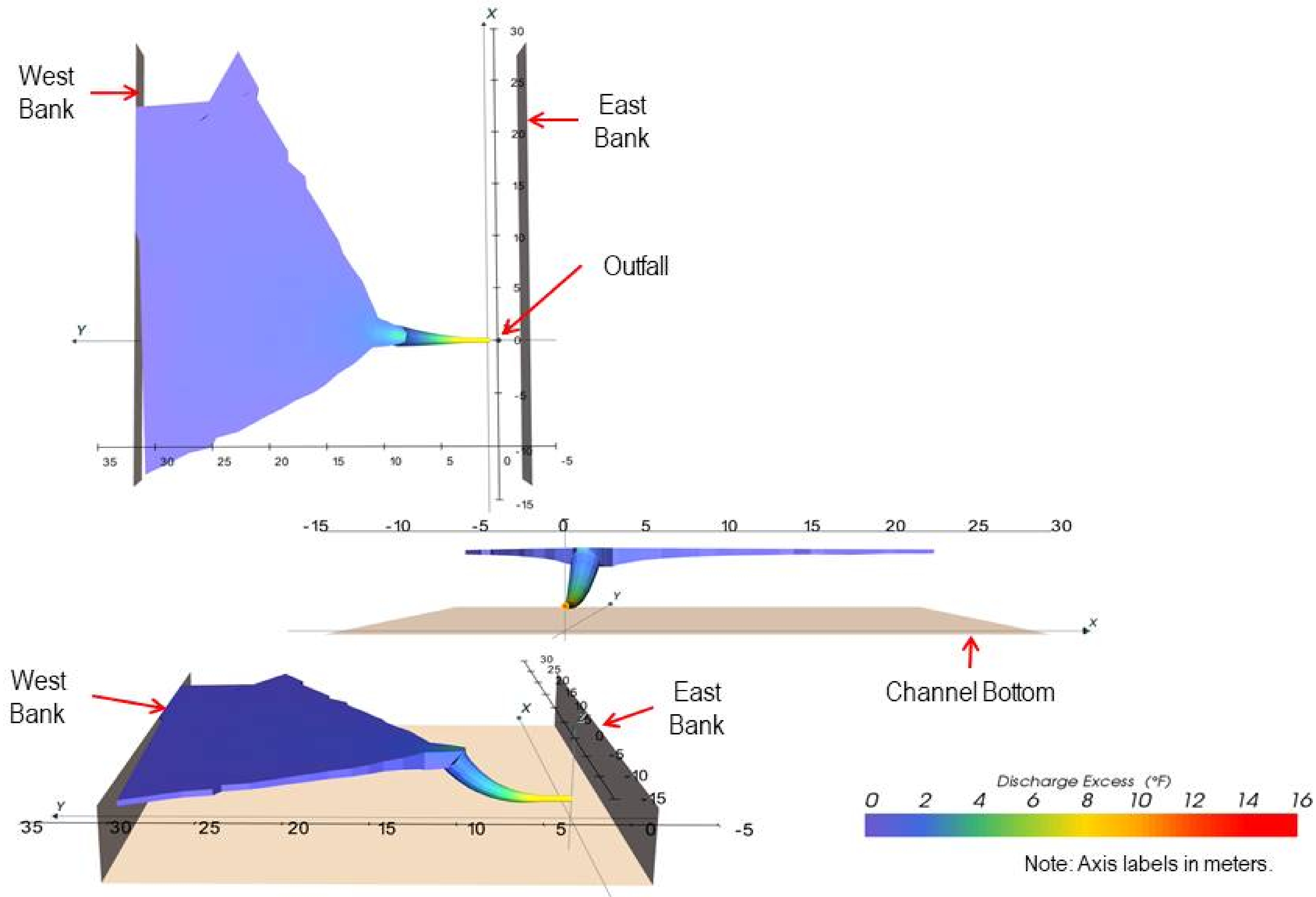


Figure C-27. July 2.5 mgd worst-case thermal plume scenario, based on effluent temperature of 81.2°F, river temperature of 65.4°F (15.8°F temperature differential), effluent flow of 3.25 mgd, and river velocity of 0.05 fps.

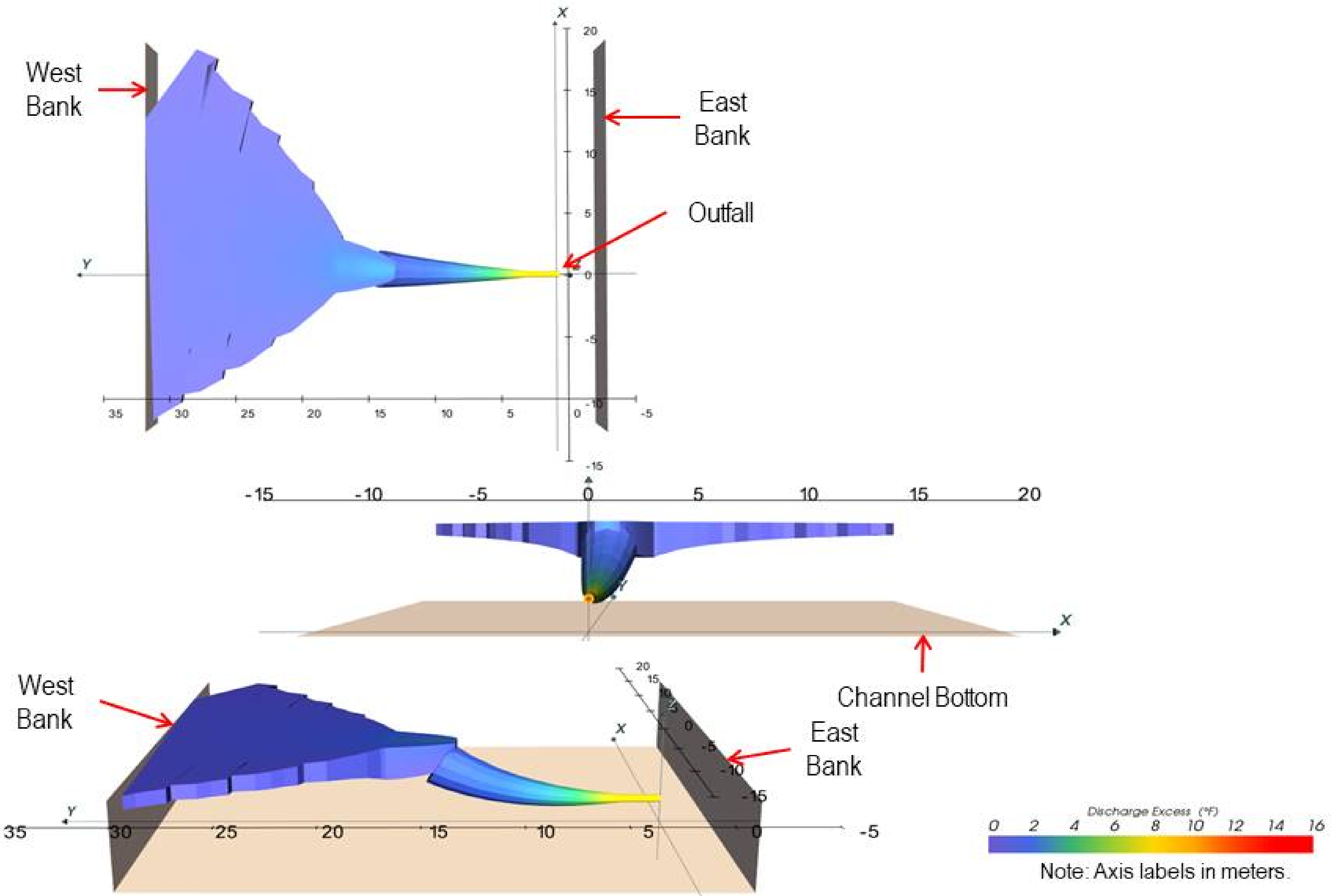


Figure C-28. July 6.0 mgd worst-case thermal plume scenario, based on effluent temperature of 81.2°F, river temperature of 65.4°F (15.8°F temperature differential), effluent flow of 7.55 mgd, and river velocity of 0.05 fps.

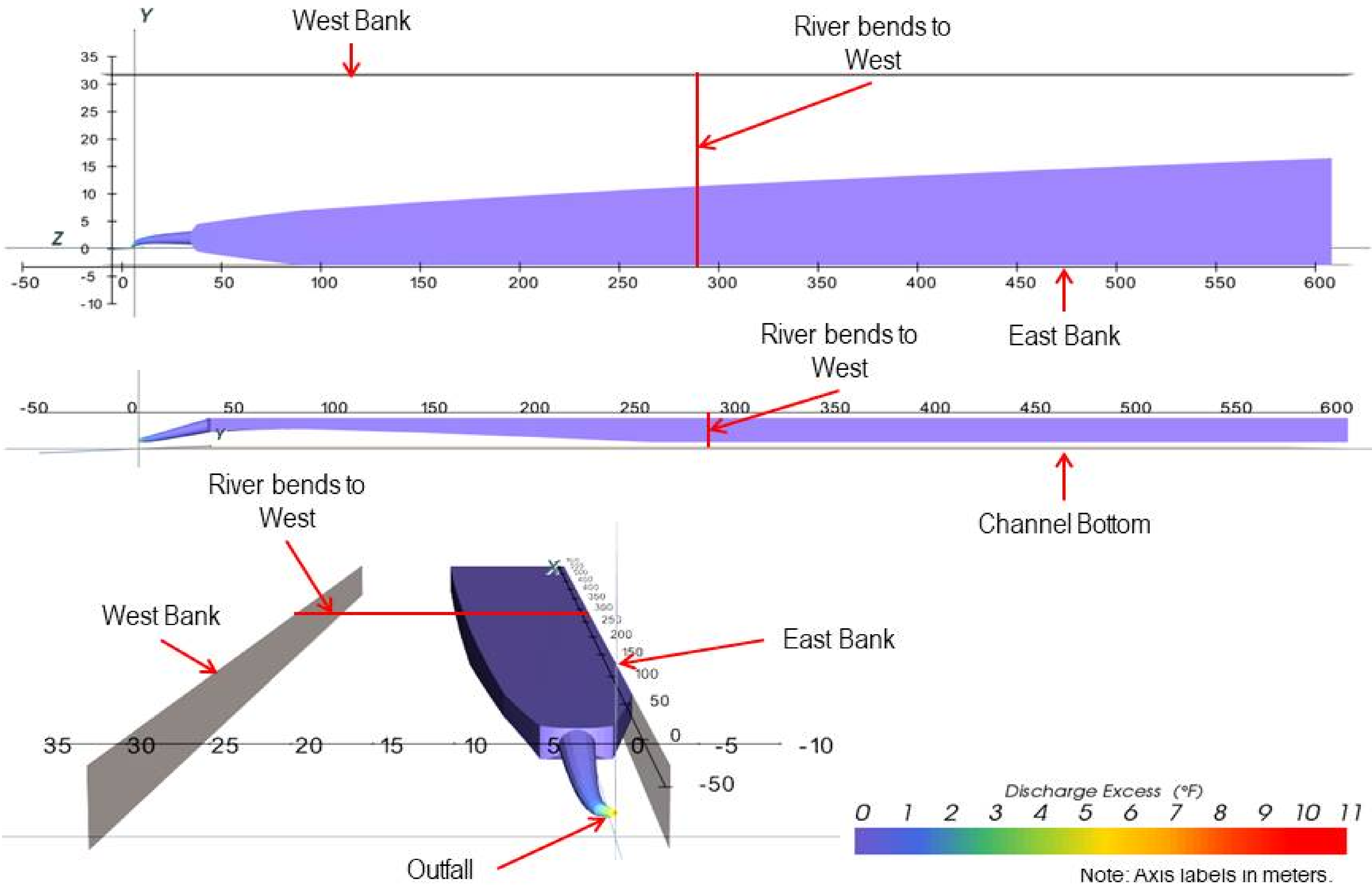


Figure C-29. August 2.5 mgd median-case thermal plume scenario, based on effluent temperature of 82.1°F, river temperature of 71.4°F (10.7°F temperature differential), effluent flow of 2.50 mgd, and river velocity of 1.19 fps.

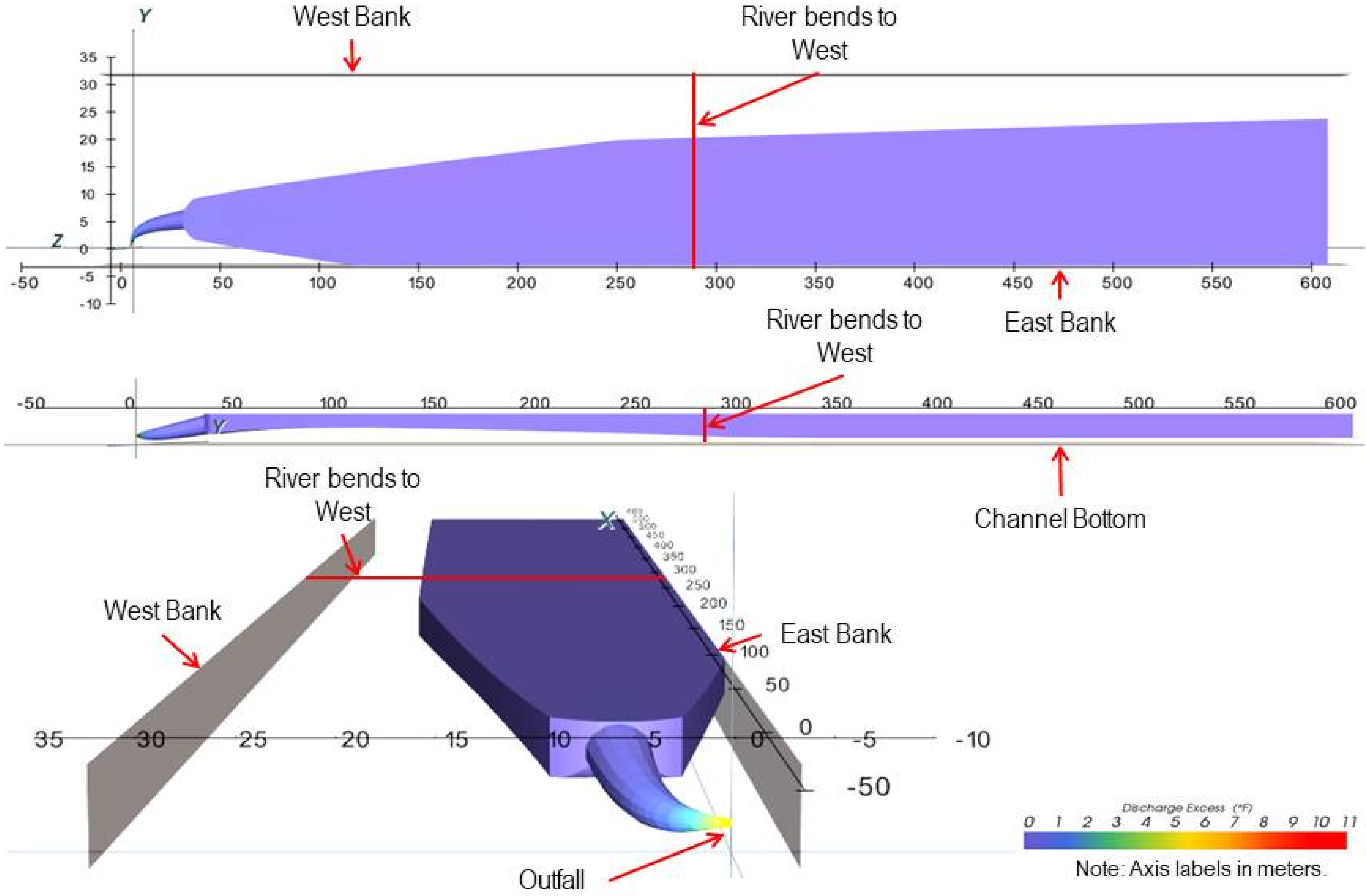


Figure C-30. August 6.0 mgd median-case thermal plume scenario, based on effluent temperature of 82.1°F, river temperature of 71.4°F (10.7°F temperature differential), effluent flow of 6.0 mgd, and river velocity of 1.19 fps.

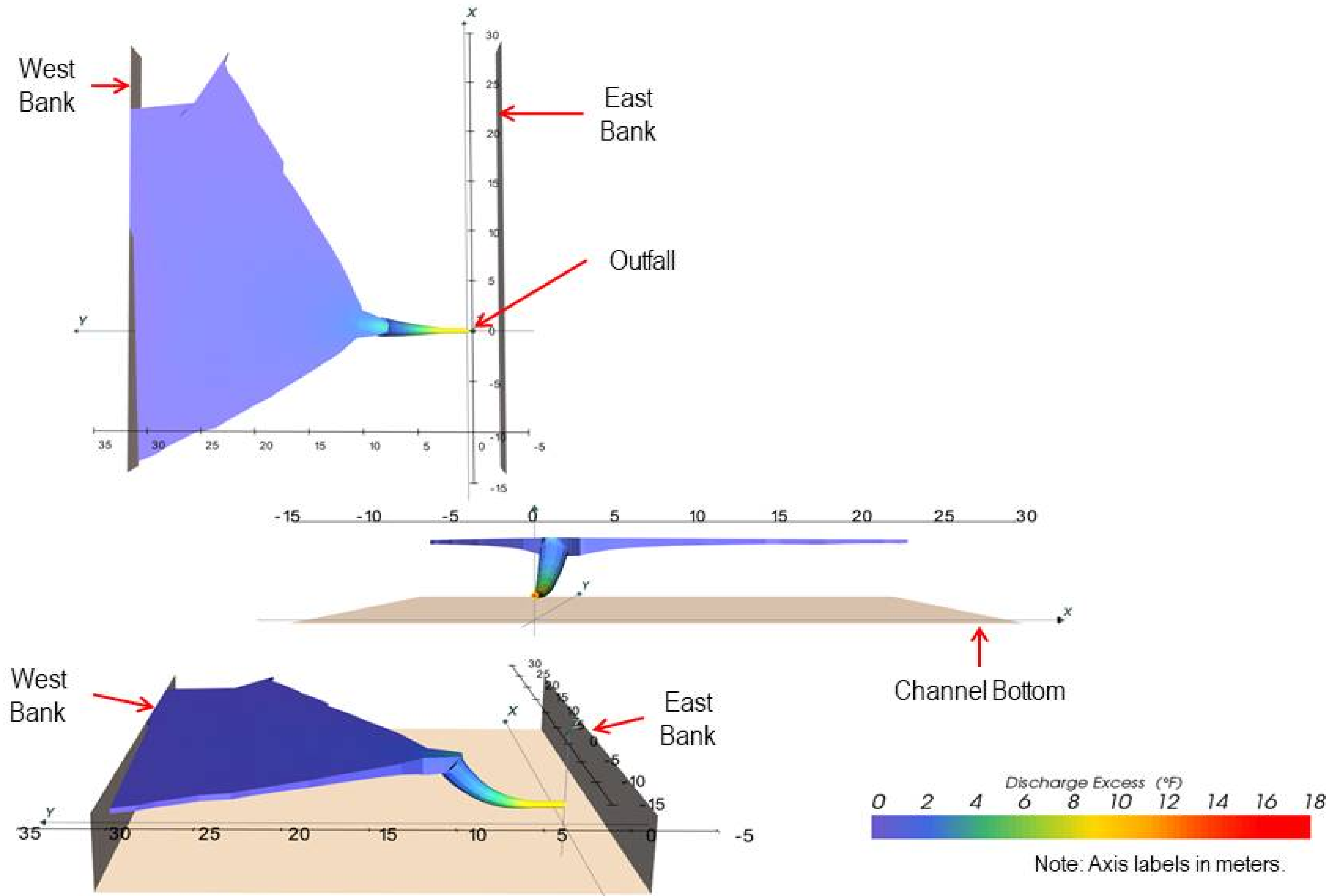


Figure C-31. August 2.5 mgd worst-case thermal plume scenario, based on effluent temperature of 83.3°F, river temperature of 66.1°F (17.2°F temperature differential), effluent flow of 3.25 mgd, and river velocity of 0.05 fps.

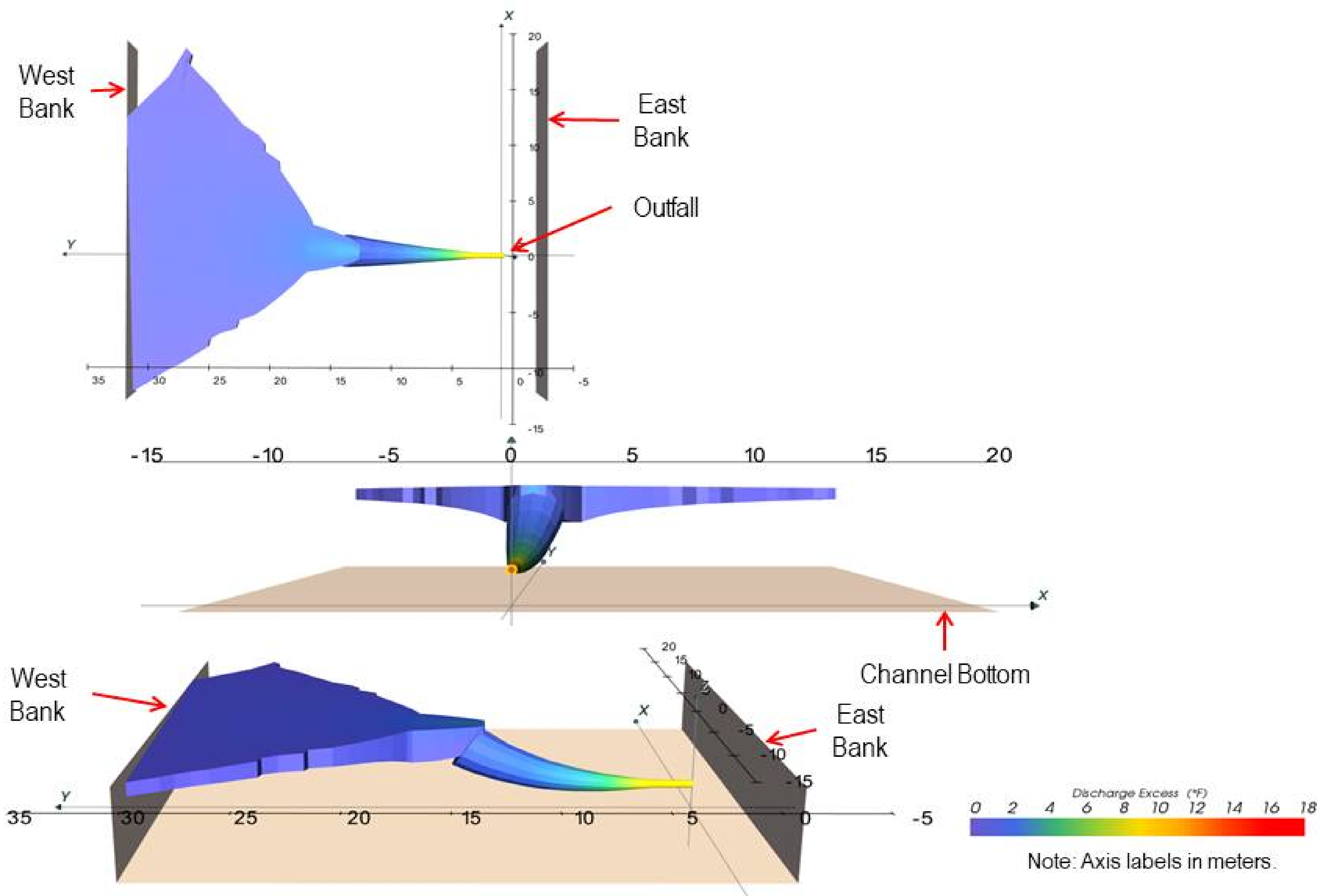


Figure C-32. August 6.0 mgd median-case thermal plume scenario, based on effluent temperature of 82.1°F, river temperature of 71.4°F (10.7°F temperature differential), effluent flow of 6.0 mgd, and river velocity of 1.19 fps.

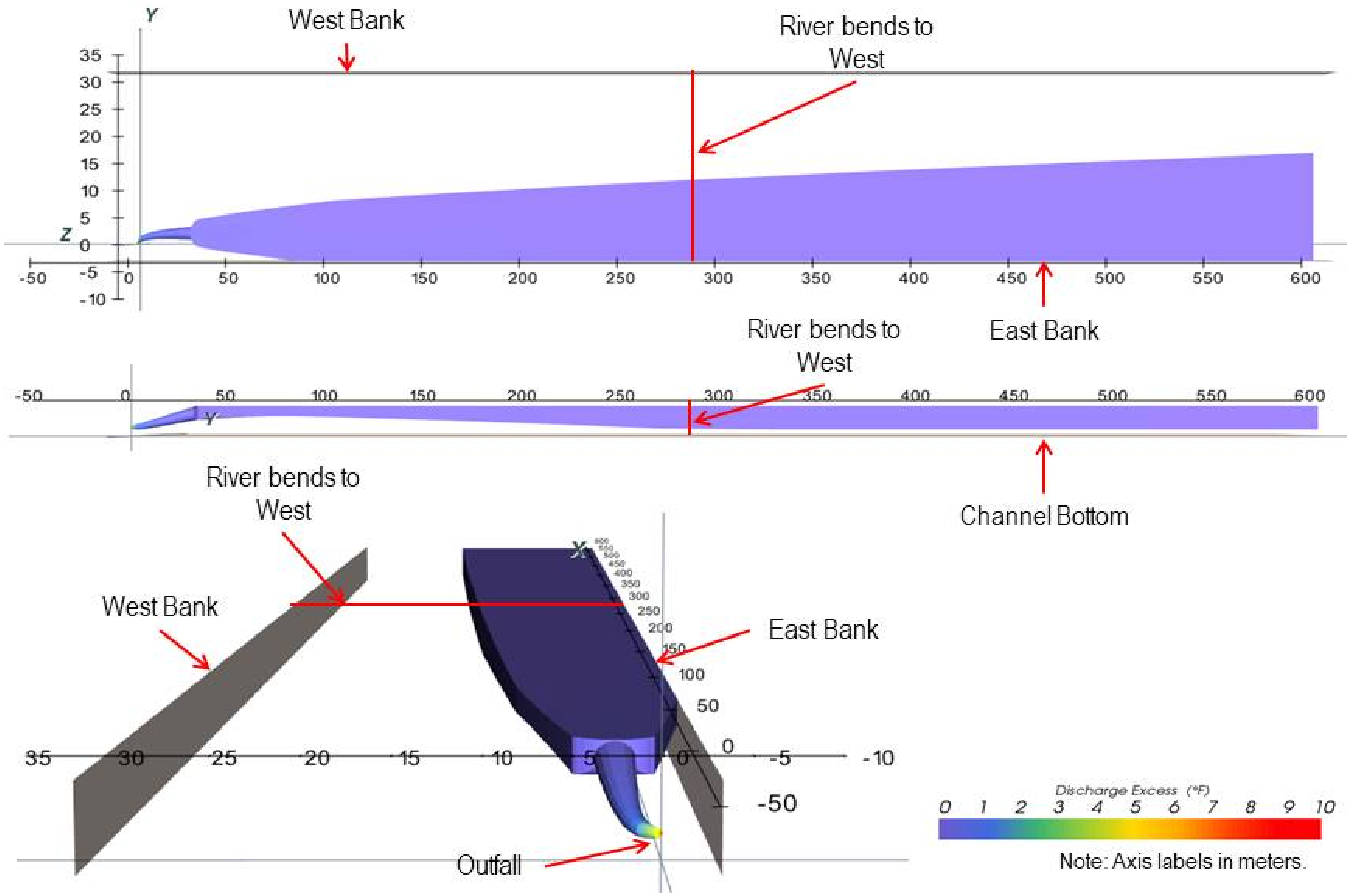


Figure C-33. September 2.5 mgd median-case thermal plume scenario, based on effluent temperature of 81.4°F, river temperature of 71.4°F (10.0°F temperature differential), effluent flow of 2.50 mgd, and river velocity of 1.09 fps.

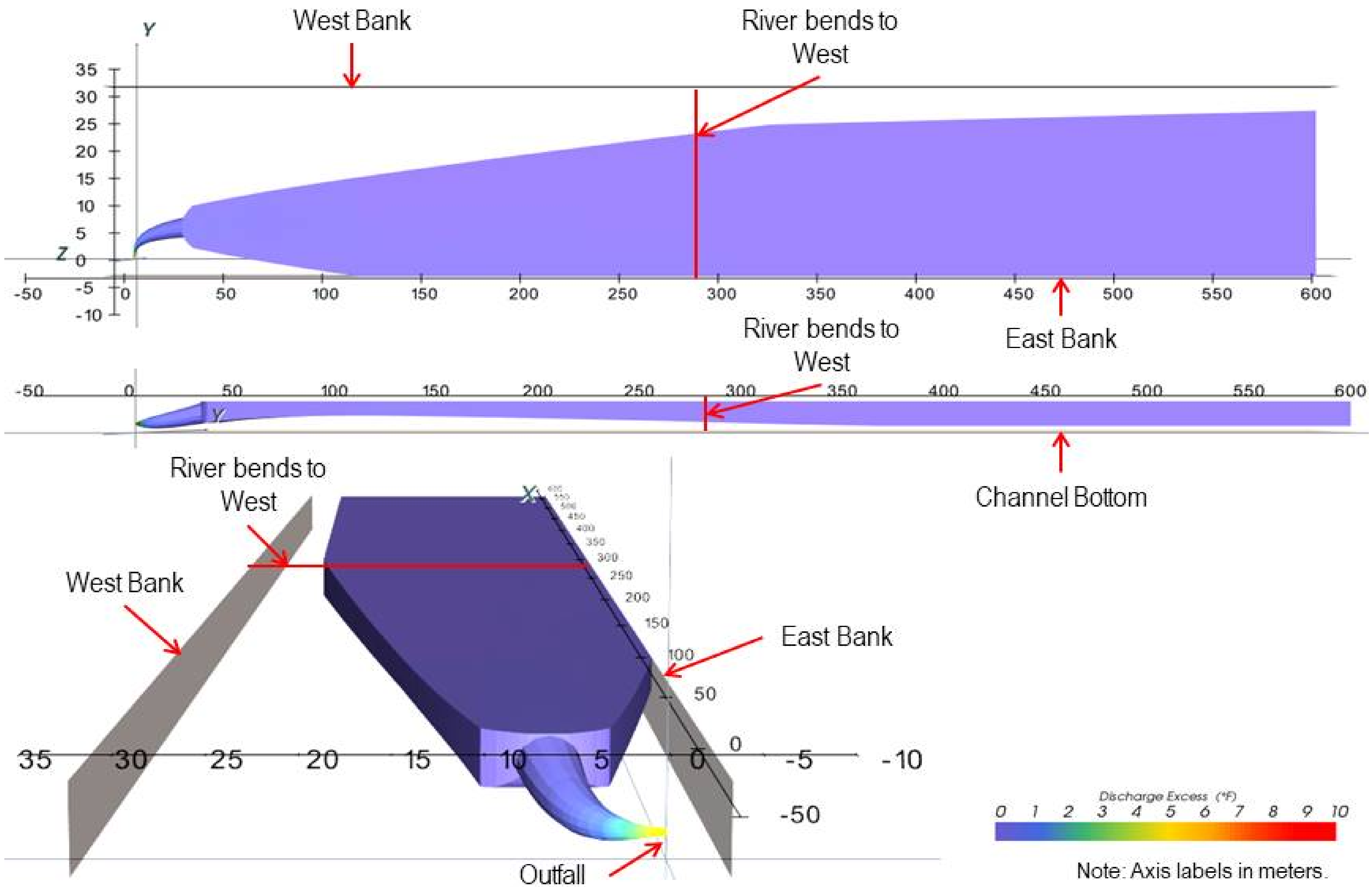


Figure C-34. September 6.0 mgd median-case thermal plume scenario, based on effluent temperature of 81.4°F, river temperature of 71.4°F (10.0°F temperature differential), effluent flow of 6.10 mgd, and river velocity of 1.09 fps.

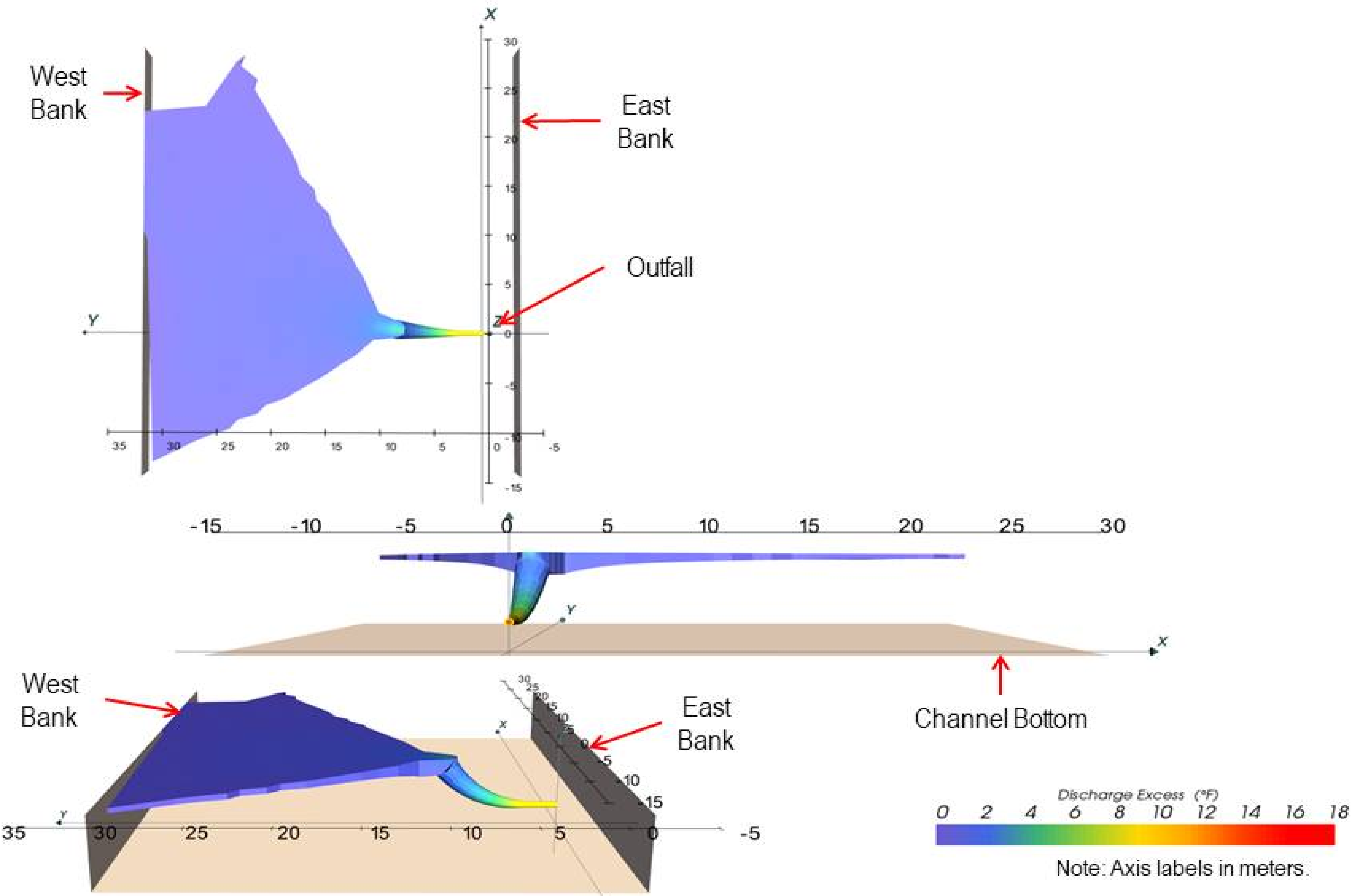


Figure C-35. September 2.5 mgd worst-case thermal plume scenario, based on effluent temperature of 82.4°F, river temperature of 65.1°F (17.3°F temperature differential), effluent flow of 3.25 mgd, and river velocity of 0.05 fps.

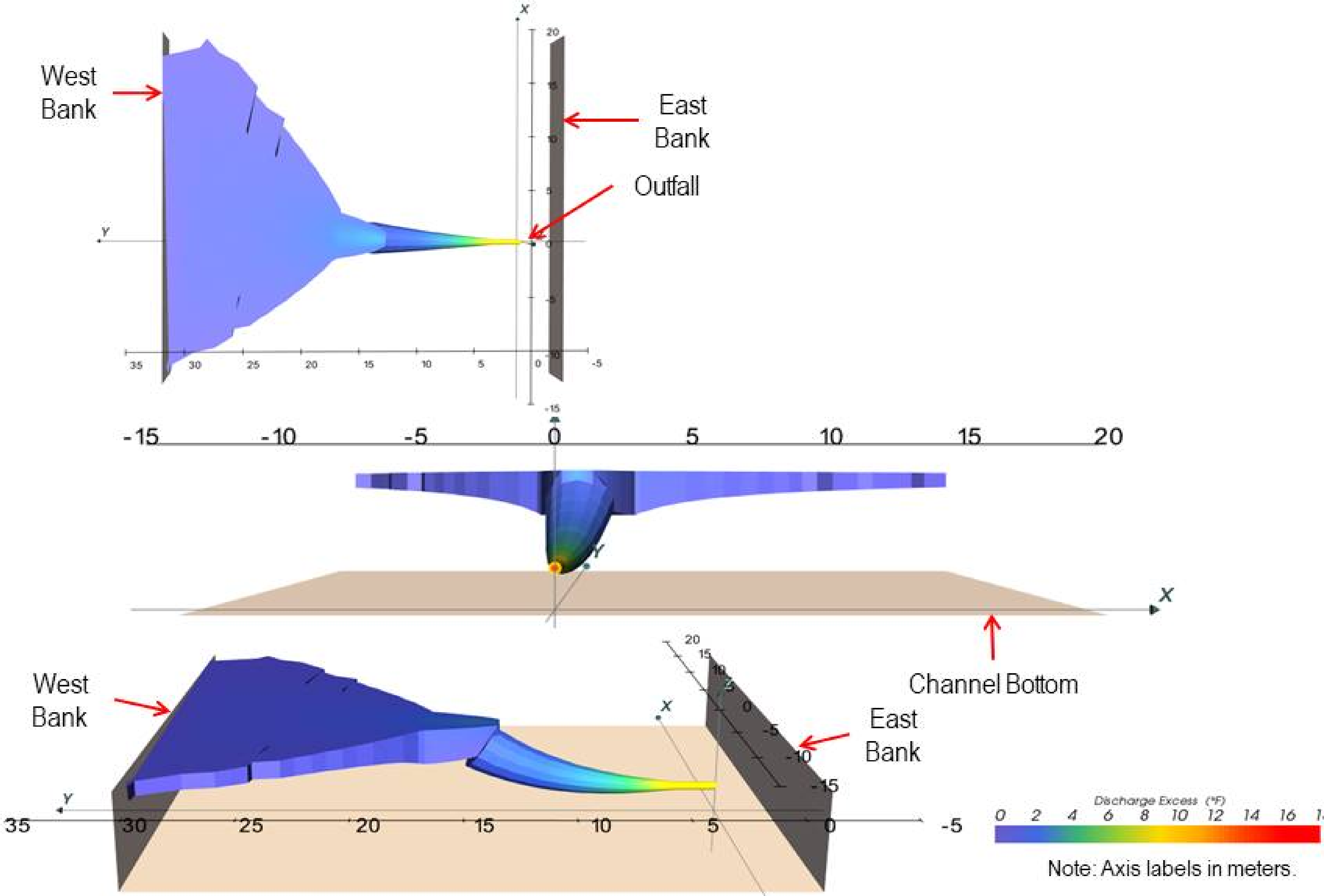


Figure C-36. September 6.0 mgd worst-case thermal plume scenario, based on effluent temperature of 82.4°F, river temperature of 65.1°F (17.3°F temperature differential), effluent flow of 7.55 mgd, and river velocity of 0.05 fps.

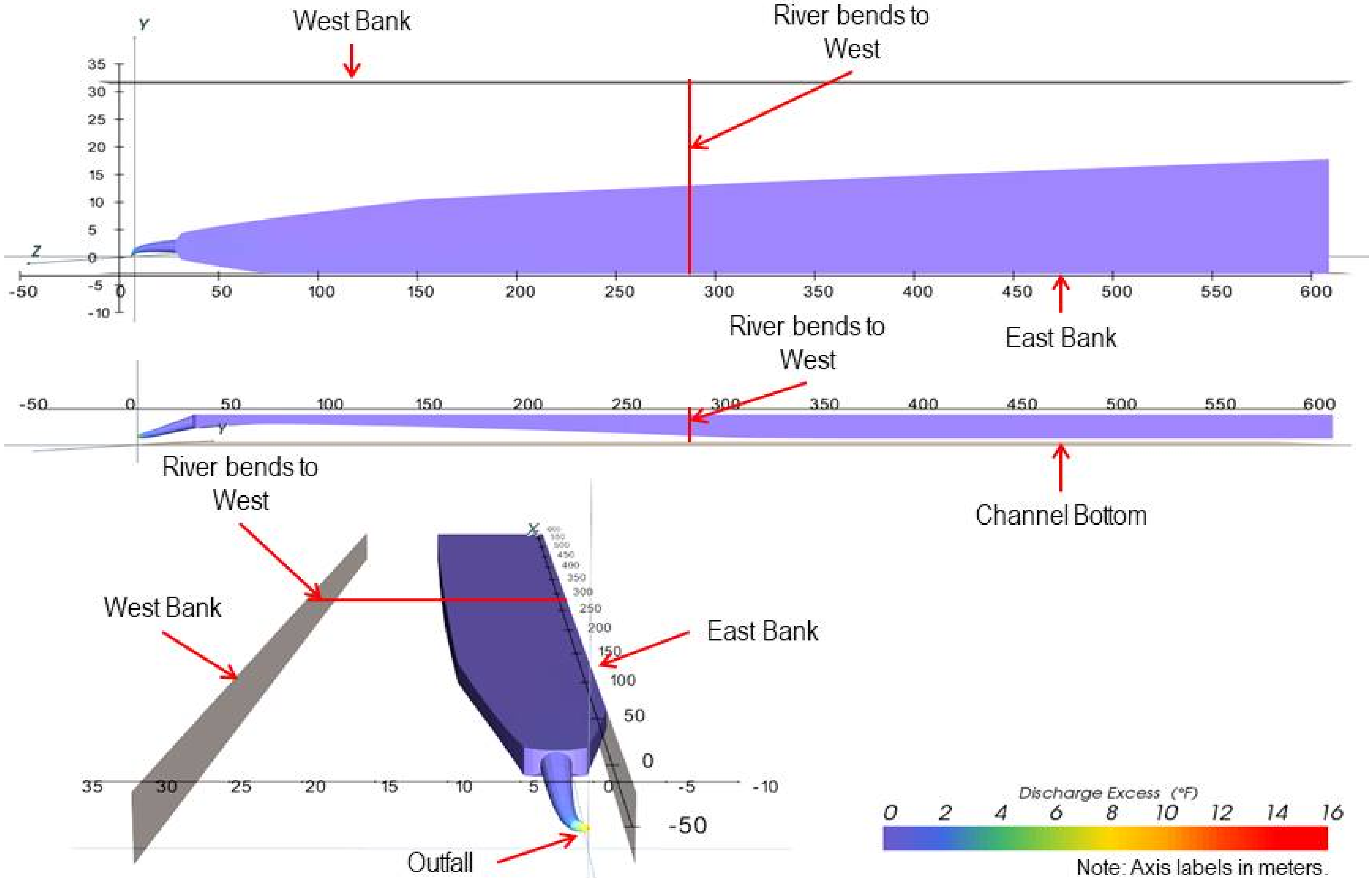


Figure C-37. October 2.5 mgd median-case thermal plume scenario, based on effluent temperature of 79.2°F, river temperature of 63.2°F (16.0°F temperature differential), effluent flow of 2.60 mgd, and river velocity of 1.16 fps.

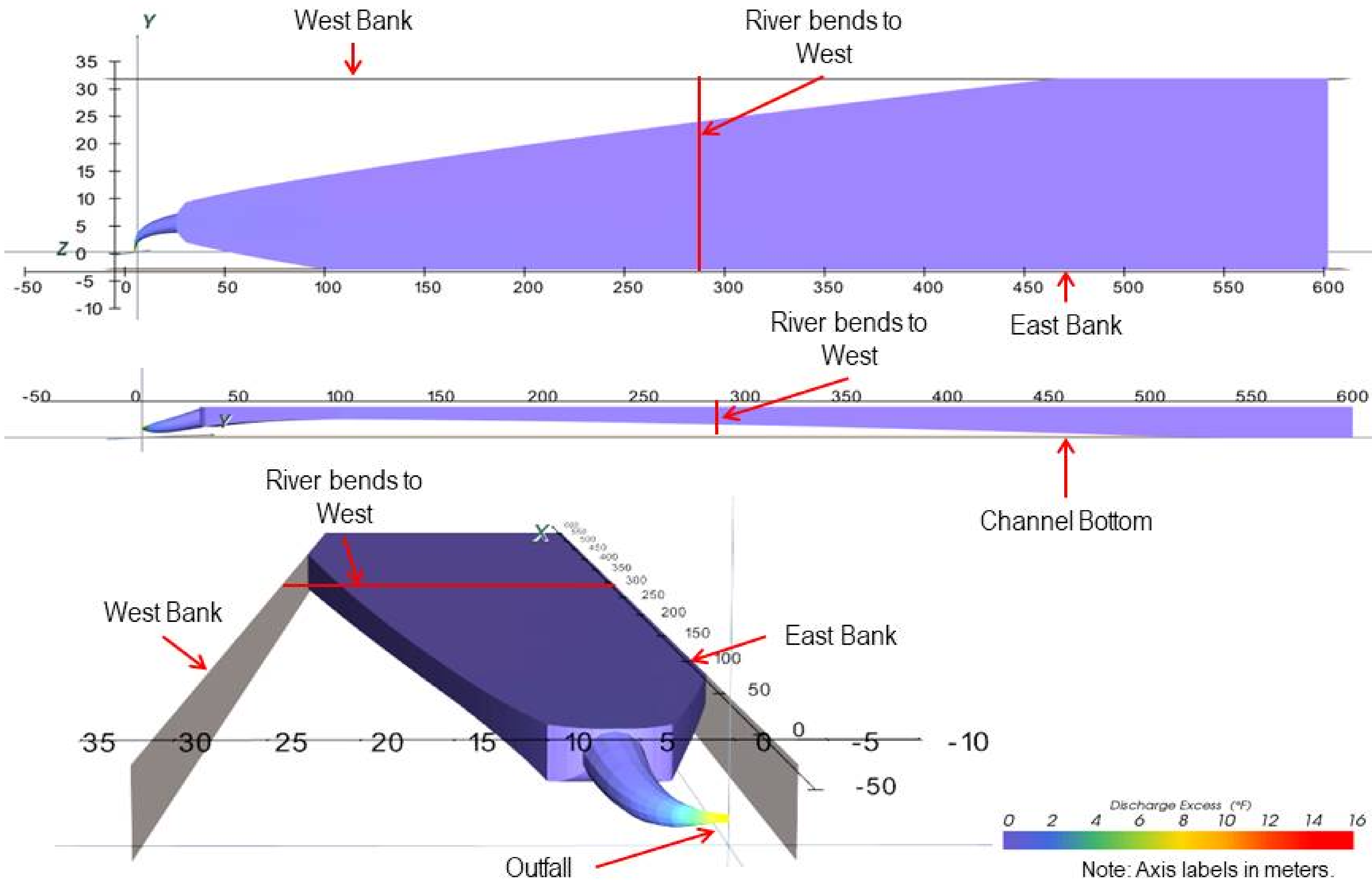


Figure C-38. October 6.0 mgd median-case thermal plume scenario, based on effluent temperature of 79.2°F, river temperature of 63.2°F (16.0°F temperature differential), effluent flow of 6.30 mgd, and river velocity of 1.16 fps.

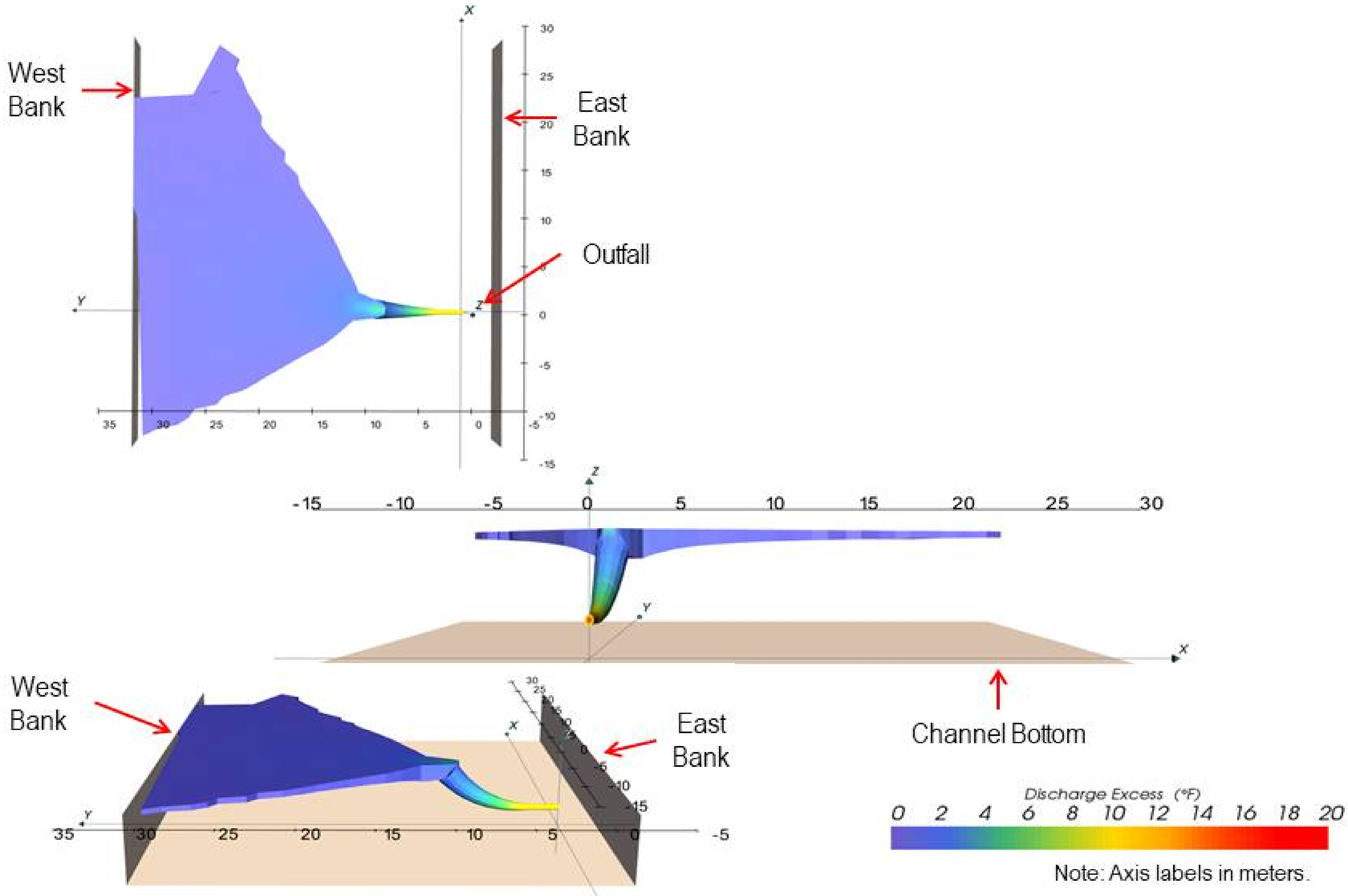


Figure C-39. October 2.5 mgd worst-case thermal plume scenario, based on effluent temperature of 75.6°F, river temperature of 55.6°F (20.0°F temperature differential), effluent flow of 3.38 mgd, and river velocity of 0.05 fps.

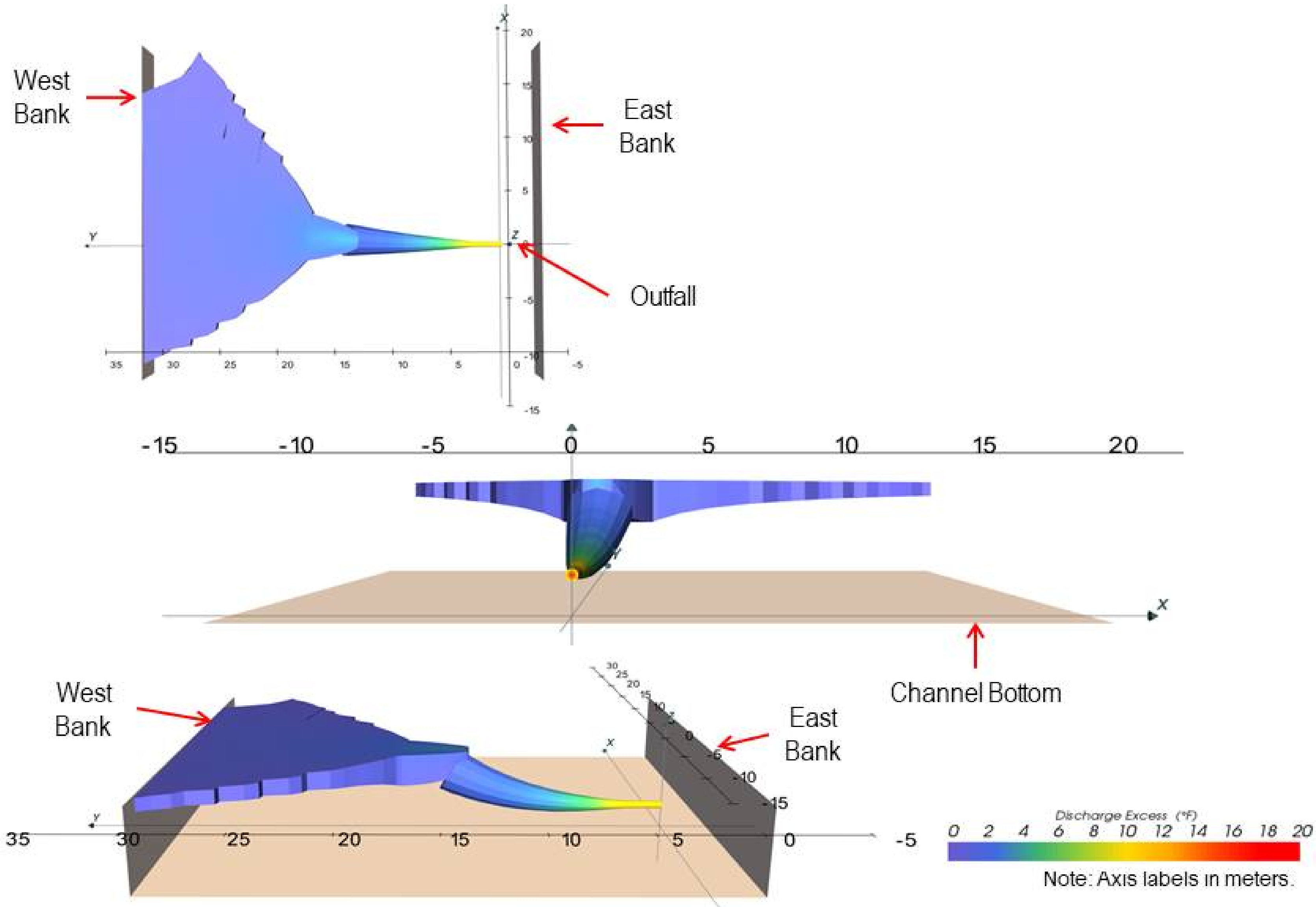


Figure C-40. October 6.0 mgd worst-case thermal plume scenario, based on effluent temperature of 75.6°F, river temperature of 55.6°F (20.0°F temperature differential), effluent flow of 7.55 mgd, and river velocity of 0.05 fps.

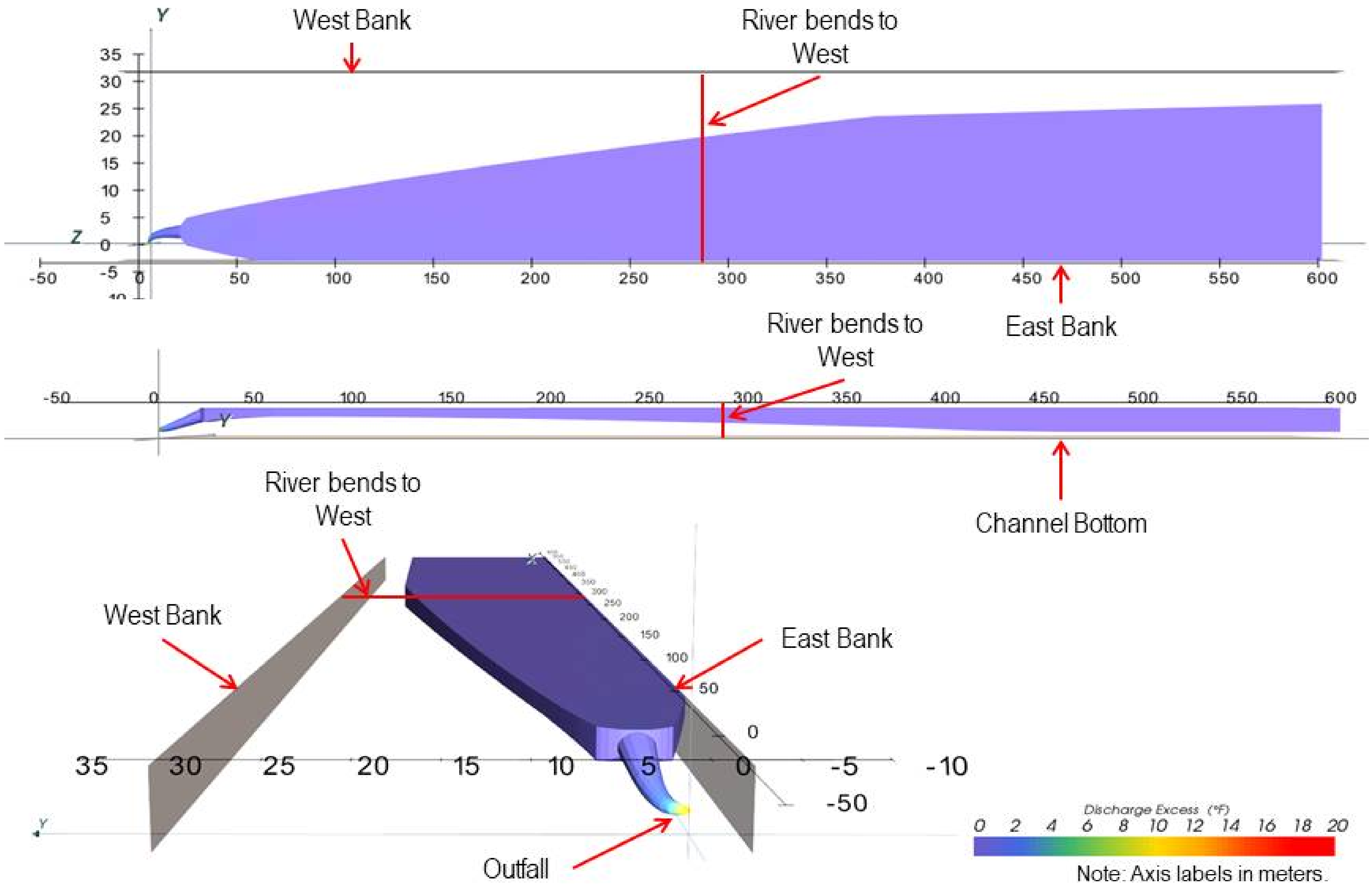


Figure C-41. November 2.5 mgd median-case thermal plume scenario, based on effluent temperature of 77.4°F, river temperature of 58.8°F (18.6°F temperature differential), effluent flow of 2.70 mgd, and river velocity of 0.97 fps.

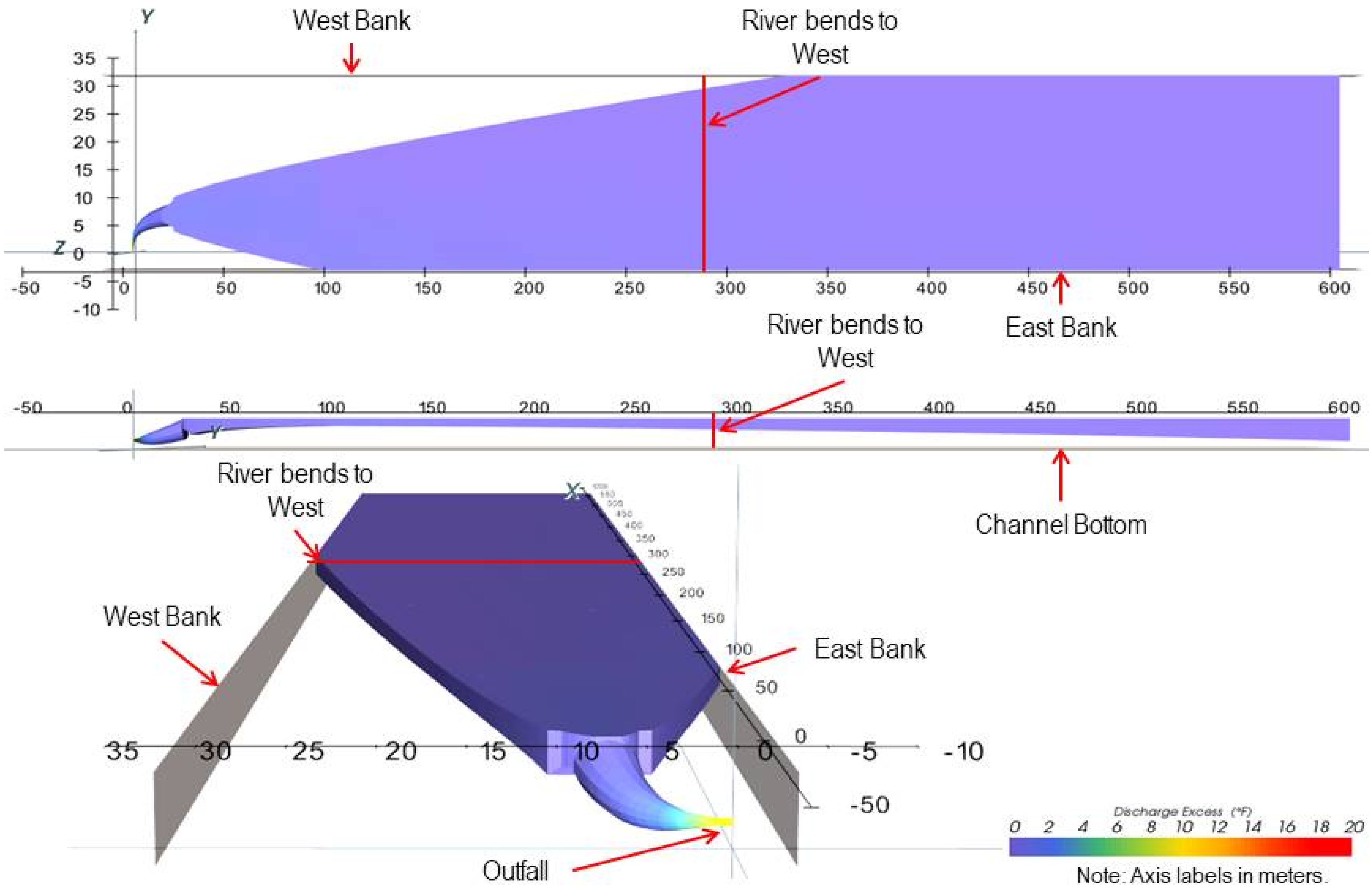


Figure C-42. November 6.0 mgd median-case thermal plume scenario, based on effluent temperature of 77.4°F, river temperature of 58.8°F (18.6°F temperature differential), effluent flow of 6.60 mgd, and river velocity of 0.97 fps.

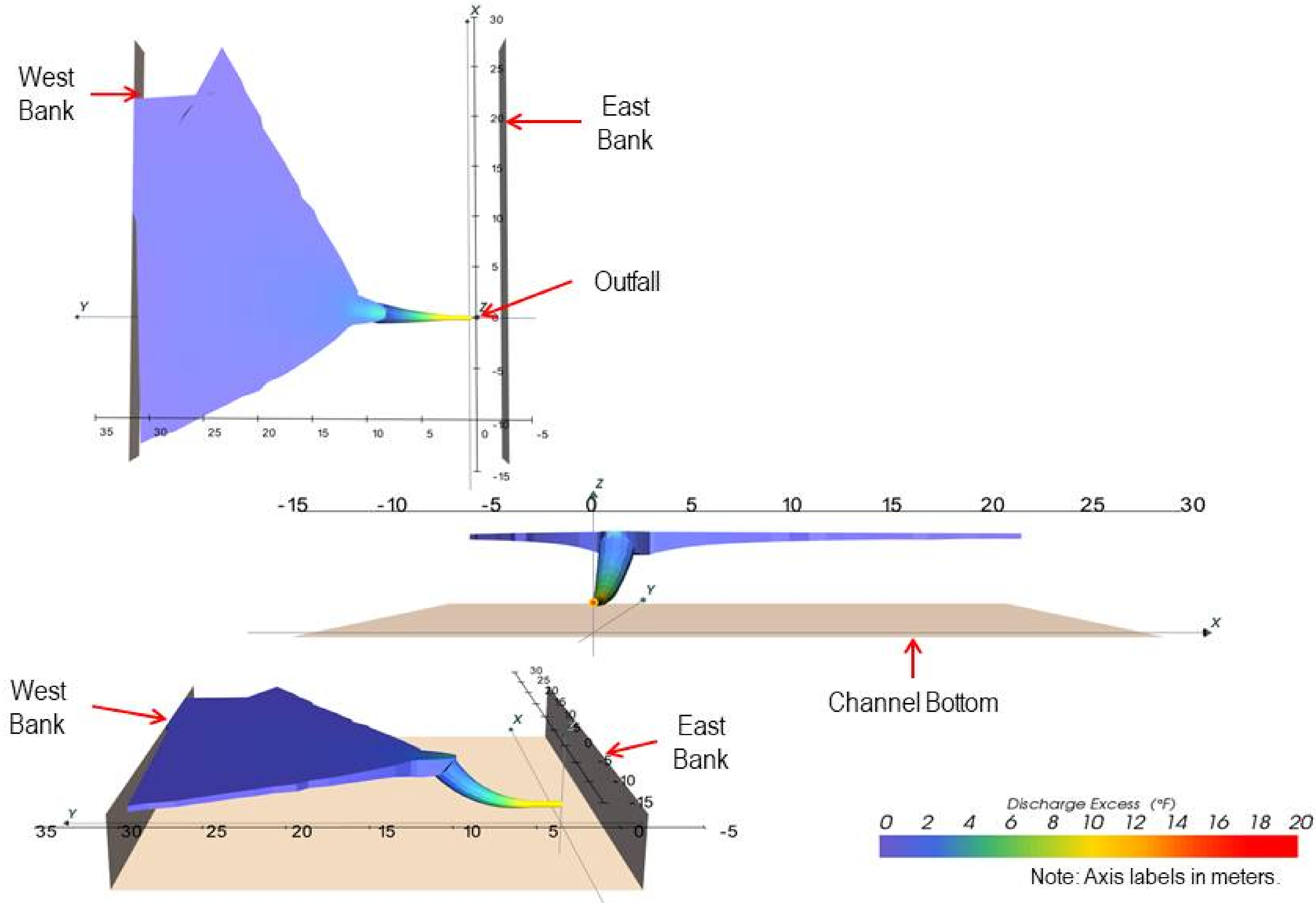


Figure C-43. November 2.5 mgd worst-case thermal plume scenario, based on effluent temperature of 76.3°F, river temperature of 56.3°F (20.0°F temperature differential), effluent flow of 3.51 mgd, and river velocity of 0.05 fps.

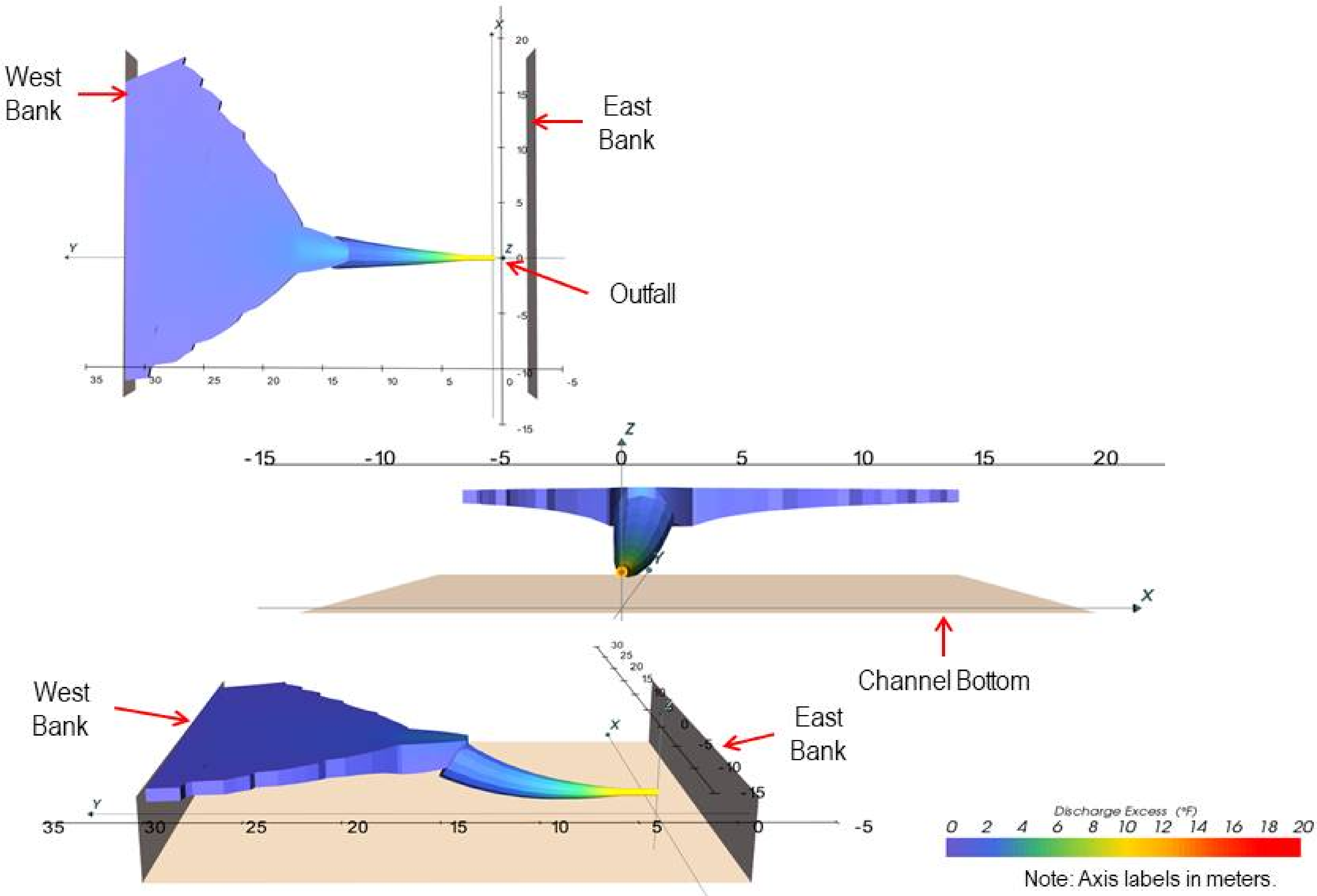


Figure C-44. November 6.0 mgd worst-case thermal plume scenario, based on effluent temperature of 76.3°F, river temperature of 56.3°F (20.0°F temperature differential), effluent flow of 7.55 mgd, and river velocity of 0.05 fps.

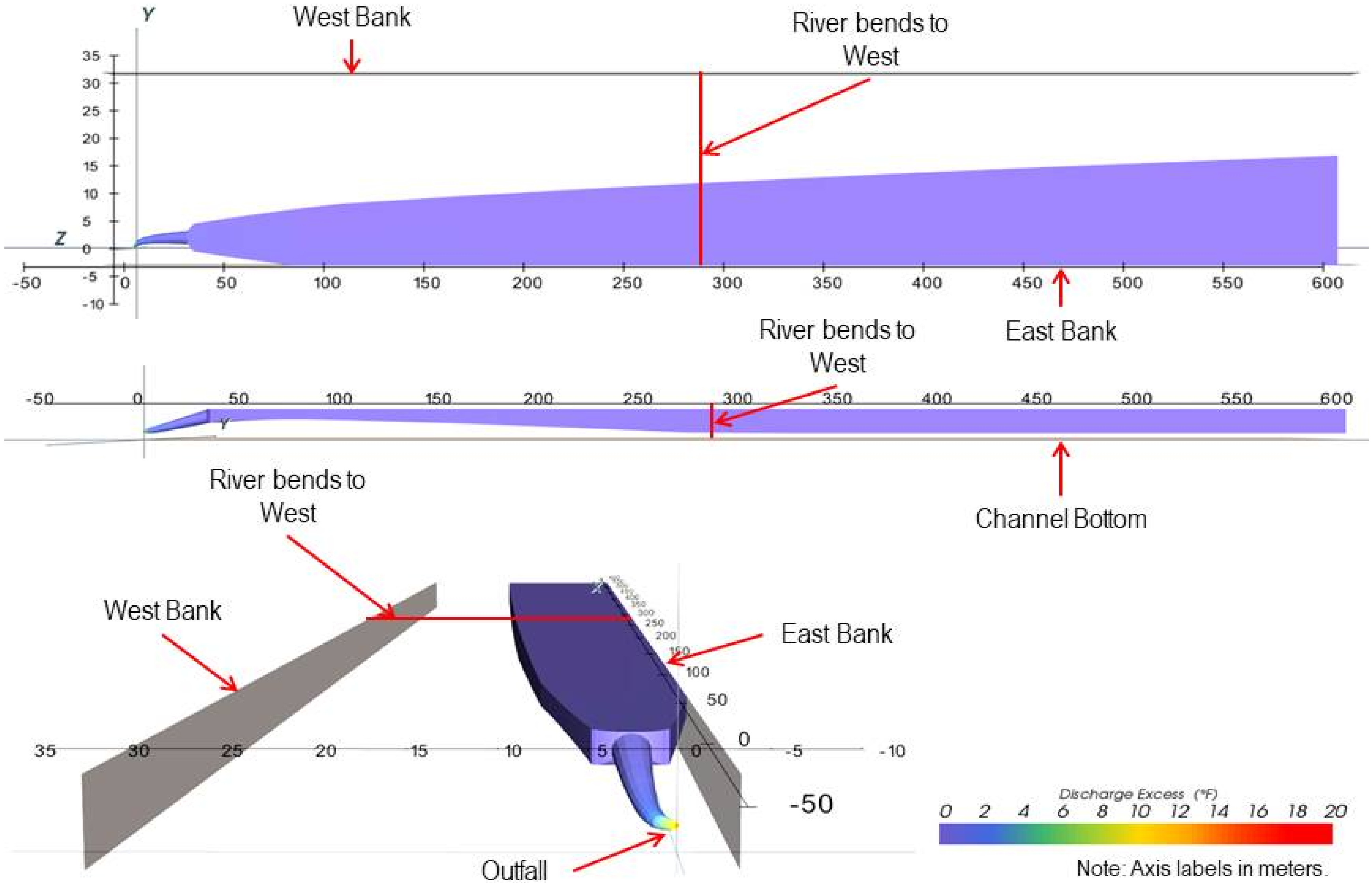


Figure C-45. December 2.5 mgd median-case thermal plume scenario, based on effluent temperature of 73.4°F, river temperature of 53.4°F (20.0°F temperature differential), effluent flow of 2.80 mgd, and river velocity of 1.27 fps.

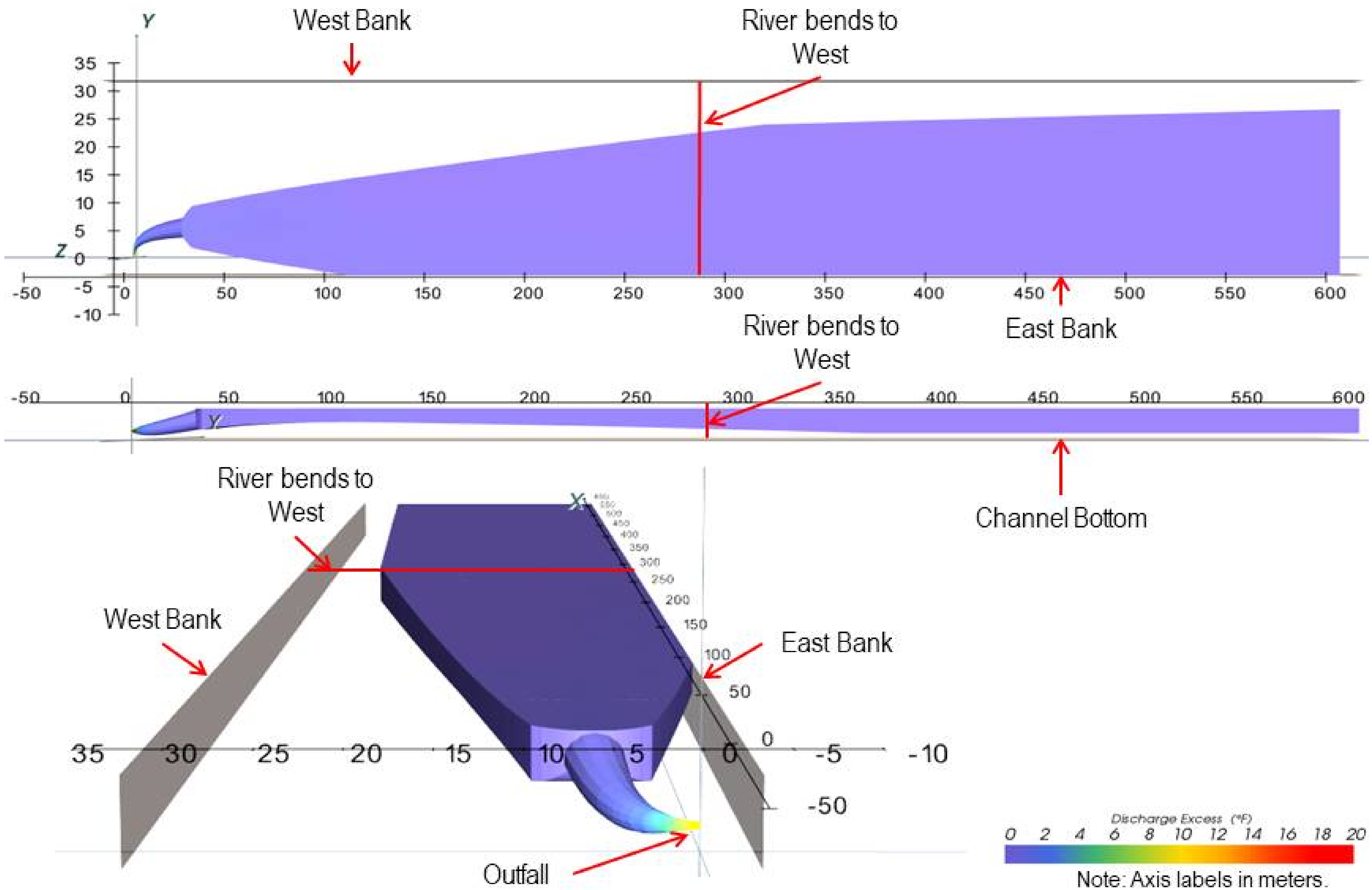


Figure C-46. December 6.0 mgd median-case thermal plume scenario, based on effluent temperature of 73.4°F, river temperature of 53.4°F (20.0°F temperature differential), effluent flow of 6.70 mgd, and river velocity of 1.27 fps.

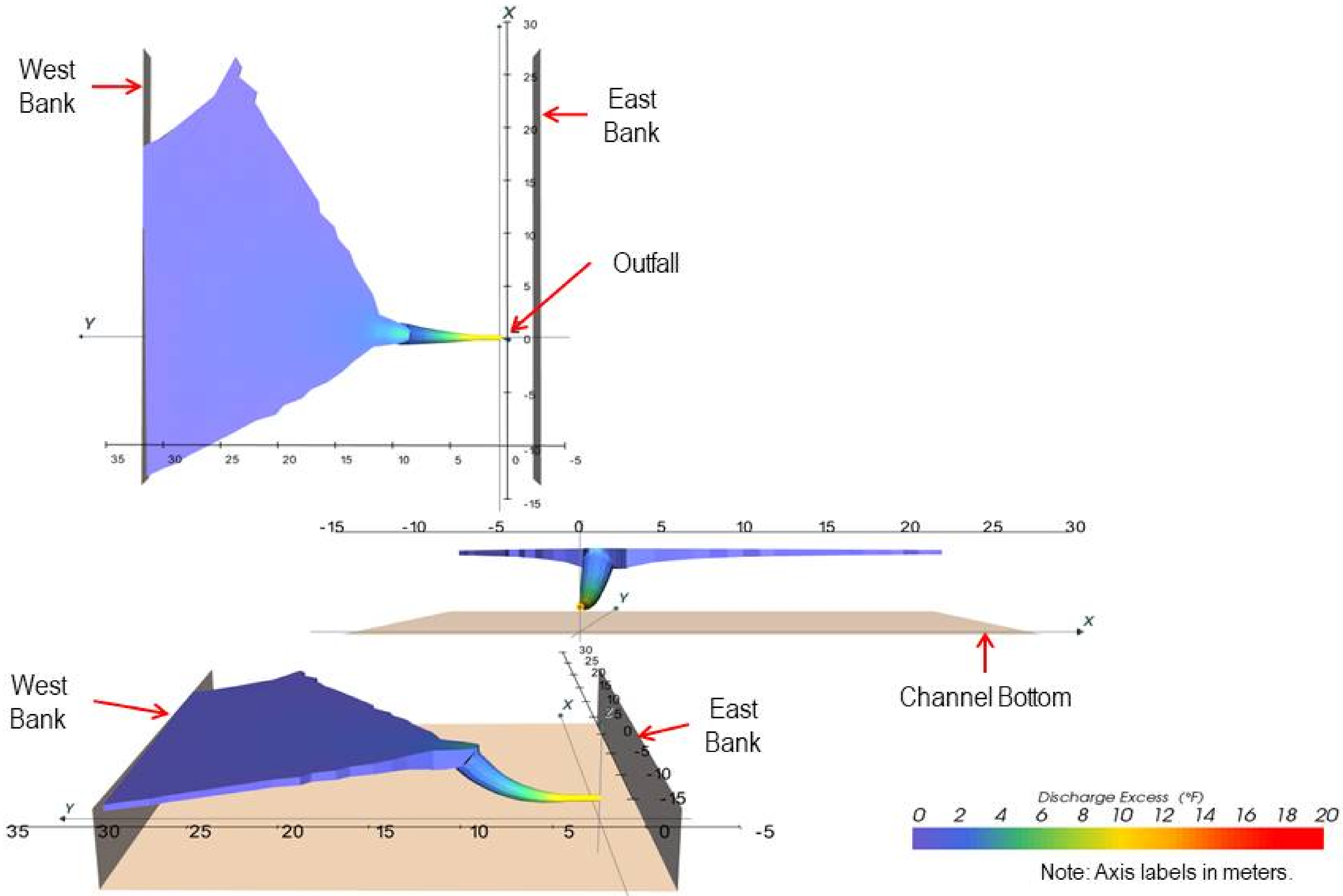


Figure C-47. December 2.5 mgd worst-case thermal plume scenario, based on effluent temperature of 73.4°F, river temperature of 53.4°F (20.0°F temperature differential), effluent flow of 3.64 mgd, and river velocity of 0.05 fps.

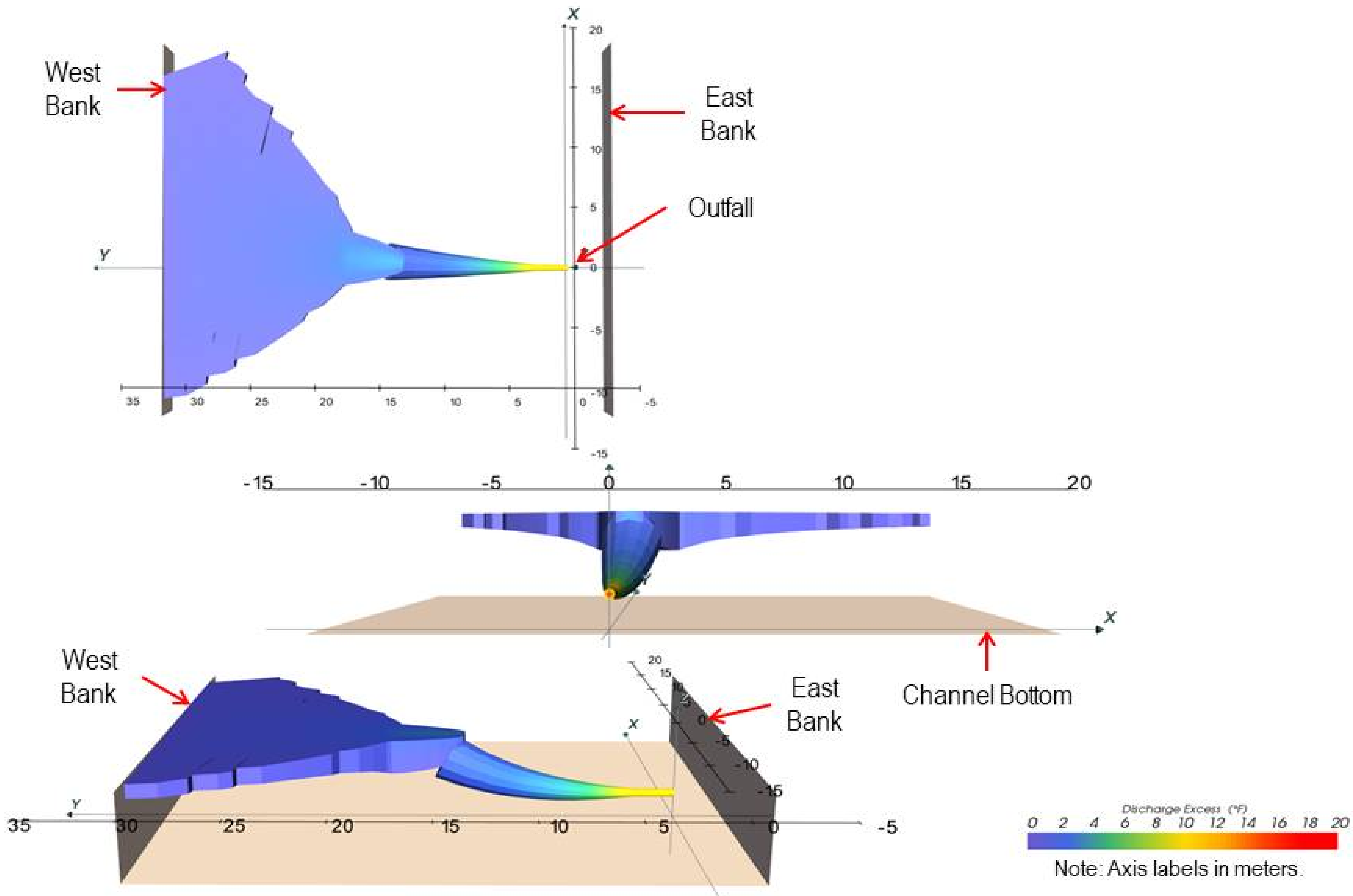


Figure C-48. December 6.0 mgd worst-case thermal plume scenario, based on effluent temperature of 73.4°F, river temperature of 53.4°F (20.0°F temperature differential), effluent flow of 7.55 mgd, and river velocity of 0.05 fps.

CORMIX Modeling Inputs.

Parameter	Worst-case	Median-case
Effluent Flow (MGD)	Peak flow based on 1.3 peaking factor applied to monthly average flow from EKI water balance. If peak flow is > 7.55 MGD, modeled flow will be 7.55 MGD because this is max river discharge flow for the conveyance system.	DSM2 modeled monthly average flow
Effluent Temperature (°F)	Based on max Delta T selected	Based on median Delta T selected
River Temperature (°F)	Based on max Delta T selected	Based on median Delta T selected
Delta T (°F)	Greatest Delta T for the month (that actually occurred based on paired hourly data)	Median Delta T for the month
River Velocity (ft/s)	0.05 ft/s	Median River velocity for the month

2.5 MGD ADWF Discharge Inputs

Table D-1. January

Parameter	Worst-case	Median-case
Effluent Flow (MGD)	4.03	3.10
Effluent Temperature (°F)	71.2	72.2
River Temperature (°F)	51.2	53.7
Delta T (°F)	20 (actual is 23.9)	18.5
River Velocity (ft/s)	0.05	1.19

Table D-2. February

Parameter	Worst-case	Median-case
Effluent Flow (MGD)	3.90	3.00
Effluent Temperature (°F)	71.0	72.9
River Temperature (°F)	51.0	56.1
Delta T (°F)	20.0 (actual is 20.3)	16.8
River Velocity (ft/s)	0.05	1.37

Table D-3. March

Parameter	Worst-case	Median-case
Effluent Flow (MGD)	3.64	2.80
Effluent Temperature (°F)	72.6	74.3
River Temperature (°F)	54.5	59.6
Delta T (°F)	18.1	14.7
River Velocity (ft/s)	0.05	1.49

Table D-4. April

Parameter	Worst-case	Median-case
Effluent Flow (MGD)	3.51	2.70
Effluent Temperature (°F)	74.6	76.3
River Temperature (°F)	57.6	62.5
Delta T (°F)	17.0	13.8
River Velocity (ft/s)	0.05	1.92

Table D-5. May

Parameter	Worst-case	Median-case
Effluent Flow (MGD)	3.38	2.60
Effluent Temperature (°F)	73.5	78.3
River Temperature (°F)	56.1	64.9
Delta T (°F)	17.4	13.4
River Velocity (ft/s)	0.05	2.18

Table D-6. June

Parameter	Worst-case	Median-case
Effluent Flow (MGD)	3.25	2.50
Effluent Temperature (°F)	77.3	82.0
River Temperature (°F)	62.1	72.7
Delta T (°F)	15.2	9.3
River Velocity (ft/s)	0.05	1.84

Table D-7. July

Parameter	Worst-case	Median-case
Effluent Flow (MGD)	3.25	2.50
Effluent Temperature (°F)	81.2	80.0
River Temperature (°F)	65.4	72.1
Delta T (°F)	15.8	7.9
River Velocity (ft/s)	0.05	1.07

Table D-8. August

Parameter	Worst-case	Median-case
Effluent Flow (MGD)	3.25	2.50
Effluent Temperature (°F)	83.3	82.1
River Temperature (°F)	66.1	71.4
Delta T (°F)	17.2	10.7
River Velocity (ft/s)	0.0	1.19

Table D-9. September

Parameter	Worst-case	Median-case
Effluent Flow (MGD)	3.25	2.50
Effluent Temperature (°F)	82.4	81.4
River Temperature (°F)	65.1	71.4
Delta T (°F)	17.3	10.0
River Velocity (ft/s)	0.05	1.09

Table D-10. October

Parameter	Worst-case	Median-case
Effluent Flow (MGD)	3.38	2.60
Effluent Temperature (°F)	75.6	79.2
River Temperature (°F)	55.6	63.2
Delta T (°F)	20.0 (actual is 21.0)	16.0
River Velocity (ft/s)	0.05	1.16

Table D-11. November

Parameter	Worst-case	Median-case
Effluent Flow (MGD)	3.51	2.70
Effluent Temperature (°F)	76.3	77.4
River Temperature (°F)	56.3	58.8
Delta T (°F)	20.0 (actual is 23.3)	18.6
River Velocity (ft/s)	0.05	0.97

Table D-12. December

Parameter	Worst-case	Median-case
Effluent Flow (MGD)	3.64	2.80
Effluent Temperature (°F)	73.4	73.4
River Temperature (°F)	53.4	53.4
Delta T (°F)	20.0 (actual is 25.0)	20.0 (actual is 20.1)
River Velocity (ft/s)	0.05	1.27

6.0 MGD ADWF Discharge Inputs

Table D-13. January

Parameter	Worst-case	Median-case
Effluent Flow (MGD)	7.55	7.30
Effluent Temperature (°F)	71.2	72.2
River Temperature (°F)	51.2	53.7
Delta T (°F)	20 (actual is 23.9)	18.5
River Velocity (ft/s)	0.05	1.19

Table D-14. February

Parameter	Worst-case	Median-case
Effluent Flow (MGD)	7.55	7.30
Effluent Temperature (°F)	71.0	72.9
River Temperature (°F)	51.0	56.1
Delta T (°F)	20.0 (actual is 20.3)	16.8
River Velocity (ft/s)	0.05	1.37

Table D-15. March

Parameter	Worst-case	Median-case
Effluent Flow (MGD)	7.55	6.70
Effluent Temperature (°F)	72.6	74.3
River Temperature (°F)	54.5	59.6
Delta T (°F)	18.1	14.7
River Velocity (ft/s)	0.05	1.49

Table D-16. April

Parameter	Worst-case	Median-case
Effluent Flow (MGD)	7.55	6.40
Effluent Temperature (°F)	74.6	76.3
River Temperature (°F)	57.6	62.5
Delta T (°F)	17.0	13.8
River Velocity (ft/s)	0.05	1.92

Table D-17. May

Parameter	Worst-case	Median-case
Effluent Flow (MGD)	7.55	6.40
Effluent Temperature (°F)	73.5	78.3
River Temperature (°F)	56.1	64.9
Delta T (°F)	17.4	13.4
River Velocity (ft/s)	0.05	2.18

Table D-18. June

Parameter	Worst-case	Median-case
Effluent Flow (MGD)	7.55	6.10
Effluent Temperature (°F)	77.3	82.0
River Temperature (°F)	62.1	72.7
Delta T (°F)	15.2	9.3
River Velocity (ft/s)	0.05	1.84

Table D-19. July

Parameter	Worst-case	Median-case
Effluent Flow (MGD)	7.55	6.00
Effluent Temperature (°F)	81.2	80.0
River Temperature (°F)	65.4	72.1
Delta T (°F)	15.8	7.9
River Velocity (ft/s)	0.05	1.07

Table D-20. August

Parameter	Worst-case	Median-case
Effluent Flow (MGD)	7.55	6.00
Effluent Temperature (°F)	83.3	82.1
River Temperature (°F)	66.1	71.4
Delta T (°F)	17.2	10.7
River Velocity (ft/s)	0.05	1.19

Table D-21. September

Parameter	Worst-case	Median-case
Effluent Flow (MGD)	7.55	6.10
Effluent Temperature (°F)	82.4	81.4
River Temperature (°F)	65.1	71.4
Delta T (°F)	17.3	10.0
River Velocity (ft/s)	0.05	1.09

Table D-22. October

Parameter	Worst-case	Median-case
Effluent Flow (MGD)	7.55	6.30
Effluent Temperature (°F)	75.6	79.2
River Temperature (°F)	55.6	63.2
Delta T (°F)	20.0 (actual is 21.0)	16.0
River Velocity (ft/s)	0.05	1.16

Table D-23. November

Parameter	Worst-case	Median-case
Effluent Flow (MGD)	7.55	6.60
Effluent Temperature (°F)	76.3	77.4
River Temperature (°F)	56.3	58.8
Delta T (°F)	20.0 (actual is 23.3)	18.6
River Velocity (ft/s)	0.05	0.97

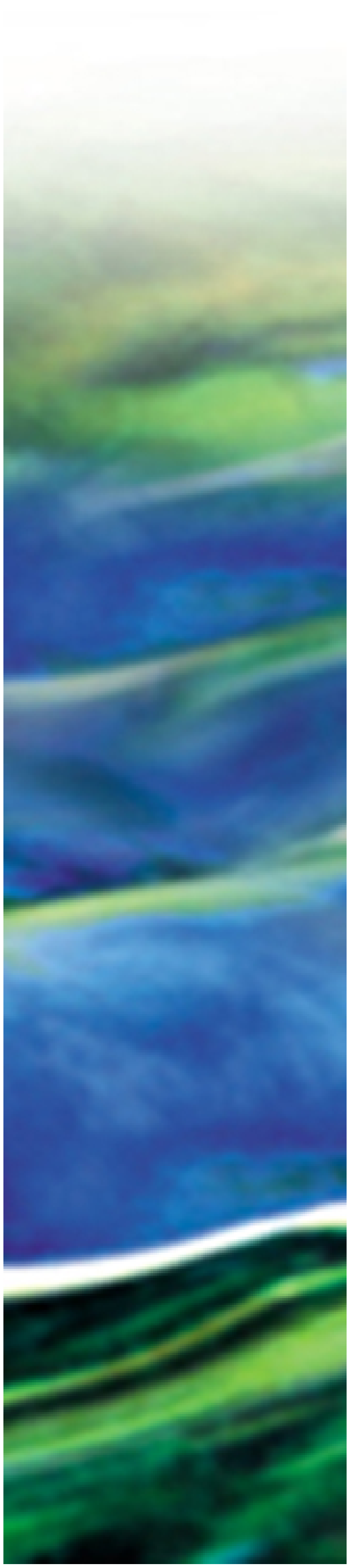
Table D-24. December

Parameter	Worst-case	Median-case
Effluent Flow (MGD)	7.55	6.70
Effluent Temperature (°F)	73.4	73.4
River Temperature (°F)	53.4	53.4
Delta T (°F)	20.0 (actual is 25.0)	20.0 (actual is 20.1)
River Velocity (ft/s)	0.05	1.27

Appendix F

Antidegradation Analysis

ANTIDEGRADATION ANALYSIS FOR THE PROPOSED CONSOLIDATED TREATMENT FACILITY DISCHARGE TO THE SAN JOAQUIN RIVER



Prepared for:

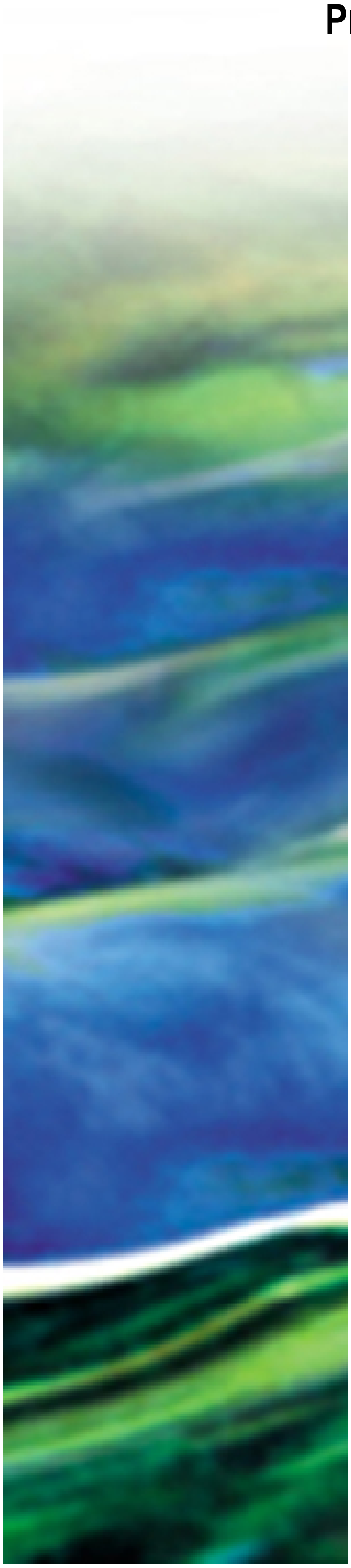
City of Lathrop

Prepared by:

ROBERTSON - BRYAN, INC.
Solutions for Progress

August 2020

ANTIDEGRADATION ANALYSIS FOR THE PROPOSED CONSOLIDATED TREATMENT FACILITY DISCHARGE TO THE SAN JOAQUIN RIVER



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August 2020

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ACRONYMS AND ABBREVIATIONS

ADWF	average dry weather flow
APU	Administrative Procedure Update
Basin Plan	Water Quality Control Plan for the Sacramento River and San Joaquin River Basins
BOD	biochemical oxygen demand
BPTC	best practical treatment or control
CEDEN	California Environmental Data Exchange Network
CCC	criterion continuous concentration
CDEC	California Data Exchange Center
CFR	Code of Federal Regulations
City	City of Lathrop
CMC	criterion maximum concentration
CTF	Consolidated Treatment Facility
CTR	California Toxics Rule
Central Valley RWQCB	Central Valley Regional Water Quality Control Board
Delta	Sacramento-San Joaquin Delta
DICU	Delta In-Consumptive Use
DSM2	Delta Simulation Model II
DWR	California Department of Water Resources
mg/L	milligrams per liter
mgd	million gallons per day
ng/L	pictograms per liter
NPDES	National Pollutant Discharge Elimination System
NRWQC	National Recommended Water Quality Criteria
NTU	Nephelometric Turbidity Unit
State Water Board	State Water Resources Control Board
TMDL	total maximum daily load
µg/L	micrograms per liter
µmhos/cm	micromhos per centimeter
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey

1 INTRODUCTION

1.1 Discharger Description

The City of Lathrop (City) owns the Consolidated Treatment Facility (CTF), which treats domestic and a relatively small amount of commercial wastewater from master planned communities in the western portion of the City and commercial and industrial wastewater from the Crossroads Commercial Center area, South Lathrop, and Lathrop Gateway Business Park. **Figure 1** shows the location of the CTF.

The CTF produces treated effluent that meets the requirements for disinfected tertiary 2.2 recycled water in accordance with Title 22 of the California Code of Regulations (Title 22, Division 4, Chapter 3). CTF effluent disposal and reuse is regulated by the Central Valley Regional Water Quality Control Board (Central Valley RWQCB) under Waste Discharge Requirements and Master Recycling Permit Order No. R5-2016-0028-01 (referred to herein as WDRs). Under the WDRs, the City may store disinfected tertiary treated CTF effluent in aboveground lined storage ponds before pumping it to the distribution system for irrigation of agricultural land application areas and public landscape areas and disposal in an onsite percolation basin. The CTF has an existing design treatment capacity of 2.5 million gallons per day (mgd) average dry weather flow (ADWF). The CTF's maximum discharge capability is limited by the currently permitted disposal capacity of 1.69 mgd ADWF.

The City is proposing to establish a direct discharge of CTF-generated Title 22 disinfected tertiary 2.2 effluent to the San Joaquin River for use when generation of treated CTF effluent exceeds the capacity of the City's recycled water system to store and reuse treated effluent for landscape irrigation. The majority of CTF effluent would be discharged to the San Joaquin River during winter, when irrigation demands are low and river flow is relatively high, and less would be discharged in the irrigation season, during which reuse of CTF recycled water would be maximized for landscape irrigation. This approach would allow land designated under the City's General Plan for urban uses, but currently used for effluent storage and disposal, to be developed in accordance with the plan.

The City intends to obtain a National Pollutant Discharge Elimination System (NPDES) permit to discharge up to 2.5 mgd ADWF of treated effluent (current ADWF treatment capacity of the CTF) to the San Joaquin River. However, the effluent discharge pipeline and outfall are being designed to accommodate CTF flows at buildout. Based on the current general plan and the City's current wastewater and recycled water master plans (EKI Environment & Water 2019a, 2019b), CTF flows at buildout are projected to be 5.2 mgd ADWF. However, based on potential cumulative development proposed in the City, buildout of the City, if approved, could generate approximately 6.0 mgd ADWF (EKI Environment & Water 2020). The need for an NPDES permit is supported by the *Evaluation of Wastewater Treatment Regionalization, Reclamation, Recycling, and Conservation for the City of Lathrop* (Robertson-Bryan, Inc. 2019).

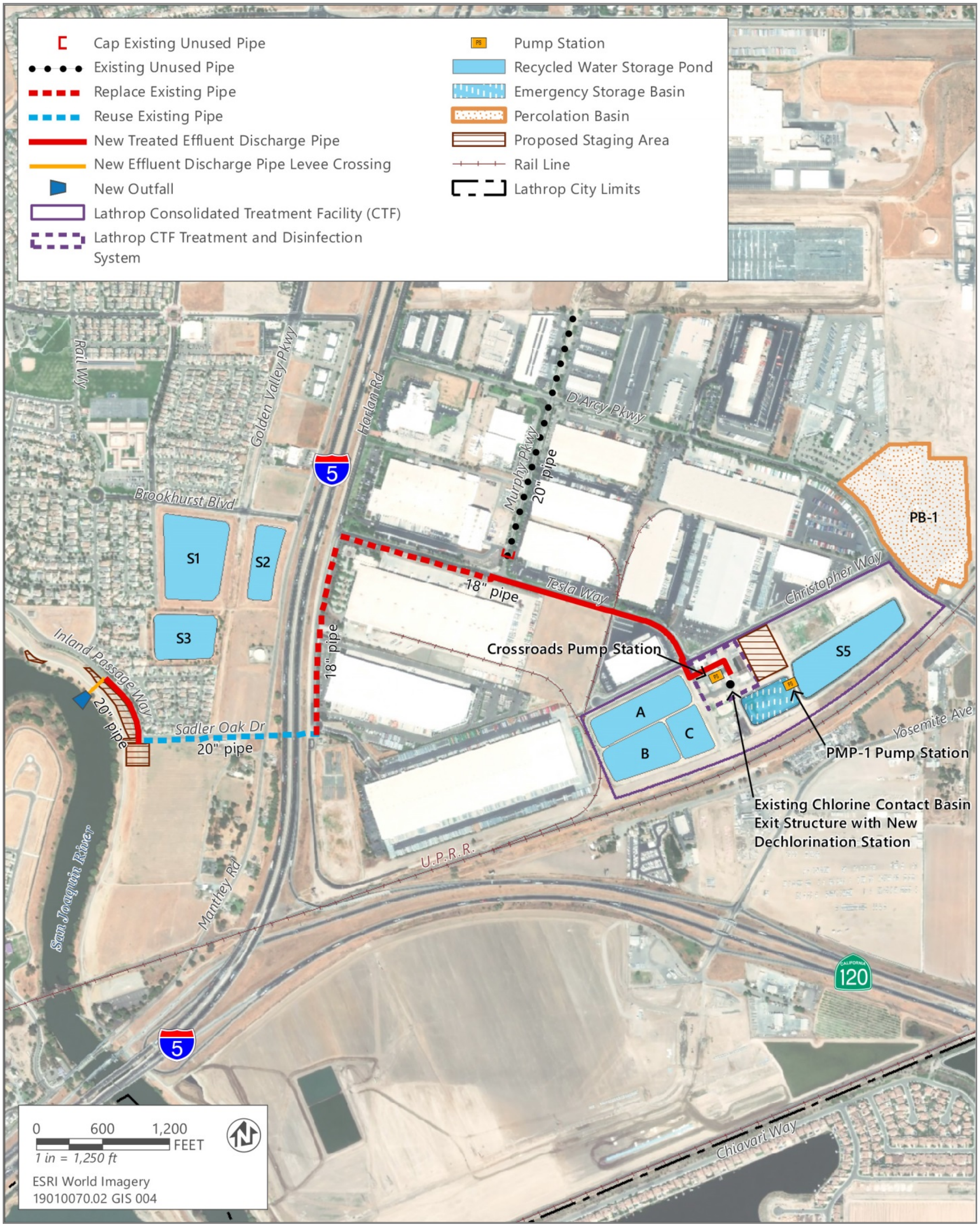

Figure 1. Consolidated Treatment Facility site.

1.2 Purpose of Report

This report provides an antidegradation analysis of the water quality changes that would result from the proposed discharge of CTF effluent to the San Joaquin River at the proposed initial discharge capacity of 2.5 mgd ADWF and the maximum anticipated buildout discharge capacity of 6.0 mgd ADWF. This report has been prepared to address federal and state antidegradation policy requirements. Specifically this report: (1) assesses the nature and degree to which the proposed CTF effluent discharge would result in a lowering of San Joaquin River water quality; (2) determines whether the CTF effluent discharge would meet waste discharge requirements that would result in best practicable treatment or control of the discharge necessary to assure that a pollution or nuisance would not occur and that receiving water quality criteria/objectives are met; (3) determines whether resultant receiving water quality would be protective of receiving water beneficial uses; and (4) determines whether allowing the identified potential incremental degradation is necessary to accommodate important economic or social development and is consistent with the maximum benefit to the people of the state of California.

This report will support the preparation of the City's Environmental Impact Report for the proposed CTF surface water discharge project, and be included with the City's Report of Waste Discharge application for an NPDES permit for the proposed discharge so that the Central Valley RWQCB can include findings in the permit regarding its consistency with the state antidegradation policy.

2 ANTIDEGRADATION POLICY AND GUIDANCE

Antidegradation policies and guidance have been issued at both the federal and state level, as described in the following sections.

2.1 Federal Antidegradation Policy and Guidance

The federal antidegradation policy is designed to protect existing uses and the level of water quality necessary to protect existing uses, and provide protection for higher quality water bodies and outstanding national water resources. Title 40 of the Code of Federal Regulations, Section 131.12 (40 CFR 131.12)) directs states to adopt a statewide policy that includes the following primary provisions, which have since become used to classify water body quality as "Tier 1," "Tier 2," or "Tier 3."

> *"(1) Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.* **[Tier 1]**
>
> *(2) Where the quality of waters exceed levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the State finds, after full satisfaction of the intergovernmental coordination and public participation provisions of the State's continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. In allowing such degradation or lower water quality, the State shall assure water quality adequate to protect existing uses fully. Further, the State*

shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control. **[Tier 2]**

(3) Where high quality waters constitute an outstanding national resource, such as waters of national and State parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected. **[Tier 3]**

(4) In those cases where potential water quality impairment associated with a thermal discharge is involved, the antidegradation policy and implementing method shall be consistent with Section 316 of the Act."

The United States Environmental Protection Agency (USEPA), Region 9 published *Guidance on Implementing the Antidegradation Provisions of 40 CFR 131.12* (USEPA 1987). The document provides general program guidance for states in Region 9, which includes California, on developing procedures for implementing antidegradation policies.

In August 2005, the USEPA issued a memorandum discussing Tier 2 antidegradation reviews and significance thresholds (USEPA 2005). The use of a 10 percent reduction in available assimilative capacity as a significance threshold was considered "… *to be workable and protective in identifying those significant lowerings of water quality that should receive a full Tier 2 antidegradation review, including public participation*."

> *"Given the different approaches states and tribes have taken recently to define significance, it is important to clarify that the most appropriate way to define a significance threshold is in terms of assimilative capacity…Further, given the importance of public participation and transparency, it is clear that a definition of significance that directly links to the resource to be protected (assimilative capacity) is more likely to be understood by the public."* (USEPA 2005)

Furthermore, the August 2005 memorandum discusses use of a cumulative cap to trigger a full socioeconomic review when the net effect of one or more incremental expansions uses a significant amount of assimilative capacity.

> *"To address situations where there are multiple or repeated expansions, OST* [USEPA Office of Science and Technology] *recommends that states and tribes incorporate a cumulative cap on the use of total assimilative capacity (i.e., the baseline capacity of the waterbody established at a specific point in time). This approach creates a backstop so that multiple or repeated discharges to a waterbody over time do not result in the majority of the assimilative capacity being used without a single antidegradation review (USEPA 2005).*"

The USEPA has not recommended a specific cumulative cap for total assimilative capacity usage.

2.2 State Antidegradation Policy and Guidance

California's antidegradation policy is embodied in State Water Board Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality Waters in California*. The goal of State Water Board Resolution No. 68-16 is to maintain high quality waters where they exist. State Water Board Resolution No. 68-16 states, in part:

> *"1. Whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the State that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies.*
>
> *2. Any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained."*

The Central Valley RWQCB's *Water Quality Control Plan for the Sacramento River and San Joaquin River Basins* (Basin Plan) implements, and incorporates by reference, the State Water Board antidegradation policy. In its implementation of Resolution No. 68-16, the Central Valley RWQCB is charged with preventing or minimizing surface water and groundwater degradation so that high quality waters of the state are maintained consistent with maximum benefit to the people of the state when issuing waste discharge requirements. Resolution No. 68-16 incorporates the federal antidegradation policy and requires that existing quality of waters be maintained unless degradation is justified based on specific findings.

In 1987, the State Water Board issued a policy memorandum to the nine regional water quality control boards to provide guidance on the application of the federal antidegradation policy for State Water Board and regional water quality control board actions, including establishing water quality objectives, issuing NPDES permits, and adopting waivers and exceptions to water quality objectives or control measures. In conducting these actions, the regional water quality control boards must assure full protection of existing instream beneficial uses, that the lowering of water quality is necessary to accommodate important economic or social development, and that outstanding national resource waters be maintained and protected.

The Central Valley RWQCB's implementation of the state antidegradation policy is guided by Administrative Procedures Update (APU) 90-004, issued by the State Water Board in 1990. The guidance requires the regional water quality control boards to determine the need to make findings as to whether water quality degradation is permissible when balanced against benefit to the public. APU 90-004 describes two types of antidegradation analyses – a "simple" analysis and a "complete" analysis. A complete antidegradation analysis is required if the proposed activity results in:

"1. A substantial increase in mass emissions of a pollutant, even if there is no other indication that the receiving waters are polluted; or

2. Mortality or significant growth or reproductive impairment of resident species.

In particular, an antidegradation finding [based on a complete analysis] *should be made and, if necessary, an analysis should be conducted when performing the following permit activities:*

1. Issuance of a permit for any new discharge, including Section 401 certifications; or

2. Material and substantial alterations to the permitted facility, such as relocation of an existing discharge; or

3. Reissuance or modification of permits which would allow a significant increase in the concentration or mass emission of any pollutant in the discharge."

A "complete" antidegradation analysis will not be required if:

"1. A Regional Board determines that the reduction of water quality will be spatially localized or limited with respect to the waterbody; e.g., confined to the mixing zone; or

2. A Regional Board determines the reduction in water quality is temporally limited and will not result in any long-term deleterious effects on water quality; e.g., will cease after a storm event is over; or

3. A Regional Board determines the proposed action will produce minor effects which will not result in a significant reduction of water quality; e.g., a POTW has a minor increase in the volume of discharge subject to secondary treatment; or

4. The Regional Board determines that the proposed activity, which may potentially reduce water quality, has been approved in the General Plan of a political subdivision and has been adequately subjected to the environmental and economic analyses in an environmental impact report (EIR) required under the California Environmental Quality Act (CEQA). If the Regional Board finds the EIR inadequate, the Regional Board must supplement this information to support the decision."

There are three main elements to the "complete" antidegradation analysis, which are quoted below.

"1. Compare receiving water quality to the water quality objectives established to protect designated beneficial uses.

a. If baseline water quality is equal to or less than the quality as defined by the water quality objective, water quality shall be maintained or improved to a level that achieves the objectives… ***[Tier 1]*** *b. If baseline water quality is better than the water quality as defined by the water quality objective, the baseline water quality shall be maintained unless poorer water quality is necessary to accommodate important economic or social development and is considered to be of maximum benefit to the people of the State...* ***[Tier 2]***

2. Balancing the proposed action against the public interest…

a. Past, present, and probable beneficial uses of the water.

b. Economic and social cost, tangible and intangible, of the proposed discharge compared to benefits…

c. The environmental aspects of the proposed discharge must be evaluated…

d. The implementation of feasible alternative control measures…

3. Report on the antidegradation analysis…

a. The water quality parameters and beneficial uses which will be affected by the proposed action and the extent of the impact.

b. The scientific rationale for determining that the proposed action will or will not lower water quality.

c. A description of the alternative measures that were considered.

d. A description of the socioeconomic evaluation.

e. The rationale for determining that the proposed action is or is not justified by socioeconomic considerations."

Because the proposed CTF discharge to the San Joaquin River would be a new discharge, the analysis presented herein is a "complete" antidegradation analysis.

3 WATER QUALITY STANDARDS

A water quality standard consists of: (1) the designated beneficial uses of a water body to be protected; (2) adopted criterion (called objective in California) designed to protect those uses; and (3) an antidegradation policy. The federal and state antidegradation policies are presented in Section 2. The following sections describe the beneficial uses and water quality criteria applicable to the San Joaquin River.

3.1 Beneficial Uses

The Basin Plan designates the beneficial uses of Central Valley region surface and ground waters (Central Valley Regional Water Quality Control Board 2018). The beneficial uses of the San Joaquin River at the proposed outfall location are: municipal and domestic water supply (MUN); agricultural supply, including stock watering (AGR); industrial process supply (PROC);

industrial service supply (IND); water contact recreation (REC-1); non-contact water recreation (REC-2); warm freshwater habitat (WARM); cold freshwater habitat (COLD); warm and cold migration of aquatic organisms (MIGR); warm spawning, reproduction, and/or early development (SPWN); wildlife habitat (WILD); and navigation (NAV).

3.2 Water Quality Criteria

The water quality assessment consist of federal criteria and state objectives for the protection of the designated beneficial uses of the San Joaquin River and Delta.

Water quality criteria adopted by USEPA specifically for inland waters of California and water quality objectives adopted by the Central Valley RWQCB and State Water Board are applicable to the San Joaquin River. USEPA adopted numeric water quality criteria for priority pollutants are contained in the California Toxics Rule (CTR; USEPA 2000, 2001). Central Valley RWQCB water quality objectives, which consist of both numeric and narrative objectives, are defined in its Basin Plan (Central Valley RWQCB 2018). Applicable objectives adopted by the State Water Board are contained in the *Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary* (Bay-Delta Plan), *Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Water and Enclosed Bays and Estuaries of California* (Thermal Plan), and the *Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California*.

Constituents detected in the CTF effluent that do not have adopted numeric federal criteria or state objectives are addressed via the Basin Plan's narrative toxicity objective. To interpret the Basin Plan's narrative toxicity objective, the USEPA's National Recommended Water Quality Criteria (NRWQC) or other similarly relevant thresholds were applied, as described below.

- Aluminum. The USEPA adopted revised NRWQC for aluminum for the protection of freshwater aquatic life in 2018. The revised criteria reflect the fact that the bioavailability of aluminum in surface waters is affected by the site chemistry of pH, hardness, and dissolved organic carbon.
- Ammonia. The USEPA adopted revised NRWQC for ammonia for the protection of freshwater aquatic life in 2013. The applicable chronic criterion varies depending on whether early life stage protection of fish is necessary. The acute criterion depends on the presence of salmonids. Both criteria depend on the presence/absence of Unionid mussels. The criteria for the protection of early life stages, and presence of salmonids and Unionid mussels were used in this assessment based on the aquatic species known to be present in the San Joaquin River at the proposed CTF outfall location. The acute and chronic criteria are equations dependent on receiving water pH and temperature.
- Boron. The USEPA's NRWQC for boron for the protection agricultural uses, published in the 1986 "Gold Book," was used in this assessment, as there is no numeric water quality objective in the Basin Plan for boron that applies to the segment of the San Joaquin River where the proposed CTF outfall would be located.
- Chloride. The state of Iowa adopted chloride criteria for the protection of freshwater aquatic life in 2009 that are an update to the USEPA's NRWQC, which were developed

in 1988. The Iowa criteria were developed in collaboration with the USEPA and in accordance with USEPA's methodology for developing NRWQC. The Iowa criteria incorporate new toxicity data that became available following the original publication in 1988, including data for four species of invertebrates believed to be highly sensitive to chloride and underrepresented in the 1988 criteria database. Because these criteria represent the current science with respect to chloride toxicity on aquatic life, these criteria were used in this assessment of degradation with respect to aquatic life criteria. The secondary maximum contaminant level (MCL) for chloride, which is incorporated by reference into the Basin Plan as a water quality objective, was used to assess degradation with respect to human health criteria.

4 WATER QUALITY ASSESSMENT

APU 90-004 states, "*…the most recent water quality resulting from permitted action is the baseline water quality to be considered in any antidegradation analysis*" (State Water Resources Control Board 1990). APU 90-004 further states, *"The baseline water quality should be representative of the water body, accounting for temporal and spatial variability."* The Porter-Cologne Water Quality Control Act provides a definition of water quality as the *"'Quality of the water' refers to chemical, physical, biological, bacteriological, radiological, and other properties and characteristics of water which affect its use."* Baseline for this assessment is the current condition of no CTF discharge to the San Joaquin River. This assessment identifies the incremental change in water quality that would occur in San Joaquin River due to the proposed CTF effluent discharge at discharge rates of 2.5 and 6.0 mgd ADWF.

4.1 Methodology

4.1.1 Overview

The water quality assessment addresses all constituents detected in the CTF effluent. The assessment is based, in part, on numerical modeling of the San Joaquin River under both the 2.5 and 6.0 mgd ADWF scenarios. This modeling was conducted using the California Department of Water Resources (DWR)-developed Delta Simulation Model II (DSM2). Electrical conductivity (EC) and temperature were modeled directly by DSM2. Other constituents with sufficient data and that generally behave conservatively when discharged to surface waters were assessed from mass-balance calculations using DSM2-modeled effluent and river fractions, and background river and effluent concentrations. Constituents that undergo transformation upon discharge to the river or otherwise cannot be mass-balanced (i.e., pH, turbidity, dissolved oxygen) were assessed qualitatively using effluent and river data and knowledge regarding how these constituents may be affected in ambient surface waters.

For a quantitative assessment of water quality impacts, USEPA recommends calculation of the assimilative capacity of the receiving water and the change that would occur with the proposed project. Based on USEPA's guidance, a project's use of 10 percent or more of available assimilative capacity requires further socioeconomic justification of the water quality degradation.

4.1.2 DSM2 Modeling

In the area of the proposed CTF outfall, the San Joaquin River flow is subject to tidal influence. Thus, under certain river flow conditions the CTF effluent could be transported in the river downstream only to move back upstream past the outfall and back downstream again during a tidal cycle. DSM2 accounts for this tidal-driven multiple dosing of effluent that could occur during specific flow conditions by modeling Delta hydrodynamics and continuous discharge scenarios.

Model Description

DSM2 is a one-dimensional computer model for simulating hydrodynamic and water quality in the Delta. A model grid representing the network of Delta channels covers major Delta channels, the Sacramento River upstream to the City of Sacramento, and the San Joaquin River upstream to Vernalis. Node 7 within the standard DSM2 grid is located at the site of the proposed CTF outfall, thus output for this node was used to quantify the amount of effluent discharged into the river at this location.

DSM2 has a HYDRO module and a QUAL module. DSM2-HYDRO models the hydrodynamics of the Delta. DSM2-QUAL models conservative and non-conservative constituents given a flow field simulated by HYDRO, and was used to model the CTF effluent fraction, EC, and river temperature. Both models run on a 15-minute time-step.

DSM2 was calibrated and validated in 1997 by DWR and in 2000 by a group of agencies, water users, and stakeholders. In 2009, DSM2 was calibrated and validated again to account for morphological changes, such as the flooded Liberty Island, and bathymetry, hydrodynamic, and water quality data collected after the 2000 calibration. DSM2 has been used frequently by DWR, other agencies, and stakeholders to simulate the potential impacts of Delta-related projects.

Scenarios and Input Data

The period modeled by DSM2 was January 1, 2008, through December 31, 2016. This period was selected because climate, hydrologic, and Delta operations data necessary to run DSM2 are available and because it encompasses the 2012–2016 extended drought period, thus providing a basis for assessing the maximum potential effect of the proposed CTF discharge on San Joaquin River water quality. Three scenarios were simulated, as follows.

- No Discharge: Historical data for the Delta with no CTF discharge. This scenario was only modeled for river temperature and EC to provide a baseline condition against which modeled temperatures and EC with the discharge occurring were compared.
- 2.5 mgd ADWF Discharge: Historical data for the Delta, and CTF effluent discharge rates associated with the plant's current 2.5 mgd ADWF treatment capacity.
- 6.0 mgd ADWF Discharge: Historical data for the Delta and CTF discharges rates associated with a City build-out discharge rate of 6.0 mgd ADWF.

Table 1 summarizes the DSM2 input parameters and sources of the input data used for the DSM2 simulation. Further explanation for the source of each input is provided below Table 1.

Table 1. Summary of input to DSM2 and sources of data.

Input Parameter	Description	Data Source
Boundary Flows	Sacramento River, San Joaquin River, Yolo Bypass, Cosumnes River, Mokelumne River, Calaveras River	DSM2 Template/CDEC/USGS
Boundary Stage	Martinez	DSM2 Template/CDEC/USGS
Exports/Diversions	CVP, SWP, CCWD Old River, CCWD Rock Slough, CCWD Victoria Canal, North Bay Aqueduct	DSM2 Template/CDEC/USGS
Gates and Barriers	Grantline Canal, Middle River, Old River, Head of Old River, Delta Cross Channel, Clifton Court Intakes	DWR Supplied File
DICU Flows	DWR DICU Model - 142 Nodes	DWR Supplied File
Climate Data[1]	Stockton Metropolitan Airport	weather.gov
Boundary Temperatures	Sacramento River [2], San Joaquin River, Martinez	CDEC/USGS
DICU Temperature	Average Delta-wide Ag Drains	MWQI Database/Waterfix Methodology [3]
CTF Discharge Rate	2.5 mgd ADWF and 6.0 mgd ADWF – see Table 2	City, RBI
CTF Effluent Temperature	Based on historical – see Figure 2	City, RBI

[1] Wet Bulb Temperature, Dry Bulb Temperature, Sky Condition, Wind Speed, Atmospheric Pressure.
[2] Sacramento River Temperatures were used also for East Side Tributaries (Mokelumne, Cosumnes, Calaveras) and Yolo Bypass.
[3] https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/california_waterfix/exhibits/exhibit107/docs/app_5B_DSM2_att4.pdf

- Boundary Flows, Boundary Stage, and Exports/Diversions: Boundary river flow, stage data, and exports/diversions were taken from the historical simulation template distributed with DSM2 version 8.1.2, supplemented with more recent data downloaded from the California Data Exchange Center (CDEC) and U.S. Geological Survey (USGS).
- Gates and Barriers: Data concerning the operation of the Delta Cross Channel Gates, installation and removal of the temporary barriers in the south Delta, and operation of the Clifton Court intakes were provided by DWR.
- DICU Flows: Delta In-Consumptive Use (DICU) flows are the agricultural withdrawals and returns that occur within the Delta. This data set is from a model was supplied by DWR, and simulates the island monthly consumptive uses, corresponding island water supplies, and the channel diversion, seepage and return volumes for each of 142 islands in the Delta, using the information on land use, historical precipitation, and agricultural activities.
- Climate Data: Climate data was obtained from a National Oceanic and Atmospheric Administration weather station located at the Stockton Metropolitan Airport, which is located approximately 7.5 miles northeast of the CTF outfall.
- Boundary Temperatures: Boundary river temperatures were downloaded from CDEC and USGS.
- DICU Temperature: DICU temperatures were based on values found from methodology documents for DSM2 temperature modeling conducted for the California WaterFix

project. The values are static monthly values that apply to all agricultural drains and are based on the average Delta-wide agricultural drain data from 1997–2004 from the Municipal Water Quality Investigations database. This DICU inflow water temperature was specified as a single monthly time series that was repeated for each year of the simulation.

- CTF Discharge Rate: The modeled CTF discharge rates were fixed for each month of the DSM2 simulation to the rates shown in **Table 2**. The CTF discharge rates for the 2.5 mgd ADWF scenario are from City of Lathrop Recycled Water Master Plan (EKI Water & Environment 2019a). The discharge rates for the 6.0 mgd ADWF scenario were derived from the monthly discharge pattern of the 2.5 mgd ADWF scenario. The ratio of monthly average discharge rate to 2.5 mgd was calculated for each month, then multiplied by 6.0 mgd to develop the discharge rates for this scenario shown in Table 2.

Table 2. Monthly average CTF effluent discharge rates modeled by DSM2.

Discharge Scenario	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.5 mgd ADWF	3.1	3.0	2.8	2.7	2.6	2.5	2.5	2.5	2.5	2.6	2.7	2.8
6.0 mgd ADWF	7.3	7.3	6.7	6.4	6.4	6.1	6.0	6.0	6.1	6.3	6.6	6.7

- CTF Effluent Temperature: Effluent temperatures were derived from hourly temperature monitoring conducted at the CTF from April 14, 2017, through May 18, 2020. A 365-day time-series of effluent temperatures was created by taking the highest daily average effluent temperature for each day of period monitored. For example, the January 1 effluent temperature was the highest of the effluent temperatures on January 1 of 2018, 2019, and 2020. The resultant 365-day effluent temperature time-series was repeated for each year of the DSM2 simulation (**Figure 2**).

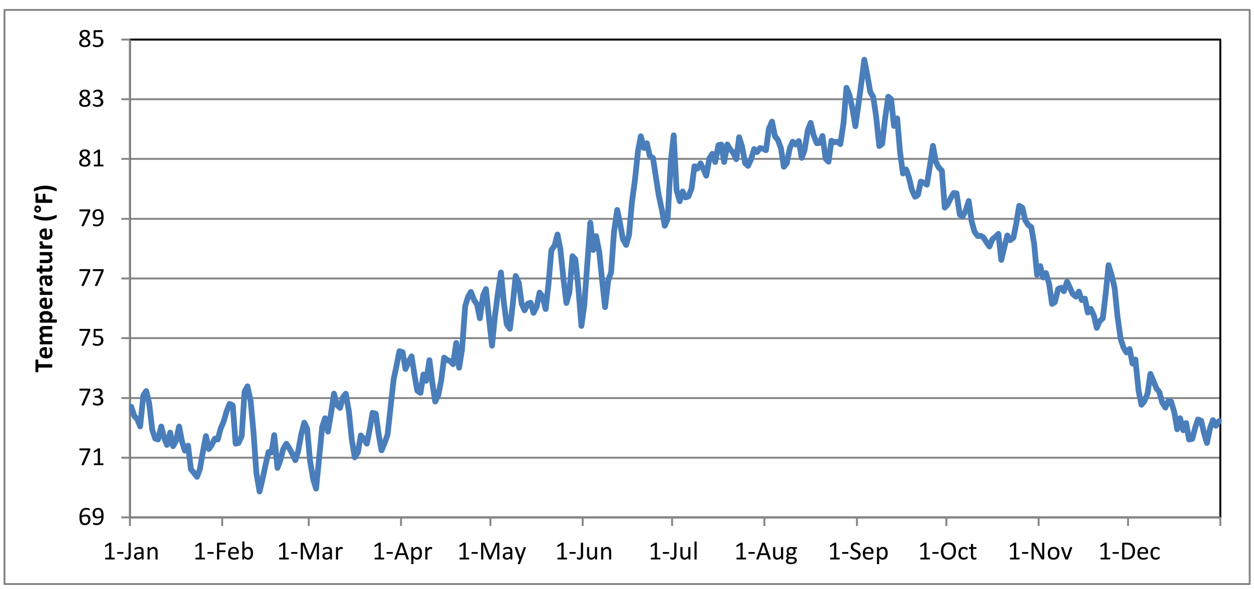

Figure 2. Daily average CTF effluent temperatures input to DSM2.

Model Validation

The DSM2 modeling required the additional step of model validation to ensure that San Joaquin River stage, flow, and temperature were being adequately modeled for purposes of this assessment. Results of the baseline model run, which simulated the January 1, 2008, through December 31, 2016, historical Delta flows and operations, climate conditions, and CTF effluent discharge flow rates and temperatures, were compared to actual, historical measured data. Modeled results were compared to data for the San Joaquin River at DWR's Mossdale Bridge monitoring station, which is located only 0.7 miles from the CTF outfall. Results of this effort showed that flow, stage, and temperature were all adequately simulated (see **Figure 3** through **Figure 6**, and **Table 3** through **Table 6**).

Model Output

Output was produced at multiple DSM2 nodes downstream of the CTF outfall for the San Joaquin River, as well as at other far-field locations. Parameters included the CTF effluent fraction, EC, and temperature. The 15-minute output was converted to daily averages for use in the assessments.

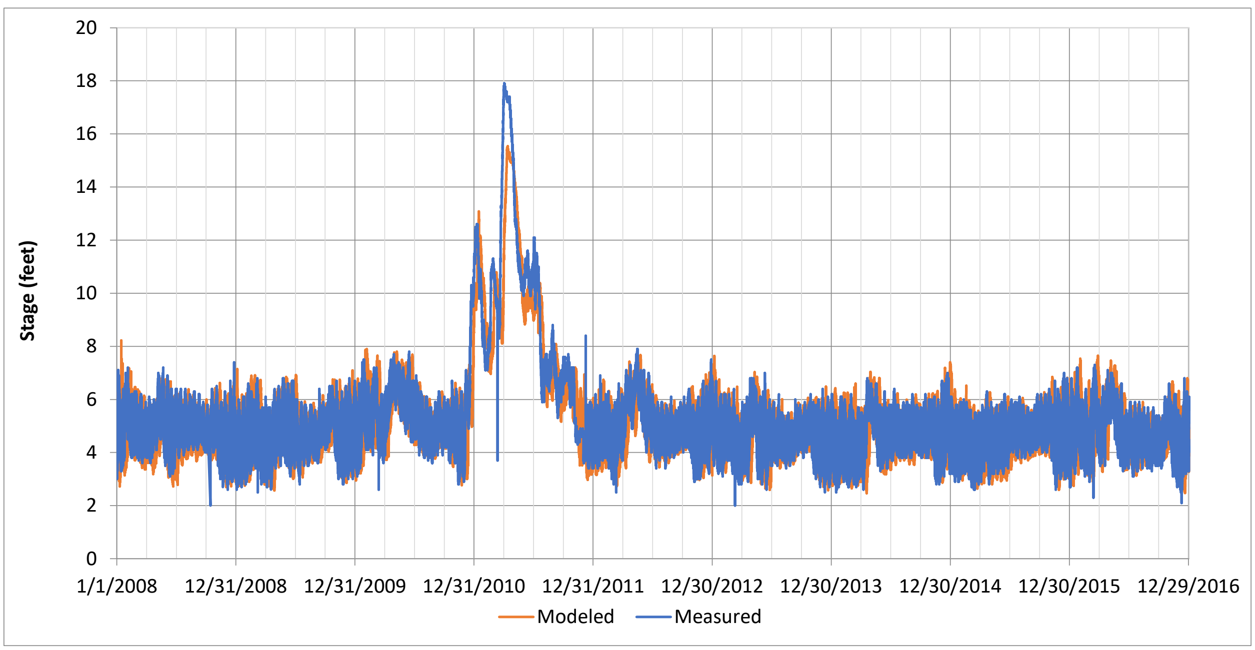

Figure 3. Time-series of San Joaquin River stage at Mossdale Bridge as modeled by DSM2 and historical measured stage data from CDEC.

Table 3. Comparison of DSM2-modeled San Joaquin River stage at Mossdale Bridge to historical measured stage data from CDEC by month.

Month	Average Difference in Daily Maximum Stage (feet) [1]	Average Difference in Daily Minimum Stage (feet) [1]
Jan	0.12	-0.08
Feb	0.18	0.02
Mar	-0.11	-0.19
Apr	-0.52	-0.75
May	0.11	0.20
Jun	-0.07	-0.23
Jul	-0.02	-0.15
Aug	-0.07	-0.14
Sep	-0.07	-0.15
Oct	-0.12	-0.14
Nov	0.18	0.36
Dec	-0.13	-0.27
Overall	**-0.04**	**-0.13**

[1] Underestimate refers to DSM2 predicting a lower stage than was measured, while overestimate refers to DSM2 predicting a higher stage than was measured.

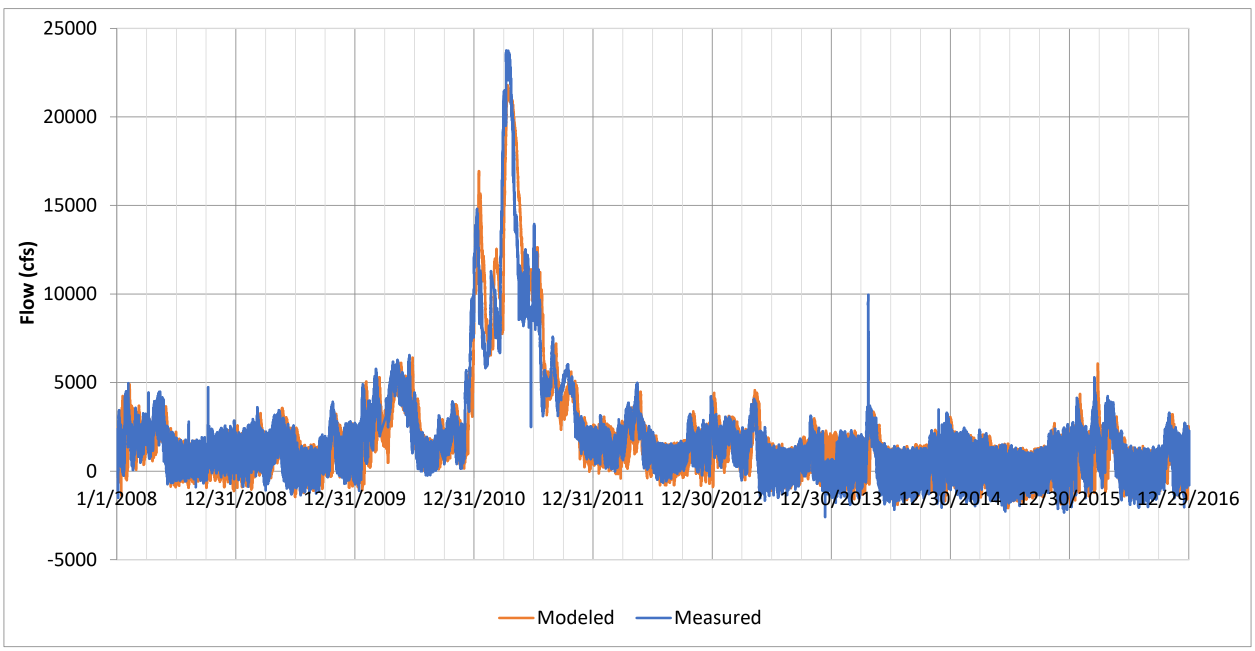

Figure 4. Time-series of San Joaquin River flow at Mossdale Bridge as modeled by DSM2 and historical measured flow data from CDEC.

Table 4. Comparison of DSM2-modeled San Joaquin River flow at Mossdale Bridge to historical measured flow data from CDEC by month.

Month	Average Difference in Daily Maximum Flow (cfs) [1]	Average Difference in Daily Minimum Flow (cfs) [1]
Jan	177	-10
Feb	108	50
Mar	-225	-215
Apr	-713	-804
May	434	741
Jun	86	343
Jul	213	430
Aug	2	-37
Sep	-40	-108
Oct	-413	-524
Nov	231	343
Dec	-305	-439
Overall	**-39**	**-22**

[1] Positive values are when DSM2 predicts a higher flow than was measured, while negative values are the opposite.

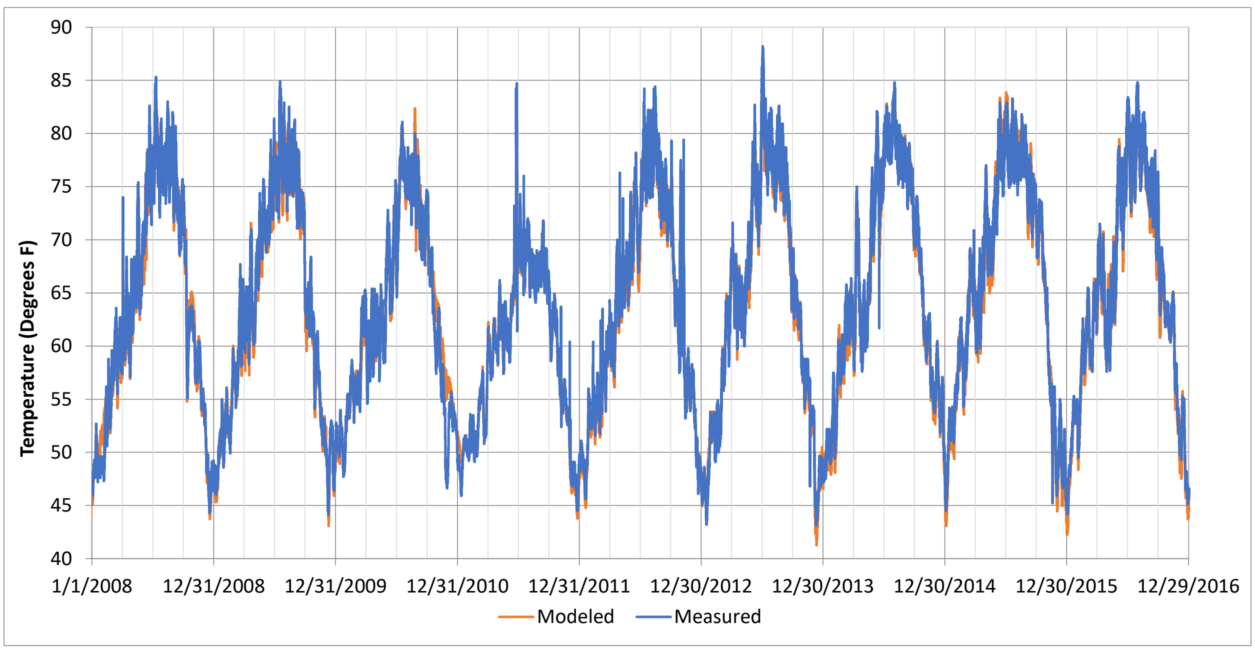

Figure 5. Time-series of San Joaquin River temperature at Mossdale Bridge as modeled by DSM2 and historical measured temperature data from CDEC.

Table 5. Comparison of DSM2-modeled daily average San Joaquin River temperature at Mossdale Bridge to historical measured temperature data from CDEC by month.

Month	Average Difference in Modeled versus Measured Temperature (°F) [1]
Jan	0.00
Feb	-0.06
Mar	-0.27
Apr	-0.20
May	-0.33
Jun	-0.41
Jul	-0.23
Aug	-0.17
Sep	-0.13
Oct	-0.15
Nov	0.08
Dec	-0.04
Overall	**-0.16**

[1] Positive values are when DSM2 predicts a higher temperature than was measured, while negative values are the opposite.

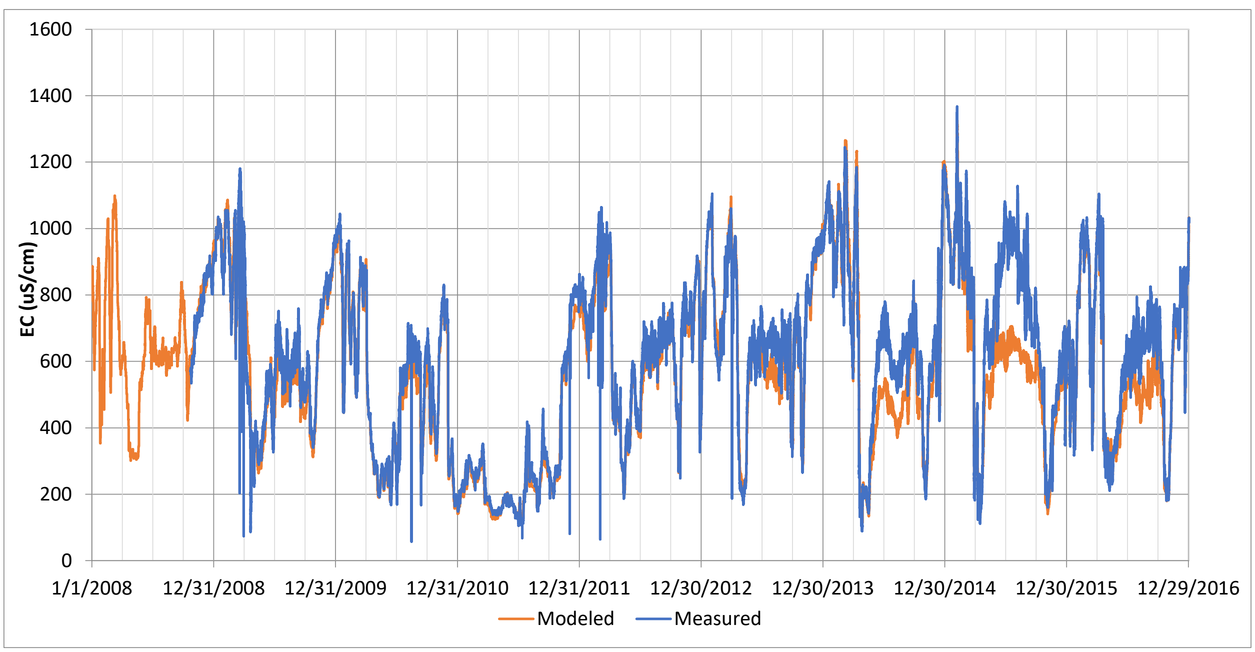

Figure 6. Time-series of San Joaquin River electrical conductivity at Mossdale Bridge as modeled by DSM2 and historical measured data from CDEC.

Table 6. Comparison of DSM2-modeled daily average San Joaquin River electrical conductivity at Mossdale Bridge to historical measured temperature data from CDEC by month.

Month	Average Difference in Modeled versus Measured EC (uS/cm) [1]
Jan	-13
Feb	3
Mar	-9
Apr	23
May	-20
Jun	-41
Jul	-63
Aug	-69
Sep	-48
Oct	-32
Nov	-15
Dec	-17
Overall	**-25**

[1] Positive values are when DSM2 predicts a higher EC than was measured, while negative values are the opposite.

4.1.3 Mass-Balance Calculations for Constituent Assessments

Water quality in the San Joaquin River upon implementing the proposed CTF discharge is represented by a steady-state, mass-balance of CTF effluent constituent concentrations and background river concentrations, calculated according to the following equation:

$$C_{mixed} = C_{effluent} * F_{effluent} + C_{river} * F_{river}$$

Where:

C_{mixed} = concentration in San Joaquin River with the CTF discharge (in µg/L or mg/L)

$C_{effluent}$ = CTF effluent concentration (in µg/L or mg/L)

$F_{effluent}$ = CTF effluent fraction at DSM2 node (%)

C_{river} = background San Joaquin River concentration (in µg/L or mg/L)

F_{river} = daily average San Joaquin River fraction at DSM2 node (%)

To assess the significance of any lowering of the water quality, the change in the assimilative capacity, on a constituent-specific basis, for the river was calculated. Available assimilative capacity is the difference between a constituent's water quality objective/criterion and receiving water concentration under existing conditions.

$$Available\ Assimilative\ Capacity = WQO - C_{river}$$

Where:

WQO = Water quality objective/criterion (in µg/L or mg/L)

The utilization of assimilative capacity from the proposed discharge is the difference between the receiving water concentration with the proposed discharge and the background concentration, divided by the available assimilative capacity.

$$\%\ Available\ Assimilative\ Capacity\ Used = 100\ \times \frac{(C_{mixed} - C_{river})}{Available\ Assimilative\ Capacity}$$

The sections below define the CTF effluent fractions and water quality concentrations input to the above mass-balance equation, and the sources for the water quality objectives/criteria for calculating available assimilative capacity.

Flow Fractions

The *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* defines critical receiving water flow considerations in the context of the water quality criterion type, thus beneficial uses to be protected (State Water Resources Control Board 2005), as follows.

- Critical flow for acute aquatic life criteria is 1Q10 (lowest one-day average flow rate with a once in ten year recurrence interval).
- Critical flow for chronic aquatic life criteria is 7Q10 (lowest seven-day average flow rate with a once in ten year recurrence interval).
- Critical flow for long-term human health criteria is the harmonic mean.

The SIP does not specify critical flows for human health constituents that exhibit non-carcinogenic effects, nitrate and nitrite in particular. USEPA (1991) recommends that for non-carcinogens associated with shortened exposures, the 30Q5 flow be used. The 30Q5 flow is the lowest five-day average flow rate with a once in five year recurrence interval. The assessment of nitrate and nitrite was based on the 30Q5 critical flow.

The 1Q10, 7Q10, and 30Q5 flow fractions were derived from the DSM2 output for the node at the CTF outfall. **Table 7** presents the highest daily average, 7-day average and 30-day average effluent fractions, and corresponding lowest river fractions, for each year of the DSM2 simulation. The 1Q10, 7Q10, and 30Q5 flow fractions were calculated from these individual flow fractions according to methods in USEPA's *DFLOW User's Manual and Technical Guidance Manual for Performing Wasteload Allocation, Book VI, Design Conditions* (USEPA 1986). The calculation method fits flow data to a log Pearson Type III probability distribution.

A harmonic mean flow is calculated as $Q_{hm} = (n)/(\sum^{n}_{i=1} 1/x_i)$ where x_i = flow values and n = number of flow values. This requirement tiers directly from the TSD's discussion in section 4.6 of dilution design conditions for river and stream discharge situations. For estuaries, the TSD (p. 74) states:

"Because of the tidal nature of the estuaries…dilution of discharges cannot be determined simply by calculating the discharge rate and the rate of the receiving water flow (i.e., the design flow)…tidal influences at any specific location have daily and monthly cycles. These additional factors require that direct, empirical steps be taken to ensure that basic dilution characteristics of a discharge to salt water are determined."

Because of the tidal nature of the San Joaquin River flow at the proposed CTF outfall location, a harmonic mean flow calculation is not applicable and long-term dilution conditions must be determined from average of the flow fractions for the 2008–2016 period simulated by DSM2.

Table 7. DSM2-modeled CTF effluent and San Joaquin River flow fractions at the CTF outfall, and corresponding 1Q10, 7Q10, 30Q5, and long-term average flow fractions for the 2.5 and 6.0 mgd ADWF discharge scenarios.

Year	Effluent %				San Joaquin River %			
	Maximum Daily Average	Maximum 7-Day Average	Maximum 30-Day Average	Long-term Average	Minimum Daily Average	Minimum 7-Day Average	Minimum 30-Day Average	Long-term Average
2.5 mgd ADWF Scenario								
2008	1.1	0.9	0.8	0.5	99.1	98.9	99.2	99.5
2009	1.0	0.9	0.9	0.5	99.1	99.0	99.1	99.5
2010	0.7	0.7	0.6	0.2	99.3	99.3	99.4	99.8
2011	0.5	0.4	0.3	0.1	99.6	99.5	99.7	99.9
2012	1.0	0.8	0.8	0.4	99.2	99.0	99.2	99.6
2013	1.1	1.0	0.9	0.5	99.0	98.9	99.1	99.5
2014	3.2	3.1	2.7	1.0	96.9	96.8	97.3	99.0
2015	6.1	6.0	5.3	1.7	94.0	93.9	94.7	98.3
2016	2.9	2.5	2.1	0.8	97.5	97.1	97.9	99.2
Critical Flow	4.4 (1Q10)	4.1 (7Q10)	2.6 (30Q5)	0.6 (Average)	95.6 (1Q10)	95.9 (7Q10)	97.4 (30Q5)	99.4 (Average)
6.0 mgd ADWF Scenario								
2008	2.4	2.1	1.9	1.1	97.9	97.6	98.1	98.9
2009	2.5	2.2	2.1	1.3	97.8	97.5	97.9	98.7
2010	1.7	1.5	1.4	0.6	98.5	98.3	98.6	99.4
2011	1.3	1.0	0.8	0.2	99.0	98.7	99.2	99.8
2012	2.5	2.1	1.9	1.1	97.9	97.5	98.1	98.9
2013	2.6	2.4	2.2	1.3	97.6	97.4	97.8	98.7
2014	7.6	7.2	6.4	2.3	92.8	92.4	93.6	97.7
2015	14.2	13.9	12.2	3.9	86.1	85.8	87.8	96.1
2016	6.9	5.8	5.0	2.0	94.2	93.1	95.0	98.0
Critical Flow	10.2 (1Q10)	9.7 (7Q10)	6.1 (30Q5)	1.5 (Average)	89.8 (1Q10)	90.3 (7Q10)	93.9 (30Q5)	98.5 (Average)
Source: DSM2 output								

Water Quality Data

<u>Receiving Water Quality</u>

Water quality monitoring data used in this analysis to characterize San Joaquin River baseline conditions and assess the incremental affect of the proposed CTF discharge on river water quality is primarily from monitoring data collected by the City of Manteca for compliance with its NPDES permit that regulates Water Quality Control Facility (WQCF) discharges to the river and is reported on the California Integrated Water Quality System (CIWQS) website. Manteca conducted monitoring of priority pollutants and other constituents of concern monthly from January through December 2017 upstream of the influence of its discharge on river water quality. In addition, Manteca conducts routine monitoring of general water quality conditions, including pH, dissolved oxygen, and turbidity, and data for these parameters is available beginning July 2010. These data were supplemented with data for the San Joaquin River at Mossdale Bridge from the DWR's Water Data Library website for pH, dissolved oxygen, dissolved and total organic carbon, and total Kjeldahl nitrogen and data for the San Joaquin River at Airport Way near Vernalis from the California Environmental Data Exchange Network (CEDEN) for biochemical oxygen demand (BOD), as no data for these parameters was available in the CIWQS data. Water quality summary statistics for San Joaquin River are provided in **Appendix A**.

CTF Effluent Quality

Because the CTF currently discharges to land, the WDRs Monitoring and Reporting Program requires monitoring for a limited number of constituents. To support the City's Report of Waste Discharge for an NPDES permit and the project Environmental Impact Report, the CTF effluent was monitored for priority pollutants and other constituents of concern typically required in Central Valley RWQCB NPDES permits for permit renewal. Effluent samples were collected downstream of the disinfection system and upstream of any effluent storage pond, the same location identified for effluent monitoring in the WDRs Monitoring and Reporting Program.

There were a total of fourteen effluent monitoring events for most constituents. The first thirteen events occurred from February 2017 through March 2018. During this time, metals, salinity-related constituents, mercury, cyanide, nitrate plus nitrite, hardness, and volatile organic compounds were monitored monthly, and semi-volatile organic compounds and pesticides were monitored quarterly. In addition, two samples were collected for dioxins and furans analysis, one in the wet season (February 2017) and one in the dry season (August 2017). The fourteenth sample event occurred in April 2020 to confirm current constituent concentrations and representativeness of the 2017–2018 data. All samples were 24-hour composite samples except for samples collected for mercury, methyl mercury, volatile organic compounds, and semi-volatile organic compounds.

Supplemental monthly monitoring for selenium occurred from May 2019 through April 2020. The selenium results from the February 2017 and March 2018 monitoring showed concentrations of selenium above concentrations that would be expected for a municipal wastewater discharger with a primarily domestic wastewater sources (based on comparisons with other Central Valley municipal wastewater dischargers) and above applicable water quality criteria. The additional 12 months of data collected for selenium revealed that the laboratory sample preparation was affecting the 2017–2018 results. The May 2019 through April 2020 data conform to the analytical method sample preparation procedures, thus these are the data used in this analysis.

Other deviations are listed below.

- Foaming agents (methylene blue active substances): Results for the February through September 2017 samples were reported by the analytical laboratory as "positive" or "negative," rather than as concentrations. Corrections were made to reporting beginning with the October 2017 to report a concentration result, to allow for comparison to the applicable water quality objective. Therefore, there are seven sample results for foaming agents (October 2017 through March 2018 and April 2020).

- Trihalomethane Compounds: The April through August 2017 effluent samples were collected prior to the chlorine contact basin. Thus, the Method EPA 624 analytical results for samples did not accurately reflect the concentrations of bromoform, chlorodibromomethane (CDBM), chloroform, and dichlorobromomethane (DCBM) in the final effluent in these samples. The April 2020 sample required dilution by 100 for the analysis, resulting in high reporting limits that resulted in non-detectable concentrations for bromoform, CDBM, and DCBM. Thus, there are eight sample results for these compounds (February 2017, and September 2017 through March 2018) measured in the final effluent.

These data were supplemented with total dissolved solids (TDS) data for the period January 2018 through March 2020 and biochemical oxygen demand (BOD) data for April 2019 through March 2020 collected by the City for WDR compliance monitoring.

Existing effluent quality characteristics are provided in **Appendix B**.

Use of Data

The effluent and river water quality data used to calculate changes in constituent concentrations varied according to the type of criterion applied to the constituent. Aquatic life criteria typically consist of an acute criterion that applies on 1-hour average basis and a chronic criterion which applies on a 4-day average basis. Because aquatic life criteria apply on a relatively short time-step, the maximum effluent and receiving water concentrations were used as a conservative measure of representative water quality. Human health criteria for the protection from consumption of organisms only are derived based on the assumption of a 70-year lifetime of exposure, and drinking water maximum contaminant levels (MCLs) are typically assessed on an annual average or four-quarter running average basis. Thus, the assessment relative to human health criteria was conducted using the average effluent and receiving water concentrations. Nitrate plus nitrite, which can have acute effects to human health, were assessed using maximum effluent and river concentrations. **Table 8** summarizes the type of data used to address each criterion category.

Many constituents monitored in the effluent and receiving water were not detected above analytical detection limits, thus these were not carried forward to calculate changes in water quality concentrations. For data sets with a mix of both detected concentrations and non-detect results, one-half the detection limit is used for non-detects for purposes of calculating average concentrations.

Table 8. Critical flows and water quality used in assessment.

Criterion Category	Critical Flow	Representative Effluent and Receiving Water Quality
Acute aquatic life	1Q10	Maximum measured concentration
Chronic aquatic life	7Q10	Maximum measured concentration
Nitrate plus nitrite	30Q5	Maximum measured concentration
Human health and agricultural criteria	Average Effluent/River Fractions	Mean of measured concentrations

4.1.4 Clean Water Act Section 303(d)-Listed Constituents

Water bodies on the State Water Board's Clean Water Act Section 303(d) list have been identified as being impaired due to one or more constituents exceeding a water quality objective; these are so-called "Tier 1" water bodies. For waters in this category, baseline water quality is equal to or less than the quality as defined by the water quality objective and water quality shall be maintained or improved to a level that achieves the objectives. The Central Valley RWQCB addresses these water bodies through development of total maximum daily loads.

The segment of the San Joaquin River where the proposed outfall is identified is on the Section 303(d) list as being within the southern portion of the Delta, which is listed due to impairments associated with chlorpyrifos, diazinon, DDT, EC, Group A pesticides (one or more pesticide compounds including aldrin, dieldrin, chlordane, endrin, heptachlor, heptachlor epoxide, BHC, endosulfan, and toxaphene), invasive species, mercury, and toxicity (State Water Resources Control Board 2017). TMDLs have been adopted for chlorpyrifos, diazinon, and mercury. All Section 303(d) listed constituents are addressed in this assessment, except for invasive species as this is biological parameter, not a water quality parameter.

4.1.5 Assessment of pH, Dissolved Oxygen, Temperature, and Turbidity

The parameters pH, dissolved oxygen, temperature, and turbidity are addressed separately from the mass balance assessment. Turbidity, dissolved oxygen, and pH are assessed directly utilizing plant performance and receiving water data. Temperature is addressed using DSM2 output.

4.2 Electrical Conductivity Assessment

The maximum CTF effluent EC is projected to be 1,039 µmhos/cm. This projection was based on recent historical monitoring for TDS, which is conducted on a monthly basis for WDR compliance reporting, and data from the unique April 2020 monitoring event. Comparison of the more recent TDS data to the data from the February 2017 through March 2018 conducted specially to develop data for NPDES permit and Environmental Impact Report support revealed that TDS concentrations are now much lower, as shown in **Figure 7**. Because EC is not routinely monitored for WDR compliance reporting, a relationship between past EC and TDS data was developed, which is shown in **Figure 8**, and the corresponding effluent EC calculated from this relationship. The calculated effluent EC values are shown in Figure 7, along with the measured data. An effluent EC of 1,039 µmhos/cm was input to the DSM2 model for purposes of modeling San Joaquin River and Delta EC for the entire simulated period.

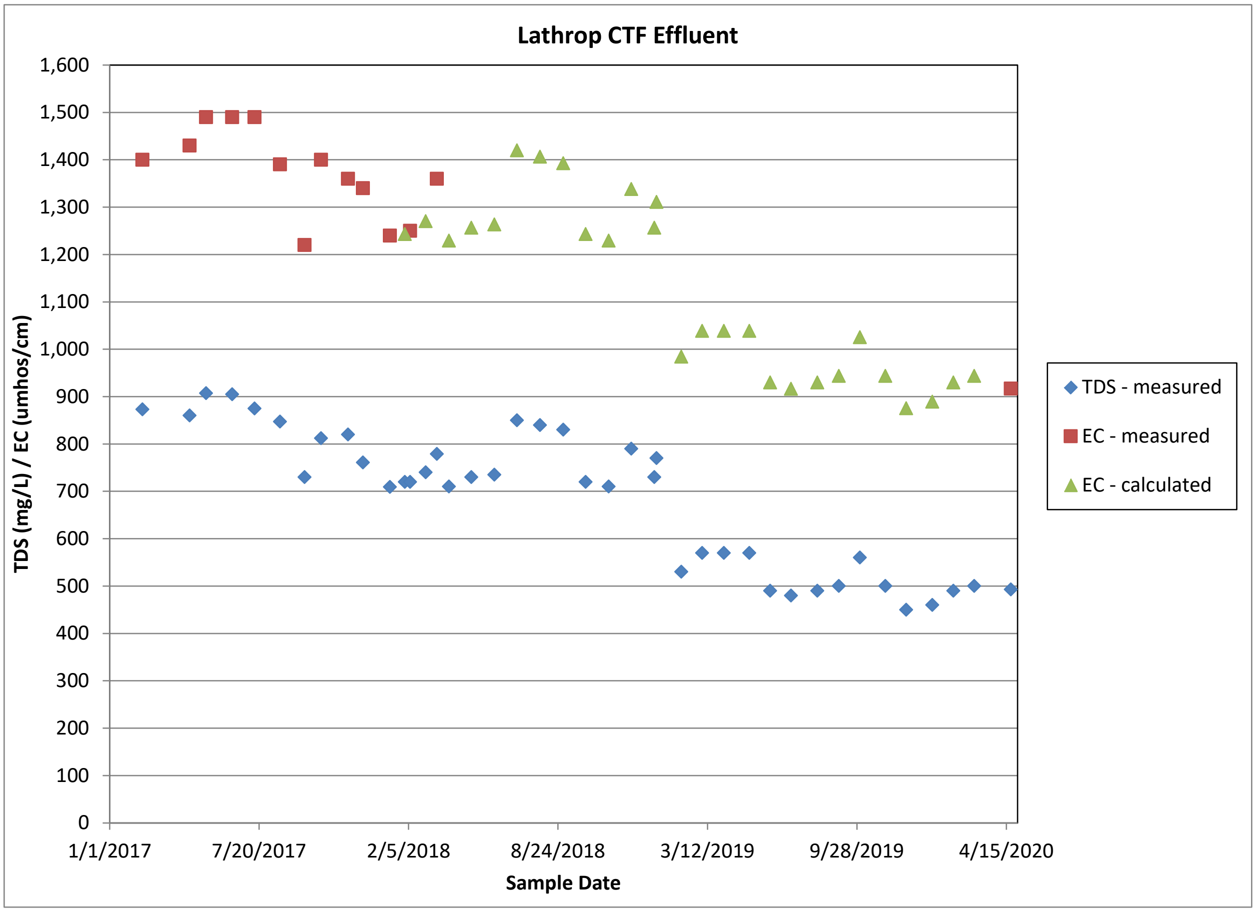

Figure 7. TDS and EC measured in the CTF effluent, and calculated effluent EC from measured TDS.

The EC objectives for the southern Delta, which includes the reach of the San Joaquin River where the CTF outfall would be located, were updated by the State Water Board in its Bay-Delta Plan in December 2018. The previous (2006) Bay-Delta Plan EC objectives for the southern Delta were 700 µmhos/cm for April through August, and 1,000 µmhos/cm for September through March, expressed as a 30-day running average of mean daily EC. The revised southern Delta EC objective is 1,000 µmhos/cm year-round, also expressed as a 30-day running average of mean daily EC. The EC objective is for protection of the agricultural beneficial use.

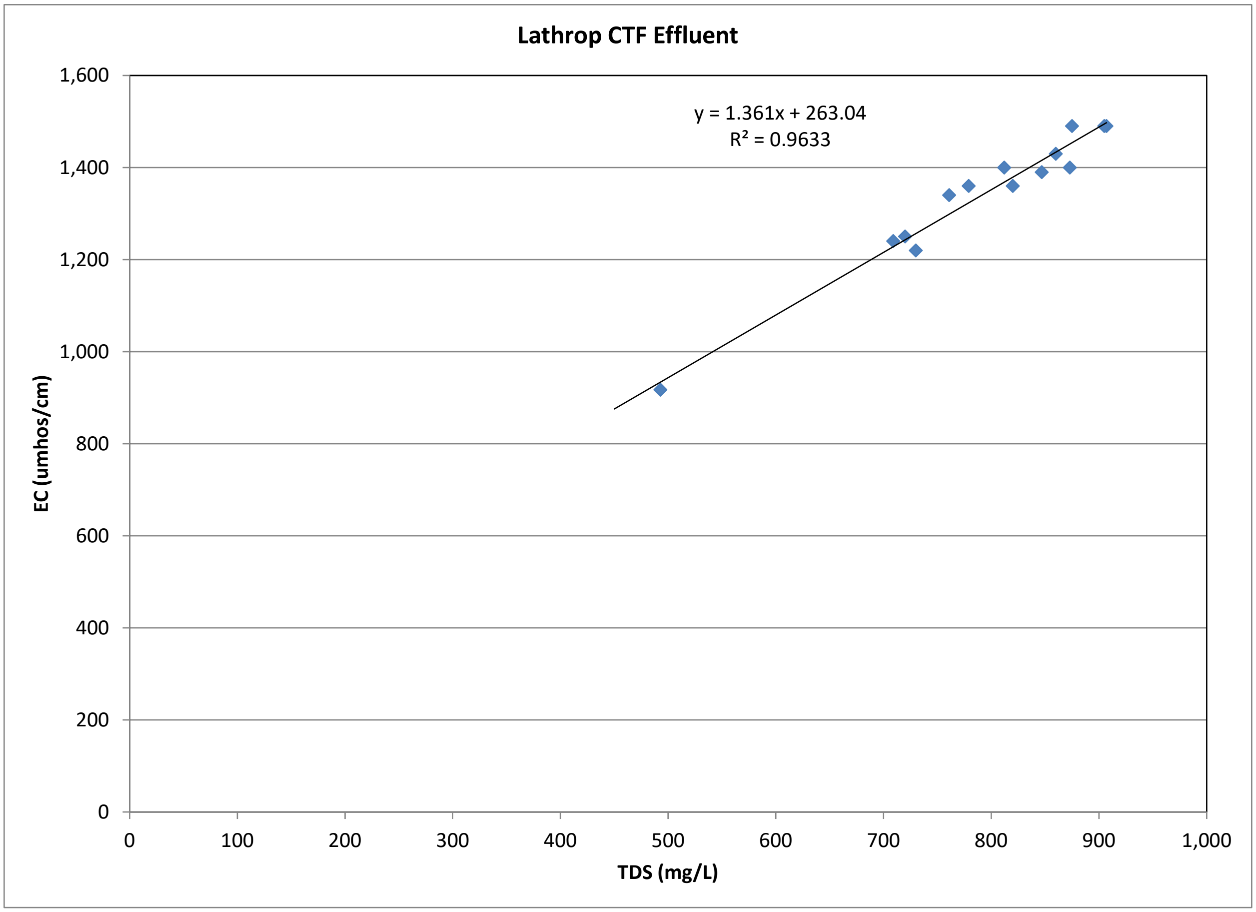

Figure 8. Effluent EC versus TDS for data from February 2017 through March 2018, and April 2020.

Table 9 presents the modeled EC for the San Joaquin River at the proposed CTF outfall location for the 2.5 and 6.0 mgd ADWF discharge scenarios compared to river EC with no CTF discharge occurring (i.e., under baseline/existing conditions), expressed as 30-day average values. The CTF discharge would not cause river EC to be greater than 1,000 µmhos/cm. Further, the discharge would have little to no effect on river EC at the outfall location in the months of January through May, and October through December, when EC increases due to the discharge would be less the 10 µmhos/cm. During the summer months of June, July, and August, EC increases would be variable. The 90^{th} percentile EC would increase the greatest, by up to 41 µmhos/cm, but would still be well below the 1,000 µmhos/cm Delta objective.

Table 10 presents summary statistics for EC at Bay-Delta Plan southern Delta compliance locations, and select southern Delta drinking water intake locations for the 2.5 and 6.0 mgd ADWF discharge scenarios compared to the EC with no CTF discharge occurring (i.e., under baseline/existing conditions), expressed as 30-day average values. The CTF discharge would have little to no effect on the maximum EC at these locations, and would not cause EC at these Delta locations to be greater than 1,000 µmhos/cm.

Table 9. DSM2-modeled EC (µmhos/cm) of the San Joaquin River at the CTF outfall for January 1, 2008, through December 31, 2016, expressed as a 30-day average.

Month	Parameter	No Discharge	2.5 mgd ADWF	Difference from No Discharge	6.0 mgd ADWF	Difference from No Discharge
Jan	Minimum	180	181	0	181	1
	25th Percentile	687	688	1	690	2
	Median	826	827	1	828	1
	75th Percentile	953	953	1	954	1
	90th Percentile	1,017	1,017	0	1,017	0
	Maximum	1,066	1,066	0	1,066	0
Feb	Minimum	215	215	0	216	1
	25th Percentile	689	690	1	691	3
	Median	790	791	1	793	2
	75th Percentile	975	975	0	976	1
	90th Percentile	993	993	0	994	1
	Maximum	1,037	1,037	0	1,037	0
Mar	Minimum	247	247	0	247	1
	25th Percentile	727	727	0	728	1
	Median	859	860	1	861	1
	75th Percentile	915	915	0	916	1
	90th Percentile	962	963	1	964	1
	Maximum	1,040	1,040	0	1,040	0
Apr	Minimum	139	139	0	139	0
	25th Percentile	536	537	1	539	2
	Median	721	722	1	723	2
	75th Percentile	841	842	1	843	2
	90th Percentile	924	924	1	925	2
	Maximum	961	961	0	961	1
May	Minimum	133	133	0	133	0
	25th Percentile	282	283	1	285	2
	Median	331	333	2	335	4
	75th Percentile	411	412	1	414	3
	90th Percentile	507	508	1	511	4
	Maximum	645	646	1	647	2
Jun	Minimum	163	163	0	164	1
	25th Percentile	283	288	4	294	11
	Median	409	414	4	417	7
	75th Percentile	538	540	2	544	6
	90th Percentile	616	621	4	630	13
	Maximum	682	684	2	687	5
Jul	Minimum	145	145	0	146	1
	25th Percentile	456	458	3	463	7
	Median	512	521	9	534	22
	75th Percentile	605	608	3	613	8
	90th Percentile	651	670	18	692	41
	Maximum	693	695	2	707	14

Table 9. DSM2-modeled EC (µmhos/cm) of the San Joaquin River at the CTF outfall for January 1, 2008, through December 31, 2016, expressed as a 30-day average.

Month	Parameter	No Discharge	2.5 mgd ADWF	Difference from No Discharge	6.0 mgd ADWF	Difference from No Discharge
Aug	Minimum	211	212	0	212	1
	25th Percentile	495	506	10	519	24
	Median	555	558	3	563	8
	75th Percentile	600	603	3	608	8
	90th Percentile	629	645	16	666	37
	Maximum	667	684	18	708	41
Sep	Minimum	207	207	1	208	1
	25th Percentile	503	512	9	525	22
	Median	561	566	5	572	11
	75th Percentile	609	613	4	619	10
	90th Percentile	630	636	6	647	17
	Maximum	685	688	3	692	6
Oct	Minimum	235	236	1	237	2
	25th Percentile	465	467	2	470	5
	Median	555	560	5	564	9
	75th Percentile	595	598	3	602	7
	90th Percentile	670	672	2	675	5
	Maximum	703	706	3	710	6
Nov	Minimum	235	236	1	237	2
	25th Percentile	368	372	4	377	9
	Median	480	481	1	483	3
	75th Percentile	594	596	2	600	6
	90th Percentile	664	666	2	669	4
	Maximum	762	764	2	766	4
Dec	Minimum	246	247	1	247	1
	25th Percentile	588	591	2	595	7
	Median	723	725	1	727	4
	75th Percentile	792	793	1	794	3
	90th Percentile	850	851	1	852	3
	Maximum	934	935	1	936	2

Table 10. DSM2-modeled EC (µmhos/cm) at southern Delta compliance locations and key drinking water intake locations for January 1, 2008, through December 31, 2016, expressed as 30-day average values.

Location	No Discharge	2.5 mgd ADWF	Difference from No Discharge	6.0 mgd ADWF	Difference from No Discharge
San Joaquin River at Vernalis					
Minimum	566	566	0	566	0
Average	132	132	0	132	0
Maximum	1,063	1,063	0	1,063	0
San Joaquin River at Brandt Bridge					
Minimum	573	575	2	578	5
Average	133	133	0	133	0
Maximum	1,093	1,092	-1	1,091	-1
Middle River at Old River					
Minimum	582	583	2	585	4
Average	109	110	1	112	3
Maximum	1,300	1,299	-1	1,297	-3
Middle River at Victoria Canal					
Minimum	333	333	0	334	1
Average	128	128	0	128	0
Maximum	586	585	-1	584	-3
Jones Pumping Plant					
Minimum	415	416	0	416	1
Average	132	133	0	133	0
Maximum	996	997	1	997	2
Banks Pumping Plant					
Minimum	374	374	0	374	0
Average	126	126	0	126	0
Maximum	866	867	1	869	2
Contra Costa Pumping Plant #1					
Minimum	410	410	0	410	-1
Average	161	161	0	161	0
Maximum	1,352	1,352	0	1,352	0
Old River at Rock Slough					
Minimum	336	336	0	336	-1
Average	137	137	0	137	0
Maximum	816	814	-2	812	-5

4.3 Mass-Balanced Constituents Assessment

The following sections provide tables showing the incremental change in San Joaquin River constituent concentrations that would occur with the CTF discharge at 2.5 and 6.0 mgd ADWF from applying the methodology described in Section 4.1.3. The incremental change in constituent concentration was compared to available assimilative capacity to determine if the discharge would use more than 10 percent of available assimilative capacity. The use of assimilative capacity was evaluated separately relative to aquatic life criteria, Basin Plan objectives that apply specifically to the Delta, and human health criteria and drinking water MCLs.

4.3.1 Incremental Change in Water Quality and Use of Available Assimilative Capacity Relative to Aquatic Life Criteria and Basin Plan Objectives Applicable to the Delta

Table 11 presents the incremental change in San Joaquin River water quality, available assimilative capacity, and the percent of available assimilative capacity used by the discharge, for those constituents with aquatic life water quality criteria and Basin Plan objectives applicable specifically to the Delta. The water quality criteria consist of CTR criteria for the protection of freshwater aquatic life, Basin Plan objectives, and USEPA NRWQC (for constituents with no CTR criteria of numeric Basin Plan objective). The Basin Plan contains objectives for arsenic, barium, copper, iron, and manganese that are maximum concentrations for the dissolved metals fraction that specifically apply to Delta waters. The lowest of these criteria were applied in the analysis.

As described in Section 2.1, based on USEPA's guidance, a project's use of 10 percent or more of available assimilative capacity is the threshold used to require further socioeconomic justification of the water quality degradation. Of the constituents listed in Table 11, only barium would use more than 10 percent of the available assimilative capacity.

4.3.2 Incremental Change in Water Quality and Use of Available Assimilative Capacity Relative to Human Health Criteria, Drinking Water MCLs, and Agricultural Objectives

Table 12 presents the incremental change in San Joaquin River water quality, available assimilative capacity, and the percent of available assimilative capacity used by the discharge, for those constituents with human health criteria in the CTR, applicable drinking water MCLs incorporated by reference into the Basin Plan as objectives, or criteria for protection of agricultural uses (for those constituents with no numeric human health criteria or MCLs).

Of the constituents listed in Table 12, only CDBM and DCBM would use more than 10 percent of the available assimilative capacity. Under the 2.5 mgd ADWF discharge scenario, the resulting long-term average San Joaquin River concentrations of CDBM and DCBM would be less than the applicable criteria at the proposed CTF outfall location. Under the 6.0 mgd ADWF discharge scenario, the resulting long-term average river concentrations would be greater than applicable criteria, resulting in a use of greater than 100 percent of assimilative capacity. The long-term average effluent and river fractions that would result in concentrations being less than CDBM and DCBM criteria are as follows.

- CDBM: Effluent fraction = 1.05, River fraction = 98.95
- DCBM: Effluent fraction = 0.86, River fraction = 99.14

Table 13 presents the modeled long-term average effluent and river fractions for the DSM2 nodes beginning at the proposed CTF outfall location and several downstream river locations. A long-term average effluent fraction of 1.05 is achieved from dilution alone at Node 12, which is 10 miles downstream of the proposed CTF outfall location, and a long-term average effluent fraction of 0.85 is achieved from dilution alone at node 15, which is 14.1 miles downstream of the proposed outfall location.

Table 11. Incremental change in San Joaquin River water quality and use of assimilative capacity relative to aquatic life criteria and Basin Plan Delta objectives due to CTF discharge.

Constituent	Units	Criterion		River Background	Available Assimilative Capacity	Incremental Change at 2.5 mgd ADWF			Incremental Change at 6.0 mgd ADWF		
		Value	Basis			River Conc.	Conc. Change [a]	% Use of Assimilative Capacity	River Conc.	Conc. Change [a]	% Use of Assimilative Capacity
Constituents with No Assimilative Capacity											
Aluminum	µg/L	280	USEPA AQ	4,200	No AC	4,035	-165	No AC	3,811	-389	No AC
Ammonia (as N)	mg/L-N	0.2 [b]	USEPA AQ	0.50	No AC	0.49	-0.01	No AC	0.47	-0.03	No AC
Iron	µg/L	300	Basin Plan	5,430	No AC	5,210	-220	No AC	4,909	-521	No AC
Lead	µg/L	2.9	CTR AQ	4.0	No AC	3.9	-0.1	No AC	3.7	-0.3	No AC
Manganese	µg/L	50	Basin Plan	303	No AC	291	-12	No AC	274	-29	No AC
Constituents with No Change or an Increase in Assimilative Capacity with Discharge											
Chromium (VI)	µg/L	11	CTR AQ	0.062	11	0.064	0.002	0.0%	0.066	0.004	0.0%
Copper	µg/L	9.2 [c]	CTR AQ	8.6	0.60	8.5	-0.1	-8.7%	8.5	-0.1	-20.5%
Nickel	µg/L	51 [c]	CTR AQ	12	40	11	-0.4	-0.9%	11	-1	-2.2%
Constituents with a Decrease in Assimilative Capacity with Discharge											
Arsenic	µg/L	10	Basin Plan	1.9	8.10	2.2	0.3	3.3%	2.5	0.6	7.8%
Barium	µg/L	100	Basin Plan	77	24	81	5	20.2%	88	11	47.7%
Cadmium	µg/L	2.4 [c]	CTR AQ	0.070	2.3	0.074	0.004	0.2%	0.080	0.010	0.4%
Chloride	mg/L	313	Iowa CCC	78	235	85	7	3.0%	94	17	7.1%
Chromium	µg/L	204 [c]	CTR AQ	9.2	195	9.4	0.2	0.1%	9.7	0.5	0.3%
Selenium	µg/L	5	CTR AQ	0.40	4.6	0.41	0.01	0.3%	0.43	0.03	0.7%
Silver	µg/L	2.8 [c]	CTR AQ	0.25	2.6	0.28	0.03	1.2%	0.32	0.07	2.7%
Zinc	µg/L	118 [c]	CTR AQ	18	100	21	3	3.1%	25	7	7.3%

Basin Plan = water quality objectives specifically for the Delta in Table 3-1 of the Central Valley RWQCB Basin Plan

CTR AQ = California Toxics Rule criterion for the chronic protection of aquatic life.

Iowa CCC = Criteria developed by the State of Iowa using the USEPA methodology for the development of aquatic life criteria, based on a concurrent San Joaquin River hardness of 31.4 mg/L (as $CaCO_3$) and sulfate of 6.9 mg/L.

No AC = No assimilative capacity is available under baseline conditions because river background concentration is above the lowest applicable criterion. For this situation, use of assimilative capacity by increased discharge rate cannot be calculated.

USEPA AQ = National Recommended Water Quality Criteria for protection of freshwater aquatic life published by the United States Environmental Protection Agency.

[a] Results are rounded from calculations performed in a spreadsheet. Thus, the incremental increase in constituent concentration due to the increased discharge rate may not be exactly equal to the

differences between the river background concentration and the river concentration with the discharge.

[b] The lowest 30-day average chronic criterion derived from the paired 30-day average pH of 8.5 and 30-day average temperature of 26 degrees Celsius measured at DWR's monitoring station at Mossdale Bridge from December 6, 2007, through August 4, 2020. The 30-day average chronic criterion ranged from 0.2 to 3.1 mg/L as nitrogen based on all data from this period.

[c] Based on a minimum effluent hardness of 107 mg/L (as $CaCO_3$) and San Joaquin River hardness range of 31.4 to 248 mg/L (as $CaCO_3$).

Table 12. Incremental change in San Joaquin River water quality and use of assimilative capacity relative to human health criteria, drinking water MCLs, and agricultural objectives due to CTF discharge.

Constituent	Units	Criterion		River Background	Available Assimilative Capacity	Incremental Change at 2.5 mgd ADWF			Incremental Change at 6.0 mgd ADWF		
		Value	Basis			River Conc.	Conc. Change [a]	% Use of Assimilative Capacity	River Conc.	Conc. Change [a]	% Use of Assimilative Capacity
Constituents with No Assimilative Capacity											
4,4'-DDD	ng/L	0.83	CTR HH	1.00	No AC	1.00	0.00	No AC	1.01	0.01	No AC
Aluminum	µg/L	200	SMCL	1,233	No AC	1,225	-7	No AC	1,215	-18	No AC
Iron	µg/L	300	SMCL	1,684	No AC	1,674	-10	No AC	1,659	-25	No AC
Manganese	µg/L	50	SMCL	95	No AC	94	-1	No AC	93	-1	No AC
Constituents with No Change or an Increase in Assimilative Capacity with Discharge											
1,2-Dibromo-3-chloropropane	µg/L	0.2	MCL	0.07	0.13	0.07	0.00	-0.3%	0.07	0.00	-0.7%
2,4-D	µg/L	70	MCL	0.04	69.97	0.04	0.00	0.0%	0.05	0.01	0.0%
Bis(2-ethylhexyl) phthalate	µg/L	1.8	CTR HH	0.55	1.25	0.55	0.00	-0.1%	0.55	0.00	-0.2%
Boron	mg/L	750	EPA AG	81	669	81	0	-0.1%	80	-1	-0.2%
Cadmium	µg/L	5	MCL	0.1	4.9	0.1	0.0	0.0%	0.1	0.0	0.0%
Chromium	µg/L	50	MCL	3.9	46	3.9	0.0	0.0%	3.9	0.0	0.0%
Copper	µg/L	1,000	SMCL	2.8	997	2.8	0.0	0.0%	2.8	0.0	0.0%
Lead	µg/L	15	MCL	1	14	1	0	0.0%	1	0	-0.1%
Mercury	ng/L	12	Statewide Mercury Objectives	4.9	7.1	4.9	0.0	-0.4%	4.8	-0.1	-0.9%
Nickel	µg/L	100	MCL	4	96	4	0	0.0%	4	0	0.0%
Nitrite (as N)	mg/L	1	MCL	0.03	0.97	0.03	0.0	0.0%	0.03	0.0	-0.1%
Selenium	µg/L	50	MCL	0.4	49.6	0.4	0.0	0.0%	0.4	0.0	0.0%
Silver	µg/L	100	SMCL	0.1	100	0.1	0.0	0.0%	0.1	0.0	0.0%
Thallium	µg/L	1.7	CTR HH	0.2	1.5	0.2	0.0	-0.1%	0.2	0.0	-0.2%

Table 12. Incremental change in San Joaquin River water quality and use of assimilative capacity relative to human health criteria, drinking water MCLs, and agricultural objectives due to CTF discharge.

Constituent	Units	Criterion		River Background	Available Assimilative Capacity	Incremental Change at 2.5 mgd ADWF			Incremental Change at 6.0 mgd ADWF		
		Value	Basis			River Conc.	Conc. Change [a]	% Use of Assimilative Capacity	River Conc.	Conc. Change [a]	% Use of Assimilative Capacity
Constituents with a Decrease in Assimilative Capacity with Discharge											
Antimony	µg/L	6	MCL	0.2	5.8	0.2	0.0	0.1%	0.2	0.0	0.1%
Arsenic	µg/L	10	MCL	1.6	8.4	1.6	0.0	0.3%	1.6	0.1	0.8%
Barium	µg/L	1,000	MCL	39	961	40	1	0.1%	41	2	0.2%
Bromoform	µg/L	4.3	CTR HH	0.04	4.26	0.07	0.03	0.6%	0.11	0.06	1.5%
CDBM	µg/L	0.41	CTR HH	0.05	0.36	0.25	0.21	56%	0.56	0.51	>100%
Chloride	mg/L	250	SMCL	23	227	24	1	0.5%	26	3	1.2%
DCBM	µg/L	0.56	CTR HH	0.05	0.51	0.40	0.35	69%	0.93	0.88	>100%
Fluoride	mg/L	2	MCL	0.07	1.93	0.07	0.00	0.0%	0.07	0.00	0.1%
Foaming Agents (MBAS)	mg/L	0.5	SMCL	0.01	0.49	0.01	0.00	0.1%	0.01	0.00	0.3%
Nitrate (as N)	mg/L	10	MCL	1.5	8.5	1.6	0.1	1.6%	1.8	0.3	3.7%
Nitrate + Nitrite (as N)	mg/L	10	MCL	1.5	8.51	1.6	0.1	1.6%	1.8	0.3	3.7%
Sulfate (as SO4)	mg/L	250	SMCL	22	228	22	0	0.2%	23	1	0.4%
Total Dissolved Solids (TDS)	mg/L	500	SMCL	245	255	246	2	0.6%	249	4	1.6%
Zinc	µg/L	5,000	SMCL	7	4,993	8	0	0.0%	8	1	0.01%

CTR HH = California Toxics Rule criterion for the chronic protection of human health from consumption of water and organisms.
MCL = Primary drinking water maximum contaminant level.
SMCL = Secondary drinking water maximum contaminant level.
No AC = No assimilative capacity is available under baseline conditions because river background concentration is above the lowest applicable criterion. For this situation, use of assimilative capacity by increased discharge rate cannot be calculated.
[a] Results are rounded from calculations performed in a spreadsheet. Thus, the incremental increase in constituent concentration due to the increased discharge rate may not be exactly equal to the differences between the river background concentration and the river concentration with the discharge.

Table 13. Long-term average CTF effluent and San Joaquin River/Delta fractions at specified DSM2 model nodes.

Node	Distance from Proposed Outfall Location	Description	Fraction at 2.5 mgd ADWF		Fraction at 6.0 mgd ADWF	
			Effluent	River/Delta	Effluent	River/Delta
7	0	San Joaquin River @ CTF Outfall	0.65	99.35	1.54	98.46
8	1.7	San Joaquin River @ Old River	0.51	99.49	1.21	98.79
9	3.9	San Joaquin River	0.50	99.50	1.21	98.79
10	5.9	San Joaquin River	0.47	99.53	1.14	98.86
11	7.6	San Joaquin River Near Brandt Bridge	0.45	99.55	1.09	98.91
12	10.1	San Joaquin River	0.42	99.58	1.02	98.98
13	11.6	San Joaquin River Near French Camp Slough	0.40	99.60	0.97	99.03
14	13.1	San Joaquin River	0.37	99.63	0.90	99.10
15	14.1	San Joaquin River	0.35	99.65	0.85	99.15
--	--	Jones Pumping Plant	0.09	99.91	0.21	99.79
--	--	Banks Pumping Plant	0.05	99.95	0.11	99.89
--	--	Contra Costa Pumping Plant #1	0.01	99.99	0.02	99.98
--	--	Old River @ Rock Slough	0.01	99.99	0.02	99.98

Because CDBM and DCBM are volatile compounds, these compounds are lost to the atmosphere as they are transported in ambient river environments. Thus, the CDBM and DCBM discharged by the CTF would be below applicable criteria much closer to the proposed outfall location than the distance based solely on mixing with river water.

The volatilization of CDBM and DCBM has been demonstrated by studies conducted by the cities of Stockton and Turlock, both of which have municipal wastewater treatment facilities that discharge to the San Joaquin River. The NPDES permits for their wastewater treatment facilities incorporate dilution credit for CDBM and DCBM that was derived considering both the dilution that occurs from mixing with river water and the volatilization losses of CDBM and DCBM to the atmosphere as the compounds are transported downstream. The study conducted by Turlock is most relevant for this analysis because the discharge rate of its Regional Water Quality Control Facility was approximately 10 mgd and the discharge to the San Joaquin River occurs upstream in a segment of the river that flows solely downstream. The volatilization of CDBM and DCBM that would be discharged by the CTF at 6.0 mgd ADWF required for river concentrations to be less than applicable water quality criteria is presented in **Table 14**, along with the distance downstream of the CTF outfall location at which this volatilization is expected to be achieved based on the Turlock study (RBI 2019). Based on anticipated volatilization rates, average CDBM concentrations would be less than criteria within 1 mile of the CTF outfall and DCBM concentrations would be less than criteria within 8.3 miles of the outfall.

Table 14. Amount of CDBM and DCBM volatilization required in addition to dilution with San Joaquin River for final river concentrations to be less than water quality criteria under the 6.0 mgd ADWF scenario.

Constituent	River Concentration (from Table 12)	Water Quality Criterion	Percent Reduction Required to Achieve Criteria	Distance Downstream Where Reduction Would Occur
CDBM	0.56	0.41 (CTR HH)	27%	1 mile
DCBM	0.93	0.56 (CTR HH)	40%	8.3 miles
CTR HH = California Toxics Rule criterion for the chronic protection of human health from consumption of water and organisms.				

4.3.3 Incremental Change in Water Quality for Constituents with No Numeric Water Quality Criteria

Constituents listed in **Table 15** have no applicable numeric federal water quality criteria or state water quality objectives. Thus, only the incremental change in San Joaquin River concentrations were calculated for these constituents. There would be a slight increase in chloroform concentrations in the river due to the proposed CTF discharge, and little to no change in other constituent concentrations.

Table 15. Incremental change in San Joaquin River water quality for constituents with no numeric water quality criteria.

Constituent	Units	River Background	Incremental Change at 2.5 mgd ADWF		Incremental Change at 6.0 mgd ADWF	
			River Conc.	Conc. Increase	River Conc.	Conc. Increase
BOD	mg/L	1.7	1.7	0.0	1.7	0.0
Chloroform	µg/L	0.10	0.49	0.39	1.1	1.0
Dissolved Organic Carbon	mg/L	3.4	3.4	0.0	3.4	0.0
Methyl mercury	ng/L	0.15	0.15	0.00	0.15	0.00
Molybdenum	µg/L	1.1	1.1	0.0	1.2	0.1
Phosphorus, Total (as P)	mg/L	0.14	0.15	0.01	0.16	0.02
Sulfite (as SO3)	mg/L	0.5	0.5	0.0	0.5	0.0
Total Organic Carbon	mg/L	3.6	3.6	0.0	3.6	0.0
Total Kjeldahl Nitrogen	mg/L	0.6	0.6	0.0	0.6	0.0

4.4 Dissolved Oxygen Assessment

The Basin Plan objective for dissolved oxygen is 5 mg/L for Delta waters, which includes the portion of the San Joaquin River where the CTF discharge would occur. Daily average dissolved oxygen concentrations in the San Joaquin River are regularly well above the Basin Plan objective, as shown in **Figure 9**, which presents data collected by DWR at its Mossdale Bridge monitoring station.

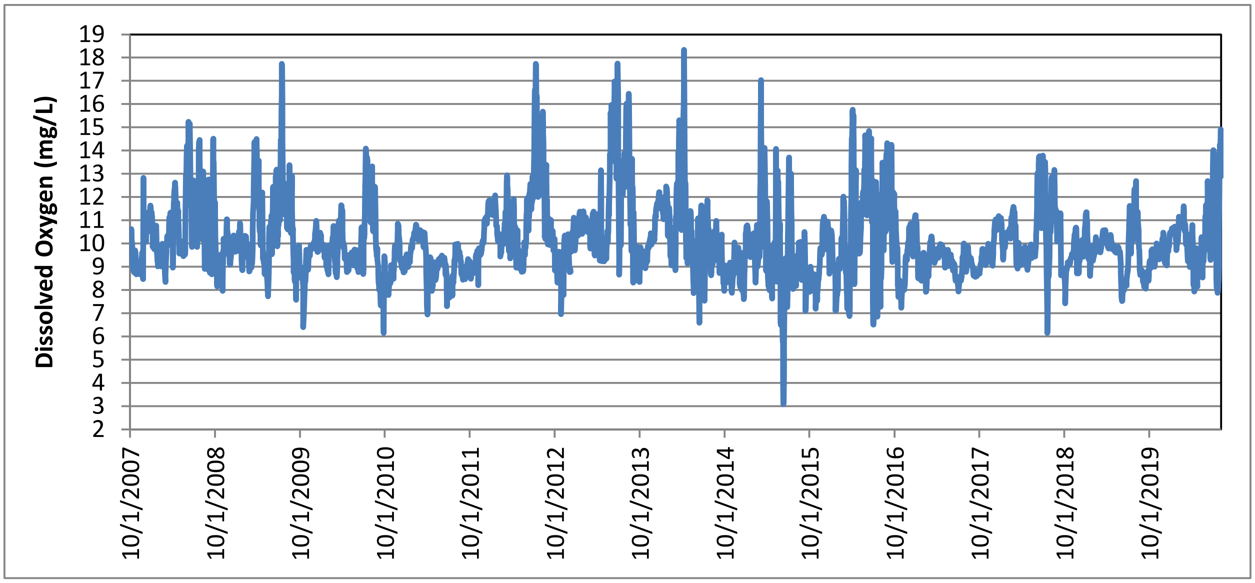

Figure 9. Daily average dissolved oxygen concentrations for San Joaquin River at Mossdale Bridge.

The CTF produces effluent characterized by BOD_5 concentrations typically less than 2 mg/L, with concentrations sometimes as high as 4.3 mg/L (Appendix B). The San Joaquin River BOD_5 also is typically less than 2 mg/L, but has been measured as high as 5.1 mg/L, from monitoring conducted at Airport Way near Vernalis (Appendix A). The CTF discharge would not result in measurable changes in San Joaquin River BOD_5 concentrations, because both the effluent and river have similar concentrations and the discharge would be such a small fraction of the river flow (Table 8, Table 15).

The CTF produces effluent characterized by ammonia concentrations less than 0.1 mg/L as nitrogen (Appendix B). San Joaquin River ammonia concentrations range from <0.01 to 0.5 mg/L as nitrogen. The CTF discharge would not result in measurable changes in San Joaquin River ammonia concentrations, because both the effluent and river have similar concentrations and the discharge would be such a small fraction of the river flow (Table 8, Table 11).

Because the CTF discharge would not result in measurable increases in San Joaquin River BOD_5 or ammonia concentrations, the discharge would not cause river dissolved oxygen concentrations be lower than currently occurs nor cause dissolved oxygen concentrations to fall below the Basin Plan objective of 5 mg/L.

4.5 pH Assessment

The Central Valley RWQCB Basin Plan pH objective requires that the San Joaquin River pH be no lower than 6.5 and no greater than 8.5. Because the pH objective is expressed as a range, calculation of available assimilative capacity for pH is not possible. Thus, this assessment of pH degradation is conducted based on expected pH changes due to the proposed discharge relative to the pH objective and how those changes would affect beneficial uses.

All NPDES permits for Delta dischargers issued by the Central Valley RWQCB include an effluent limitation that restricts the pH of the effluent to a minimum of 6.5 and maximum of 8.5. The CTF effluent pH is routinely within this range (Appendix B) and is expected to continue to be within this range when discharging to the San Joaquin River. Thus, the proposed CTF discharge rate would not cause the river pH to fall outside of 6.5 to 8.5, and would not adversely affect beneficial uses.

4.6 Turbidity Assessment

The Central Valley RWQCB Basin Plan turbidity objective requires that the San Joaquin River turbidity to not be affected by a discharge, as follows.

- Where natural turbidity is less than 1 Nephelometric Turbidity Unit (NTU), controllable factors shall not cause downstream turbidity to exceed 2 NTUs.
- Where natural turbidity is between 1 and 5 NTUs, increases shall not exceed 1 NTU.
- Where natural turbidity is between 5 and 50 NTUs, increases shall not exceed 20 percent.
- Where natural turbidity is between 50 and 100 NTUs, increases shall not exceed 10 NTUs.
- Where natural turbidity is greater than 100 NTUs, increases shall not exceed 10 percent.

Because the turbidity objective is expressed as a restriction on increases above background, rather than an absolute threshold, calculation of available assimilative capacity for turbidity is not possible. Thus, this assessment of turbidity degradation is conducted based on expected changes due to the proposed discharge and how those changes would affect beneficial uses.

The CTF produces tertiary-treated effluent characterized by low turbidity levels, typically less than 1 Nephelometric Turbidity Unit (NTU). In contrast, San Joaquin River turbidity levels in the vicinity of the proposed CTF discharge location range from 2 to 62 NTU (Appendix A). Because the CTF effluent turbidity is typically less than 1 NTU, the CTF discharge would not contribute to increases in river turbidity that would cause exceedance of objectives or adversely affect beneficial uses.

4.7 Temperature Assessment

The temperature objectives applicable to the San Joaquin River at the proposed CTF discharge location are contained in the Thermal Plan. The Thermal Plan contains temperature objectives for estuaries and specifically includes the Delta in the definition of an estuary. The Thermal Plan contains temperature objectives for different types of waste discharges and defines an "elevated temperature waste" as: "*…liquid, solid, or gaseous material including thermal waste discharged at a temperature higher than the natural temperature of receiving water*." A municipal wastewater discharge is considered an "elevated temperature waste" under the Thermal Plan. The Thermal Plan's objectives for "elevated waste discharges" to "estuaries," identified in section 5.A of the Thermal Plan, are as follows.

"(1) Elevated temperature waste discharges shall comply with the following:

a. *The maximum temperature shall not exceed the natural receiving water temperature by more than 20°F.*

b. *Elevated temperature waste discharges either individually or combined with other discharges shall not create a zone, defined by water temperatures of more than 1°F above natural receiving water temperature, which exceeds 25 percent of the cross-sectional area of a main river channel at any point.*

c. *No discharge shall cause a surface water temperature rise greater than 4°F above the natural temperature of the receiving waters at any time or place.*

d. *Additional limitations shall be imposed when necessary to assure protection of beneficial uses."*

Because the Thermal Plan objectives are expressed as a restriction on increases above background, rather than an absolute threshold, calculation of available assimilative capacity for temperature is not possible. Thus, this assessment of temperature degradation is conducted based on expected changes in temperature due to the proposed discharge and how those changes would affect beneficial uses.

San Joaquin River temperature was modeled for the baseline (no discharge) condition and for the 2.5 and 6.0 mgd ADWF discharge scenarios using DSM2. Modeled river temperatures at the proposed CTF discharge location, and differences between the river temperature with the CTF discharge and baseline river temperature, are provided in **Table 16** for the 2.5 mgd ADWF discharge scenario and the **Table 17** for the 6.0 mgd ADWF discharge scenario. The CTF discharge would have little effect on San Joaquin River temperature at the 2.5 mgd ADWF discharge rate. River temperature would increase by a maximum of 0.2°F. For the 6.0 mgd ADWF discharge scenario, river temperatures would increase from 0.1 to 0.3°F under most conditions, and by 0.5°F in winter months when river temperatures are the lowest. Based on the relatively small temperature changes that are expected to occur in the San Joaquin River near the CTF outfall, no significant degradation of temperature would occur, and beneficial uses would not be adversely affected. A complete assessment of temperature effects of the proposed CTF discharge on aquatic life beneficial uses is provided in the *Phase 2 Surface Water Discharge Project Draft EIR* (City of Lathrop 2020).

Table 16. DSM2-modeled San Joaquin River temperatures under baseline (no discharge) and 2.5 mgd ADWF discharge conditions.

Outfall Location												
No Discharge												
	Daily Average Temperature (Degrees F)											
Statistic	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Probability of Exceedance												
0.1%	74.4	63.9	58.9	55.1	61.5	68.3	72.9	75.3	81.6	85.0	81.7	78.4
1%	73.4	63.6	57.9	54.4	61.1	67.6	72.1	74.5	80.9	83.7	81.2	78.0
5%	72.5	62.9	56.6	53.4	60.1	65.5	69.3	72.8	79.8	81.8	80.4	77.7
10%	71.3	62.1	55.7	52.6	59.0	64.3	67.8	70.7	78.6	80.8	79.7	76.8
25%	67.9	60.0	53.3	51.2	56.1	62.4	65.1	67.4	75.9	79.2	78.6	74.8
50%	64.0	56.8	49.1	49.7	53.8	59.1	62.0	65.2	73.0	77.6	77.2	73.0
75%	62.4	54.7	46.9	48.1	52.1	56.9	60.0	62.5	69.0	75.3	75.7	71.2
99.9%	54.5	46.7	42.3	43.2	49.0	50.5	57.0	57.6	58.8	65.9	65.4	64.0
Full Simulation Period[a]	65.0	57.1	50.0	49.6	54.3	59.5	62.8	65.4	72.4	76.8	76.3	72.8
Water Year Types[b]												
Above Normal and Wet (25%)	64.5	58.0	50.9	50.5	52.9	56.3	60.4	61.2	66.1	71.8	71.2	69.9
Below Normal (11%)	64.5	57.9	48.5	49.2	53.4	59.4	62.6	67.5	72.2	76.3	76.9	73.6
Dry and Critical (64%)	65.4	56.4	56.4	49.3	55.0	60.6	63.6	66.4	74.5	78.5	77.8	73.6
2.5 mgd (ADWF)												
	Daily Average Temperature (Degrees F)											
Statistic	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Probability of Exceedance												
0.1%	74.4	64.0	59.0	55.2	61.6	68.3	72.9	75.3	81.6	84.9	81.7	78.5
1%	73.4	63.7	58.0	54.5	61.2	67.6	72.1	74.6	80.9	83.7	81.2	78.0
5%	72.5	63.0	56.6	53.5	60.2	65.5	69.3	72.8	79.8	81.8	80.4	77.8
10%	71.3	62.1	55.8	52.8	59.1	64.3	67.8	70.7	78.6	80.8	79.7	76.8
25%	67.9	60.1	53.4	51.2	56.2	62.5	65.2	67.4	76.0	79.3	78.6	74.9
50%	64.1	56.9	49.3	49.8	53.9	59.1	62.0	65.3	73.0	77.6	77.2	73.1
75%	62.5	54.8	47.0	48.2	52.2	57.0	60.1	62.5	69.1	75.3	75.7	71.3
99.9%	54.5	46.9	42.5	43.4	49.1	50.5	57.1	57.7	58.8	65.9	65.4	64.0
Full Simulation Period[a]	65.1	57.2	50.1	49.7	54.4	59.6	62.8	65.4	72.4	76.8	76.3	72.8
Water Year Types[b]												
Above Normal and Wet (25%)	64.5	58.1	51.0	50.5	52.9	56.3	60.5	61.2	66.1	71.8	71.3	70.0
Below Normal (11%)	64.6	58.0	48.7	49.3	53.5	59.4	62.7	67.5	72.2	76.3	77.0	73.6
Dry and Critical (64%)	65.5	56.5	56.5	49.4	55.0	60.7	63.6	66.5	74.5	78.5	77.9	73.6
2.5 mgd (ADWF) minus No Discharge												
	Daily Average Temperature (Degrees F)											
Statistic	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Probability of Exceedance												
0.1%	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1
1%	0.0	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5%	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1
10%	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
25%	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1
50%	0.1	0.1	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
75%	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.1
99.9%	0.0	0.2	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Full Simulation Period[a]	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Water Year Types[b]												
Above Normal and Wet (25%)	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Below Normal (11%)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1
Dry and Critical (64%)	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1

a Based on the 2008-2016 simulation period.
b As defined by the San Joaquin Valley 60-20-20 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999).
c Positive differences are highted in red color which indicate increase in Temperature.

Table 17. DSM2-modeled San Joaquin River temperatures under baseline (no discharge) and 6.0 mgd ADWF discharge conditions.

Outfall Location												
No Discharge												
	Daily Average Temperature (Degrees F)											
Statistic	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
Probability of Exceedance												
0.1%	74.4	63.9	58.9	55.1	61.5	68.3	72.9	75.3	81.6	85.0	81.7	78.4
1%	73.4	63.6	57.9	54.4	61.1	67.6	72.1	74.5	80.9	83.7	81.2	78.0
5%	72.5	62.9	56.6	53.4	60.1	65.5	69.3	72.8	79.8	81.8	80.4	77.7
10%	71.3	62.1	55.7	52.6	59.0	64.3	67.8	70.7	78.6	80.8	79.7	76.8
25%	67.9	60.0	53.3	51.2	56.1	62.4	65.1	67.4	75.9	79.2	78.6	74.8
50%	64.0	56.8	49.1	49.7	53.8	59.1	62.0	65.2	73.0	77.6	77.2	73.0
75%	62.4	54.7	46.9	48.1	52.1	56.9	60.0	62.5	69.0	75.3	75.7	71.2
99.9%	54.5	46.7	42.3	43.2	49.0	50.5	57.0	57.6	58.8	65.9	65.4	64.0
Full Simulation Period[a]	65.0	57.1	50.0	49.6	54.3	59.5	62.8	65.4	72.4	76.8	76.3	72.8
Water Year Types[b]												
Above Normal and Wet (25%)	64.5	58.0	50.9	50.5	52.9	56.3	60.4	61.2	66.1	71.8	71.2	69.9
Below Normal (11%)	64.5	57.9	48.5	49.2	53.4	59.4	62.6	67.5	72.2	76.3	76.9	73.6
Dry and Critical (64%)	65.4	56.4	56.4	49.3	55.0	60.6	63.6	66.4	74.5	78.5	77.8	73.6
6.0 mgd (ADWF)												
	Daily Average Temperature (Degrees F)											
Statistic	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
Probability of Exceedance												
0.1%	74.4	64.1	59.1	55.4	61.7	68.3	72.9	75.4	81.6	84.9	81.7	78.6
1%	73.5	63.7	58.1	54.5	61.3	67.7	72.2	74.6	80.9	83.7	81.2	78.1
5%	72.6	63.1	56.7	53.6	60.3	65.6	69.4	72.8	79.7	81.8	80.4	77.8
10%	71.4	62.2	55.8	52.9	59.2	64.4	67.9	70.8	78.7	80.8	79.8	76.9
25%	67.9	60.2	53.5	51.3	56.3	62.6	65.2	67.5	76.0	79.3	78.7	75.0
50%	64.2	57.0	49.4	49.9	54.0	59.2	62.1	65.3	73.1	77.6	77.2	73.1
75%	62.5	54.9	47.2	48.3	52.2	57.0	60.2	62.6	69.1	75.4	75.8	71.4
99.9%	54.6	47.2	42.8	43.7	49.3	50.5	57.1	57.7	58.8	65.9	65.4	64.1
Full Simulation Period[a]	65.1	57.3	50.2	49.8	54.5	59.7	62.9	65.5	72.4	76.8	76.3	72.9
Water Year Types[b]												
Above Normal and Wet (25%)	64.6	58.2	51.2	50.6	53.0	56.4	60.5	61.2	66.1	71.9	71.3	70.0
Below Normal (11%)	64.7	58.2	48.9	49.5	53.7	59.5	62.8	67.6	72.2	76.3	77.0	73.7
Dry and Critical (64%)	65.5	56.6	56.6	49.6	55.2	60.8	63.7	66.5	74.6	78.5	77.9	73.7
6.0 mgd (ADWF) minus No Discharge												
	Daily Average Temperature (Degrees F)											
Statistic	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
Probability of Exceedance												
0.1%	0.1	0.2	0.2	0.3	0.2	0.1	0.0	0.0	-0.1	-0.1	0.0	0.2
1%	0.1	0.1	0.2	0.1	0.2	0.1	0.0	0.0	0.0	-0.1	0.0	0.1
5%	0.1	0.2	0.2	0.3	0.3	0.1	0.1	0.1	0.0	0.0	0.0	0.1
10%	0.1	0.1	0.1	0.3	0.2	0.1	0.1	0.0	0.1	0.0	0.1	0.1
25%	0.1	0.2	0.2	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.2
50%	0.2	0.3	0.3	0.3	0.2	0.1	0.0	0.1	0.1	0.1	0.1	0.1
75%	0.1	0.2	0.3	0.3	0.2	0.1	0.1	0.0	0.1	0.1	0.1	0.2
99.9%	0.1	0.5	0.5	0.5	0.3	0.0	0.1	0.0	0.0	0.0	0.0	0.1
Full Simulation Period[a]	0.1	0.2	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Water Year Types[b]												
Above Normal and Wet (25%)	0.1	0.2	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Below Normal (11%)	0.2	0.3	0.3	0.3	0.2	0.1	0.1	0.0	0.1	0.1	0.1	0.1
Dry and Critical (64%)	0.1	0.2	0.2	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.2

a Based on the 2008-2016 simulation period.
b As defined by the San Joaquin Valley 60-20-20 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999).
c Positive differences are highted in red color which indicate increase in Temperature.

5 EVALUATION OF BEST PRACTICAL TREATMENT OR CONTROL

5.1 Applicable Regulations

The term "best practical treatment or control" (BPTC) appears in the state's antidegradation policy (State Water Board Resolution No. 68-16):

> *"Any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in* <u>*best practicable treatment or control*</u> *of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the state will be maintained."* [emphasis added]

However, nowhere in state regulations or policies has BPTC been defined in terms of specific treatment processes for specific constituents, or in terms of effluent quality, other than in the language cited above which states, "…to meet waste discharge requirements which will result in best practicable treatment or control…".

Sections 301, 302, 306, and 307 of the Clean Water Act incorporate technology-based effluent limits according to "best practical control technology," "best available technology economically achievable," and "best conventional pollutant control technology economically achievable." However, these terms are used in the context of regulating discharges from point sources other than publicly owned treatment works.

For publically owned treatment works, Section 301(b)(1)(B) of the Clean Water Act requires that secondary treatment standards be met. Secondary treatment standards are defined by numeric effluent limitations for the pollutant parameters 5-day BOD, suspended solids, and pH (40 CFR 133.102). More stringent limitations beyond those required to meet the definition of secondary treatment may be incorporated, if necessary, to achieve certain water quality standards [Section 301(b)(1)(C) of the Clean Water Act].

Permits shall contain the following technology-based treatment requirements in accordance with the following statutory deadlines (40 CFR 125.3(a)(1)):

(i) Secondary treatment--from date of permit issuance; and

(ii) The best practicable waste treatment technology--not later than July 1, 1983.

Best practicable waste treatment technology is defined as (40 CFR 35.2005):

> The cost-effective technology that can treat wastewater, combined sewer overflows and non-excessive infiltration and inflow in publicly owned or individual wastewater treatment works, to meet the applicable provisions of:
>
> (i) 40 CFR part 133--secondary treatment of wastewater;
>
> (ii) 40 CFR part 125, subpart G--marine discharge waivers;

(iii) 40 CFR 122.44(d)--more stringent water quality standards and State standards; or

(iv) 41 FR 6190 (February 11, 1976)--Alternative Waste Management Techniques for Best Practicable Waste Treatment (treatment and discharge, land application techniques and utilization practices, and reuse).

Thus, in the state and federal regulations, achievement of "best practical treatment or control" and "best practicable waste treatment technology" are defined in terms of performance and maintenance of water quality standards via achieving appropriate NPDES permit limitations, rather than specific treatment technologies.

5.2 Evaluations and Findings

The City of Lathrop CTF produces tertiary-treated, Title 22 quality effluent suitable for unrestricted reuse. The City plans to maximize reuse of recycled wastewater for irrigation within the City as it continues to develop, and has adopted a Recycled Water Master Plan as part of its Integrated Water Resources Master Plan.

Key technical findings from this analysis demonstrate the following.

(a) The City of Lathrop CTF provides state-of-the-art advanced treatment to produce Title 22 quality, tertiary-treated effluent suitable for unrestricted reuse.

(b) The CTF currently is operated to maximize the use of recycled water and minimize discharges to surface waters and will continue to be in the future.

(d) The CTF and effluent quality meets or exceeds the regulations discussed in Section 5.1 of this report.

(e) Current and future expected operations of the CTF will achieve compliance with NPDES permit requirements and will meet receiving water quality criteria/objectives, thereby assuring that a pollution or nuisance will not occur and the highest water quality consistent with maximum benefit to the people of the state of California will be maintained.

Based on the above findings determined from this analysis, CTF discharge rates of 2.5 and 6.0 mgd ADWF are consistent with BPTC as it is defined and intended in State Water Board Resolution No. 68-16.

6 SOCIOECONOMIC CONSIDERATIONS

The water quality assessment in Section 4 identified changes in San Joaquin River water quality that would occur with the CTF discharge at 2.5 and 6.0 mgd ADWF. Some constituents would utilize more than 10 percent of the available assimilative capacity. State and federal antidegradation policies require the evaluation of alternatives to the proposed project that would reduce or eliminate any potential substantial lowering of water quality. However, project alternatives have the potential to result in economic and social costs, whereas the project has economic and social benefits.

6.1 Socioeconomic Costs of Alternatives

Several alternatives are considered below that conceptually would reduce or eliminate the lowering of water quality for certain constituents in San Joaquin River.

- Zero discharge
- Regionalization of wastewater treatment and disposal
- Higher level of treatment

Each alternative is assessed for feasibility of implementation and effectiveness in reducing the lowering of water quality. Where necessary, initial cost estimates for construction of additional plant facilities are provided.

6.1.1 Zero Discharge

The CTF currently operates with zero discharge to surface water and has developed a Recycled Water Master Plan as part of its Integrated Water Resources Management Plan adopted in December 2019. Demand for recycled water for landscape irrigation will increase as the City continues to build out. However, at buildout, effluent production at the CTF, during the low-irrigation/non-irrigation months of October through April in particular, is projected to exceed the City's available land-based effluent storage, reuse, and disposal capacity based on the analysis in the *Evaluation of Wastewater Treatment Regionalization, Reclamation, Recycling, and Conservation for the City of Lathrop* (Robertson-Bryan, Inc. 2019). Thus, zero discharge is not feasible without restricting the City's future development.

6.1.2 Regionalization

City's *Evaluation of Wastewater Treatment Regionalization, Reclamation, Recycling, and Conservation for the City of Lathrop* (Robertson-Bryan, Inc. 2019) explored the feasibility of regionalization of the treatment and disposal of wastewater that is to be treated by the CTF with the City of Manteca WQCF. This facility provides a similar level of tertiary treatment of wastewater as the CTF, and discharges treated effluent to the San Joaquin River approximately one mile upstream of the proposed CTF outfall. One main difference between the CTF and WQCF is that the WQCF uses ultraviolet (UV) light for disinfection instead of chlorine.

Regionalization with Manteca does not avoid discharge of wastewater effluent from the CTF service area to the San Joaquin River that would not otherwise occur with a permitted CTF surface water discharge. In other words, whether wastewater from Lathrop ultimately is treated and discharged via the Manteca WQCF and outfall, or via a future CTF surface water discharge, the wastewater would be discharged to the San Joaquin River in both scenarios. As such, water quality within the San Joaquin River would be the same upon effluent discharges fully mixing with receiving water flows given that both provide tertiary treatment. The main difference is that the discharge of CDBM and DCBM would be greatly reduced because the WQCF uses UV disinfection.

In addition, because of uncertainties regarding securing recycled water from the WQCF for reuse within Lathrop, regionalization with Manteca could potentially result in greater discharge of wastewater effluent on an annual basis to the San Joaquin River than if Lathrop continued to operate the CTF and was permitted to discharge effluent to the river only in excess of what could be reused for landscape irrigation. Thus, this regionalization opportunity would result in the same, or potentially greater, degradation of San Joaquin River water quality than if Lathrop continued to operate and discharge from the CTF and maximized its recycled water use for most constituents in the discharge.

Finally, the City of Manteca has been approached by both the City of Lathrop and the Central Valley RWQCB NPDES permitting staff about regionalization, and Manteca staff have not been supportive of moving forward with this approach.

6.1.3 Higher Level of Treatment

The CTF currently produces a high quality tertiary-treatment level effluent suitable for unrestricted reuse as recycled water. The sections below describe the current treatment processes, additional processes that would be required to reduce the constituent levels described in the water quality analysis, and the environmental considerations of each.

Current Treatment Processes

The RWQCF currently provides tertiary-level treatment using a membrane bioreactor treatment process. The City completed an upgrade and expansion project at the CTF in October 2018. The project resulted in increasing the ADWF treatment capacity from 1.0 mgd to 2.5 mgd, as well as facility improvements. The upgraded facilities include the following:

- Headworks
  - New packaged fine and ultra-fine screening and grit removal headworks system
  - New odor control system
- Secondary Process
  - New influent, basin drain, mixed liquor suspended solids process and membrane filtration process structure
  - New activated sludge treatment process, including valves, gates, mixers, pumps, and process air diffusers
  - Four new aeration blowers
- Membrane Filtration System
  - New membrane filtration trains
  - Four new membrane scouring blowers
- Sludge Handling
  - Two new waste activated sludge pumps
  - Two new scum pumps
  - New sludge drying pad area
- Power and Control
  - New standby generator equipment
  - New motor control center equipment

    - New programmable logic controller and Supervisory Control and Data Acquisition (SCADA) system
    - New field instrumentation for new treatment processes

- Buildings
    - New Administration, Lab, and Maintenance Building
    - New Mechanical Treatment Building

- Safety and Employee Relations
    - New heating, ventilation, and air conditioning equipment
    - Safety ladders and grating for access to equipment and subgrade structures
    - New site lighting at critical process areas
    - New warning signs
- Miscellaneous
    - New general site grading and stormwater retention basin
    - New building utilities, including water gas, and telecom/fiber optic/ethernet

The above described improvements to the CTF cost $25 million.

Additional Treatment Processes

Microfiltration and Reverse Osmosis

A treatment process that can be used to treat dissolved solids and ions (e.g., water containing high chlorides, sulfate) is reverse osmosis (RO). In RO systems, pressure is applied to water containing a high concentration of a constituent (e.g., chloride) that is in contact with an RO membrane, while the other side of the RO membrane contains water with low concentration of the same constituent. The applied pressure forces water to diffuse through the membrane, flowing from the region of high concentration to low concentration, but excluding the chemical solids and ions from diffusing across the membrane. The water that passes through the membrane is the RO permeate, which has very low chemical concentration, while the water that remains on the feed side of the membrane is rejected as the RO brine. RO processes require high energy input to apply pressure to the high concentration water in contact with the membrane, and also generate large quantities of brine. Brine usually contains dissolved solids in excess of 36,000 mg/L, and is difficult to dispose of for both technological and environmental reasons.

RO processes also require either microfiltration or ultrafiltration as a pretreatment step to prevent frequent fouling of RO membranes. Microfiltration works by straining out suspended particles in the range of 0.08–2.0 µm. The combination of microfiltration and RO (MFRO) has the potential to remove compounds contributing to salinity (e.g., chloride, sulfate) and compounds such as metals (aluminum, copper, and zinc) to very low levels. Given the infrastructure and energy requirements, treating a side-stream of tertiary effluent with MFRO to achieve partial pollutant removals is much more achievable than treating the entire discharge.

To provide an order of magnitude estimate for advanced treatment costs, cost estimates developed for another discharger in 2013 are provided here. An MFRO treatment unit constructed to treat 22 percent of a 5 mgd ADWF tertiary-treated municipal wastewater treatment plant (i.e., a 1.1 mgd ADWF MFRO plant) would have a capital cost of $11 million and an operations and maintenance present value cost of $27 million (assuming 20 year expected life), for a total present value cost of $38 million. Accounting for inflation (3 percent per year compounded), the present net value cost of the same system would be approximately $47 million. Thus, the total present net value cost of an MFRO unit to treat 6.0 mgd ADWF is $250 million. Treating recycled water with MFRO in the matter described herein would eliminate the water quality degradation from the proposed CTF discharge for most, but not all constituents.

UV Disinfection

This higher level of treatment would not eliminate the discharge of CDBM and DCBM, because these are formed during disinfection. To provide an order of magnitude estimate for UV disinfection, cost estimates developed for another discharger in 2008 are provided here. In 2008, the capital cost to construct a UV disinfection system for a 12 mgd municipal wastewater treatment plant was $20 million; accounting for inflation (3 percent annualized increase), the cost in 2020 would be $29 million. A UV disinfection system for the CTF to disinfect 6.0 mgd ADWF would cost approximately $18 million, which also accounts for a 20 percent increase in cost for the loss of economy of scale relative to a larger UV system. Cost estimates for operations and maintenance of the UV system were not available.

The environmental impact of MFRO and UV is from substantially higher energy requirements, which would contribute to greenhouse gas emission concerns. There would also be greater air emissions concerns associated with the trucking of brine waste. Disposal of the brine waste poses significant management and disposal challenges, and costs.

6.2 Socioeconomic Benefits of Proposed Project

As has been explained in other project planning documents, including the *Phase 2 Surface Water Discharge Project Draft EIR* (City of Lathrop 2020) and the *Evaluation of Wastewater Treatment Regionalization, Reclamation, Recycling, and Conservation for the City of Lathrop* (Robertson-Bryan, Inc. 2019), the City will eventually not be able to accommodate future development because of constraints associated with continuing to discharge to land. The primary benefits of this project will be realized through achieving the following objectives (City of Lathrop 2020):

- Provide for planned City buildout and development based on the City's General Plan by providing effluent discharge to the San Joaquin River.
- Provide efficient and cost-effective wastewater services through buildout of the City.
- Maximize use of recycled water in the City presently and in the future.

Placing connection bans on the CTF to prevent future generation of wastewater, or requiring that the City maintain a network of effluent storage ponds and irrigation fields would have negative socioeconomic effects on the area and would not be in the best interest of the people of the region or the state, in light of the magnitude and effects of incremental changes to water quality in San Joaquin River that are expected as a result of the proposed discharge.

Should the incremental changes in San Joaquin River water quality characterized herein (which would occur as a result of accommodating planned and approved growth within the CTF service area) be disallowed, such action would force development within the City to cease or require adding a MFRO treatment processes to a significant portion of flow at the CTF, and possibly other plant expansions/upgrades (e.g., UV disinfection), to eliminate the increment for all constituents from the discharge at significant costs to the City (thus rate payers). Costs for expansion of the CTF to 6 mgd ADWF are estimated to be $50 million (based on costs presented in the City's Wastewater System Master Plan (EKI Water & Environment 2019a). The addition of MFRO at approximately $250 million would result is a total cost of approximately $300 million, or six times the cost just to expand the CTF using the same treatment technologies, which would contribute to substantial increases to rate payers.

The City currently maximizes use of recycled water, and will continue to do so in the future, thereby minimizing discharges to surface waters. The City will continue to operate a treatment train that meets BPTC. Any potential for discharges to cause exceedances of adopted water quality criteria/objectives would be effectively addressed through the NPDES permit renewal process, thereby being addressed in a timely manner. Thus, resulting downstream water quality within San Joaquin River with the CTF discharge at 2.5 and 6.0 mgd ADWF would not cause a nuisance and would continue to be protective of all beneficial uses.

7 ANTIDEGRADATION ANALYSIS FINDINGS

The water quality assessment determined that the proposed CTF discharge at both 2.5 and 6.0 mgd ADWF would use less than 10 percent of assimilative capacity on a concentration basis for all constituents detected in the effluent except for barium, CDBM, and DCBM. The water quality of San Joaquin River, with respect to chemical constituents, pH, and turbidity would remain better than necessary to fully protect beneficial uses. Resulting temperature and dissolved oxygen conditions in San Joaquin River are expected to remain at levels throughout the year that would be protective of beneficial uses.

Based on the assessment contained herein, it is determined that the City of Lathrop CTF can meet waste discharge requirements that will result in best practicable treatment or control of the discharge necessary to assure that a pollution or nuisance will not occur. As a result, receiving water quality criteria/objectives will be met and beneficial uses will be fully protected. The proposed CTF discharge will accommodate planned and approved growth and socioeconomic development in accordance with the City's General Plan. As such, the potential incremental degradation to San Joaquin River water quality discussed herein is necessary to accommodate this important economic and social development in the region. Based on these findings, the anticipated water quality changes in San Joaquin River are consistent with the maximum benefit to the people of the state of California and are consistent with the state and federal antidegradation policies.

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Appendix A

San Joaquin River Water Quality Summary Statistics

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San Joaquin River Water Quality Summary Statistics

Parameter	Units	Begin Date	End Date	Number of Samples	Number Detected	Percent Detected	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Concentration	Average Concentration (see Note a)	Maximum Detected Concentration
1,1,1-Trichloroethane	ug/L	1/11/2017	12/13/2017	12		0%	0.09	0.09		0.05	
1,1,2,2-Tetrachloroethane	ug/L	1/11/2017	12/13/2017	12		0%	0.07	0.11		0.05	
1,1,2-Trichloro-1,2,2-Trifluoroethane	ug/L	1/11/2017	12/13/2017	12		0%	0.07	0.12		0.05	
1,1-Dichloroethane	ug/L	1/11/2017	12/13/2017	12		0%	0.08	0.11		0.05	
1,1-Dichloroethylene	ug/L	1/11/2017	12/13/2017	12		0%	0.06	0.11		0.05	
1,1-Dichloropropene	ug/L	1/11/2017	12/13/2017	12		0%	0.06	0.11		0.05	
1,2,4-Trichlorobenzene	ug/L	1/11/2017	12/13/2017	12		0%	0.07	0.16		0.07	
1,2-Dibromo-3-Chloropropane	ug/L	1/11/2017	12/13/2017	12		0%	0.14	0.14		0.07	
1,2-Dibromoethane	ug/L	1/11/2017	12/13/2017	12		0%	0.07	0.13		0.06	
1,2-Dichlorobenzene	ug/L	1/11/2017	12/13/2017	12		0%	0.09	0.15		0.07	
1,2-Dichloroethane	ug/L	1/11/2017	12/13/2017	12		0%	0.07	0.11		0.05	
1,2-Dichloropropane	ug/L	1/11/2017	12/13/2017	12		0%	0.06	0.11		0.05	
1,2-Diphenylhydrazine	ug/L	1/11/2017	12/13/2017	12		0%	0.5	0.5		0.25	
1,3-Dichlorobenzene	ug/L	1/11/2017	12/13/2017	12		0%	0.07	0.15		0.06	
1,3-Dichloropropylenes, Sum	ug/L	1/11/2017	12/13/2017	12		0%	0.08	0.15		0.06	
1,4-Dichlorobenzene	ug/L	1/11/2017	12/13/2017	12		0%	0.05	0.16		0.06	
2,3,7,8-TCDD (Dioxin)	pg/L	1/11/2017	12/13/2017	12	1	8%	1.35	1.49	1.47	0.75	1.47
2,4,5-TP (Silvex)	ug/L	1/11/2017	12/13/2017	12		0%	0.09	0.09		0.05	
2,4,5-Trichlorophenol	ug/L	1/11/2017	12/13/2017	12		0%	0.3	0.3		0.15	
2,4-D	ug/L	1/11/2017	12/13/2017	12		0%	0.07	0.07		0.04	
2,4-Dichlorophenol	ug/L	1/11/2017	12/13/2017	12		0%	0.3	0.7		0.22	
2,4-Dimethylphenol	ug/L	1/11/2017	12/13/2017	12		0%	0.2	0.2		0.10	
2,4-Dinitrophenol	ug/L	1/11/2017	12/13/2017	12		0%	0.4	0.7		0.30	
2,4-Dinitrotoluene	ug/L	1/11/2017	12/13/2017	12		0%	0.4	0.4		0.20	
2,6-Dinitrotoluene	ug/L	1/11/2017	12/13/2017	12		0%	0.5	0.5		0.25	
2-Chloroethylvinyl Ether	ug/L	1/11/2017	12/13/2017	12		0%	0.11	0.17		0.08	
2-Chloronaphthalene	ug/L	1/11/2017	12/13/2017	12		0%	0.3	0.3		0.15	

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2-Chlorophenol	ug/L	1/11/2017	12/13/2017	12		0%	0.5	0.5		0.25	
2-Nitrophenol	ug/L	1/11/2017	12/13/2017	12		0%	0.4	0.4		0.20	
3,3-Dichlorobenzidine	ug/L	1/11/2017	12/13/2017	12		0%	0.4	0.4		0.20	
4,4-DDD	ng/L	1/11/2017	12/27/2017	12		0%	2	2		1.00	
4,4-DDE	ug/L	1/11/2017	12/27/2017	12		0%	0.002	0.002		0.00	
4,4-DDT	ug/L	1/11/2017	12/27/2017	12		0%	0.002	0.002		0.00	
4,6-Dinitro-2-methylphenol	ug/L	1/11/2017	12/13/2017	12		0%	0.4	0.4		0.20	
4-Bromophenyl Phenyl Ether	ug/L	1/11/2017	12/13/2017	12		0%	0.5	0.5		0.25	
4-Chloro-3-methylphenol	ug/L	1/11/2017	12/13/2017	12		0%	0.3	0.3		0.15	
4-Chlorophenyl Phenyl Ether	ug/L	1/11/2017	12/13/2017	12		0%	0.4	0.4		0.20	
4-Nitrophenol	ug/L	1/11/2017	12/13/2017	12		0%	0.6	0.6		0.30	
Acenaphthene	ug/L	1/11/2017	12/13/2017	12		0%	0.4	0.4		0.20	
Acenaphthylene	ug/L	1/11/2017	12/13/2017	12		0%	0.4	0.4		0.20	
Acrolein	ug/L	1/11/2017	12/13/2017	12		0%	1	2		0.67	
Acrylonitrile	ug/L	1/11/2017	12/13/2017	12		0%	0.12	0.15		0.07	
Alachlor	ug/L	1/11/2017	12/13/2017	12		0%	0.022	0.022		0.01	
Aldrin	ug/L	1/11/2017	12/27/2017	12		0%	0.002	0.002		0.00	
alpha-BHC	ug/L	1/11/2017	12/27/2017	12		0%	0.002	0.002		0.00	
Aluminum	ug/L	1/11/2017	12/27/2017	12	12	100%	1.5	7.5	277	1232.50	4200
Ammonia (as N)	mg/L	7/7/2014	12/27/2017	64	56	88%	0.01	0.01	0.02	0.15	0.5
Anthracene	ug/L	1/11/2017	12/13/2017	12		0%	0.4	0.4		0.20	
Antimony, Total	ug/L	1/11/2017	12/27/2017	12		0%	0.2	1		0.20	
Arsenic, Total	ug/L	1/11/2017	12/27/2017	12	12	100%	0.2	1	1.3	1.58	1.9
Asbestos	million fibers/L	1/11/2017	12/13/2017	12		0%	0.02	0.02		0.01	
Atrazine	ug/L	1/11/2017	12/13/2017	12		0%	0.034	0.034		0.02	
Barium	ug/L	1/11/2017	12/27/2017	12	12	100%	0.1	0.5	20.5	39.23	76.5
Bentazon	ug/L	1/11/2017	12/13/2017	12		0%	0.11	0.11		0.06	

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Benzene	ug/L	1/11/2017	12/13/2017	12		0%	0.07	0.12		0.05	
Benzidine	ug/L	1/11/2017	12/13/2017	12		0%	1.1	1.1		0.55	
Benzo(a)anthracene	ug/L	1/11/2017	12/13/2017	12		0%	0.4	0.4		0.20	
Benzo(a)pyrene	ug/L	1/11/2017	12/13/2017	12		0%	0.4	0.4		0.20	
Benzo(b)fluoranthene	ug/L	1/11/2017	12/13/2017	12		0%	0.2	0.2		0.10	
Benzo(ghi)perylene	ug/L	1/11/2017	12/13/2017	12		0%	0.3	0.3		0.15	
Benzo(k)fluoranthene	ug/L	1/11/2017	12/13/2017	12		0%	0.2	0.2		0.10	
Beryllium, Total	ug/L	1/11/2017	12/27/2017	12		0%	0.1	0.5		0.10	
beta-BHC	ug/L	1/11/2017	12/27/2017	12		0%	0.002	0.002		0.00	
Bis (2-Chloroethoxy) Methane	ug/L	1/11/2017	12/13/2017	12		0%	0.4	0.4		0.20	
Bis (2-Chloroethyl) Ether	ug/L	1/11/2017	12/13/2017	12		0%	0.4	0.4		0.20	
Bis (2-Chloroisopropyl) Ether	ug/L	1/11/2017	12/13/2017	12		0%	0.4	0.4		0.20	
Bis (2-Ethylhexyl) Phthalate	ug/L	1/11/2017	12/13/2017	12		0%	1.1	1.1		0.55	
BOD (5-Day)	mg/L	2/25/1999	1/30/2003	42	41	98%	0.1	3	0.7	1.72	5.1
Boron	ug/L	1/11/2017	12/27/2017	12	12	100%	2	10	23.7	81.20	257
Bromochloromethane	ug/L	1/11/2017	5/3/2017	5		0%	0.08	0.1		0.04	
Bromoform	ug/L	1/11/2017	12/13/2017	12		0%	0.05	0.1		0.04	
Bromomethane	ug/L	1/11/2017	12/13/2017	12		0%	0.1	0.1		0.05	
Butylbenzyl Phthalate	ug/L	1/11/2017	12/13/2017	12	3	25%	0.5	1.5	0.5	0.67	2.6
Cadmium, Total	ug/L	1/11/2017	12/27/2017	12	2	17%	0.05	0.25	0.06	0.06	0.07
Carbofuran	ug/L	1/11/2017	12/13/2017	12		0%	0.59	0.59		0.30	
Carbon Tetrachloride	ug/L	1/11/2017	12/13/2017	12		0%	0.05	0.1		0.04	
Chlordane	ug/L	1/11/2017	12/27/2017	12		0%	0.1	0.1		0.05	
Chloride	mg/L	1/11/2017	12/27/2017	12	12	100%	0.1	0.2	5.5	23	77.7
Chlorobenzene	ug/L	1/11/2017	12/13/2017	12		0%	0.06	0.13		0.05	
Chlorodibromomethane	ug/L	1/11/2017	12/13/2017	12		0%	0.06	0.11		0.05	
Chloroethane	ug/L	1/11/2017	12/13/2017	12		0%	0.09	0.12		0.06	
Chloroform	ug/L	1/11/2017	12/13/2017	12	1	8%	0.07	0.25	0.23	0.10	0.23

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San Joaquin River Water Quality Summary Statistics

Parameter	Units	Begin Date	End Date	Number of Samples	Number Detected	Percent Detected	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Concentration	Average Concentration (see Note a)	Maximum Detected Concentration
Chloromethane	ug/L	1/11/2017	12/13/2017	12		0%	0.12	0.17		0.08	
Chlorpyrifos	ug/L	1/11/2017	12/13/2017	12		0%	0.006	0.03		0.005	
Chromium (III)	ug/L	6/21/2017	12/27/2017	7	7	100%	0.1	0.5	0.622	1.88	3.68
Chromium (total)	ug/L	1/11/2017	5/3/2017	5	5	100%	0.1	0.5	1.2	3.92	9.2
Chromium (VI)	ug/L	1/11/2017	12/27/2017	12	12	100%	0.02	0.02	0.028	0.04	0.062
Chrysene	ug/L	1/11/2017	12/13/2017	12		0%	0.2	0.2		0.10	
Copper, Total	ug/L	1/11/2017	12/27/2017	12	12	100%	0.1	0.5	1.1	2.80	8.6
Cyanide, Total (as CN)	ug/L	1/11/2017	12/13/2017	12		0%	1	1		0.50	
Dalapon	ug/L	1/11/2017	12/13/2017	12		0%	0.1	0.1		0.05	
delta-BHC	ug/L	1/11/2017	12/27/2017	12		0%	0.002	0.002		0.00	
Di (2-ethylhexyl) adipate	ug/L	1/11/2017	12/13/2017	12		0%	0.5	0.5		0.25	
Diazinon	ug/L	1/11/2017	12/13/2017	12		0%	0.006	0.03		0.01	
Dibenzo(a,h)anthracene	ug/L	1/11/2017	12/13/2017	12		0%	0.05	0.05		0.03	
Dichlorobromomethane	ug/L	1/11/2017	12/13/2017	12		0%	0.08	0.11		0.05	
Dieldrin	ug/L	1/11/2017	12/27/2017	12		0%	0.002	0.002		0.00	
Diethyl Phthalate	ug/L	1/11/2017	12/13/2017	12		0%	0.6	0.6		0.30	
Dimethyl Phthalate	ug/L	1/11/2017	12/13/2017	12		0%	0.6	1.1		0.47	
Di-n-butyl Phthalate	ug/L	1/11/2017	12/13/2017	12	5	42%	1.4	3.5	2.1	2.16	3.7
Di-n-octyl Phthalate	ug/L	1/11/2017	12/13/2017	12	1	8%	0.4	0.4	0.4	0.22	0.4
Dinoseb	ug/L	1/11/2017	12/13/2017	12		0%	0.14	0.14		0.07	
Diquat	ug/L	1/11/2017	12/13/2017	12		0%	0.9	0.9		0.45	
Dissolved Organic Carbon	mg/L as C	11/1/2000	6/1/2018	8	8	100%	0.1	0.5	2.5	3.35	5.3
Electrical Conductivity	umhos/cm	7/7/2010	3/25/2020	288	288	100%	0.3	2	69.8	525	1140
Endosulfan I	ug/L	1/11/2017	12/27/2017	12		0%	0.002	0.002		0.00	
Endosulfan II	ug/L	1/11/2017	12/27/2017	12		0%	0.002	0.002		0.00	
Endosulfan Sulfate	ug/L	1/11/2017	12/27/2017	12		0%	0.002	0.002		0.00	
Endothal	ug/L	1/11/2017	12/13/2017	12		0%	3.5	3.5		1.75	
Endrin	ug/L	1/11/2017	12/27/2017	12		0%	0.002	0.002		0.00	

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Parameter	Units	Begin Date	End Date	Number of Samples	Number Detected	Percent Detected	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Concentration	Average Concentration (see Note a)	Maximum Detected Concentration
Endrin Aldehyde	ug/L	1/11/2017	12/27/2017	12		0%	0.003	0.003		0.00	
Ethylbenzene	ug/L	1/11/2017	12/13/2017	12		0%	0.06	0.12		0.05	
Fluoranthene	ug/L	1/11/2017	12/13/2017	12		0%	0.3	0.3		0.15	
Fluorene	ug/L	1/11/2017	12/13/2017	12		0%	0.4	0.4		0.20	
Fluoride, Total	mg/L	1/11/2017	12/27/2017	12	12	100%	0.02	0.02	0.05	0.07	0.09
Foaming Agents (MBAS)	mg/L	1/11/2017	12/27/2017	12		0%	0.02	0.02		0.01	
gamma-BHC	ug/L	1/11/2017	12/27/2017	12		0%	0.002	0.002		0.00	
Hardness, Total (as CaCO3)	mg/L	7/7/2010	1/29/2020	184	184	100%	0.24	3	26	133	253
Heptachlor	ug/L	1/11/2017	12/27/2017	12		0%	0.002	0.002		0.00	
Heptachlor Epoxide	ug/L	1/11/2017	12/27/2017	12		0%	0.002	0.002		0.00	
Hexachlorobenzene	ug/L	1/11/2017	12/13/2017	12		0%	0.5	0.5		0.25	
Hexachlorobutadiene	ug/L	1/11/2017	12/13/2017	12		0%	0.05	0.11		0.05	
Hexachlorocyclopentadiene	ug/L	1/11/2017	12/13/2017	12		0%	0.7	0.7		0.35	
Hexachloroethane	ug/L	1/11/2017	12/13/2017	12		0%	0.3	0.3		0.15	
Indeno (1,2,3-cd) Pyrene	ug/L	1/11/2017	12/13/2017	12		0%	0.04	0.04		0.02	
Iron	ug/L	1/11/2017	12/27/2017	12	12	100%	7	35	499	1683.75	5430
Isophorone	ug/L	1/11/2017	12/13/2017	12		0%	0.8	0.8		0.40	
Lead, Total	ug/L	1/11/2017	12/27/2017	12	12	100%	0.1	0.5	0.2	0.95	4
Manganese	ug/L	1/11/2017	12/27/2017	12	12	100%	0.1	0.5	38.3	94.52	303
Mercury, Total	ng/L	7/7/2010	12/13/2017	40	40	100%	0.2	0.2	1.46	4.91	17.9
Methoxychlor	ug/L	1/11/2017	12/27/2017	12		0%	0.002	0.002		0.00	
Methyl Mercury	ng/L	7/7/2010	12/13/2017	32	31	97%	0.02	0.02	0.04	0.15	0.456
Methyl Tert-butyl Ether (MTBE)	ug/L	1/11/2017	12/13/2017	12		0%	0.08	0.1		0.05	
Methylene Chloride	ug/L	6/21/2017	12/13/2017	7	1	14%	0.11	0.11	0.11	0.06	0.11
Molinate	ug/L	1/11/2017	12/13/2017	12		0%	0.039	0.039		0.02	
Molybdenum	ug/L	1/11/2017	12/27/2017	12	12	100%	0.1	0.5	0.8	1.09	2.1
Naphthalene	ug/L	1/11/2017	12/13/2017	12	1	8%	0.07	0.13	0.08	0.06	0.08
Nickel, Total	ug/L	1/11/2017	12/27/2017	12	12	100%	0.2	1	1.3	3.59	11.5

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San Joaquin River Water Quality Summary Statistics

Parameter	Units	Begin Date	End Date	Number of Samples	Number Detected	Percent Detected	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Concentration	Average Concentration (see Note a)	Maximum Detected Concentration
Nitrate (as N)	mg/L	1/11/2017	12/27/2017	12	12	100%	0.02	0.1	0.07	0.56	1.49
Nitrite (as N)	mg/L	1/11/2017	12/27/2017	12	11	92%	0.003	0.015	0.005	0.01	0.03
Nitrobenzene	ug/L	1/11/2017	12/13/2017	12		0%	0.4	0.4		0.20	
N-Nitrosodimethylamine	ug/L	1/11/2017	12/13/2017	12		0%	0.2	0.2		0.10	
N-Nitrosodi-n-Propylamine	ug/L	1/11/2017	12/13/2017	12		0%	0.9	0.9		0.45	
N-Nitrosodiphenylamine	ug/L	1/11/2017	12/13/2017	12		0%	0.4	0.4		0.20	
Oxamyl	ug/L	1/11/2017	12/13/2017	12		0%	0.48	0.48		0.24	
PCB-1016	ug/L	1/11/2017	12/27/2017	12		0%	0.1	0.1		0.05	
PCB-1221	ug/L	1/11/2017	12/27/2017	12		0%	0.1	0.1		0.05	
PCB-1232	ug/L	1/11/2017	12/27/2017	12		0%	0.1	0.1		0.05	
PCB-1242	ug/L	1/11/2017	12/27/2017	12		0%	0.1	0.1		0.05	
PCB-1248	ug/L	1/11/2017	12/27/2017	12		0%	0.1	0.1		0.05	
PCB-1254	ug/L	1/11/2017	12/27/2017	12		0%	0.1	0.1		0.05	
PCB-1260	ug/L	1/11/2017	12/27/2017	12		0%	0.1	0.1		0.05	
PCB-1262	ug/L	1/11/2017	12/27/2017	12		0%	0.1	0.1		0.05	
Pentachlorophenol	ug/L	1/11/2017	12/13/2017	12	1	8%	0.4	0.4	0.4	0.22	0.4
Phenanthrene	ug/L	1/11/2017	12/13/2017	12		0%	0.4	0.4		0.20	
Phenol, Single Compound	ug/L	1/11/2017	12/13/2017	12		0%	0.2	0.2		0.10	
Phosphorus, Total (as P)	ug/L	1/11/2017	12/27/2017	12	12	100%	0.02	0.02	0.1	0.14	0.31
Picloram	ug/L	1/11/2017	12/13/2017	12		0%	0.05	0.05		0.03	
Pyrene	ug/L	1/11/2017	12/13/2017	12		0%	0.2	0.2		0.10	
Selenium, Total	ug/L	1/11/2017	12/27/2017	12	1	8%	0.4	2	0.4	0.42	0.4
Silver, Total	ug/L	1/11/2017	12/27/2017	12		0%	0.05	0.25		0.05	
Simazine	ug/L	1/11/2017	12/13/2017	12		0%	0.015	0.015		0.01	
Styrene	ug/L	1/11/2017	12/13/2017	12		0%	0.05	0.12		0.05	
Sulfate	mg/L	1/11/2017	12/27/2017	12	12	100%	0.2	0.2	5.8	22.08	68.7
Sulfide, Dissolved (as S)	ug/L	1/11/2017	12/27/2017	12	5	42%	0.05	0.05	0.057	0.05	0.152
Sulfite (as SO3)	ug/L	1/11/2017	12/27/2017	12		0%	1	1		0.50	

Appendix A
San Joaquin River Water Quality Summary Statistics

Parameter	Units	Begin Date	End Date	Number of Samples	Number Detected	Percent Detected	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Concentration	Average Concentration (see Note a)	Maximum Detected Concentration
Tetrachloroethene	ug/L	1/11/2017	12/13/2017	12		0%	0.08	0.12		0.05	
Thallium, Total	ug/L	1/11/2017	12/27/2017	12	1	8%	0.2	1	0.2	0.21	0.2
Thiobencarb	ug/L	1/11/2017	12/13/2017	12		0%	0.025	0.025		0.01	
Toluene	ug/L	1/11/2017	12/13/2017	12		0%	0.07	0.13		0.06	
Total Dissolved Solids (TDS)	mg/L	7/7/2010	1/29/2020	48	48	100%	2	3	28	245	653
Total Kjeldahl Nitrogen	mg/L as N	11/1/2000	1/20/2010	6	5	83%	0.1	0.1	0.4	0.56	1.1
Total Organic Carbon	mg/L as C	11/1/2000	6/1/2018	7	7	100%	0.1	0.5	2.8	3.64	6.2
Toxaphene	ug/L	1/11/2017	12/27/2017	12		0%	0.1	0.1		0.05	
trans-1,2-Dichloroethene	ug/L	1/11/2017	12/13/2017	12		0%	0.05	0.13		0.05	
Tributyltin (TBT)	ug/L	1/11/2017	12/13/2017	12		0%	0.0012	0.0012		0.00	
Trichloroethene	ug/L	1/11/2017	12/13/2017	12		0%	0.09	0.14		0.06	
Trichlorofluoromethane	ug/L	1/11/2017	12/13/2017	12		0%	0.06	0.09		0.04	
Turbidity	NTU	7/7/2010	3/25/2020	275	275	100%	0.06	0.06	2.18	13.17	62.3
Vinyl Chloride	ug/L	1/11/2017	12/13/2017	12		0%	0.06	0.1		0.04	
Xylenes, Total	ug/L	1/11/2017	12/13/2017	12		0%	0.11	0.28		0.11	
Zinc, Total	ug/L	1/11/2017	12/27/2017	12	12	100%	0.6	3	1.6	7.43	18.1

Note:
[a] For data sets with a mix of detect and non-detect results, or all non-detect results, the average was calculated by using one-half the detection limit of each non-detect sample result. This approach is consistent with the handling of non-detect results described in the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California*, State Water Resources Control Board 2005.

Appendix B

Effluent Quality Summary Statistics

Appendix B
CTF Effluent Quality Summary Statistics

Parameter	Units	Begin Date	End Date	Number of Samples	Number Detected	Percent Detected	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Concentration	Average Concentration (see Note a)	Maximum Detected Concentration
1,1,1-Trichloroethane	µg/L	2/14/2017	4/21/2020	14		0%	0.053	0.12		0.03	
1,1,2,2-Tetrachloroethane	µg/L	2/14/2017	4/21/2020	14		0%	0.046	0.076		0.04	
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	2/14/2017	4/21/2020	14		0%	0.058	0.098		0.03	
1,1,2-Trichloroethane	µg/L	2/14/2017	4/21/2020	14		0%	0.033	0.099		0.02	
1,1-Dichloroethane	µg/L	2/14/2017	4/21/2020	14		0%	0.04	0.16		0.08	
1,1-Dichloroethene	µg/L	2/14/2017	4/21/2020	14		0%	0.16	0.49		0.23	
1,2,4-Trichlorobenzene	µg/L	2/14/2017	12/6/2017	4		0%	0.48	0.48		0.24	
1,2-Benzanthracene	µg/L	2/14/2017	12/6/2017	4		0%	0.025	0.43		0.16	
1,2-Dibromo-3-chloropropane (DBCP)	µg/L	2/14/2017	12/6/2017	4	2	50%	0.0057	0.0057	0.00706	0.005	0.00882
1,2-Dichlorobenzene	µg/L	2/14/2017	4/21/2020	14		0%	0.026	0.055		0.01	
1,2-Dichloroethane	µg/L	2/14/2017	4/21/2020	14		0%	0.044	0.086		0.02	
1,2-Dichloropropane	µg/L	2/14/2017	4/21/2020	14		0%	0.094	0.16		0.05	
1,2-Diphenylhydrazine	µg/L	2/14/2017	12/6/2017	4		0%	0.47	0.47		0.24	
1,3-Dichlorobenzene	µg/L	2/14/2017	4/21/2020	14		0%	0.062	0.11		0.05	
1,3-Dichloropropene	µg/L	2/14/2017	4/21/2020	14		0%	0.1	0.21		0.05	
1,4-Dichlorobenzene	µg/L	2/14/2017	4/21/2020	14		0%	0.05	0.063		0.03	
2- Chloroethyl vinyl ether	µg/L	2/14/2017	4/21/2020	14		0%	0.14	0.14		0.07	
2,4,5-TP (Silvex)	µg/L	2/14/2017	12/6/2017	4		0%	0.32	0.32		0.16	
2,4,6-Trichlorophenol	µg/L	2/14/2017	12/6/2017	4		0%	0.9	0.9		0.45	
2,4-D	µg/L	2/14/2017	12/6/2017	4	1	25%	0.9	0.9	1.56	0.73	1.56
2,4-Dichlorophenol	µg/L	2/14/2017	12/6/2017	4		0%	0.79	0.79		0.40	
2,4-Dimethylphenol	µg/L	2/14/2017	12/6/2017	4		0%	0.76	0.76		0.38	
2,4-Dinitrophenol	µg/L	2/14/2017	12/6/2017	4		0%	0.22	0.22		0.11	
2,4-Dinitrotoluene	µg/L	2/14/2017	12/6/2017	4		0%	0.49	0.49		0.25	
2,6-Dinitrotoluene	µg/L	2/14/2017	12/6/2017	4		0%	0.55	0.55		0.28	
2-Chloronaphthalene	µg/L	2/14/2017	12/6/2017	4		0%	0.63	0.63		0.32	
2-Chlorophenol	µg/L	2/14/2017	12/6/2017	4		0%	1	1		0.50	

Appendix B
CTF Effluent Quality Summary Statistics

Parameter	Units	Begin Date	End Date	Number of Samples	Number Detected	Percent Detected	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Concentration	Average Concentration (see Note a)	Maximum Detected Concentration
2-Nitrophenol	µg/L	2/14/2017	12/6/2017	4		0%	1.1	1.1		0.55	
3,3'-Dichlorobenzidine	µg/L	2/14/2017	12/6/2017	4		0%	0.43	0.43		0.22	
3,4-Benzofluoranthene	µg/L	2/14/2017	12/6/2017	4		0%	0.37	0.37		0.19	
4,4'-DDD	ng/L	2/14/2017	12/6/2017	4	1	25%	1.3	1.3	4.49	1.61	4.49
4,4'-DDE	ng/L	2/14/2017	12/6/2017	4		0%	1.3	1.3		0.65	
4,4'-DDT	ng/L	2/14/2017	12/6/2017	4		0%	1.3	4.1		1.70	
4,6-Dinitro-2-methylphenol	µg/L	2/14/2017	12/6/2017	4		0%	0.43	0.43		0.22	
4-Bromophenyl phenyl ether	µg/L	2/14/2017	12/6/2017	4		0%	0.46	0.46		0.23	
4-Chloro-3-methylphenol	µg/L	2/14/2017	12/6/2017	4		0%	0.86	0.86		0.43	
4-Chlorophenyl phenyl ether	µg/L	2/14/2017	12/6/2017	4		0%	0.62	0.62		0.31	
4-Nitrophenol	µg/L	2/14/2017	12/6/2017	4		0%	1.1	1.1		0.55	
Acenaphthene	µg/L	2/14/2017	12/6/2017	4		0%	0.5	0.5		0.25	
Acenaphthylene	µg/L	2/14/2017	12/6/2017	4		0%	0.39	0.39		0.20	
Acrolein	µg/L	2/14/2017	4/21/2020	14		0%	2.5	2.5		1.25	
Acrylonitrile	µg/L	2/14/2017	4/21/2020	14		0%	0.85	0.85		0.43	
Alachlor	µg/L	2/14/2017	12/6/2017	4		0%	0.16	0.16		0.08	
Aldrin	ng/L	2/14/2017	12/6/2017	4		0%	0.91	0.91		0.46	
alpha-Chlordane	ng/L	2/14/2017	12/6/2017	4		0%	1.8	1.8		0.90	
alpha-Endosulfan	ng/L	2/14/2017	12/6/2017	4		0%	2.1	2.1		1.05	
alpha-Hexachlorocyclohexane	ng/L	2/14/2017	12/6/2017	4		0%	1.3	1.3		0.65	
Aluminum	µg/L	2/14/2017	4/21/2020	14	14	100%	0.05	0.52	17.3	39.4	186
Ammonia (as N)	mg/L	2/14/2017	4/21/2020	14	1	7%	0.072	0.091	0.20	0.05	0.20
Anthracene	µg/L	2/14/2017	12/6/2017	4		0%	0.43	0.43		0.22	
Antimony	µg/L	2/14/2017	4/21/2020	14	14	100%	0.0071	0.18	0.262	0.73	2.34
Arsenic	µg/L	2/14/2017	4/21/2020	14	14	100%	0.016	0.077	1.59	6.13	8.42
Asbestos	MFL	2/14/2017	12/6/2017	4		0%	0.2	1		0.30	
Atrazine	µg/L	2/14/2017	12/6/2017	4		0%	0.14	0.14		0.07	

Appendix B
CTF Effluent Quality Summary Statistics

Parameter	Units	Begin Date	End Date	Number of Samples	Number Detected	Percent Detected	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Concentration	Average Concentration (see Note a)	Maximum Detected Concentration
Barium	µg/L	2/14/2017	4/21/2020	14	14	100%	0.013	0.11	21.7	148	192
Bentazon	µg/L	2/14/2017	12/6/2017	4		0%	0.45	0.45		0.23	
Benzene	µg/L	2/14/2017	4/21/2020	14		0%	0.12	0.13		0.06	
Benzidine	µg/L	2/14/2017	12/6/2017	4		0%	1.8	1.8		0.90	
Benzo(a)pyrene (3,4-Benzopyrene)	µg/L	2/14/2017	12/6/2017	4		0%	0.4	0.4		0.20	
Benzo(g,h,i)perylene	µg/L	2/14/2017	12/6/2017	4		0%	0.4	0.4		0.20	
Benzo(k)fluoranthene	µg/L	2/14/2017	12/6/2017	4		0%	0.5	0.5		0.25	
Beryllium	µg/L	2/14/2017	4/21/2020	14		0%	0.0073	0.073		0.02	
beta-Endosulfan	ng/L	2/14/2017	12/6/2017	4		0%	2.1	2.1		1.05	
beta-Hexachlorocyclohexane	ng/L	2/14/2017	12/6/2017	4		0%	1.5	1.5		0.75	
Bis(2-chloroethoxy) methane	µg/L	2/14/2017	12/6/2017	4		0%	0.56	0.56		0.28	
Bis(2-chloroethyl) ether	µg/L	2/14/2017	12/6/2017	4		0%	0.52	0.52		0.26	
Bis(2-chloroisopropyl) ether	µg/L	2/14/2017	12/6/2017	4		0%	0.53	0.53		0.27	
Bis(2-ethylhexyl) phthalate	µg/L	2/14/2017	12/6/2017	4	3	75%	0.41	0.41	0.447	0.78	1.86
BOD	mg/L	4/3/2019	3/31/2020	61	13	21%	2	2	1.5	1.37	4.3
Boron	mg/L	2/14/2017	4/21/2020	14	14	100%	0.000087	0.0088	0.257	0.387	0.455
Bromoform	µg/L	2/14/2017	3/15/2018	8	7	88%	0.033	0.21	1.74	4.32	9.98
Bromomethane	µg/L	2/14/2017	4/21/2020	14		0%	0.22	0.25		0.12	
Butyl benzyl phthalate	µg/L	2/14/2017	12/6/2017	4		0%	0.29	0.29		0.15	
Cadmium	µg/L	2/14/2017	4/21/2020	14	4	29%	0.0069	0.066	0.021	0.036	0.178
Carbofuran	µg/L	2/14/2017	12/6/2017	4		0%	0.59	1.1		0.49	
Carbon tetrachloride	µg/L	2/14/2017	4/21/2020	14		0%	0.05	0.12		0.03	
Chloride	mg/L	2/14/2017	4/21/2020	14	14	100%	0.0045	0.067	142	211	249
Chlorobenzene	µg/L	2/14/2017	4/21/2020	14		0%	0.036	0.1		0.02	
Chlorodibromomethane	µg/L	2/14/2017	3/15/2018	8	8	100%	0.078	0.17	24.6	34.3	43.3
Chloroethane	µg/L	2/14/2017	4/21/2020	14		0%	0.073	0.37		0.17	
Chloroform	µg/L	2/14/2017	3/15/2018	8	8	100%	0.045	0.089	33.0	64.4	98.1

Appendix B
CTF Effluent Quality Summary Statistics

Parameter	Units	Begin Date	End Date	Number of Samples	Number Detected	Percent Detected	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Concentration	Average Concentration (see Note a)	Maximum Detected Concentration
Chloromethane	µg/L	2/14/2017	4/21/2020	14		0%	0.35	0.36		0.18	
Chlorpyrifos	ng/L	2/14/2017	12/6/2017	4		0%	2.4	2.4		1.20	
Chromium (total)	µg/L	2/14/2017	4/21/2020	14	14	100%	0.052	0.18	0.84	4.52	14.5
Chromium (hexavalent)	µg/L	2/14/2017	4/21/2020	14	8	57%	0.012	0.051	0.0295	0.039	0.103
Chrysene	µg/L	2/14/2017	12/6/2017	4		0%	0.51	0.51		0.26	
Copper	µg/L	2/14/2017	4/21/2020	14	13	93%	0.038	1.2	0.97	2.76	7.33
Cyanide	mg/L	2/14/2017	4/21/2020	14		0%	0.001	0.0023		0.00	
Dalapon	µg/L	2/14/2017	12/6/2017	4		0%	3.5	3.5		1.75	
delta-Hexachlorocyclohexane	ng/L	2/14/2017	12/6/2017	4		0%	1.8	1.8		0.90	
Di(2-ethylhexyl)adipate	µg/L	2/14/2017	12/6/2017	4		0%	0.063	0.063		0.03	
Diazinon	ng/L	2/14/2017	12/6/2017	4		0%	2.4	2.4		1.20	
Dibenzo(a,h)-anthracene	µg/L	2/14/2017	12/6/2017	4		0%	0.023	0.37		0.05	
Dichlorobromomethane	µg/L	2/14/2017	3/15/2018	8	8	100%	0.089	0.15	38.9	58.7	79.3
Dichloromethane	µg/L	2/14/2017	4/21/2020	14		0%	0.24	0.34		0.12	
Dieldrin	ng/L	2/14/2017	12/6/2017	4		0%	1.5	1.5		0.75	
Diethyl phthalate	µg/L	2/14/2017	12/6/2017	4		0%	0.34	0.34		0.17	
Dimethyl phthalate	µg/L	2/14/2017	12/6/2017	4		0%	0.31	0.31		0.16	
Di-n-butylphthalate	µg/L	2/14/2017	12/6/2017	4		0%	0.35	0.35		0.18	
Di-n-octylphthalate	µg/L	2/14/2017	12/6/2017	4		0%	0.31	0.31		0.16	
Dinoseb	µg/L	2/14/2017	12/6/2017	4		0%	0.49	0.49		0.25	
Diquat	µg/L	2/14/2017	12/6/2017	4		0%	0.12	0.12		0.06	
Dissolved Organic Carbon	mg/L	2/14/2017	12/6/2017	4	4	100%	0.017	0.017	2.99	4.27	6.09
Electrical conductivity	umhos/cm	2/14/2017	4/21/2020	14	14	100%	0	0.16	917	1341	1490
Endosulfan sulfate	ng/L	2/14/2017	12/6/2017	4		0%	1.2	1.2		0.60	
Endothall	µg/L	2/14/2017	12/6/2017	4		0%	16	16		8.00	
Endrin	ng/L	2/14/2017	12/6/2017	4		0%	1.3	1.3		0.65	
Endrin Aldehyde	ng/L	2/14/2017	12/6/2017	4		0%	1.9	1.9		0.95	

Appendix B
CTF Effluent Quality Summary Statistics

Parameter	Units	Begin Date	End Date	Number of Samples	Number Detected	Percent Detected	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Concentration	Average Concentration (see Note a)	Maximum Detected Concentration
Ethylbenzene	µg/L	2/14/2017	4/21/2020	14		0%	0.046	0.059		0.02	
Ethylene Dibromide	µg/L	2/14/2017	12/6/2017	4		0%	0.0027	0.0027		0.00	
Fluoranthene	µg/L	2/14/2017	12/6/2017	4		0%	0.44	0.44		0.22	
Fluorene	µg/L	2/14/2017	12/6/2017	4		0%	0.62	0.62		0.31	
Fluoride	mg/L	2/14/2017	4/21/2020	14	14	100%	0.0021	0.027	0.064	0.186	0.292
Foaming Agents (MBAS)	mg/L	10/11/2017	4/21/2020	7	7	100%	0.017	0.017	0.0429	0.10	0.176
gamma-Chlordane	ng/L	2/14/2017	12/6/2017	4		0%	1.3	1.3		0.65	
Glyphosate	µg/L	2/14/2017	12/6/2017	4		0%	0.97	18		2.49	
Hardness (as CaCO3)	mg/L	2/14/2017	4/21/2020	14	14	100%	0.0065	0.13	107	213	275
Heptachlor	ng/L	2/14/2017	12/6/2017	4		0%	1.8	1.8		0.90	
Heptachlor Epoxide	ng/L	2/14/2017	12/6/2017	4		0%	0.77	0.77		0.39	
Hexachlorobenzene	µg/L	2/14/2017	12/6/2017	4		0%	0.47	0.47		0.24	
Hexachlorobutadiene	µg/L	2/14/2017	12/6/2017	4		0%	0.45	0.45		0.23	
Hexachlorocyclopentadiene	µg/L	2/14/2017	12/6/2017	4		0%	0.24	0.24		0.12	
Hexachloroethane	µg/L	2/14/2017	12/6/2017	4		0%	0.43	0.43		0.22	
Indeno(1,2,3-c,d)pyrene	µg/L	2/14/2017	12/6/2017	4		0%	0.021	0.021		0.01	
Iron	µg/L	2/14/2017	4/21/2020	14	14	100%	0.44	9.1	10	34.2	60.2
Isophorone	µg/L	2/14/2017	12/6/2017	4		0%	0.41	0.41		0.21	
Lead	µg/L	2/14/2017	4/21/2020	14	12	86%	0.013	0.036	0.041	0.30	1.18
Lindane (gamma-Hexachlorocyclohexane)	ng/L	2/14/2017	12/6/2017	4		0%	3.7	3.7		1.85	
Manganese	µg/L	2/14/2017	4/21/2020	14	13	93%	0.099	1.8	1.15	3.46	9.02
Mercury	ng/L	2/14/2017	4/21/2020	14	14	100%	0.02	0.2	0.231	0.62	3.6
Methoxychlor	ng/L	2/14/2017	12/6/2017	4		0%	0.46	0.46		0.23	
Methyl mercury	ng/L	2/14/2017	4/21/2020	14	3	21%	0.02	0.02	0.0220	0.0140	0.0419
Methyl-tert-butyl ether (MTBE)	µg/L	2/14/2017	4/21/2020	14		0%	0.081	0.41		0.05	
Molinate (Ordram)	µg/L	2/14/2017	12/6/2017	4		0%	0.13	0.13		0.07	
Molybdenum	µg/L	2/14/2017	4/21/2020	14	14	100%	0.0098	0.088	4.34	8.86	36.8

Appendix B
CTF Effluent Quality Summary Statistics

Parameter	Units	Begin Date	End Date	Number of Samples	Number Detected	Percent Detected	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Concentration	Average Concentration (see Note a)	Maximum Detected Concentration
Naphthalene	µg/L	2/14/2017	12/6/2017	4		0%	0.55	0.55		0.28	
Nickel	µg/L	2/14/2017	4/21/2020	14	14	100%	0.0098	0.098	0.597	1.78	2.39
Nitrate (as N)	mg/L	2/14/2017	4/21/2020	14	14	100%	0.0008	0.032	1.6	4.4	6.6
Nitrate + Nitrite (as N)	mg/L	2/14/2017	4/21/2020	14	14	100%	0.0032	0.074	1.6	4.3	6.6
Nitrite (as N)	mg/L	2/14/2017	4/21/2020	14	1	7%	0.00064	0.011	0.014	0.002	0.014
Nitrobenzene	µg/L	2/14/2017	12/6/2017	4		0%	0.47	0.47		0.24	
N-Nitrosodimethylamine	µg/L	2/14/2017	12/6/2017	4		0%	0.47	0.47		0.24	
N-Nitrosodi-n-propylamine	µg/L	2/14/2017	12/6/2017	4		0%	0.53	0.74		0.29	
N-Nitrosodiphenylamine	µg/L	2/14/2017	12/6/2017	4		0%	0.53	0.74		0.34	
Oxamyl	µg/L	2/14/2017	12/6/2017	4		0%	0.48	1.4		0.59	
PCB-1016	µg/L	2/14/2017	12/6/2017	4		0%	0.13	0.13		0.07	
PCB-1221	µg/L	2/14/2017	12/6/2017	4		0%	0.19	0.19		0.10	
PCB-1232	µg/L	2/14/2017	12/6/2017	4		0%	0.2	0.2		0.10	
PCB-1242	µg/L	2/14/2017	12/6/2017	4		0%	0.2	0.2		0.10	
PCB-1248	µg/L	2/14/2017	12/6/2017	4		0%	0.056	0.056		0.03	
PCB-1254	µg/L	2/14/2017	12/6/2017	4		0%	0.086	0.086		0.04	
PCB-1260	µg/L	2/14/2017	12/6/2017	4		0%	0.11	0.11		0.06	
Pentachlorophenol	µg/L	2/14/2017	12/6/2017	4		0%	0.91	0.91		0.46	
pH	SU	2/14/2017	4/21/2020	43	43	100%			7.2	7.68	8.15
Phenanthrene	µg/L	2/14/2017	12/6/2017	4		0%	0.018	0.018		0.01	
Phenol	µg/L	2/14/2017	12/6/2017	4		0%	0.88	0.88		0.44	
Phosphorus, Total	mg/L	2/14/2017	12/6/2017	4	4	100%	0.02	0.02	0.0716	1.43	5.4
Picloram	µg/L	2/14/2017	12/6/2017	4		0%	0.18	0.18		0.09	
Pyrene	µg/L	2/14/2017	12/6/2017	4		0%	0.46	0.46		0.23	
Selenium	µg/L	5/29/2019	4/21/2020	12	12	100%	0.031	0.17	0.316	0.561	0.717
Silver	µg/L	2/14/2017	4/21/2020	14	8	57%	0.0088	0.088	0.0425	0.21	0.969
Simazine (Princep)	µg/L	2/14/2017	12/6/2017	4		0%	0.16	0.16		0.08	

Appendix B
CTF Effluent Quality Summary Statistics

Parameter	Units	Begin Date	End Date	Number of Samples	Number Detected	Percent Detected	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Concentration	Average Concentration (see Note a)	Maximum Detected Concentration
Styrene	µg/L	2/14/2017	4/21/2020	14		0%	0.059	0.065		0.03	
Sulfate (as SO4)	mg/L	2/14/2017	4/21/2020	14	14	100%	0.015	0.077	41.4	79.9	110
Sulfide (as S)	mg/L	2/14/2017	12/6/2017	4		0%	0.017	0.1		0.03	
Sulfite (as SO3)	mg/L	2/14/2017	12/6/2017	4	3	75%	0.49	0.49	1.0	1.0	1.5
Tetrachloroethene	µg/L	2/14/2017	4/21/2020	14		0%	0.056	0.094		0.03	
Thallium	µg/L	2/14/2017	4/21/2020	14	2	14%	0.011	0.028	0.11	0.023	0.112
Thiobencarb	µg/L	2/14/2017	12/6/2017	4		0%	0.15	0.15		0.08	
Toluene	µg/L	2/14/2017	4/21/2020	14		0%	0.05	0.14		0.03	
Total Dissolved Solids (TDS)	mg/L	2/5/2019	4/21/2020	15	15	100%	5.8	5.8	450	510	570
Total Organic Carbon	mg/L	2/14/2017	12/6/2017	4	4	100%	0.15	0.15	2.54	3.24	3.7
Total Organic Kjeldahl Nitrogen	mg/L	2/14/2017	12/6/2017	4	1	25%	0.19	0.32	0.378	0.20	0.378
Toxaphene	µg/L	2/14/2017	12/6/2017	4		0%	0.044	0.044		0.02	
trans-1,2-Dichloroethylene	µg/L	2/14/2017	4/21/2020	14		0%	0.11	0.12		0.06	
Tributyltin	ng/L	2/14/2017	12/6/2017	4		0%	1.3	1.4		0.66	
Trichloroethene	µg/L	2/14/2017	4/21/2020	14		0%	0.05	0.071		0.03	
Trichlorofluoromethane	µg/L	2/14/2017	4/21/2020	14		0%	0.071	0.15		0.07	
Vinyl chloride	µg/L	2/14/2017	4/21/2020	14		0%	0.09	0.17		0.08	
Xylenes	µg/L	2/14/2017	4/21/2020	14		0%	0.084	0.084		0.04	
Zinc	µg/L	2/14/2017	4/21/2020	14	14	100%	0.57	8	32.7	53.0	93.4

Note:
[a] For data sets with a mix of detect and non-detect results, or all non-detect results, the average was calculated by using one-half the detection limit of each non-detect sample result. This approach is consistent with the handling of non-detect results described in the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California*, State Water Resources Control Board 2005.

Appendix G

CORMIX Modeling to
Determine Outfall Elevation

Robertson - Bryan, Inc.
Solutions for Progress

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TECHNICAL MEMORANDUM

Date: August 18, 2020

Prepared for: City of Lathrop

Prepared by: Cyle Moon, P.E.

Reviewed by: Michael Bryan, Ph.D.

Project: City of Lathrop Surface Water Discharge Project

Subject: Recommendation for elevation of the proposed San Joaquin River outfall for the City of Lathrop Consolidated Treatment Facility

Introduction

Robertson-Bryan, Inc. (RBI) conducted CORMIX modeling to determine the proper elevation at which to place the proposed new outfall pipe for the City of Lathrop's (City) Consolidated Treatment Facility (CTF) in the San Joaquin River. The recommended outfall elevation considers the temperature objectives that will be included in the future National Pollutant Discharge Elimination System (NPDES) permit for the new surface water discharge, as well as a set of rules within CORMIX for outfall elevation to optimize mixing with receiving waters. This technical memorandum summarizes the regulatory and design constraints locating the outfall elevation, the CORMIX modeling inputs and results, and a recommended outfall elevation range.

Proposed Outfall Location

The City is proposing to construct a San Joaquin River outfall to discharge treated wastewater from the CTF. Field bathymetry data of the San Joaquin River in the vicinity of the City's preferred discharge location was obtained and utilized to determine optimal locations for placement of the CTF outfall. Based on RBI's experience with river discharge outfalls, understanding of plume mixing dynamics, and conversation with a National Marine Fisheries Service biologist, a location approximately 420 feet (ft) downstream of the City's existing stormwater outfall was chosen. This location was chosen based on its cross-sectional profile, which includes substantial depth on the eastern bank where the outfall structure will be placed. The channel bathymetry at this location promotes superior effluent mixing and provides better zones of passage around the effluent plume for migratory fish compared to the cross-section at the existing stormwater outfall structure. A map showing the proposed outfall location is provided in **Figure 1**.

Figure 1. Map of City of Lathrop CTF and proposed San Joaquin River discharge outfall location.

Outfall Elevation Constraints

The primary factor dictating outfall depth is the ability of the discharge to comply with the State Water Resources Control Board's temperature objectives contained within its "*Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California*" (Thermal Plan). More specifically, objective 5A(1)c states that: "*no discharge shall cause a surface water temperature rise greater than 4°F above the natural temperature of the receiving waters at any time or place.*" Hence, the outfall pipe for the CTF must be placed at an elevation within the river channel to allow for the effluent temperature to attenuate as the warmer, buoyant effluent rises through the water column as it spreads and mixes within the river channel such that the surface water temperature not increase more than 4°F above the river background temperature at any time or place. This Thermal Plan objective, and two other objectives from the plan (i.e., objective 5A(1)a – The maximum temperature of the effluent shall not exceed the natural receiving water temperature by more than 20^{o}F; and objective 5A(1)b – the discharge shall not cause a zone, defined by water temperature of more than 1^{o}F above natural receiving water temperature, which exceeds 25 percent of the cross-sectional area of a main river channel at any point) will be included as effluent and receiving water temperature limitations in the NPDES permit for the CTF.

Submerging the outfall as much as practicable is recommended to maximize the duration for which the effluent plume is submerged to facilitate compliance with the Thermal Plan objectives.

By maximizing the duration of plume submergence, dilution and cooling of the effluent plume is maximized. CORMIX guidance on outfall placement consists of a set of rules for both “deeply submerged” and “slightly submerged” discharges. These rules must be followed in order for the model to run. A “deeply submerged” discharge configuration was selected because this will provide maximum effluent plume cooling. The CORMIX rules for “deeply submerged” discharges are as follows.

(a) The river depth at the discharge location must be at least three times greater than the diameter of the outfall pipe.

(b) The distance between the outfall pipe centerline and the bottom of the river channel at the discharge location must be no greater than one third of the river depth at the discharge location.

(c) The distance between the outfall pipe centerline and the bottom of the river channel must be no less than the radius of the outfall pipe.

(d) The river depth at the outfall pipe location (i.e., depth at discharge) cannot be more than 30 percent greater than the average river channel depth across the transect at the outfall location.

Based on these rules, the bathymetry of the San Joaquin River at the proposed outfall location, and the critical tidal condition (mean lower low water level [MLLW]), the centerline of the outfall pipe must be 0.9–5.6 ft from the bottom of the river channel at the discharge location. However, to ensure that the outfall pipe does not become impacted by varying bedload, the minimum distance from the outfall centerline to the river bottom was set at 2.5 ft. As such, the range of distances from the outfall pipe centerline to the river bottom is 2.5–5.6 ft.

Outfall Configuration in CORMIX

The average river depth at the proposed outfall location is approximately 13.0 ft under MLLW tidal conditions (**Figure 1**). The depth of the river channel on the eastern side (where the outfall pipe will be placed) is approximately 19.8 ft under MLLW tidal conditions. This depth of 19.8 ft where the outfall pipe will be placed is more than 30 percent greater than the average depth of the river channel at the discharge location, and thus does not comply with CORMIX rule “d” (see above). To satisfy CORMIX rule “d,” the river depth at the outfall was set to 16.8 ft, which is 29 percent greater than the average river depth (13.0 ft x 1.29 = 16.8 ft). This was done strictly to enable simulations in CORMIX; the actual river depth at the discharge location will be used when determining outfall elevations in NAVD88 for placement of the outfall.

Using the river depth at the discharge location that complied with CORMIX rules (i.e., 16.8 ft) and the range of distances from the outfall pipe centerline to the river bottom previously specified (2.5–5.6 ft), the modeled outfall can achieve 11.2–14.3 ft of submergence under the MLLW tidal condition. These CORMIX input parameters, along with other inputs used for the CORMIX modeling are shown in **Table 1**.

Figure 2. San Joaquin River channel cross-section at proposed outfall location, with the mean lower low water (MLLW) level, mean water level (MWL), and ordinary high water mark (OHWM) shown.

Table 1. CORMIX Input Parameters.

Parameter (units)	Value	Notes
	Effluent / Outfall	
Outfall Location	37°47'42.05"N 121°18'26.26"W	
Flow (MGD)	7.55	Maximum river discharge per EKI 2020 (1.3*ADWF)
Temperature above Ambient (°F)	20	Thermal Plan limiting condition
Outfall Diameter (in)	20	Design drawings
Outfall Orientation (relative to river flow)	Perpendicular	
Distance to East Bank (ft)	10	Assumed
Outfall Centerline Distance from River Bottom (ft)	2.5 – 5.6	This is the acceptable range based on rules in CORMIX and to ensure outfall pipe integrity.
	River / Ambient	
Width (ft)	205	Wetted river width at MLLW tidal condition
Average Depth (ft)	13.0 (MLLW)	
Depth at Discharge (ft)	16.8 (MLLW)	
Velocity (ft/s)	0.05 (slack tide)	

CORMIX Modeling Results

The CORMIX model of the proposed outfall was run to compare varying outfall submergence scenarios under peak buildout effluent flows and slack tide river conditions (which constitutes worst-case river conditions for this assessment) to better understand effluent mixing with receiving water flows and resultant cooling of the effluent plume as it rises to the water's surface. **Table 2** provides a summary of the results from the CORMIX modeling simulations performed.

Table 2. Summary of CORMIX Output.

Effluent Flow (MGD)	River Velocity (ft/s)	Tidal Condition	Outfall Centerline Distance from River Bottom (ft)	Maximum Plume Temperature Difference Relative to Background at Water Surface (°F)	Dilution Prior to Plume Surfacing (C/C_0)
7.55	0.05	MLLW	2.5	4.12	4.8
			3.0	4.12	4.8
			3.5	4.12	4.8
			4.0	4.12	4.8
			4.5	4.12	4.8
			5.0	4.12	4.8
			5.2	3.88	5.2
			5.4	3.92	5.1
			5.6	3.96	5.1

From Table 2, the CORMIX modeling shows that optimal cooling and mixing of the effluent plume is achieved at an outfall centerline distance from the river bottom of about 5.2 ft. At the greater outfall submergences (i.e., shorter distance to river bottom), cooling and mixing of the effluent plume decreased. This is due to the plume interacting with the river bottom immediately upon discharge, thereby reducing the plume's ability to mix with the river.

All of the outfall depths modeled using CORMIX will likely achieve compliance with the Thermal Plan's objective 5A(1)c. However, optimal cooling and mixing of the effluent plume was achieved at a modeled outfall distance from the river bottom of 5.2 ft. Consequently, it is recommended that the outfall be placed approximately no less than 5.2 ft (-12.74 ft, NAVD88) and no more than 5.6 ft. (-12.3 ft, NAVD88) from the river bottom at the identified outfall location.

Appendix H

Noise Modeling Results

Construction Source Noise Prediction Model

Location	Distance to Nearest Receptor in feet	Combined Predicted Noise Level (L_{eq} dBA)
Threshold	816	55.0
Nearest Residential Receptor	65	82.3
25 feet from Nearest Residential Receptor	90	78.6
50 feet from Nearest Residential Receptor	115	75.8

Equipment	Reference Noise Levels (L_{max}) at 50 feet[1]	Usage Factor[1]
Dump Truck	84	0.4
Front End Loader	80	0.4
Concrete Saw	90	0.2

Ground Type	soft
Source Height	8
Receiver Height	5
Ground Factor[2]	0.63

Predicted Noise Level [3]	L_{eq} dBA at 50 feet[3]
Dump Truck	80.0
Front End Loader	76.0
Concrete Saw	83.0

Combined Predicted Noise Level (L_{eq} dBA at 50 feet)
85.3

Sources:

[1] Obtained from the FHWA Roadway Construction Noise Model, January 2006. Table 1.

[2] Based on Table 4-26 from the Federal Transit Noise and Vibration Impact Assessment, 2018 (pg 86).

[3] Based on the following from the Federal Transit Noise and Vibration Impact Assessment, 2018 (pg 176 and 177).

$L_{eq}(equip) = E.L.+10*\log(U.F.) - 20*\log(D/50) - 10*G*\log(D/50)$

Where: E.L. = Emission Level;

U.F.= Usage Factor;

G = Constant that accounts for topography and ground effects (FTA 2018: pg 86); and

D = Distance from source to receiver.

Construction Source Noise Prediction Model

Location	Distance to Nearest Receptor in feet	Combined Predicted Noise Level (L_{eq} dBA)
Threshold	741	55.0
Nearest Residential Receptor	170	70.3
25 feet from Nearest Residential Receptor	195	68.7
50 feet from Nearest Residential Receptor	220	67.3

Equipment	Reference Noise Levels (L_{max}) at 50 feet[1]	Usage Factor[1]
Dump Truck	84	0.4
Front End Loader	80	0.4
Excavator	85	0.4

Ground Type	soft
Source Height	8
Receiver Height	5
Ground Factor[2]	0.63

Predicted Noise Level [3]	L_{eq} dBA at 50 feet[3]
Dump Truck	80.0
Front End Loader	76.0
Excavator	81.0

Combined Predicted Noise Level (L_{eq} dBA at 50 feet)
84.3

Sources:

[1] Obtained from the FHWA Roadway Construction Noise Model, January 2006. Table 1.

[2] Based on Table 4-26 from the Federal Transit Noise and Vibration Impact Assessment, 2018 (pg 86).

[3] Based on the following from the Federal Transit Noise and Vibration Impact Assessment, 2018 (pg 176 and 177).

L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50)

Where: E.L. = Emission Level;

U.F.= Usage Factor;

G = Constant that accounts for topography and ground effects (FTA 2018: pg 86); and

D = Distance from source to receiver.

Construction Source Noise Prediction Model

Location	Distance to Nearest Receptor in feet	Combined Predicted Noise Level (L_{eq} dBA)
Threshold	1,133	55.0
Nearest Residential Receptor	270	69.6
25 feet from Nearest Residential Receptor	295	68.6
50 feet from Nearest Residential Receptor	320	67.6

Equipment	Reference Noise Levels (L_{max}) at 50 feet[1]	Usage Factor[1]
Dump Truck	84	0.4
Front End Loader	80	0.4
Vibratory Pile Driver	95	0.2

Ground Type	soft
Source Height	8
Receiver Height	5
Ground Factor[2]	0.63

Predicted Noise Level [3]	L_{eq} dBA at 50 feet[3]
Dump Truck	80.0
Front End Loader	76.0
Vibratory Pile Driver	88.0

Combined Predicted Noise Level (L_{eq} dBA at 50 feet)
88.9

Sources:

[1] Obtained from the FHWA Roadway Construction Noise Model, January 2006. Table 1.

[2] Based on Table 4-26 from the Federal Transit Noise and Vibration Impact Assessment, 2018 (pg 86).

[3] Based on the following from the Federal Transit Noise and Vibration Impact Assessment, 2018 (pg 176 and 177).

L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50)

Where: E.L. = Emission Level;

U.F.= Usage Factor;

G = Constant that accounts for topography and ground effects (FTA 2018: pg 86); and

D = Distance from source to receiver.

Construction Source Noise Prediction Model

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Location	Distance to Nearest Receptor in feet	Combined Predicted Noise Level (L_{max} dBA)
Threshold	225	75.0
Nearest Residential Receptor	65	88.3
25 feet from Nearest Residential Receptor	90	84.6
50 feet from Nearest Residential Receptor	115	81.8

Equipment	Reference Emission Noise Levels (L_{max}) at 50 feet[1]	Usage Factor[1]
Dump Truck	84	1
Front End Loader	80	1
Concrete Saw	90	1

Ground Type	soft
Source Height	8
Receiver Height	5
Ground Factor[2]	0.63

Predicted Noise Level [3]	L_{eq} dBA at 50 feet[3]
Dump Truck	84.0
Front End Loader	80.0
Concrete Saw	90.0

Combined Predicted Noise Level (L_{max} dBA at 50 feet)
91.3

Sources:

[1] Obtained from the FHWA Roadway Construction Noise Model, January 2006. Table 1.

[2] Based on Table 4-26 from the Federal Transit Noise and Vibration Impact Assessment, 2018 (pg 86).

[3] Based on the following from the Federal Transit Noise and Vibration Impact Assessment, 2018 (pg 176 and 177).

L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50)

Where: E.L. = Emission Level;

U.F.= Usage Factor;

G = Constant that accounts for topography and ground effects (FTA 2018: pg 86); and

D = Distance from source to receiver.

Construction Source Noise Prediction Model

Location	Distance to Nearest Receptor in feet	Combined Predicted Noise Level (L_{max} dBA)
Threshold	169	75.0
Nearest Residential Receptor	170	74.2
25 feet from Nearest Residential Receptor	195	72.7
50 feet from Nearest Residential Receptor	220	71.3

Equipment	Reference Emission Noise Levels (L_{max}) at 50 feet[1]	Usage Factor[1]
Dump Truck	84	1
Front End Loader	80	1
Excavator	85	1

Ground Type	soft
Source Height	8
Receiver Height	5
Ground Factor[2]	0.63

Predicted Noise Level [3]	L_{eq} dBA at 50 feet[3]
Dump Truck	84.0
Front End Loader	80.0
Excavator	85.0

Combined Predicted Noise Level (L_{max} dBA at 50 feet)
88.2

Sources:

[1] Obtained from the FHWA Roadway Construction Noise Model, January 2006. Table 1.

[2] Based on Table 4-26 from the Federal Transit Noise and Vibration Impact Assessment, 2018 (pg 86).

[3] Based on the following from the Federal Transit Noise and Vibration Impact Assessment, 2018 (pg 176 and 177).

L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50)

Where: E.L. = Emission Level;

U.F.= Usage Factor;

G = Constant that accounts for topography and ground effects (FTA 2018: pg 86); and

D = Distance from source to receiver.

Construction Source Noise Prediction Model

Location	Distance to Nearest Receptor in feet	Combined Predicted Noise Level (L_{max} dBA)
Threshold	329	75.0
Nearest Residential Receptor	270	76.2
25 feet from Nearest Residential Receptor	295	75.2
50 feet from Nearest Residential Receptor	320	74.2

Equipment	Reference Emission Noise Levels (L_{max}) at 50 feet[1]	Usage Factor[1]
Dump Truck	84	1
Front End Loader	80	1
Vibratory Pile Driver	95	1

Ground Type	soft
Source Height	8
Receiver Height	5
Ground Factor[2]	0.63

Predicted Noise Level [3]	L_{eq} dBA at 50 feet[3]
Dump Truck	84.0
Front End Loader	80.0
Vibratory Pile Driver	95.0

Combined Predicted Noise Level (L_{max} dBA at 50 feet)
95.5

Sources:

[1] Obtained from the FHWA Roadway Construction Noise Model, January 2006. Table 1.

[2] Based on Table 4-26 from the Federal Transit Noise and Vibration Impact Assessment, 2018 (pg 86).

[3] Based on the following from the Federal Transit Noise and Vibration Impact Assessment, 2018 (pg 176 and 177).

L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50)

Where: E.L. = Emission Level;

U.F.= Usage Factor;

G = Constant that accounts for topography and ground effects (FTA 2018: pg 86); and

D = Distance from source to receiver.

Construction Source Noise Prediction Model

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Location	Distance to Nearest Receptor in feet	Combined Predicted Noise Level (L_{eq} dBA)
Threshold	838	55.0
Residential receptor south of Pond B	550	58.2
Residential receptor east of Pond S5	1010	51.2

Equipment	Reference Noise Levels (L_{max}) at 50 feet[1]	Usage Factor[1]
Flat Bed Truck	84	0.4
Concrete Saw	90	0.2
Rock Drill	85	0.2

Ground Type	soft
Source Height	8
Receiver Height	5
Ground Factor[2]	0.63

Predicted Noise Level [3]	L_{eq} dBA at 50 feet[3]
Flat Bed Truck	80.0
Concrete Saw	83.0
Rock Drill	78.0

Combined Predicted Noise Level (L_{eq} dBA at 50 feet)
85.6

Sources:

[1] Obtained from the FHWA Roadway Construction Noise Model, January 2006. Table 1.

[2] Based on Table 4-26 from the Federal Transit Noise and Vibration Impact Assessment, 2018 (pg 86).

[3] Based on the following from the Federal Transit Noise and Vibration Impact Assessment, 2018 (pg 176 and 177).

L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50)

Where: E.L. = Emission Level;

U.F.= Usage Factor;

G = Constant that accounts for topography and ground effects (FTA 2018: pg 86); and

D = Distance from source to receiver.

Construction Source Noise Prediction Model

Location	Distance to Nearest Receptor in feet	Combined Predicted Noise Level (L_{max} dBA)
Threshold	238	75.0
Residential receptor south of Pond B	550	64.5
Residential receptor east of Pond S5	1010	57.6

Equipment	Reference Emission Noise Levels (L_{max}) at 50 feet[1]	Usage Factor[1]
Flat Bed Truck	84	1
Concrete Saw	90	1
Rock Drill	85	1

Ground Type	soft
Source Height	8
Receiver Height	5
Ground Factor[2]	0.63

Predicted Noise Level [3]	L_{eq} dBA at 50 feet[3]
Flat Bed Truck	84.0
Concrete Saw	90.0
Rock Drill	85.0

Combined Predicted Noise Level (L_{max} dBA at 50 feet)
92.0

Sources:

[1] Obtained from the FHWA Roadway Construction Noise Model, January 2006. Table 1.

[2] Based on Table 4-26 from the Federal Transit Noise and Vibration Impact Assessment, 2018 (pg 86).

[3] Based on the following from the Federal Transit Noise and Vibration Impact Assessment, 2018 (pg 176 and 177).

L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50)

Where: E.L. = Emission Level;

U.F.= Usage Factor;

G = Constant that accounts for topography and ground effects (FTA 2018: pg 86); and

D = Distance from source to receiver.

Operational Noise Prediction Model for CTF

Location	Distance to Nearest Receptor in feet	Combined Predicted Noise Level (L_{eq} dBA)
Threshold	1,510	40.0
Residential receptor south of Pond B	1580	37.5
Residential receptor east of Pond S5	2060	34.5

Equipment	Reference Noise Levels (L_{max}) at 50 feet[1]	Usage Factor[1]
Pumps	77	0.5
Pumps	77	0.5

Ground Type	soft
Source Height	8
Receiver Height	5
Ground Factor[2]	0.63

Predicted Noise Level [3]	L_{eq} dBA at 50 feet[3]
Pumps	74.0
Pumps	74.0

Combined Predicted Noise Level (L_{eq} dBA at 50 feet)
77.0

Sources:

[1] Obtained from the FHWA Roadway Construction Noise Model, January 2006. Table 1.

[2] Based on Table 4-26 from the Federal Transit Noise and Vibration Impact Assessment, 2018 (pg 86).

[3] Based on the following from the Federal Transit Noise and Vibration Impact Assessment, 2018 (pg 176 and 177).

L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50)

Where: E.L. = Emission Level;

U.F.= Usage Factor;

G = Constant that accounts for topography and ground effects (FTA 2018: pg 86); and

D = Distance from source to receiver.

Operational Noise Prediction Model for CTF

Location	Distance to Nearest Receptor in feet	Combined Predicted Noise Level (L_{max} dBA)
Threshold	199	65.0
Residential receptor south of Pond B	1580	40.5
Residential receptor east of Pond S5	2060	37.5

Equipment	Reference Emission Noise Levels (L_{max}) at 50 feet[1]	Usage Factor[1]
Pumps	77	1
Pumps	77	1

Ground Type	soft
Source Height	8
Receiver Height	5
Ground Factor[2]	0.63

Predicted Noise Level [3]	L_{eq} dBA at 50 feet[3]
Pumps	77.0
Pumps	77.0

Combined Predicted Noise Level (L_{max} dBA at 50 feet)
80.0

Sources:

[1] Obtained from the FHWA Roadway Construction Noise Model, January 2006. Table 1.

[2] Based on Table 4-26 from the Federal Transit Noise and Vibration Impact Assessment, 2018 (pg 86).

[3] Based on the following from the Federal Transit Noise and Vibration Impact Assessment, 2018 (pg 176 and 177).

L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50)

Where: E.L. = Emission Level;

U.F.= Usage Factor;

G = Constant that accounts for topography and ground effects (FTA 2018: pg 86); and

D = Distance from source to receiver.

Equipment Description	Acoustical Usage Factor (%)	Spec 721.560 Lmax @ 50ft (dBA slow)	Actual Measured Lmax @ 50ft (dBA slow)	No. of Actual Data Samples (count)	Spec 721.560 LmaxCalc	Spec 721.560 Leq	Distance	Actual Measured LmaxCalc	Actual Measured Leq
Auger Drill Rig	20	85	84	36	79.0	72.0	100	78.0	71.0
Backhoe	40	80	78	372	74.0	70.0	100	72.0	68.0
Bar Bender	20	80	na	0	74.0	67.0	100		
Blasting	na	94	na	0	88.0		100		
Boring Jack Power Unit	50	80	83	1	74.0	71.0	100	77.0	74.0
Chain Saw	20	85	84	46	79.0	72.0	100	78.0	71.0
Clam Shovel (dropping)	20	93	87	4	87.0	80.0	100	81.0	74.0
Compactor (ground)	20	80	83	57	74.0	67.0	100	77.0	70.0
Compressor (air)	40	80	78	18	74.0	70.0	100	72.0	68.0
Concrete Batch Plant	15	83	na	0	77.0	68.7	100		
Concrete Mixer Truck	40	85	79	40	79.0	75.0	100	73.0	69.0
Concrete Pump Truck	20	82	81	30	76.0	69.0	100	75.0	68.0
Concrete Saw	20	90	90	55	84.0	77.0	100	84.0	77.0
Crane	16	85	81	405	79.0	71.0	100	75.0	67.0
Dozer	40	85	82	55	79.0	75.0	100	76.0	72.0
Drill Rig Truck	20	84	79	22	78.0	71.0	100	73.0	66.0
Drum Mixer	50	80	80	1	74.0	71.0	100	74.0	71.0
Dump Truck	40	84	76	31	78.0	74.0	100	70.0	66.0
Excavator	40	85	81	170	79.0	75.0	100	75.0	71.0
Flat Bed Truck	40	84	74	4	78.0	74.0	100	68.0	64.0
Front End Loader	40	80	79	96	74.0	70.0	100	73.0	69.0
Generator	50	82	81	19	76.0	73.0	100	75.0	72.0
Generator (<25KVA, VMS signs)	50	70	73	74	64.0	61.0	100	67.0	64.0
Gradall	40	85	83	70	79.0	75.0	100	77.0	73.0
Grader	40	85	na	0	79.0	75.0	100		
Grapple (on Backhoe)	40	85	87	1	79.0	75.0	100	81.0	77.0
Horizontal Boring Hydr. Jack	25	80	82	6	74.0	68.0	100	76.0	70.0
Hydra Break Ram	10	90	na	0	84.0	74.0	100		
Impact Pile Driver	20	95	101	11	89.0	82.0	100	95.0	88.0
Jackhammer	20	85	89	133	79.0	72.0	100	83.0	76.0
Man Lift	20	85	75	23	79.0	72.0	100	69.0	62.0
Mounted Impact Hammer (hoe ram)	20	90	90	212	84.0	77.0	100	84.0	77.0
Pavement Scarafier	20	85	90	2	79.0	72.0	100	84.0	77.0
Paver	50	85	77	9	79.0	76.0	100	71.0	68.0
Pickup Truck	40	55	75	1	49.0	45.0	100	69.0	65.0
Pneumatic Tools	50	85	85	90	79.0	76.0	100	79.0	76.0
Pumps	50	77	81	17	71.0	68.0	100	75.0	72.0
Refrigerator Unit	100	82	73	3	76.0	76.0	100	67.0	67.0
Rivit Buster/chipping gun	20	85	79	19	79.0	72.0	100	73.0	66.0
Rock Drill	20	85	81	3	79.0	72.0	100	75.0	68.0
Roller	20	85	80	16	79.0	72.0	100	74.0	67.0
Sand Blasting (Single Nozzle)	20	85	96	9	79.0	72.0	100	90.0	83.0
Scraper	40	85	84	12	79.0	75.0	100	78.0	74.0
Shears (on backhoe)	40	85	96	5	79.0	75.0	100	90.0	86.0
Slurry Plant	100	78	78	1	72.0	72.0	100	72.0	72.0
Slurry Trenching Machine	50	82	80	75	76.0	73.0	100	74.0	71.0
Soil Mix Drill Rig	50	80	na	0	74.0	71.0	100		
Tractor	40	84	na	0	78.0	74.0	100		
Vacuum Excavator (Vac-truck)	40	85	85	149	79.0	75.0	100	79.0	75.0
Vacuum Street Sweeper	10	80	82	19	74.0	64.0	100	76.0	66.0
Ventilation Fan	100	85	79	13	79.0	79.0	100	73.0	73.0
Vibrating Hopper	50	85	87	1	79.0	76.0	100	81.0	78.0
Vibratory Concrete Mixer	20	80	80	1	74.0	67.0	100	74.0	67.0
Vibratory Pile Driver	20	95	101	44	89.0	82.0	100	95.0	88.0
Warning Horn	5	85	83	12	79.0	66.0	100	77.0	64.0
Welder / Torch	40	73	74	5	67.0	63.0	100	68.0	64.0

Source:
FHWA Roadway Construction Noise Model, January 2006. Table 9.1
U.S. Department of Transportation
CA/T Construction Spec. 721.560

Distance Propagation Calculations for Stationary Sources of Ground Vibration

ASCENT ENVIRONMENTAL

KEY: Orange cells are for input.
Grey cells are intermediate calculations performed by the model.
Green cells are data to present in a written analysis (output).

STEP 1: Determine units in which to perform calculation.

— If vibration decibels (VdB), then use Table A and proceed to Steps 2A and 3A.
— If peak particle velocity (PPV), then use Table B and proceed to Steps 2B and 3B.

STEP 2A: Identify the vibration source and enter the reference vibration level (VdB) and distance.

STEP 3A: Select the distance to the receiver.

Table A. Propagation of vibration decibels (VdB) with distance

Noise Source/ID	Reference Noise Level			Attenuated Noise Level at Receptor		
	vibration level (VdB)	@	distance (ft)	vibration level (VdB)	@	distance (ft)
Impact pile driver	104	@	25	80.2	@	155
Loaded truck	86	@	25	79.9	@	40
Jack and bore	87	@	25	79.9		43

The Lv metric (VdB) is used to assess the likelihood for vibration to result in human annoyance.

STEP 2B: Identify the vibration source and enter the reference peak particle velocity (PPV) and distance.

STEP 3B: Select the distance to the receiver.

Table B. Propagation of peak particle velocity (PPV) with distance

Noise Source/ID	Reference Noise Level			Attenuated Noise Level at Receptor		
	vibration level (PPV)	@	distance (ft)	vibration level (PPV)	@	distance (ft)
Impact pile driver	0.644	@	25	0.20	@	55
Loaded truck	0.076	@	25	0.20	@	13
Jack and bore	0.089	@	25	0.19	@	15

The PPV metric (in/sec) is used for assessing the likelihood for the potential of structural damage.

Notes:

Computation of propagated vibration levels is based on Equations 7-2 and 7-3 presented on page 185 of FTA 2018. Estimates of attenuated vibration levels do not account for reductions from intervening underground barriers or other underground structures of any type, or changes in soil type.

Sources:

Federal Transit Administration. 2018. Transit Noise and Vibration Impact Assessment. FTA Report No. 0123. Prepared by John A. Volpe National Transportation Systems Center, Cambridge, MA. Available: https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf. Accessed April 8, 2020.

Traffic Noise Spreadsheet Calculator

Project: #REF!

Noise Level Descriptor: CNEL
Site Conditions: Soft
Traffic Input: ADT
Traffic K-Factor:

Segment Description and Location				Input										Output				
					Speed	Distance to Directional Centerline, (feet)[4]		Traffic Distribution Characteristics						CNEL,	Distance to Contour, (feet)[3]			
Number	Name	From	To	ADT	(mph)	Near	Far	% Auto	% Medium	% Heavy	% Day	% Eve	% Night	(dBA)[5,6,7]	70 dBA	65 dBA	60 dBA	55 dBA
#REF!																		
1	Interstate 5	State Route 205	Lathrop Road	279,000	65	100	145	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%	80.1	571	1231	2652	5713

*All modeling assumes average pavement, level roadways (less than 1.5% grade), constant traffic flow and does not account for shielding of any type or finite roadway adjustments. All levels are reported as A-weighted noise levels.

Citation #	Citations	
1	Caltrans Technical Noise Supplement. 2009 (November). Table (5-11), Pg 5-60.	Caltrans Technical Noise Supplement. 2013 (September). Table (4-2), Pg 4-17.
2	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-26), Pg 5-60.	Caltrans Technical Noise Supplement. 2013 (September). Equation (4-5), Pg 4-17
3	Caltrans Technical Noise Supplement. 2009 (November). Equation (2-16), Pg 2-32.	FHWA 2004 TNM Version 2.5
4	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-11), Pg 5-47, 48.	FHWA 2004 TNM Version 2.5
5	Caltrans Technical Noise Supplement. 2009 (November). Equation (2-26), Pg 2-55, 56.	Caltrans Technical Noise Supplement. 2013 (September). Equation (2-23), Pg 2-5
6	Caltrans Technical Noise Supplement. 2009 (November). Equation (2-27), Pg 2-57.	Caltrans Technical Noise Supplement. 2013 (September). Equation (2-24), Pg 2-5
7	Caltrans Technical Noise Supplement. 2009 (November). Pg 2-53.	Caltrans Technical Noise Supplement. 2013 (September). Pg 2-57.
8	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-7), Pg 5-45.	FHWA 2004 TNM Version 2.5
9	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-8), Pg 5-45.	FHWA 2004 TNM Version 2.5
10	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-9), Pg 5-45.	FHWA 2004 TNM Version 2.5
11	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-13), Pg 5-49.	FHWA 2004 TNM Version 2.5
12	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-14), Pg 5-49.	FHWA 2004 TNM Version 2.5
13	Federal Highway Administration Traffic Noise Model Technical Manual. Report No. FHWA-PD-96-010. 1998 (January). Equation (16), Pg 67	
14	Federal Highway Administration Traffic Noise Model Technical Manual. Report No. FHWA-PD-96-010. 1998 (January). Equation (20), Pg 69	
15	Federal Highway Administration Traffic Noise Model Technical Manual. Report No. FHWA-PD-96-010. 1998 (January). Equation (18), Pg 69	

References

California Department of Transportation (Caltrans). 2009 (November). Technical Noise Supplement. Available: http://www.dot.ca.gov/hq/env/noise/pub/tens_complete.pdf. Accessed A
2017.

Addition of Noise Levels from Multiple Sources at a Discrete Receptor

OBJECTIVE: This work sheet is designed to estiamte the combined level of noise exposure at a single discrete receptor from multiple point sources.

KEY: Orange cells are for input.
Grey cells are intermediate calculations performed by the model.
Green cells are data to present in a written analysis (output).

Receptor Name: **Houses on East Side of West Taron Drive (back yards) Close to Riparian Court During Daytime and Nighttime Hours**

STEP 1: Identify the noise sources and enter the reference noise levels (dBA and distance).
STEP 2: Select the ground type (hard or soft), and enter the source and receiver heights.
STEP 3: Select the distance to the receptor and the reduction provided by any intervening barrier.

Step 1.				Step 2.				Step 3.			
Noise Source	**Reference Noise Level**			**Attenuation Characteristics**				**Attenuated Noise Level at Receptor**			
	Reference Noise Level (dBA)	@	Reference Distance (ft)	Ground Type (soft/hard)	Source Height (ft)	Receiver Height (ft)	Ground Factor	Noise Level (dBA)	@	Distance to Receptor (ft)	Reduction Provided by Barrier, if any (dBA)
Construction crew 1	82.3	@	65	soft	8	5	0.63	82.3	@	65	0
Construction crew 2	82.3	@	65	soft	8	5	0.63	79.6	@	82	0
							0.66				
							0.66				
							0.66				
							0.66				

Combined level of noise exposure at receptor from all noise sources (dBA): **84.2**

Notes:
1 - Computation of the attenuated noise level is based on the equation presented on pg. 176 and 177 of FTA 2018.
2 - Computation of the ground factor is based on the equation presentd in Table 4-26 on pg. 86 of FTA 2018, where the distance of the reference noise leve can be adjusted and the usage factor is not applied (i.e., the usage factor is equal to 1).
3 - Summation of noise levels from different stationary noise sources at the same receptor is based on the equation presented on page 201 of FTA 2018.

Sources:
Federal Transit Association (FTA). 2018 (September). Transit Noise and Vibration Impact Assessment. Washington, D.C. Available: <http://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf>Accessed:

Sources:
Federal Transit Association (FTA). 2006 (May). Transit Noise and Vibration Impact Assessment. FTA-VA-90-1003-06. Washington, D.C. Available: <http://www.fta.dot.gov/documents/FTA_Noise_and_Vibration_Manual.pdf>. Accessed: March 5, 2020.

Addition of Noise Levels from Multiple Sources at a Discrete Receptor

OBJECTIVE: This work sheet is designed to estiamte the combined level of noise exposure at a single discrete receptor from multiple point sources.

KEY: Orange cells are for input.
Grey cells are intermediate calculations performed by the model.
Green cells are data to present in a written analysis (output).

Receptor Name: **Houses on East Side of West Taron Drive (back yards) Close to Riparian Court During Daytime and Nighttime Hours**

STEP 1: Identify the noise sources and enter the reference noise levels (dBA and distance).
STEP 2: Select the ground type (hard or soft), and enter the source and receiver heights.
STEP 3: Select the distance to the receptor and the reduction provided by any intervening barrier.

Step 1.				Step 2.				Step 3.			
Noise Source	**Reference Noise Level**			**Attenuation Characteristics**				**Attenuated Noise Level at Receptor**			
	Reference Noise Level (dBA)	@	Reference Distance (ft)	Ground Type (soft/hard)	Source Height (ft)	Receiver Height (ft)	Ground Factor	Noise Level (dBA)	@	Distance to Receptor (ft)	Reduction Provided by Barrier, if any (dBA)
Construction crew 1	88.3	@	65	soft	8	5	0.63	88.3	@	65	0
Construction crew 2	88.3	@	65	soft	8	5	0.63	85.6	@	82	0
							0.66				
							0.66				
							0.66				
							0.66				

Combined level of noise exposure at receptor from all noise sources (dBA): **90.2**

Notes:
1 - Computation of the attenuated noise level is based on the equation presented on pg. 176 and 177 of FTA 2018.
2 - Computation of the ground factor is based on the equation presentd in Table 4-26 on pg. 86 of FTA 2018, where the distance of the reference noise leve can be adjusted and the usage factor is not applied (i.e., the usage factor is equal to 1).
3 - Summation of noise levels from different stationary noise sources at the same receptor is based on the equation presented on page 201 of FTA 2018.

Sources:
Federal Transit Association (FTA). 2018 (September). Transit Noise and Vibration Impact Assessment. Washington, D.C. Available: <http://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf>Accessed:

Sources:
Federal Transit Association (FTA). 2006 (May). Transit Noise and Vibration Impact Assessment. FTA-VA-90-1003-06. Washington, D.C. Available: <http://www.fta.dot.gov/documents/FTA_Noise_and_Vibration_Manual.pdf>. Accessed: March 5, 2020.