UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
650 Capitol Mall, Suite 5-100
Sacramento, California 95814-4700

Refer to NMFS ECO #: WCR-2024-00199

August 2, 2024

Hillary Regnart
Project Manager, CA North Section
U.S. Army Corps of Engineers
1325 J Street
Sacramento, CA 95814-2922

Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson–Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Westside Sewer Interceptor Phase 3 Project.

Dear Ms. Regnart:

Thank you for your January 18, 2024, letter requesting initiation of consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 *et seq*.) for the Westside Sewer Interceptor Phase 3 Project. Thank you, also, for your request for consultation pursuant to the essential fish habitat (EFH) provisions in Section 305(b) of the Magnuson–Stevens Fishery Conservation and Management Act [16 U.S.C. 1855(b)] for this action.

Based on the best available scientific and commercial information, the biological opinion concludes that the proposed project is not likely to jeopardize the continued existence of the federally listed: endangered Sacramento River (SR) winter-run Chinook salmon (*Oncorhynchus tshawytscha*) evolutionarily significant unit (ESU), threatened Central Valley (CV) spring-run Chinook salmon (*O. tshawytscha*) ESU, threatened California Central Valley (CCV) steelhead distinct population segment (DPS) (*O. mykiss*), or the threatened southern DPS (sDPS) of North American green sturgeon (*Acipenser medirostris*), and is not likely to destroy or adversely modify the designated critical habitats of the above federally listed species. For the above species, NMFS has included an incidental take statement with reasonable and prudent measures and terms and conditions that are necessary and appropriate to avoid, minimize, or monitor incidental take of listed species associated with the project.

We have also concluded that the action would adversely affect EFH designated under the Pacific Coast Salmon Fishery Management Plan (PFMC 2014), and we included EFH conservation recommendations in this document.

Please contact Kathryn Swick at the California Central Valley Office of NMFS at (301) 427-7812 or via email at kathryn.swick@noaa.gov if you have any questions concerning this consultation, or if you require additional information.

Sincerely,

A. Catherine Marcinkevage

Cathy Marcinkevage
Assistant Regional Administrator for
California Central Valley Office

Enclosure

cc: ARN 151422-WRC2024-SA0006

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Heather Waldrop, Stantec Consulting Services Inc., heather.waldrop@stantec.com

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Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion [and Magnuson–Stevens Fishery Conservation and Management Act Essential Fish Habitat Response]

Westside Sewer Interceptor Phase 3 Project

NMFS Consultation ECO Number: WCR-2024-00199

Action Agency: U.S. Army Corps of Engineers

Affected Species and NMFS' Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species?	Is Action Likely to Jeopardize the Species?	Is Action Likely to Adversely Affect Critical Habitat?	Is Action Likely to Destroy or Adversely Modify Critical Habitat?
SR winter-run Chinook salmon (*O. tshawytscha*) ESU	Endangered	Yes	No	Yes	No
CV spring-run Chinook salmon (*O. tshawytscha*) ESU	Threatened	Yes	No	Yes	No
CCV steelhead DPS (*O. mykiss*)	Threatened	Yes	No	Yes	No
sDPS North American green sturgeon (*Acipenser medirostris*)	Threatened	No	No	Yes	No

Fishery Management Plan That Identifies EFH in the Project Area	Does Action Have an Adverse Effect on EFH?	Are EFH Conservation Recommendations Provided?
Pacific Coast Salmon	Yes	Yes

Consultation Conducted By: National Marine Fisheries Service, West Coast Region

Issued A. Catherine Marcinkevage

By:Cathy Marcinkevage
Assistant Regional Administrator for California Central Valley Office

Date: **August 2, 2024**

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1. INTRODUCTION

This Introduction section provides information relevant to the other sections of this document and is incorporated by reference into Sections 2 and 3, below.

1.1. Background

The National Marine Fisheries Service (NMFS) prepared the biological opinion (opinion) and incidental take statement (ITS) portions of this document in accordance with section 7(b) of the Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531 *et seq*.), as amended, and implementing regulations at 50 CFR part 402.

We also completed an essential fish habitat (EFH) consultation on the proposed action, in accordance with section 305(b)(2) of the Magnuson–Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1801 *et seq*.) and implementing regulations at 50 CFR part 600.

We completed pre-dissemination review of this document using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (DQA) (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The document will be available within 2 weeks at the NOAA Library Institutional Repository (https://repository.library.noaa.gov/welcome). A complete record of this consultation is on file at the Sacramento NMFS Office.

1.2. Consultation History

- On May 3, 2022, the Senior Environmental Specialist of the California Department of Fish and Wildlife (CDFW), Northern Region, reached out to NMFS seeking early consultation for the proposed Westside Sewer Interceptor Phase 3 Project (proposed project) in Redding, CA. Subsequently, the US Army Corps of Engineers (USACE) did not initiate consultation.
- On January 17, 2024, USACE sent an email with additional information pertaining to the proposed project; however, NMFS had no record of a formal consultation request.
- On January 18, 2024, NMFS received the formal consultation request for the proposed project.
- On February 1, 2024, NMFS requested more information regarding the project start date, the timeframe of in-water work, information on how the applicant would assemble the work platform, and information on their anticipated acoustic impact.
- On February 29, 2024, NMFS had a call via WebEx with the USACE, Stantec Inc., and the City of Redding to discuss the in-water work schedule in Clear Creek. All parties agreed that heavy construction in Clear Creek would begin after the June pulse flows at the Whiskeytown Dam. The applicant agreed to follow up with these agreements in writing.
- On March 20, 2024, NMFS received all requested information and initiated formal consultation.

On July 5, 2022, the U.S. District Court for the Northern District of California issued an order vacating the 2019 regulations that were revised or added to 50 CFR part 402 in 2019 ("2019 Regulations," see 84 FR 44976, August 27, 2019) without making a finding on the merits. On September 21, 2022, the U.S. Court of Appeals for the Ninth Circuit granted a temporary stay of the district court's July 5 order. On November 14, 2022, the Northern District of California issued an order granting the government's request for voluntary remand without vacating the 2019 regulations. The District Court issued a slightly amended order two days later on November 16, 2022. As a result, the 2019 regulations remain in effect, and we are applying the 2019 regulations here. For purposes of this consultation and in an abundance of caution, we considered whether the substantive analysis and conclusions articulated in the biological opinion and incidental take statement would be any different under the pre-2019 regulations. We have determined that our analysis and conclusions would not be any different.

1.3. Proposed Federal Action

Under the ESA, "action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (see 50 CFR 402.02). Under the MSA, "Federal action" means any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken by a Federal agency (see 50 CFR 600.910). The City of Redding, California, funded and directed the design, permitting, construction, and monitoring for this project. The USACE is the lead federal action agency for the purposes of this consultation. The applicant plans to replace 3,200 feet (ft) (975.36 meters (m)) of existing trunk-sewer pipeline. The proposed action will increase the conveyance capacity of wastewater by replacing the existing sewer pipeline in the project area. This will prepare the City of Redding to handle increasing wastewater from peak wet weather events and population growth through increased development and construction.

We considered, under the ESA, whether or not the proposed action would cause any other activities and determined that it would not. The following sections describe the project description, project location, construction activities, and proposed avoidance, minimization, and conservation measures (AMMs).

1.3.1. Project location

The proposed project will take place in southern Redding, Shasta County, California. The new 3,200-foot pipeline would begin at the existing diversion structure located at Girvan Road, just east of Olney Creek in Cascade Park, and terminate at the Clear Creek Wastewater Treatment Plant's (CCWTP) existing headworks pump station wet well along the south bank of Clear Creek (Figure 1). The approximately 20-acre project area encompasses a 60–100-foot- (18.2–30.5 m) wide corridor along the new pipeline alignment, and four potential staging areas (varying from 0.4–0.6 acres each). The project location includes crossings of Clear Creek, Olney Creek, and an unnamed local drainage channel (unnamed channel).

The project location is in the Enterprise, California 7.5-minute U.S. Geological Survey (USGS) quadrangle in Township 30N, Range 5W, Section 30. The starting point of the project location is located at approximately 40°30'46.28"N and 122°22'6.70"W.

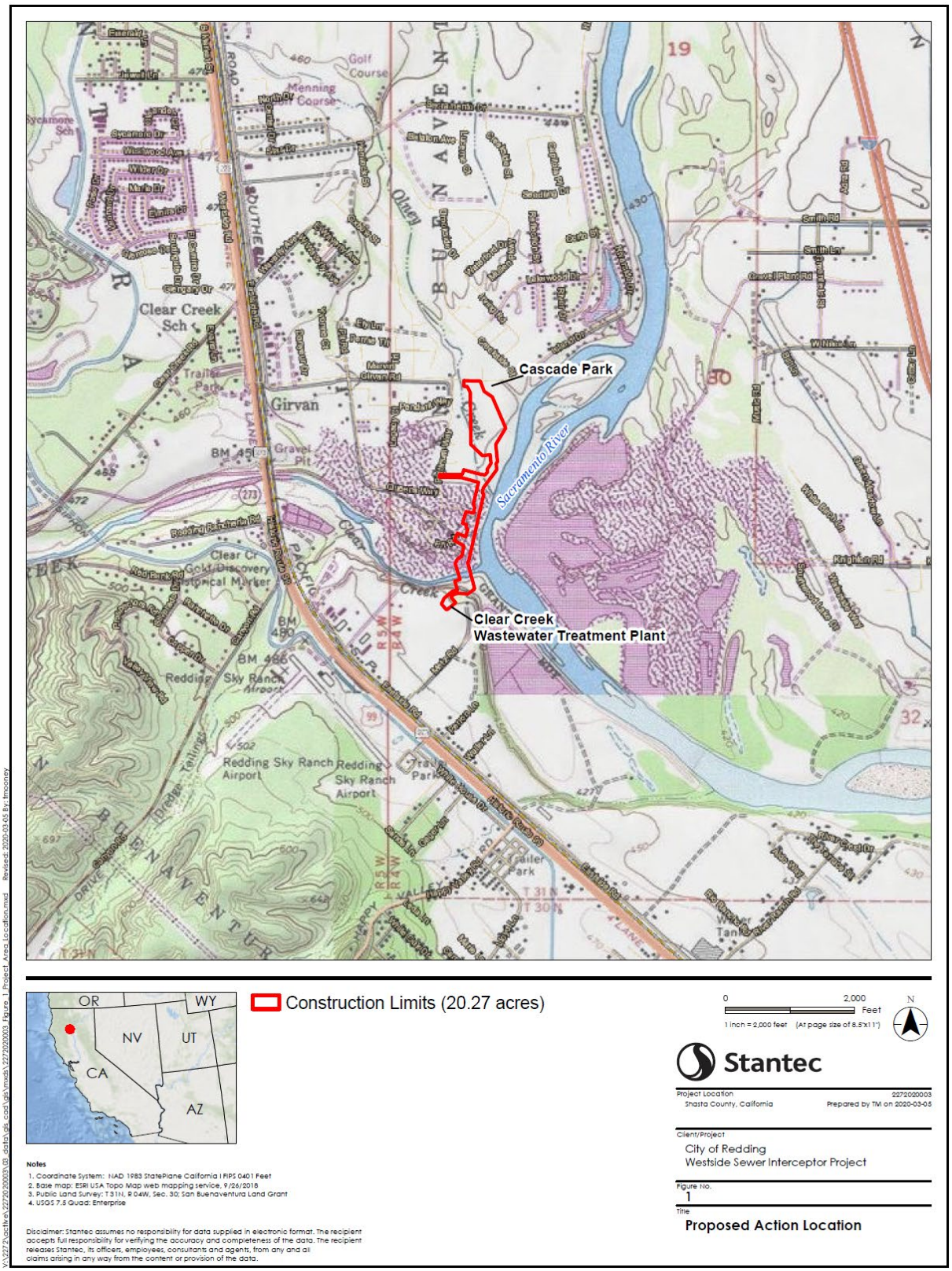

Figure 1. Proposed project beginning at Girvan Road and extend south along the east side of the Crown Estates neighborhood towards the CCWTP (Stantec Inc. 2023).

1.3.2. Project description

The city of Redding is proposing to construct a new 48-inch- (in) (121.9-centimeter- (cm)) diameter trunk-sewer pipeline to increase their wastewater collection system's hydraulic capacity. The existing 42 in (106.7 cm) diameter pipeline conveys wastewater from a diversion structure near Girvan Road to the CCWTP. The proposed new pipeline would provide additional capacity to accommodate existing stormwater surges and planned future-development wastewater flows, consistent with the projected buildout accounted for in the City's General Plan. The additional capacity also will significantly reduce the risk of sanitary sewer overflows during wet weather events.

The new pipeline would provide a maximum design flow of 30 million gallons (113.6 million liters) per day and includes:

1. A 20-foot-wide (6 m), 20-foot-long (6 m), 20-foot-deep (6 m) concrete junction structure at the north end near Girvan Road.
2. Seven maintenance holes placed approximately every 600 ft (182.9 m) along the alignment.
3. A second 20-foot-wide (6 m), 20-foot-long (6 m), 16-foot-deep (4.9 m) concrete junction structure approximately 100 ft (30.4 m) north of the Clear Creek channel crossing (Figures 2 and 3).

The applicant will construct a new maintenance hole on the existing 42 in (106.7 cm) pipe to improve inspection and maintenance access (located near the end of Garnet Ct.), and a new maintenance hole will be constructed to connect an existing sewer line that serves nearby properties to both the existing and new pipelines (see Figure 2). All the junction structures are located in upland areas. The proposed action would be located within an existing City-owned easement; however, an expanded and/or new easement will be required to accommodate the new pipeline. The new easement will be 50–60 ft (15.2–18.3 m) wide along the length of the project area. The applicant will install gravel access roads along the alignment to allow periodic access to maintenance holes from adjacent City streets. In addition, a new 12 ft (3.7 m) wide concrete walking path/access driveway will replace an old 6 ft (1.8 m) wide concrete walking path starting at Girvan Road and terminating at Cascade Park (Figure 2).

1.3.2.1 Upland construction

Construction for most of the proposed action will be via open cut, using two construction methods: sloped sidewall and vertical trenches. Depending on soil conditions, the contractor may choose to slope back the excavations at an approximate 1:1 slope; however, if soil conditions are not adequate to provide a safe work zone at the base of the excavated slope, vertical shoring (*e.g.*, trench boxes) will be installed on the banks of the excavation as shown in Figure 4. The width of the top trench of the sloped method would vary depending on the depth of the trench, but will range between 24 ft–44 ft (7.3 m–13.4 m). The vertical trench method requires a top width of about 10 ft (3 m). Both methods require at least 16 ft (4.9 m) of additional horizontal space on each side of the trench for access and safety.

Excavated material to be used as backfill will be temporarily stored adjacent to the trench area or nearby, typically within 500 ft (152.4 m) of excavation. The temporary storage will occur within the defined staging and construction areas. Excess excavated material (estimated to be up to 216,000 cubic feet (ft^3) (8,000 cubic yards (yd^3)) will be disposed of in accordance with federal, state, and local regulations.

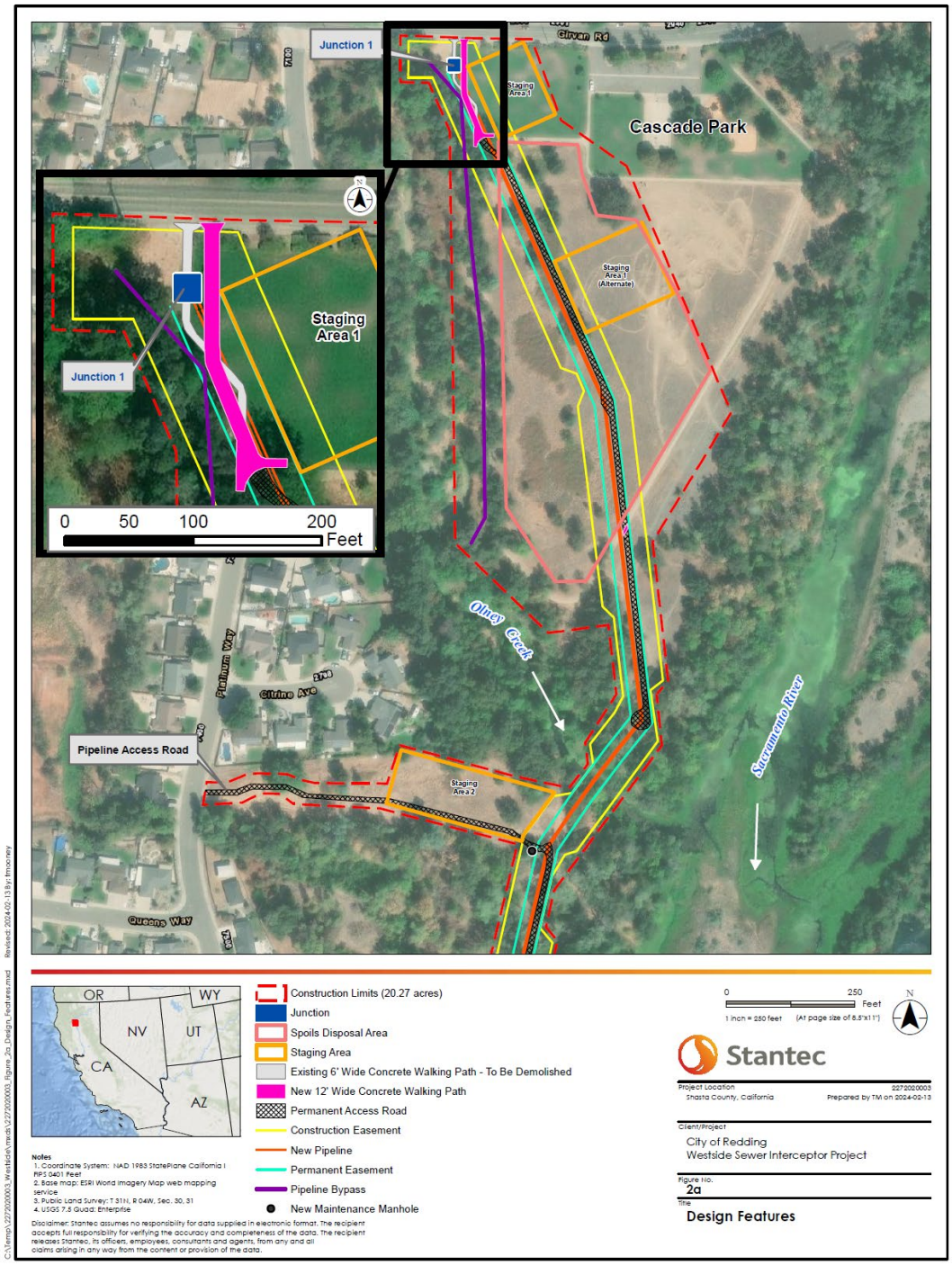

Figure 2. Path of the new pipeline and access to the construction areas. Image includes Olney Creek which is north of unnamed creek (Stantec Inc. 2023).

Figure 3. Path of the new pipeline and access to the construction areas. Image includes unnamed creek and Clear Creek which are south of unnamed creek (Stantec Inc. 2023).

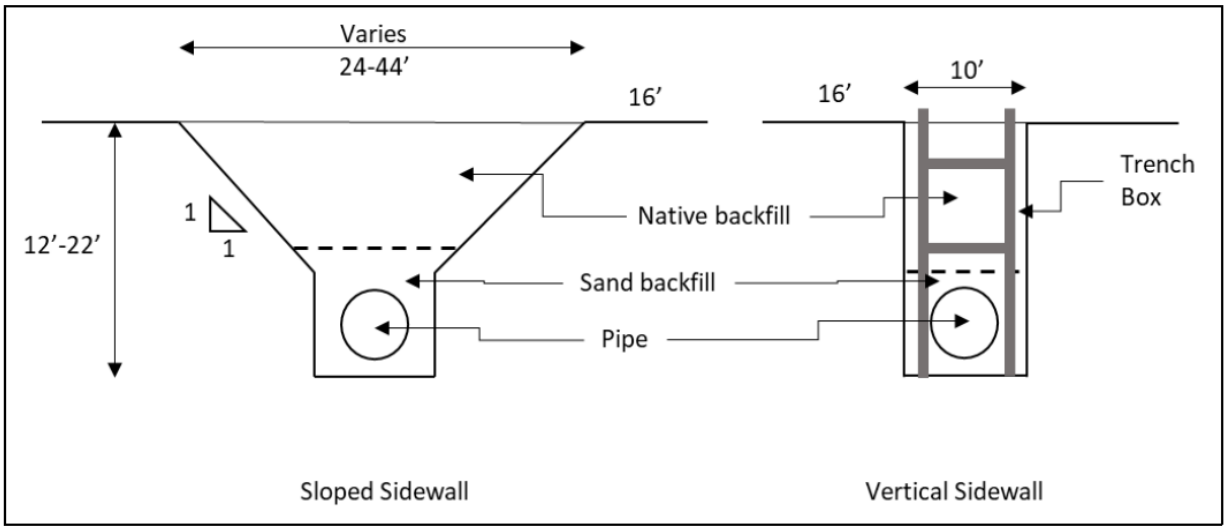

Figure 4. Typical excavation schematic (Stantec Inc. 2023).

Construction of the concrete junction structures will require temporary bypass pumping of wastewater while the old sewer is connected to the new one. During this approximately 3-week period, the applicant will pump wastewater from an upstream manhole to a downstream manhole to bypass the junction box while it is under construction. Bypass pumping will occur during the dry season to reduce required pumping capacity and reduce the likelihood of a spill.

Manhole excavation will require an area of about 10 ft wide (3 m), 10 ft long (3 m), and up to 25 ft deep (7.6 m) at each of the seven maintenance holes installed on the new pipeline as well as the two maintenance holes installed on the existing pipeline. The two concrete junction box structures will require an area of about 60 ft wide (18.2 m), 60 ft long (18.2 m), and up to 25 ft deep (7.6 m). Dewatering the excavations will be required; the water will be disposed of in accordance with local, state, and federal requirements. Dewatering water will be disposed of in the City's sewer system and will follow the City's requirement for pretreatment prior to discharge into the sewer.

The trenches will be backfilled with excavated native material from the site, but will require an additional 180,900 ft^3 (6,700 yd^3) of engineered backfill material. The ultimate outcome will be the restoration of the ground surface to pre-construction grades.

The general construction steps for upland construction are:

- Clear and grub the project area, remove trees and debris from the alignment
- Excavate the trench to the required depth
- Place bedding material (*e.g.*, washed sand) in the trench bottom
- Install the pipe segments
- Construct the trench dams at regular intervals
- Place intermediate backfill (*e.g.*, imported aggregate, native fill, slurry fill) over and around pipe to match the surrounding grade
- Compact and grade the filled trench to match pre-construction contours

1.3.2.2 Creek crossings

The proposed project will require construction within three waterways: Clear Creek, Olney Creek, and an unnamed channel (see Figure 2 and 3). All work within the crossings will occur during summer months during base-flow or dry conditions.

Clear Creek crossing

Construction of the Clear Creek pipeline crossing would be limited to June 1–August 31 to minimize impacts to listed fish species. Installation of the pipeline crossing will occur without significant dewatering of the construction area. To access the work area in the waterway, the applicant will excavate between 2–3 ft (61–91 cm) of streambank to create ramps down the bank to two temporary work platforms elevated above the stream surface; one platform for equipment access and one platform for materials staging. This will allow access of construction equipment to the in-channel construction area. The elevated work platforms will be constructed across the stream, adjacent to the pipeline alignment, and would extend across the entire creek approximately 8 ft (2 m) above the creek bed to provide a working area for the excavator and haul trucks (figure 5). Construction of the platforms would commence no earlier than June 1. Excavation within Clear Creek will occur after the completion of pulse flows from the Whiskeytown Dam (expected in mid-June) or July 1, whichever comes first.

Cofferdams will be installed upstream and downstream of the pipeline alignment, affecting about one-half of the channel width at a time. The cofferdams will prevent the migration of solids (rocks and floating debris) from entering the construction area but not keep the excavated area completely free of water (Figure 6). The cofferdams will consist of large concrete blocks that are on the creek bottom, or sheet piles (or a combination of both). If needed, sheet piles will be installed using a vibratory hammer or oscillated and pushed into place. Turbidity curtains will be installed downstream of the cofferdams and trench work, as necessary to control turbidity, meeting the Water Quality Control Plan for the Sacramento River and San Joaquin River Basin's turbidity objectives to protect beneficial water quality uses, including special status fish species protection (Stantec Inc. 2023).

The applicant will accomplish pipeline installation in Clear Creek in two stages. They will begin construction from about the center of the channel to the north bank and then transfer cofferdams to the other half of the creek working from the center of the channel to the south bank. During construction, the portion of the creek's width that is not under construction will be unimpeded to accommodate the natural flow of Clear Creek and allow for fish passage. The portion of the streambed protected by the cofferdam will be excavated to create a trench. The applicant will install and join pipe segments in the trench, and precast pipe weights made on-shore or in a precast shop will act as ballast on top of the newly installed pipe. Select segments of the coffer-dammed trench work may need to be isolated, using plastic sheeting to seal concrete block and/or sheet pile enclosures, to reduce water intrusion and promote successful joining of pipe segments and backfilling with specialized concrete. A pump will dewater wastewater from the coffer-dam-isolated in-channel trench segments into the existing sanitary sewer system. No concrete placement will take place in live flowing water and all concrete will cure completely prior to contact with the creeks. Native streambed materials will cover the concrete backfill to restore the bed to the original streambed elevation.

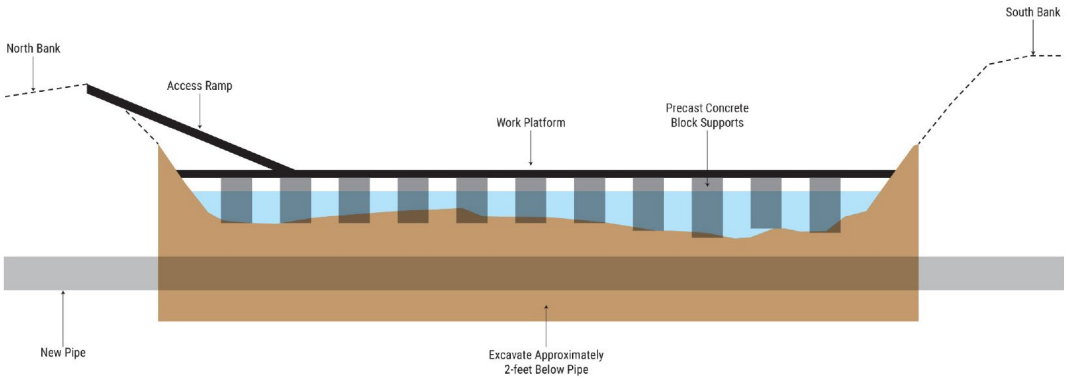

Figure 5. Potential work bridge design for Clear Creek crossing.

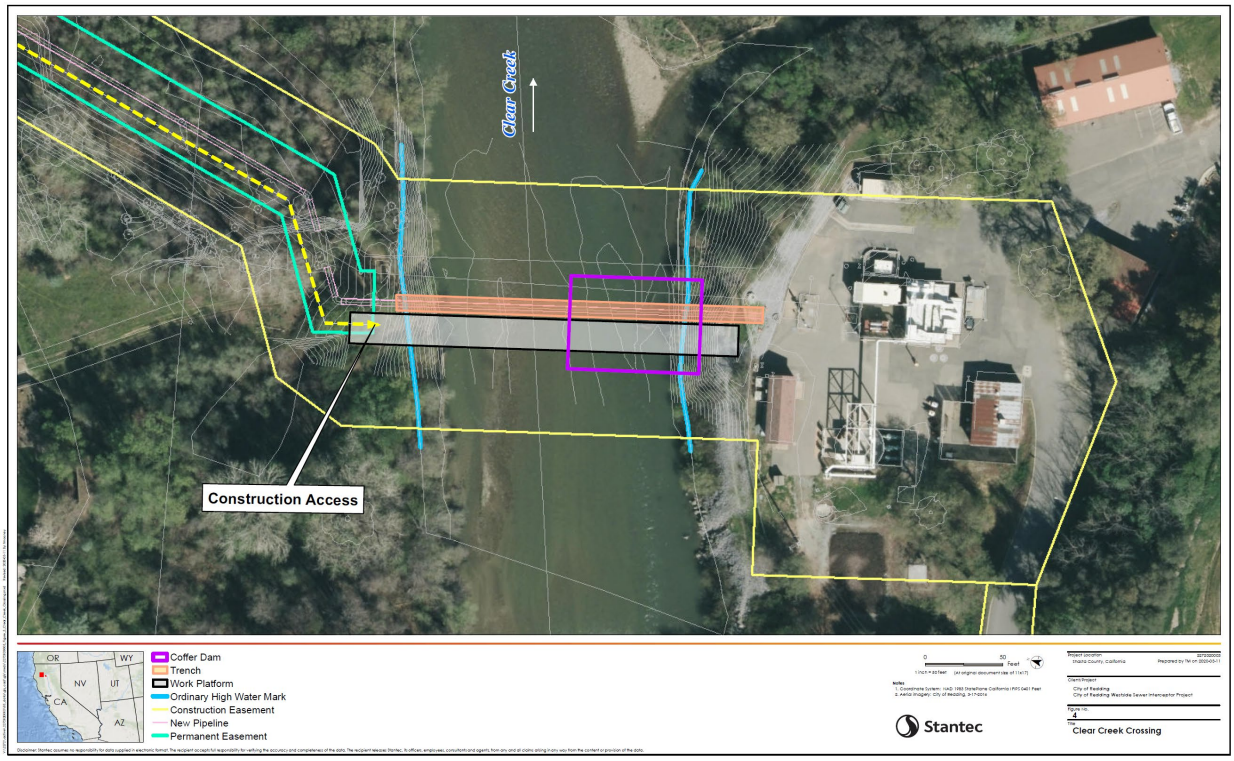

Figure 6. Proposed crossing and construction design for Clear Creek.

Olney Creek and unnamed creek crossings

The Olney Creek and unnamed channel crossings will be constructed using cofferdams upstream and downstream of the crossing (Figure 7 and 8). The applicant will divert flow in the channels around the construction areas using bypass pumping (or gravity flow bypass), and dewatered wastewater will divert into the City's sewer. Once the area is backfilled and the cofferdams removed, the applicant will return the area to pre-project elevations. Anticipated duration for these two creek crossings is approximately 25–40 days each.

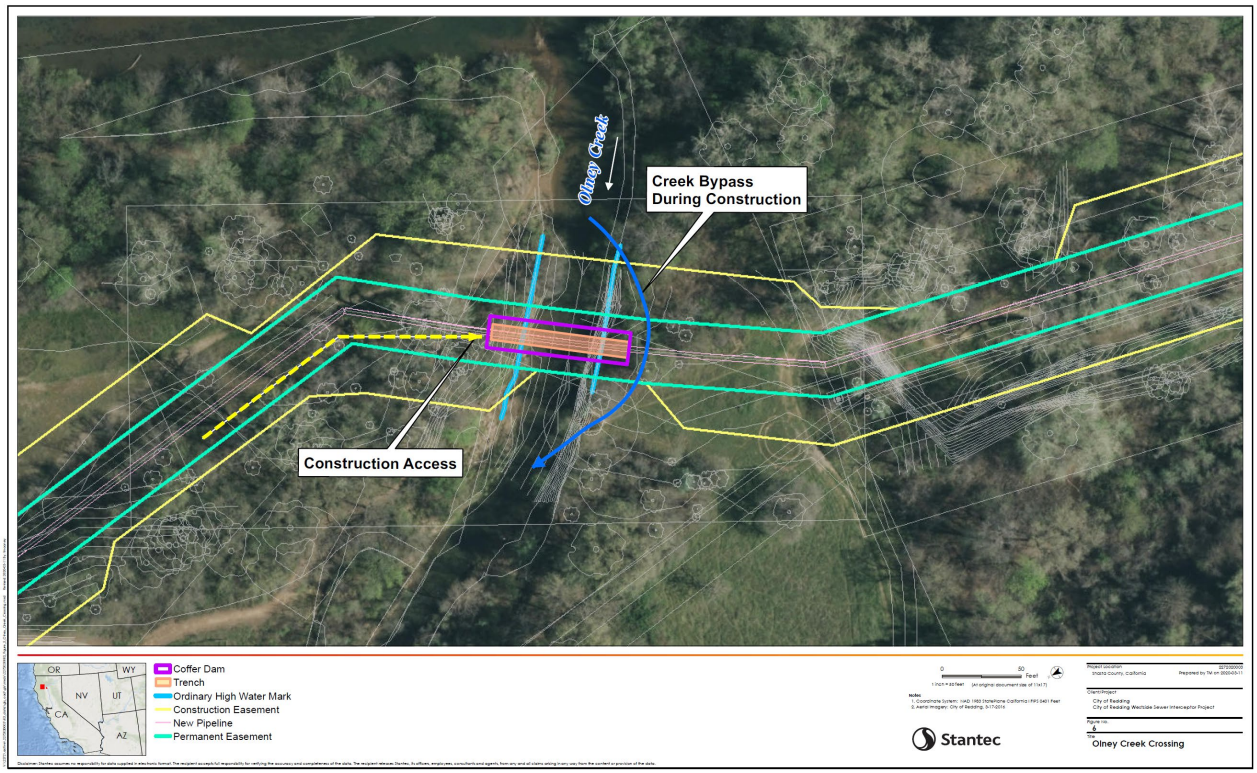

Figure 7. Proposed crossing and construction design for Olney Creek.

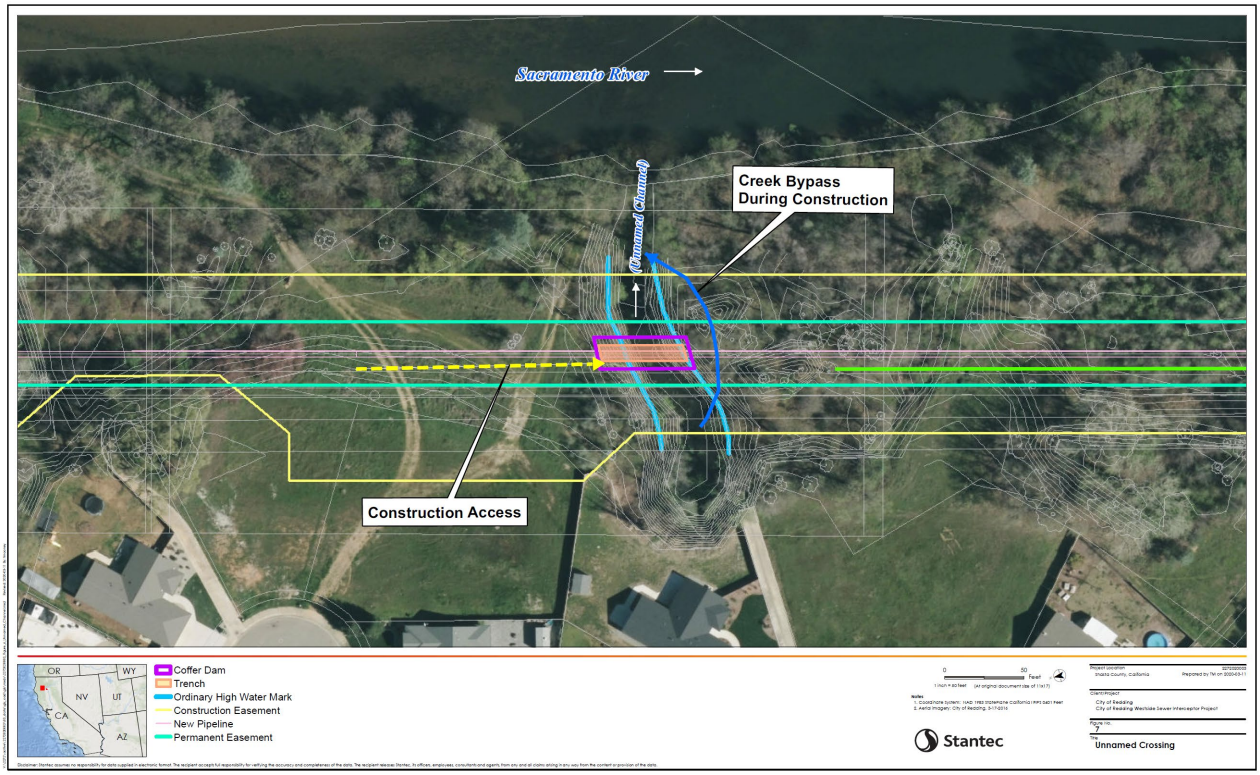

Figure 8. Proposed crossing and construction design for unnamed creek.

1.3.2.3 New concrete walkway

The applicant will remove an old 6-foot-wide, poured concrete walkway and create a new 12-foot-wide, poured concrete walkway/access driveway. The new pathway, and the pathway that will be demolished, originate at Girvan Road and terminate within the Cascade Park. To accomplish this, the applicant will remove approximately 1712 square ft (ft^2) of existing walkway and pour 2788 ft^2 of concrete for the new walkway/access driveway (Figure 9).

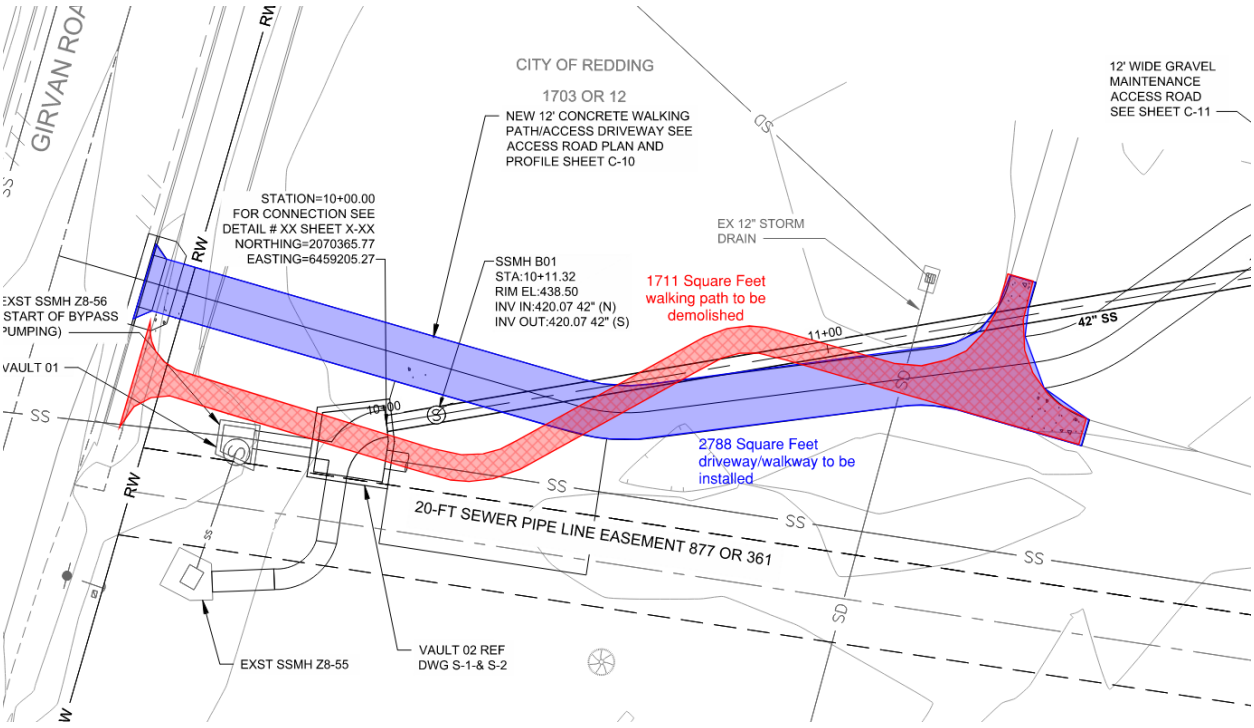

Figure 9. A close up image of the plans to remove the existing poured concrete pathway to build a new, wider poured concrete pathway.

1.3.2.4 Construction schedule

Construction activities should begin in late spring/early summer of 2025 and will take place over two construction seasons (summer 2025 and summer 2026). All work will be limited to Monday through Friday from 7 a.m.–7 p.m. Special hours, such as nights or weekends, may arise for special circumstances, such as the tie-in of the existing sewer lateral(s) to the new interceptor; however, this would only occur after approval by the City.

1.3.2.5 Construction access, vehicles, and staging

Construction access will be primarily through Girvan Road (staging area 1), Platinum Way (staging area 2), Garnet Court (staging area 3), and Pit Road (staging area 4). The applicant will construct a temporary road stabilized with gravel along the pipeline distance area. Construction crews will consist of 12–24 workers during a typical workday conducting multiple activities simultaneously where feasible. Table 1 provides a list of the general equipment most likely used for pipeline and structure construction during the project. Staging of equipment and materials for

construction would be within the temporary and permanent easements along the proposed pipeline alignment and in designated areas on City-owned property.

Table 1. Construction equipment

Equipment	Quantity
10-wheel dump trucks	6
Water tender trucks, 2400 gallon	1
Wheeled loaders	2
Backhoe	3
Skip loader	1
Tracked excavators	3 each
Bulldozers	1
Vibratory soil compactor	1
Portable diesel generator	1
Portable diesel generator (dewatering)	2
Bypass pumps	2
Rough terrain crane, 30 ton	1
Delivery trucks	60 trips
Dump trucks, 270 ft^3 (10 yd^3)	800 trips
Concrete trucks	65 trips
Bulk Material Delivery Trucks	1,500 trips

1.3.3. Avoidance, minimization, and conservation measures

Conservation measures are measures and practices adopted to reduce or avoid adverse effects that could result from project construction, maintenance, or operation. The following sections describe the measures adopted for the proposed project. Several construction best management practices (BMPs) and other measures to avoid or minimize impacts to surrounding resources, including the listed species and their critical habitat, will be implemented as part of the proposed action.

1.3.3.1 Fish protection measures and limited instream construction windows

Limited in-water work

The presence of at least one life stage of federally listed fish species exists in Clear Creek year round; thus, in-water work restrictions to avoid harm entirely are not possible. To protect the most vulnerable life stages within the project area, all in-channel work will occur June 1–August 31, and work will be limited to daylight hours, unless approved by the City. This work window prioritizes avoiding impacts to vulnerable species and life states of listed salmonids potentially present (specifically migrating and rearing juveniles, adult Chinook salmon, and any incubating Sacramento River (SR) winter-run Chinook salmon eggs downstream of the Clear Creek confluence with the Sacramento River).

Olney Creek and the unnamed creek experience seasonal inundation, and Olney Creek is critical habitat for Central Valley (CV) spring-run Chinook salmon and California Central Valley (CCV)

steelhead. Given the seasonal low-flow conditions and temperature restrictions of both creeks in summertime, in-water work will occur July 1–November 1 when constriction is least likely to affect federally listed fish species.

Fish survey and relocation

Fish inspection will occur before the commencement of in-water work in order to reduce the potential for effects to listed species through crushing or other impacts of construction activity at Clear Creek, Olney Creek, or the unnamed creek. If the applicant notes the presence of federally listed fish species, they will herd the fish away for the work area using seines. Qualified fish biologists will relocate federally listed fish species that need removed from completely enclosed work areas, such as when the cofferdam is sealed for concrete to cure. As another means to protect federally listed species, construction workers will operate their machinery slowly and deliberately during the excavation and placement of fill materials in the active channel so that federally listed fish species are warned and will move away from the work area.

In Clear Creek, most of the trenching and pipeline installation will occur within semi-isolated cofferdam work areas to manage upstream shoring and downstream turbidity. Semi-enclosed cofferdams will allow fish to volitionally enter and exit the work area; however, fully enclosed cofferdams will be necessary when pipes are joined and concrete is curing. As mentioned, a qualified biologist will relocate fish during this time. In Olney Creek and the unnamed creek, seining will herd federally and non-federally listed fish species from the work area. The seine will pass three times and then a block net will prevent fish from reentering the work area. These steps will protect federally and non-federally listed species from water pumping and diversion activities.

Pumping and bypass measures

Any withdrawals/movement of water from creek channels will use pump intakes with screens meeting NMFS/California Department of Fish and Wildlife (CDFW) criteria to prevent entrainment injury and impingement of fish. The NMFS Anadromous Salmonid Passage Facility Design (2011) guidelines include specific criteria for end of pipe screens and screen materials for use in streams and rivers, which include measures, such as:

Location: if applicable, the end of pipe screens must be placed in locations with sufficient ambient velocity to sweep away debris from the screen face or designed in a manner to prevent debris re-impingement and provide for debris removal.

Escape route: a clear escape route should exist for fish that approach the intake volitionally or otherwise. For example, if a pump intake is located off the river (such as in an intake lagoon), a conventional open channel screen should be placed in the intake channel or at the edge of the river to prevent fish from entering a lagoon.

Screen material guidelines: the percent open area for any screen material must be at least 27 percent. Circular screen face openings must not exceed 3/32 in (.24 cm) in diameter. Perforated plate must be smooth to the touch with openings punched through in the direction of an approaching flow. Slotted or rectangular screen face openings must not exceed 3/32 in (0.24 cm) on a side. The screen material must be corrosion resistant and sufficiently durable to maintain a

smooth, uniform surface with long-term use. Other components of the screen facility (such as seals) must not include gaps greater than the maximum screen opening defined above.

Turbidity monitoring

The City will hire a qualified water quality professional to monitor turbidity and suspended sediment levels at locations 50 ft (15.2 m) upstream and 300–500 ft (91.4–152.4 m) downstream from construction during any in-channel activities in Olney Creek or Clear Creek, when and where work has the greatest likelihood to affect water quality. Water quality monitoring will occur regularly (hourly) throughout each day during in-channel excavation, and the contractor will prepare a detailed turbidity monitoring report for the city. The contractor will report turbidity, settle-able solids, and other water quality results in real-time via automated data-loggers, or at least daily, to the City construction manager and NMFS, as deemed necessary.

Turbidity curtain deployment

In conjunction with daily turbidity monitoring, the contractor will install silt curtains immediately downstream of in-water work areas if necessary to meet water quality objectives, to minimize the amount of turbid water escaping from the construction site, and to prevent suspended sediment from drifting outside of the immediate project work site. The contractor will keep silt curtains in working order so that fish can volitionally enter and exit the curtained area without difficulty.

1.3.3.2 Erosion sediment control measures

Stormwater pollution prevention

The proposed action will include BMPs to reduce the potential for project-related erosion, sedimentation, and other potential impacts on water quality. Such provisions shall include the preparation of a stormwater pollution prevention plan, which will describe and illustrate said BMPs.

Limited vegetation removal and exclusionary fencing

Areas where vegetation needs to be removed will be identified in advance of ground disturbance and limited to those areas that have been approved by the City. Exclusionary fencing will be installed around areas that are not to be disturbed.

Sedimentation prevention BMPs

Suitable BMPs will be implemented, such as placing silt fences, straw wattles, or catch basins, below all construction activities at the edge of surface water features to intercept sediment before it reaches the waterway. These structures will be installed prior to any clearing or grading activities.

Sediment control measures will be in place prior to the onset of the rainy season and will be monitored and maintained in good working condition until disturbed areas have been revegetated. Additionally, for activity within jurisdictional waters, the City will also comply with

the terms of a Streambed Alteration Agreement with the CDFW. Prior to any disturbance into wetlands and other waters located in the action area, the required permits and authorizations will be obtained from the respective agencies. All terms and conditions of the required permits and authorizations will be implemented.

1.3.3.3 Prevention of accidental spills and release of hazardous materials

Construction specifications shall include the following measures to reduce potential impacts to vegetation and aquatic habitat resources in the project area associated with accidental spills of pollutants (*e.g.* fuel, oil, and grease). The construction measures listed below prevent hazardous materials from entering surface and ground waters during construction activities.

Handling, storage, and spill response of hazardous materials

A prepared plan shall include provisions for the proper handling and storage of all potentially hazardous materials and a site-specific spill prevention plan shall be implemented for potentially hazardous materials. The plan shall include the proper handling and storage of all potentially hazardous materials, as well as the proper procedures for cleaning up and reporting any spills. If necessary, containment berms shall be constructed to prevent spilled materials from reaching surface water features.

Equipment maintenance

All construction equipment will be inspected daily for leaks prior to the start of any activities. Vehicles and equipment used during construction will receive proper and timely maintenance to reduce the potential for mechanical breakdowns leading to a spill of fuel, lubricants, and other automotive fluids. Maintenance and fueling shall be conducted in an area at least 50 ft (15.2 m) away from waterways or within a designated fueling containment area.

Use of non-toxic hydraulic fluids

Equipment operating within the river channel shall use non-toxic vegetable oil for operating hydraulic equipment instead of conventional hydraulic fluids.

1.3.3.4 Prevention and spread of invasive species

Equipment cleanliness

All equipment used for off-road construction activities will be weed free prior to entering the action area. Construction equipment shall be properly disinfected or cleaned according to guidance provided by the State of California Aquatic Invasive Species Management Plan (CDFG 2008) prior to in-channel work to prevent the spread of aquatic invasive species.

Use of native species

Any seed mixes or other vegetative material used for re-vegetation of disturbed sites will consist of native plant materials.

Gravel standards

Any gravels or materials used for the temporary stream diversion shall be from a local source, or properly disinfected and cleaned.

1.3.3.5 Protection of riparian habitat

Pre-construction planning

The width of the construction disturbance zone within any riparian habitat shall be minimized through careful pre-construction planning.

Exclusionary fencing

Exclusionary fencing will be installed along the boundaries of all riparian areas to be avoided to ensure that impacts on riparian vegetation outside of the construction area are minimized.

Habitat mitigation

Mature trees, such as cottonwoods, alders, and valley oaks located in shaded riverine habitat (SRA) habitat near construction areas, shall be flagged and avoided during construction. Only those branches in the lower 10 ft (3 m) of any woody plant will be trimmed to accommodate vehicular access. Understory vegetation will be trimmed as needed. All mature trees deemed contributing SRA habitat that are disturbed during project activities will be replaced. The amount of habitat created/restored will be at least three times greater than the amount lost due to project implementation (3:1 ratio of new plantings per large woody riparian plant destroyed). In addition, the City has prepared a Compensatory Mitigation and Restoration Plan (Appendix B of the Stantec Westside Sewer Interceptor Project Biological Assessment is incorporated here by reference) to be approved by the CDFW that will include three years of monitoring and annual reporting to ensure success.

1.3.3.6 Air quality and dust control

The City shall include provisions in the construction bid documents that the contractor shall implement a dust control program to limit fugitive dust emissions. The dust control program shall include, but not be limited to, the following elements:

Stockpile dust control

Water any inactive construction sites and exposed stockpile sites at least twice daily, including during non-workdays or until soils are stable.

Hauling BMPs

Pursuant to the California Vehicle Code (Section 23114(e)(4)) (California Legislative Information 2016), all trucks hauling soil and other loose material to and from the construction site shall be covered or shall maintain at least 6 in (15.2 cm) of freeboard (i.e., minimum vertical distance between top of load and the trailer) unless the load, where it contacts the sides, front,

and back of the cargo container area, remains 6 in (15.2 cm) from the upper edge of the container area, and if the load does not extend, at its peak, above any part of the upper edge of the cargo container area.

2. ENDANGERED SPECIES ACT: BIOLOGICAL OPINION AND INCIDENTAL TAKE STATEMENT

The ESA establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat upon which they depend. As required by section 7(a)(2) of the ESA, each Federal agency must ensure that its actions are not likely to jeopardize the continued existence of endangered or threatened species or to adversely modify or destroy their designated critical habitat. Per the requirements of the ESA, Federal action agencies consult with NMFS, and section 7(b)(3) requires that, at the conclusion of consultation, NMFS provide an opinion stating how the agency's actions would affect listed species and their critical habitats. If incidental take is reasonably certain to occur, section 7(b)(4) requires NMFS to provide an ITS that specifies the impact of any incidental taking and includes reasonable and prudent measures (RPMs) and terms and conditions to minimize such impacts.

2.1. Analytical Approach

This biological opinion includes both a jeopardy analysis and an adverse modification analysis. The jeopardy analysis relies upon the regulatory definition of "jeopardize the continued existence of" a listed species, which is "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02). Therefore, the jeopardy analysis considers both survival and recovery of the species.

This biological opinion also relies on the regulatory definition of "destruction or adverse modification," which "means a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species" (50 CFR 402.02).

The designation(s) of critical habitat for CV spring-run Chinook salmon, CCV steelhead, and southern distinct population group (sDPS) North American green sturgeon use(s) the term primary constituent element (PCE) or essential features. The 2016 final rule (81 FR 7414; February 11, 2016) that revised the critical habitat regulations (50 CFR 424.12) replaced this term with physical or biological features (PBFs). The shift in terminology does not change the approach used in conducting a "destruction or adverse modification" analysis, which is the same regardless of whether the original designation identified PCEs, PBFs, or essential features. In this biological opinion, we use the term PBF to mean PCE or essential feature, as appropriate for the specific critical habitat.

The ESA Section 7 implementing regulations define effects of the action using the term "consequences" (50 CFR 402.02). As explained in the preamble to the final rule revising the definition and adding this term (84 FR 44976, 44977; August 27, 2019), that revision does not change the scope of our analysis, and in this opinion we use the terms "effects" and "consequences" interchangeably.

We use the following approach to determine whether a proposed action is likely to jeopardize listed species or destroy or adversely modify critical habitat:

- Evaluate the range-wide status of the species and critical habitat expected to be adversely affected by the proposed action.
- Evaluate the environmental baseline of the species and critical habitat.
- Evaluate the effects of the proposed action on species and their critical habitat using an exposure–response approach.
- Evaluate cumulative effects.
- In the integration and synthesis, add the effects of the action and cumulative effects to the environmental baseline, and, in light of the status of the species and critical habitat, analyze whether the proposed action is likely to: (1) directly or indirectly reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species; or (2) directly or indirectly result in an alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species.
- If necessary, suggest a reasonable and prudent alternative to the proposed action.

2.2. Range-wide Status of the Species and Critical Habitat

This opinion examines the status of each species that is likely to be adversely affected by the proposed action. The status is determined by the level of extinction risk that the listed species face, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. This informs the description of the species' likelihood of both survival and recovery. The species status section also helps to inform the description of the species' "reproduction, numbers, or distribution" for the jeopardy analysis. The opinion also examines the condition of critical habitat throughout the designated area, evaluates the conservation value of the various watersheds and coastal and marine environments that make up the designated area, and discusses the function of the PBFs that are essential for the conservation of the species.

2.2.1. Listed species and critical habitat

This Biological Opinion analyzes the effects of the proposed project on the endangered SR winter-run Chinook salmon, the threatened CV spring-run Chinook salmon, CCV steelhead, and the sDPS of North American green sturgeon (Table 2), and their designated critical habitats (Table 3).

Table 2. Description of species, current Endangered Species Act listing classification and summary of species status.

Species and Recovery Plans	Listing Classification and Federal Register Notice	Status Summary
SR winter-run Chinook salmon (*Oncorhynchus tshawytscha*) ESU Recovery Plan for the ESUs of Sacramento River Winter-Run Chinook Salmon and CV Spring-Run Chinook Salmon and the DPS of CCV Steelhead (CV salmonid recovery plan, NMFS 2014)	Endangered, 70 FR 37160; June 28, 2005	The 2024 5-year review found that the biological status of the SR winter-run Chinook salmon ESU declined since the 2016 5-year review, with the single spawning population on the mainstem Sacramento River at a high risk of extinction (Sawyer *et al.* 2024). This aligns with the most recent viability assessment (VA) (SFSC 2023), that found that the overall viability of the SR winter-run Chinook salmon ESU continued to decline since the 2015 VA (Williams *et al.* 2016). Two consecutive years of poor returns increased the vulnerability of the overall population, and unusually warm temperatures in both freshwater and ocean ecosystems likely contributed to the low numbers of natural-origin returns observed in 2017 and 2018. The Livingston Stone National Fish Hatchery (LSNFH) has improved the SR winter-run Chinook salmon ESU viability by increasing population abundance, however, reliance on production from LSNFH remains a cause for serious concern to the long-term viability and genetic integrity of the population and the ESU. As of the 2024 5-year review, hatchery influence is declining, but remains at a level above which would indicate a low or moderate extinction risk (Sawyer *et al.* 2024). The viability of the SR winter-run Chinook salmon ESU will improve by re-establishing winter-run Chinook salmon in their historical spawning and rearing habitat. Projects to reintroduce SR winter-run Chinook salmon into Battle Creek are ongoing while reintroduction to historical habitats upstream of Shasta Reservoir are in the planning and early implementation phases (SFSC 2023). The primary threats to the SR winter-run Chinook salmon ESU include barriers to historical spawning grounds, altered water temperatures, reduced habitat complexity, and emerging concerns regarding thiamine deficiency, thus resulting in severe risks to the abundance, productivity, and especially to the spatial structure and genetic diversity of the winter-run Chinook salmon ESU (Sawyer *et al.* 2024; NMFS 2014).

CV spring-run Chinook salmon (*O. tshawytscha*) ESU (CV salmonid recovery plan, NMFS 2014)	Threatened, 70 FR 37160; June 28, 2005	The most recent VA (SFSC 2023) indicates that all remaining historically independent populations (Battle, Deer, Mill, and Butte Creeks) show substantially lower populations and mean escapements than in the previous VA (Williams *et al.* 2016). The rate of decline over the past decade coupled with low abundances place the Battle, Deer, and Mill Creek populations at a high risk of extinction. The Butte Creek population remains at a low risk of extinction, yet all viability metrics are trending in a negative direction relative to the 2015 VA. All populations of CV spring-run Chinook salmon are still exhibiting declines in population size over time, with the exception of two dependent populations – Antelope and Clear Creek that have positive point estimates of population growth (SFSC 2023). At the ESU level, spring-run Chinook salmon are present in all diversity groups. On one hand, the CV spring-run Chinook salmon ESU is trending in a positive direction towards achieving at least two populations in each of the four historical diversity groups necessary for recovery (NMFS 2014). On the other hand, CV spring-run Chinook salmon populations have declined sharply in recent years to worryingly low levels of abundance (SFSC 2023). The largest threats to CV spring-run Chinook salmon include drought and adverse climate events. From 2012–2016, the Central Valley experienced drought conditions and low river and stream discharges, which are strongly associated with lower survival of Chinook salmon (Michel *et al.* 2015). The impacts of the recent drought series, and warm ocean conditions on the juvenile life stage seems to have manifested in the low run sizes in 2015–2018 for most CV spring-run Chinook salmon populations (SFSC 2023).
CCV steelhead DPS (*O. mykiss*) (CV salmonid recovery plan, NMFS 2014)	Threatened, 71 FR 834; January 5, 2006	The most recent assessment of CCV Steelhead viability found that the species remains in moderate risk of extinction; however, new emerging evidence indicates that the proportions of hatchery returns to natural-origin returns are increasing and hatcheries influence has raised the risk of extinction from moderate to high in 11 out of 16 CCV Steelhead populations (SFSC 2023). Most natural-origin CCV populations are very small, not monitored, and may lack the resilience to persist for protracted periods if subjected to additional stressors, particularly widespread stressors such as climate change. While updated data on steelhead in the American River is mostly based on hatchery returns, natural spawning populations within the Sacramento tributaries have fluctuated, but have shown a steady decline in the past 10 years (SFSC 2023).

sDPS North American green sturgeon (*Acipenser medirostris*) Recovery Plan for the Southern DPS of North American Green Sturgeon (*Acipenser medirostris*) (NMFS 2018)	Threatened, 71 FR 17757; April 7, 2006	According to the NMFS 5-year review (Vick *et al.* 2021), many of the principal factors considered when listing sDPS green sturgeon as threatened are relatively unchanged. As previously reported in the 2015 review (Doukakis 2015) and the 2018 Final Recovery Plan (NMFS 2018), some threats to the sDPS North American green sturgeon, such as those posed by fisheries and impassable barriers, have been reduced. Confirmation of spawning in the Feather and Yuba rivers is encouraging and the decommissioning of Red Bluff Diversion Dam and the breach of Shanghai Bend makes spawning conditions more favorable, although sDPS green sturgeon still encounter impassable barriers in the Sacramento, Feather, and Yuba rivers that limit their spawning range. Habitat degradation and poaching continue to remain a threat to the species. Recommended future actions for threat reduction include research on the impact of habitat restoration and modification, continued efforts to remove barriers to migration, efforts to reduce entrainment of juveniles at water diversions through the development of screening and fish passage criteria, and efforts to reduce poaching (Vick *et al.* 2021).

Table 3. Description of Critical Habitat, Designation, and Status Summary.

Critical Habitat	Designation Date and Federal Notice	Description
SR winter-run Chinook salmon (*O. tshawytscha*) ESU	June 16, 1993; 58 FR 33212	Designated critical habitat includes the Sacramento River from Keswick Dam (RM 302) to Chipps Island (RM 0) at the westward margin of the Sacramento-San Joaquin Delta (Delta); all waters from Chipps Island westward to the Carquinez Bridge, including Honker Bay, Grizzly Bay, Suisun Bay, and the Carquinez Strait; all waters of San Pablo Bay westward of the Carquinez Bridge; and all waters of San Francisco Bay north of the San Francisco-Oakland Bay Bridge from San Pablo Bay to the Golden Gate Bridge. The designation includes the river water, river bottom and adjacent riparian zones used by fry and juveniles for rearing. PBFs considered essential to the conservation of the species include: Access from the Pacific Ocean to spawning areas; availability of clean gravel for spawning substrate; adequate river flows for successful spawning, Incubation of eggs, fry development and emergence, and downstream transport of juveniles; water temperatures at 5.8–14.1°C (42.5–57.5°F) for successful spawning, egg incubation, and fry development; riparian and floodplain habitat that provides for successful juvenile development and survival; and access to downstream areas so that juveniles can migrate from spawning grounds to the San Francisco Bay and the Pacific Ocean. Although the current conditions of PBFs for SR winter-run critical habitat in the Sacramento River are significantly limited and degraded, the habitat remaining is considered highly valuable.

CV spring-run Chinook salmon (*O. tshawytscha*) ESU	September 2, 2005; 70 FR 52488	Critical habitat for CV spring-run Chinook salmon includes stream reaches of the Feather, Yuba and American rivers, Big Chico, Butte, Deer, Mill, Battle, Antelope, and Clear creeks, the Sacramento River, as well as portions of the northern Delta. Critical habitat includes the stream channels in the designated stream reaches and the lateral extent as defined by the ordinary high-water line. In areas where the ordinary high-water line has not been defined, the lateral extent will be defined by the bankfull elevation. PBFs considered essential to the conservation of the species include: Spawning habitat; freshwater rearing habitat; freshwater migration corridors; and estuarine areas. Although the current conditions of PBFs for CV spring-run Chinook salmon critical habitat in the Central Valley are significantly limited and degraded, the habitat remaining is considered highly valuable.
CCV steelhead DPS (*O. mykiss*)	September 2, 2005; 70 FR 52488	Critical habitat for CCV steelhead includes stream reaches of the Feather, Yuba and American rivers, Big Chico, Butte, Deer, Mill, Battle, Antelope, and Clear creeks, the Sacramento River, as well as portions of the northern Delta. Critical habitat includes the stream channels in the designated stream reaches and the lateral extent as defined by the ordinary high-water line. In areas where the ordinary high-water line has not been defined, the lateral extent will be defined by the bank-full elevation. PBFs considered essential to the conservation of the species include: spawning habitat; freshwater rearing habitat; freshwater migration corridors; and estuarine areas. Although the current conditions of PBFs for CCV steelhead critical habitat in the Central Valley are significantly limited and degraded, the habitat remaining is considered highly valuable.

sDPS North American green sturgeon (*Acipenser medirostris*)	October 9, 2009; 74 FR 52300	Critical habitat includes the stream channels and waterways in the Delta to the ordinary high water line. Critical habitat also includes the main stem Sacramento River upstream from the I Street Bridge to Keswick Dam, the Feather River upstream to the fish barrier dam adjacent to the Feather River Fish Hatchery, and the Yuba River upstream to Daguerre Dam. Critical habitat in coastal marine areas include waters out to a depth of 60 fathoms, from Monterey Bay in California, to the Strait of Juan de Fuca in Washington. Coastal estuaries designated as critical habitat include San Francisco Bay, Suisun Bay, San Pablo Bay, and the lower Columbia River estuary. Certain coastal bays and estuaries in California (Humboldt Bay), Oregon (Coos Bay, Winchester Bay, Yaquina Bay, and Nehalem Bay), and Washington (Willapa Bay and Grays Harbor) are included as critical habitat for sDPS green sturgeon. PBFs considered essential to the conservation of the species for freshwater and estuarine habitats include: food resources, substrate type or size, water flow, water quality, migration corridor; water depth, sediment quality. In addition, PBFs include migratory corridor, water quality, and food resources in nearshore coastal marine areas. Although the current conditions of PBFs for sDPS green sturgeon critical habitat in the Central Valley are significantly limited and degraded, the habitat remaining is considered highly valuable.

Current Limiting Factors

The following are current limiting factors for the listed species' population numbers included in this consultation:

- Dams block access to historical spawning and summer holding areas along with altering river flow regimes and temperatures (up to 90 percent for SR winter-run and CV spring-run Chinook salmon).
- Water management/diversions/barriers
- Loss of floodplain rearing habitat (levees/bank protection)
- Urbanization and rural development
- Logging
- Grazing
- Agriculture
- Mining – historic hydraulic mining from the California Gold Rush era
- Estuarine modified and degraded, thus reducing developmental opportunities for juvenile salmonids
- Predation
- Dredging and sediment disposal
- Contaminants
- Altering prey base for fish, especially for sDPS green sturgeon
- Fisheries

- Hatcheries
- "Natural" factors (*e.g.*, ocean conditions)
- Climate change exacerbating flow and water temperature related impacts (see below for more detail)

2.2.2. Global climate change

One major factor affecting the range-wide status of the threatened and endangered anadromous fish in the Central Valley and aquatic habitat at large is climate change. Warmer temperatures associated with climate change reduce snowpack and alter the seasonality and volume of seasonal hydrograph patterns (Cohen *et al.* 2000). Central California has shown trends toward warmer winters since the 1940s (Dettinger and Cayan 1995). Projected warming is expected to affect Central Valley Chinook salmon, steelhead, and green sturgeon. Because the runs are restricted to low elevations as a result of impassable rim dams, if climate warms by 5°C (9°F), it is questionable whether any Central Valley Chinook salmon populations can persist (Williams 2006).

Factors modeled by VanRheenen *et al.* (2004) show that snow melt earlier in the year leads to a large percent reduction of spring snow water equivalent (SWE) (up to 100 percent in shallow snowpack areas). Additionally, an air temperature increase of 2.1°C (3.8°F) is expected to result in a loss of about half of the average April snowpack storage (VanRheenen *et al.* 2004). The decrease in spring SWE (as a percentage) would be greatest in the region of the Sacramento River watershed, at the north end of the Central Valley, where snowpack is shallower than in the San Joaquin River watersheds to the south.

For SR winter-run Chinook salmon, the embryonic and larval life stages that are most vulnerable to warmer water temperatures occur during the summer, so this run is particularly at risk from climate warming. The only remaining population of SR winter-run Chinook salmon relies on the cold-water pool in Shasta Reservoir that buffers the effects of warm temperatures in most years. The exception occurs during drought years that are predicted to occur more often with climate change (Yates *et al.* 2008). Additionally, air temperature appears to be increasing at a greater rate than previously analyzed (Beechie *et al.* 2012, Dimacali 2013). These factors will compromise the quantity and/or quality of SR winter-run Chinook salmon habitat available downstream of Keswick Dam.

CV spring-run Chinook salmon adults are vulnerable to climate change, because they over-summer in freshwater streams before spawning in autumn (Thompson *et al.* 2012). CV spring-run Chinook salmon spawn primarily in the tributaries to the Sacramento River, and those tributaries without cold water refugia (usually input from springs) will be more susceptible to impacts of climate change.

CCV steelhead will experience similar effects of climate change to Chinook salmon, as they are also blocked from the vast majority of their historic spawning and rearing habitat. The effects may be even greater in some cases, as juvenile CCV steelhead need to rear in the stream for one to two summers prior to emigrating as smolts. In the Central Valley, summer and fall temperatures below the dams in many streams already exceed the recommended temperatures for optimal growth of juvenile CCV steelhead, which range from 14°C to 19°C (57°F to 66°F).

Adult sDPS green sturgeon have been observed as far upstream as the Anderson-Cottonwood Irrigation District (ACID) Dam, which is considered the upriver extent of sDPS green sturgeon passage in the Sacramento River (Heublein *et al.* 2009). However, sDPS green sturgeon spawning occurs approximately 30 kilometers (18.6 miles) downriver of the ACID Dam where water temperature is warmer than at the ACID Dam during late spring and summer. If water temperatures increase with climate change, temperatures at spawning locations below the ACID Dam may be above tolerable levels for the embryonic and larval life stages of sDPS green sturgeon.

In summary, observed and predicted climate change effects are generally detrimental to all of the listed anadromous fish species, so unless offset by improvements in other factors, the status of the species and critical habitat is likely to decline over time. The climate change projections referenced above cover the time period between the present and approximately 2100. While there is uncertainty associated with projections, which increases over time, the direction of change is relatively certain (McClure *et al.* 2013).

2.2.3. Recovery plans

In July 2014, NMFS released a final recovery Plan for SR winter-run Chinook salmon, CV spring-run Chinook salmon, and CCV steelhead (NMFS 2014). The salmonid recovery plan outlines actions to restore habitat and access, and improve water quality and quantity conditions in the Sacramento River to promote the recovery of listed salmonids. Key recovery actions in the recovery plan include conducting landscape-scale restoration throughout the Delta, incorporating ecosystem restoration into Central Valley flood control plans that includes breaching and setting back levees, and restoring flows throughout the Sacramento and San Joaquin River basins and the Delta.

In August 2018, NMFS released a final recovery plan for the sDPS green sturgeon (NMFS 2018), which focuses on fish screening and passage projects, floodplain and river restoration, and riparian habitat protection in the Sacramento River Basin, the Delta, San Francisco Estuary, and nearshore coastal marine environment as strategies for recovery.

2.3. Action Area

"Action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR §402.02).

The proposed action consists of two components:

- Terrestrial components
    - Areas used for staging
    - Areas trenched for the new pipeline
    - Areas cleared and graded
    - Areas terraced to created riparian habitat
    - Areas that will become a new poured concrete walking path
    - Areas where construction noise levels are in excess of ambient conditions
- Aquatic Components

- Areas where pile driving may occur to secure coffer dams
- Areas where concrete blocks in the stream bed will secure coffer dams or assemble work bridges
- Areas trenched for the new pipeline
- Areas where construction noise levels are in excess of ambient conditions
- Areas where construction and restoration related water quality impacts are in excess of ambient conditions

The applicant will place 3,200 ft (975.4 m) of new sewer pipeline. The proposed project will include instream construction, clearing and grading, and trench digging. Sloped sidewall trench digging requires the widest amount of construction space with up to 44 ft (13.4 m) of trench and 16 ft (4.9 m) of horizontal space on each side of the trench for access. Trench digging will also occur within Clear Creek, Olney Creek, and unnamed creek. Turbidity from past projects with a larger footprint than the proposed project have created turbidity plumes of 25–75 NTU extending up to 1,000 ft (304.8 m) downstream from the project area (NMFS 2006). Thus, the action area within the terrestrial corridor is 60–100 ft wide (18.3–50.5 m) along the pipeline and in the aquatic corridor, 1000 ft (304.8 m) downstream from the proposed in-channel activity where stream flow extends the action area into the Sacramento River.

2.4. Environmental Baseline

The "environmental baseline" refers to the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the proposed action. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultations, and the impact of State or private actions which are contemporaneous with the consultation in process. The consequences to listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the environmental baseline (50 CFR 402.02).

2.4.1. Topography, climate and geomorphology

The topography of the action area is relatively flat with minor elevation changes and a mean elevation of 450 ft (137.2 m) above mean sea level. The Mediterranean climate in the study area and general vicinity experiences cool, wet winters and hot, dry summers. Precipitation primarily occurs as rain and the average annual rainfall is approximately 33 inches (84 cm). Air temperatures range between an average January high of 56ºF, and an average July high of 99ºF. The year-round average high is approximately 76ºF (Stantec Inc. 2023).

In the lower Clear Creek, there are small areas with some gravel and cobble bars, but low flow and a shortage of quality substrate suggest that there is limited suitable spawning habitat available for federally listed species. Olney Creek, at the pipeline crossing, is less than 50 ft wide, deeply incised, and channelized. Some cobbles and gravel are present in the area, and spawning and migration habitat may be present for CCV steelhead and fall/late-fall run Chinook salmon in the rainy months starting in November.

2.4.2. Hydrology

Regional hydrology

The Central Valley Project (CVP), managed by the Bureau of Reclamation (BOR), is a complex, multi-purpose network of dams, reservoirs, canals, hydroelectric power plants and other facilities. The purpose of the CVP is to reduce flood risk in the Central Valley and supply water for domestic and industrial use.

The Shasta and Keswick Dams, in the upper Sacramento River, are impassable barriers for anadromous fishes. There are two peak flow periods at both dams: January–February and July–August. The January–February period corresponds with flood control releases, while the July–August period represents peak releases for water deliveries and water quality management in the delta estuary. NMFS works with the BOR to regulate water flow throughout the Central Valley so that river flows and flow ramping rates reduce negative impacts to anadromous fishes (Stantec Inc. 2023).

Clear Creek hydrology

Hydrology in the lower Clear Creek is influenced by backflow from the Sacramento River and flows from the Whiskeytown Dam. The Whiskeytown Dam is managed by the BOR as part of the CVP. The dam separates the upper Clear Creek from the lower Clear Creek. Most of the water that is stored behind the Whiskeytown Dam is diverted into the Keswick Dam, where it is released into the Sacramento River. The remaining water is released into the Clear Creek. Between October 1 and June 1, flows of 200 cubic feet per second (cfs) are released into Clear Creek, with occasional lower releases during dry periods. Between July and September, flows of 150 cubic feet per second (cfs) or less are released (Stantec Inc. 2023). There are two pulse flows that occur in late-spring and early-summer in an effort to signal the movement of spring-run Chinook salmon upstream to their spawning habitat in Clear Creek (USGS 2024). Additionally, periodic storm events result in the release of higher flows through the spillway. Clear Creek and the location of the pipeline connection are seen in Figure 10.

Figure 10. Location of pipeline connection on the north side of Clear Creek, January 31, 2019 (Stantec Inc. 2023).

Olney Creek and unnamed creek hydrology

The hydrology of Olney Creek is largely a result of the region's topography, climate, and land use. Olney Creek flow in the action area is mainly provided by backflow from the Sacramento River, sheet flow during rainstorms, snow melt from the upper watershed, and groundwater accretion to the stream channel. Late-summer flows in Olney Creek are intermittent in most years. Some minor level of discharge may occur in the downstream-most reach of the creek because of groundwater seepage from the ACID canal during the summer (NMFS 2014). Data from the Shasta West Watershed Assessment from June 2005 found that water runoff per square mile in cubic feet per second was zero for the months of July, August and September (Stantec Inc. 2023). In addition, a record of site visits in November 2018 demonstrated the low flow conditions of the Creek upstream of the action area during the dry season (Figure 11). Within the action area, biologists documented stagnant, standing water at the proposed pipeline crossing (figure 12). While Olney Creek serves as critical habitat for federally listed species, its functionality is likely limited to winter and springs months when the water is cooler and flow is present. Unnamed creek is seasonally inundated due to backflow from Clear Creek.

Figure 11. Olney Creek upstream of the proposed pipeline crossing, November 15, 2018 (Stantec Inc. 2023).

Figure 12. Olney Creek near the Proposed Pipeline Crossing Location on November 15, 2018 (Stantec Inc. 2023).

2.4.3. Vegetation

Clear Creek vegetation

At the location of the pipeline crossing, the stream bank on both sides of the creek consists of natural vegetation with few trees. Due to the width of the stream channel and the dearth of trees, there is limited riparian shading in the lower Clear Creek.

Olney Creek and unnamed creek vegetation

Olney Creek and unnamed creek are seasonally inundated and act as a riparian wetland. They contain emergent and floating aquatic vegetation when inundated, and support woody, riparian shrub and willow species.

2.4.4. Status of federally listed species and/or critical habitat within the action area

At present, the action area provides spawning, rearing, and/or critical habitat for federally listed species. Table 4 outlines how federally listed species use critical habitat in the action area.

Table 4. Salmonid and sturgeon spawning, rearing, and migratory habitat in the action area. There is currently no data available for unnamed creek (NMFS 2014).

	Action area within the Sacramento River	Action area within Clear Creek	Action area within Olney Creek	Action area within unnamed creek
SR winter-run Chinook salmon	Spawning, rearing, and migratory habitat	Not present	Not present	-
CV spring-run Chinook salmon	Spawning, rearing, and migratory habitat	Rearing and migratory habitat	Possible spawning, rearing, and migratory habitat	-
CCV steelhead	Spawning, rearing, and migratory habitat	Spawning, rearing, and migratory habitat	Spawning, rearing, and migratory habitat	-
sDPS North American green sturgeon	Possible spawning, rearing, and migratory habitat	Not present	Not present	-

2.4.4.1 Status of the SR winter-run Chinook salmon in the action area

SR winter-run Chinook salmon primarily spawn in the mainstem Sacramento River between Keswick Dam and the Red Bluff Diversion Dam (RBDD). Spawning occurs between late-April and mid-August, with a peak in June and July. Embryo incubation in the Sacramento River can extend into October. Fry rearing in the upper Sacramento River exhibit peak abundance during September, with fry and juvenile emigration past the RBDD occurring from July through November (NMFS 2014). Given that the single spawning population of SR winter-run Chinook salmon spawn, rear, and migrate in the upper Sacramento River, there is a high probability that adult SR winter-run Chinook salmon will be present in the action area.

2.4.4.2 Status of the CV spring-run Chinook salmon in the action area

CV spring-run Chinook salmon migrate, spawn, and rear in the action area within the Sacramento River, and migrate and rear in the action are within Clear Creek. Adult salmon leave the ocean to begin their upstream migration in January and early February. They enter the

Sacramento River primarily in May and June, and hold in deep, cold water pools in the river for several months before spawning. Spawning occurs between mid-August and early October, peaking in September (NMFS 2014). In late spring and early summer, the Whiskeytown dam releases pulse flows of water to encourage spring-run Chinook salmon to swim to their upstream spawning habitat. These two events usually occur in April/May and mid to late June (USGS 2024). Given the utility of the Sacramento River and Clear Creek for the needs of the run, there is a high probability that juvenile and adult CV spring-run Chinook salmon will be present in the action area.

2.4.4.3 Status of the CCV steelhead in the action area

CCV steelhead spawn, rear, and migrate in the action area within the Sacramento River, Clear Creek, and Olney Creek. From August through April, CCV steelhead migrate from the ocean and into fresh water where they hold until water flow in the tributaries is high enough to support spawning. They spawn December through April with peaks from January through March. Juvenile steelhead return to the ocean in spring and early summer once they are between 1 and 3 years of age. Given the utility of the Sacramento River and Clear Creek for the needs of the species, there is a high probability that CCV steelhead, juvenile and adult, will be present in the action area. CCV steelhead may be present in Olney Creek and unnamed creek, but because the summer season creates warm, low-flow conditions, Olney Creek and unnamed creek may not be suitable to support CCV steelhead during construction activity.

2.4.4.4 Status of the sDPS North American green sturgeon in the action area

The sDPS North American green sturgeon may spawn, rear, and migrate in the action area within the Sacramento River. Adult sDPS enter San Francisco Bay in late winter through early spring and spawn in the Sacramento River primarily from April through early July, with peaks of activity likely influenced by factors including water flow and temperature. Spawning primarily occurs in cool sections of the upper mainstem Sacramento River in deep pools. Post-spawn fish may hold for several months in the Sacramento River and out-migrate in the fall or winter or move out of the river quickly during the spring and summer months, though holding behavior is most commonly observed. Given that the sDPS North American green sturgeon spawn, rear, and migrate in the upper Sacramento River, there is a high probability that juvenile and adult fishes will be present in the action area.

2.4.4.5 Factors affecting federally listed species critical habitat in the action area

The PBFs of critical habitat for federally listed species in the action area are listed in Table 5. The action area within the Sacramento River stands as important critical habitat for SR winter-run Chinook salmon, and maintaining this habitat remains essential for the long-term recovery goals for the species. Construction activity could temporarily impact the PBFs of critical habitat in the Sacramento River, Clear Creek, and Olney Creek as turbidity could affect the freshwater and clean gravel necessary for spawning, and noise could disrupt the behavior of prey species. Adequate river flows and unimpeded access to and from spawning ground in the Clear Creek and Olney Creek could be temporarily affected as coffer dams are used to partially block (Clear Creek) or completely block (Olney Creek) stream flow. The use of AMMs renders the effects of these actions as temporary.

Table 5. Physical and biological features of critical habitat for federally listed species in the action area (NMFS 2014). There is currently no data available for unnamed creek.

	Action area within the Sacramento River	Action area within Clear Creek	Action area within Olney Creek	Action area within unnamed creek
SR winter-run Chinook salmon	Clean gravel for spawning; adequate river flows; appropriate water temperatures; riparian habitat; adequate prey; unimpeded access to and from spawning grounds	Species not present	Species not present	-
CV spring-run Chinook salmon	Freshwater; quality substrate; adequate river flows; riparian habitat; adequate prey; unimpeded access to and from spawning ground	Freshwater; adequate river flows; riparian habitat; adequate prey; unimpeded access to and from spawning ground	Freshwater; quality substrate; adequate river flows; riparian habitat; adequate prey	-
CCV steelhead	Freshwater; quality substrate; adequate river flows; riparian habitat; adequate prey; unimpeded access to and from spawning ground	Freshwater; quality substrate; adequate river flows; riparian habitat; adequate prey; unimpeded access to and from spawning ground	Freshwater; quality substrate; adequate river flows; riparian habitat; adequate prey; unimpeded access to and from spawning ground	-
sDPS North American green sturgeon	Suitable substrate; adequate prey; adequate river flows; freshwater; unimpeded access to and from spawning grounds	Species not present	Species not present	-

2.4.5. Factor affecting species and species' habitat in the action area

Since 2003, the CDFW has placed a temporary, seasonal picket-weir across Clear Creek, just upstream of the project, to create spatial separation between spawning spring-run Chinook salmon and returning fall-run Chinook salmon to mitigate the adverse effects of hybridization and redd superimposition. The temporary picket-weir is generally installed at the end of August and removed in November. In addition, in recent decades, Clear Creek has benefited from extensive restoration and recovery actions. These actions include channel reconstruction, spawning gravel augmentation, and prescribed Whiskeytown Reservoir releases. Fall-run have responded to these improvements and Clear Creek normally contains the third largest fall-run population in the upper Sacramento River basin (Killman *et al.* 2016).

2.5. Effects of the Action

Under the ESA, "effects of the action" are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action (see 50 CFR 402.02). A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (see 50 CFR 402.17). In our analysis, which describes the effects of the proposed action, we considered the factors set forth in 50 CFR 402.17(a) and (b).

Table 6. Potential effects of the proposed action on SR winter-run Chinook salmon, CV spring-run Chinook salmon, CCV steelhead, sDPS North American green sturgeon, and their designated critical habitat, and Pacific salmon Essential Fish Habitat.

Activity	SR winter-run salmon	CV spring-run Chinook salmon	CCV steelhead	Salmonid critical habitat	sDPS North American green sturgeon	sDPS North American green sturgeon critical habitat	Chinook salmon EFH
Construction activity effects							
Sediment and turbidity	SMA	SMA	SMA	SMA	SMA	SMA	SMA
Possible contaminants	NEAA	NEAA	NEAA	NEAA	NEAA	NEAA	NEAA
Noise/sound pressure	NEAA	SMA	SMA	SMA	NEAA	NEAA	SMA
Bank modification	NEAA	SMA	SMA	SMA	NEAA	NEAA	SMA
Fish relocation or entrapment	NEAA	SMA	SMA	NE	NEAA	NE	NE
Physical habitat change	NEAA	NEAA	NEAA	SMA	NEAA	NEAA	SMA

SMA = Short-term, minimal adverse effect
NEAA = Not expected to adversely affect
NE = No Effect

2.5.1. Effects of increased sediment mobility and turbidity

Sediment mobility and turbidity may increase because of project actions. Construction-related increases in sedimentation and turbidity above the background level could potentially affect fish species and their habitat by reducing juvenile survival, interfering with feeding activities, causing breakdown of social organization, and reducing primary and secondary productivity. The magnitude of potential effects on fish depends on the timing and extent of sediment loading and flow in the river before, during, and immediately following construction.

High concentrations of suspended sediment can have both short- and long-term effects on salmonids and green sturgeon. The severity of these effects depends on the sediment concentration, duration of exposure, and sensitivity of the affected life stage. Based on the types

and duration of proposed in-water construction methods, short-term increases in turbidity and suspended sediment may disrupt feeding activities or result in avoidance or displacement of fish from preferred habitat. Juvenile salmonids have been observed to avoid streams that are chronically turbid (Lloyd 1987) or move laterally or downstream to avoid turbidity plumes (Sigler *et al.*1984). Bisson and Bilby (1982) reported that juvenile Coho salmon (*O. kisutch*) avoid turbidities exceeding 70 NTUs. Sigler *et al.* (1984) found that prolonged exposure to turbidities between 25 and 50 NTUs resulted in reduced growth and increased emigration rates of juvenile Coho salmon and steelhead trout compared to controls. These findings are generally attributed to reductions in the ability of salmon to see and capture prey in turbid water (Waters 1995). Chronic exposure to high turbidity and suspended sediment may also affect growth and survival by impairing respiratory function, reducing tolerance to disease and contaminants, and causing physiological stress (Waters 1995).

Berg and Northcote (1985) observed changes in social and foraging behavior and increased gill flaring (an indicator of stress) in juvenile Coho salmon at moderate turbidity (30- 60 NTUs). In their study, behavior returned to normal quickly after turbidity was reduced to lower levels (0-20 NTU). In addition to direct behavioral and physical effects on fish, increased sedimentation can alter downstream substrate conditions, as suspended sediment settles and increases the proportion of fine particles in the system. Deposited fine sediment can impair growth and survival of juvenile salmonids (Harvey *et al.* 2009; Suttle *et al.* 2004). Less is known about the specific detrimental physical and physiological effects of sedimentation and turbidity to sturgeon. However, it is thought that high levels of turbidity can generally result in gill fouling, reduced temperature tolerance, reduced swimming capacity and reduced forage capacity in lotic fishes (Wood and Armitage 1997).

Any increase in turbidity associated with the project is likely to be brief and occur only in the vicinity of the site, attenuating downstream as suspended sediment settles out of the water column. These temporary spikes in suspended sediment may result in behavioral avoidance of the site by fish; several studies have documented active avoidance of turbid areas by juvenile and adult salmonids (Servizi and Martens 1992; Lloyd 1987; Sigler *et al.* 1984).

CV spring-run Chinook salmon and CCV steelhead are likely to be present in Clear Creek, and CV spring-run Chinook salmon, CCV steelhead, SR winter-run Chinook salmon and sDPS North American green sturgeon are likely to be present in the Sacramento River during construction activity. Turbidity curtains and erosion control measures will minimize the adverse effects of construction activity; however, turbidity curtains are not always effective at reducing turbidity (Francingues and Palermo 2005). Individual fish that encounter increased turbidity or sediment concentrations would be expected to move laterally, downstream, or upstream of the affected areas. For juveniles, this may increase their exposure to predators if they are forced to leave protective habitat. The impacts of sedimentation and turbidity from site construction on fish species are expected to adversely affect small numbers of each species.

2.5.2. Effects of contaminants

During construction, the potential exists for spills or leakage of toxic substances that could enter the action area. Refueling, operation, and storage of construction equipment and materials could result in accidental spills of pollutants (*e.g.*, fuels, lubricants, concrete, sealants, and oil). High

concentrations of contaminants are lethal to fish. Effects include mortality from exposure or increased susceptibility to disease that reduces the overall health and survival of the exposed fish. The severity of effects from exposure to toxic substances depends on the contaminant, the concentration, duration of exposure, and sensitivity of the affected life stage. Another potential effect of contamination is reduced prey availability; invertebrate prey survival could be reduced following exposure; therefore making food less available for fish. Fish consuming infected prey may also absorb toxins directly. With the incorporation of AMMs, and the timing of construction, exposure to contaminants is not expected to occur.

2.5.3. Effects of noise and sound pressure

Noise generated by heavy equipment and personnel during construction activities could adversely affect fish and other aquatic organisms. The potential effects of underwater noise on fish and other organisms depend on a number of biological characteristics (*e.g.*, fish size, hearing sensitivity, behavior) and the physical characteristics of the sound (*e.g.*, frequency, intensity, duration) to which fish and invertebrates are exposed. Potential adverse effects include behavioral effects, physiological stress, physical injury (including hearing loss), and mortality. No long-term adverse effects are anticipated as a result of construction noise.

If needed, a vibratory hammer will be used to install sheet piles for the coffer dam, which will produce underwater sound pressure waves. Pressure waves generated from pile driving have potential to cause adverse physiological effects on fish and marine mammals, including damage to internal organs, over relatively long distances (Washington *et al.* 1992). Adverse impacts can be caused by extended exposure to low-level sound pressure or by exposure to higher level sound pressure for a shorter period of time. Sound pressure impacts on fish can include auditory and non-auditory (*e.g.*, fish bladder, capillaries, eyes) tissue damage, neuro-trauma, and temporary or permanent hearing loss, reducing fitness, "which may increase the animal's vulnerability to predators and result in the fish's inability or reduced success in locating prey, inability to communicate, or inability to sense their physical environment" (Oestman *et al.* 2009).

Exposure level and distance from sound, length of exposure, and fish size and anatomy can influence the severity of the impact, with smaller fish being more susceptible to damage. Eggs, larvae, and juvenile fish might be affected more acutely than other life stages, because they lack the physical ability, or have reduced ability compared to adults, to move away from loud noise (Oestman *et al.* 2009). For instance, the burst speed of adult Chinook salmon has been determined to be 20 times greater than that of juveniles (Bell 1986). Pile driving has been identified as a specific threat to Pacific Coast Chinook salmon EFH (Stadler *et al.* 2011) and might reduce the availability of important resources, such as food, because of substrate disturbance or impeded fish passage.

Vibratory hammers use counter-rotating eccentric weights to transmit vertical vibrations into the pile, causing the sediment surrounding the pile to liquefy and allow the pile to penetrate the substrate. The vibratory hammer produces sound energy that is spread out over time and is generally 10 to 20 decibels (dB) lower than impact pile driving for the same type and size pile (Molnar *et al.* 2020). Based on the results of hydroacoustic monitoring of vibratory hammer pile installation (Molnar *et al.* 2020), the sound levels generated by vibratory hammer use will be below the injury and mortality thresholds for both single strike and cumulative sound exposure

level (SEL). Pile-driving activities by vibratory hammer should result in noise that startles federally listed fish. Startled fish may hide, move to adjacent suitable habitat, or cease activities, such as feeding or holding station, until the disturbance has ended. In addition, sound associated with vibratory pile driving may mask environmentally relevant noise that could prevent federally listed fish from detecting predators or conspecifics.

CV spring-run Chinook salmon and CCV steelhead are likely to be present in Clear Creek, and CV spring-run Chinook salmon, CCV steelhead, SR winter-run Chinook salmon and sDPS North American green sturgeon are likely to be present in the Sacramento River during construction activity. Vibratory pile driving minimizes underwater sound pressures to below injury thresholds for peak pressures and accumulated sound exposure levels (Table 7 and 8). However, federally listed species may change their behavior in response to vibratory pile driving, increasing their risk for predation. The impacts of noise and sound pressure from site construction are expected to adversely affect small numbers of adult and juvenile CV spring-run Chinook salmon and CCV steelhead.

Table 7. Summary of Near-Source (10-Meter) Un-attenuated Sound Pressures for In-Water Pile Installation Using a Vibratory Driver/Extractor (Oestman *et al.* 2009).

Pile Type and Approximate Size	Relative Water Depth	Peak Average Sound Pressure Measured in dB	RMS* Average Sound Pressure Measured in dB	SEL** Average Sound Pressure Measured in dB
0.30-meter (12-inch) steel H-type	<5 meters	165	150	150
0.30-meter (12-inch) steel pipe pile	<5 meters	171	155	155
1-meter (36-inch) steel pipe pile – typical	~5 meters	180	170	170
0.6-meter (24-inch) AZ steel sheet – typical	~15 meters	175	160	160
0.6-meter (24-inch) AZ steel sheet – loudest	~15 meters	182	165	165
1-meter (36-inch) steel pipe pile – loudest	~5 meters	185	175	175
1.8-meter (72-inch) steel pipe pile – typical	~5 meters	183	170	170
1.8-meter (72-inch) steel pipe pile – loudest	~5 meters	195	180	180

* Impulse level (35 millisecond average)
** Sound exposure level (SEL) for 1 second of continuous driving

Table 8. The onset of fish injury relative to fish size and sound exposure. *Lp,0-pk* is a measure of peak sound pressure while flat indicates that the peak sound pressures are unweighted within the generalized hearing range of fish species. *LE,p*, is the cumulative sound exposure level. NMFS acoustic thresholds for the onset of behavioral disturbance (underwater and in-air) are determined by the root-mean-square (RMS) received levels (NMFS 2023).

Fish Size	**Onset of Physical Injury (Received Level) Impulsive**
Fishes ≥ 2 g	$L_{p,0\text{-}pk,flat}$: 206 dB $L_{E,p,12h}$: 187 dB
Fishes < 2 g	$L_{p,0\text{-}pk,flat}$: 206 dB $L_{E,p,12h}$: 183 dB
Source Type	**Threshold for the Onset of Behavioral Disturbance**
All sources	L_{RMS} 150dB

2.5.4. Temporary and permanent lighting effects on salmonids

Construction activity may require the use of artificial lighting at night (ALAN). ALAN of the water's surface can alter fish behavior and predator-prey interactions in marine and freshwater environments. It often shifts nocturnal behaviors toward more daylight-like behaviors, and it can affect light-mediated behaviors, such as migration timing (Becker *et al.* 2013; Celedonia and Tabor 2015; Tabor *et al.* 2017). Tabor *et al.* (2017) found that sub-yearling Chinook, Coho, and sockeye salmon exhibit strong nocturnal phototaxic behavior when exposed to levels of 5.0 to 50.0 lumens per square meter, with phototaxis positively correlated with light intensity. Celedonia and Tabor (2015) found that juvenile Chinook salmon in the Lake Washington Ship Canal were attracted to artificially lit areas at 0.5 to 2.5 lumens per square meter. The authors also reported that attraction to artificial lights may delay the onset of morning migration by up to 25 minutes for some juvenile Chinook salmon migration through the Lake Washington Ship Canal. Nelson *et al.* (2022) reported significantly increases in rainbow trout densities at the Sundial Bridge on the Sacramento River when any amount of ALAN was present.

In the Sacramento-San Joaquin Delta, specifically, Nelson *et al.* (2021) reported that juvenile salmonid predation risk increased with artificial lighting at night due to increases in predator densities. The authors noted that a supplemental statistical analysis found predation risk did not increase until after 8-10 lux was reached, however, this level should be interpreted with caution and that previous work has suggested that ALAN intensities should remain as low as possible (<0.1 lux) to mitigate the impacts of salmonids during out-migration (Tabor *et al.* 2004, 2017). Past studies have demonstrated that juvenile Chinook Salmon do not have different behavioral responses when exposed to different spectral wavelengths of light (Hansen *et al.* 2018, Tabor *et al.* 2021).

CV spring-run Chinook salmon and CCV steelhead are likely to be present in Clear Creek, and may be present in Olney Creek and the unnamed creek, during construction activity. The need of ALAN may arise for special circumstances when crews have to work later than 7:00pm. Work completed after 7:00pm would consist of actions that are not likely to cause fish disturbance such as the tie-in of the existing sewer lateral(s) to the new interceptor. The impacts of ALAN are expected to be short-term and minimal for federally listed species in the action area.

2.5.5. Effects of bank modification

Construction activities will modify bank habitat through the removal of vegetation and grading of banks to create ramps down the bank for construction access. The applicant will minimize bank disruption and retain existing riparian habitat unless it obstructs construction activity. The applicant will stabilize disturbed soils, and will plant native vegetation to control erosion and offset any unavoidable losses of vegetation after construction.

Temporary and permanent impacts to SRA habitat around the creek and channel crossings will occur from excavation and other work area disturbances. Construction will temporarily affect approximately 0.46 acre of riparian habitat in Clear Creek, 0.06 acres in Olney Creek and 0.09 acres in the unnamed channel. The proposed project will permanently impact approximately 0.19 acres of SRA habitat (0.04 acres in Clear Creek and 0.15 acres in Olney Creek). Some short-term losses of mature riparian vegetation will occur during construction affecting 3.99 acres of riparian vegetation throughout the utility corridor. After construction, these areas will be contoured, stabilized to minimize erosion, and revegetated to match surrounding pre-construction habitat. Areas that cannot be revegetated in the easement of the utility corridor will be seeded with native seed mix and mitigated via the purchase of the equivalent Aquatic Resource Credits or via financial contribution to a local restoration project. The effects of the proposed action on local riparian habitats will be a temporary, localized, reduction in vegetation cover that will recover in a goal of 3 years.

The salmonid recovery plan (NMFS 2014) identifies loss of riparian habitat and in-stream cover as a primary stressor affecting the recovery of the species. This threat primarily affects the juvenile rearing and outmigration life stage of these species, from the upper reaches of their watershed of origin through the Delta. Effects of the action that contribute to the loss of riparian habitat and in-stream cover are likely to result in a probable change in fitness of reduced growth and/or reduced survival probability.

The amount of habitat created/restored will be at least three times greater than the amount lost due to project implementation. Clear Creek currently has very little SRA habitat and will benefit from subsequent habitat creation. Olney Creek and unnamed creek will experience temporary and small declines in SRA habitat, and adequate SRA habitat is available in Olney Creek upstream and downstream of the project location. Riparian planting of woody vegetation at a 3:1 ratio will contribute to the overall improvement of the habitat in the action area. The impacts of bank modification are expected to be short-term and minimal for federally listed species in the action area.

2.5.6. Effects of fish relocation and entrapment

The construction of the work platform in Clear Creek, cofferdams, and installation of anchors for a turbidity curtain within the creek channels could result in the entrapment, injury, or mortality of federally listed species. Additionally, fish salvage from enclosed cofferdams would involve handling and relocation of aquatic species, which could cause direct injury. To reduce potential adverse effects on federally listed species through crushing or other impacts during in-channel operations, a qualified biologist will visually inspect the areas prior to the onset of construction. If federally listed species are present, they will be herded away from the work area using seines.

Fish relocation activities pose a risk of fish injury or mortality. Fish that migrate in response to in-stream construction may endure short-term stress from being forced away from their rearing area, crowding and competition with resident fish for food and habitat. Any fish relocation has some associated risk to fish, including stress, disease transmission, injury, or death. The amount of unintentional injury and mortality attributable to fish relocation varies widely depending on the method used, ambient conditions, and the experience of the field crew.

CV spring-run Chinook salmon and CCV steelhead, both adult and juvenile, have the potential to occur in Clear Creek year-round; however, aquatic habitat in Olney Creek (and unnamed creek) during the proposed limited operating period is generally poor for salmonids due to warm water temperatures and the lack of flow in the summer months. As a result, there is a low probability that listed species would occur in Olney Creek during the construction window. Fish herding is unlikely to be 100 percent effective at removing all individuals. Fish that evade relocation and remain in the construction area may be injured or killed from construction activities.

2.5.7. Effects of physical changes to the habitat

Disturbance of benthic substrates will occur as part of the proposed action. In Clear Creek, the installation of temporary work platforms and cofferdams will temporarily reduce the amount of benthic habitat available and may temporarily affect essential habitat types and PBFs present. Upon completion of construction, the disturbed area would be relatively biologically sterile due to removal of detritus, macroinvertebrates, and nutrients contained within the channel substrate and the physical changes would include a small reduction in benthic habitat availability. Temporary impacts resulting from this reduction of benthic habitat should not change the foraging behavior of any juveniles present as the construction design allows for adequate flow and passage around the work areas. In addition, any disturbed areas should recolonize by drifting organisms and sediments from abundant upstream sources. Therefore, only minor temporary effects will occur to the PBFs and associated essential features and habitat types present in Clear Creek. Disturbance of the benthic substrate and banks will also occur at the Olney Creek and the unnamed channel crossings, which will use temporary cofferdams during construction. However, the applicant will construct these crossings in the dry summer months when listed salmonids will not be present. Federally listed species are not expected to be harmed due to physical changes of habitat.

2.6. Cumulative Effects

"Cumulative effects" are those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation [50 CFR 402.02 and 402.17(a)]. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Some continuing non-Federal activities are reasonably certain to contribute to climate effects within the action area. However, it is difficult if not impossible to distinguish between the action area's future environmental conditions caused by global climate change that are properly part of the environmental baseline *vs.* cumulative effects. Therefore, all relevant future climate-related

environmental conditions in the action area are described earlier in the discussion of environmental baseline (Section 2.4).

2.6.1. Increased urbanization

Increases in urbanization and housing developments can affect habitat by altering watershed characteristics and changing both water use and stormwater runoff patterns. Increased growth will place additional burdens on resource allocations, including natural gas, electricity, and water, as well as on infrastructure, such as wastewater sanitation plants, roads and highways, and public utilities. Some of these actions, particularly those situated away from water bodies, will not require Federal permits, and thus will not undergo review through the ESA section 7 Consultation process with NMFS.

Increased urbanization can lead to increased residential pesticide use, affecting federally listed species and their prey in adjacent watersheds. Anzalone *et al.* 2022 found that juvenile Chinook salmon and their prey in the mainstem Sacramento River and the Yolo Bypass floodplain were subject to pesticide bioaccumulation, and that juvenile Chinook salmon rearing in floodplains and feeding on zooplankton within the water column may experience more pesticides than those feeding on benthic macroinvertebrates. Bioaccumulation of pesticides can lead to olfactory and endocrine system disruption. Another toxicant associated with increased urbanization is 6PPD-quinone. 6PPD-quinone is the byproduct of oxidation of a chemical that manufactures apply to vehicle tires to improve their durability. Tian *et al.* (2020) found that stormwater exposure caused acute mortality to Northwest Coho salmon secondary to the presence of 6PPD-quinone at lethal levels.

Increased urbanization also could result in increased recreational activities in the region. Among the activities expected to increase in volume and frequency is recreational boating. Boating activities typically result in increased wave action and propeller wash in waterways. This may degrade riparian and wetland habitat by eroding channel banks and mid-channel islands, thereby causing an increase in siltation and turbidity. Wakes and propeller wash also churn up benthic sediments thereby potentially re-suspending contaminated sediments and degrading areas of submerged vegetation. This will reduce habitat quality for the invertebrate forage required for the survival of juvenile salmonids and green sturgeon. Increased recreational boat operation could result in more contamination from the operation of gasoline and diesel-powered engines on watercraft entering the associated water bodies.

2.6.2. Agricultural practices

Non-Federal actions that may affect the action area include ongoing agricultural activities in the Sacramento River watershed. Farming and ranching activities within, adjacent to, or upstream of the action area may have negative effects on water quality due to runoff laden with agricultural chemicals. Stormwater and irrigation discharges related to agricultural activities contain numerous pesticides and herbicides that may adversely affect salmonid reproductive success and survival rates (King *et al.* 2014). Grazing activities from cattle operations can degrade or reduce suitable critical habitat for listed salmonids by increasing erosion and sedimentation as well as introducing nitrogen, ammonia, and other nutrients into the watershed, which then flow into the receiving waters of the associated watersheds. Agricultural practices in the Sacramento River

may adversely affect riparian and wetland habitats through upland modifications of the watershed that lead to increased siltation or reductions in water flow.

2.6.3. Fish hatcheries

More than 32 million fall-run Chinook salmon, 2 million spring-run Chinook salmon, 1 million late fall-run Chinook salmon, 0.25 million winter-run Chinook salmon, and 2 million steelhead are released annually from six hatcheries producing anadromous salmonids in the Central Valley. All of these facilities operate to mitigate for natural habitats that have already been permanently lost because of dam construction. Releasing large numbers of hatchery fish can pose a threat to natural-origin Chinook salmon populations through genetic impacts, displacement, competition for food and other resources, predation of hatchery fish on natural-origin fish, and increased fishing pressure on natural-origin stocks as a result of hatchery production (Waples 1991).

The relatively low number of adult spawners needed to sustain a hatchery population can result in high harvest-to-escapement ratios in waters where fishing regulations are set according to hatchery population. California salmon fishing regulations are set according to the combined abundance of hatchery and natural stocks, which can lead to over-exploitation and reduction in the abundance of natural-origin populations existing in the same system as hatchery populations due to incidental bycatch (McEwan 2001).

2.6.4. Water diversions

Several unscreened diversions are located in close proximity to the action area (CDFW 2024). Depending on the size, location, and season of operation, unscreened diversions entrain and kill many life stages of aquatic species, including juvenile listed anadromous species. Water transportation and diversions can affect the upstream migration of anadromous fishes, while low flows can impede fish passage. Altered flow regimes can influence migratory cues, water quality, sedimentation, and water temperature (NMFS 2014).

2.7. Integration and Synthesis

The Integration and Synthesis section is the final step in assessing the risk that the proposed action poses to species and critical habitat. In this section, we add the effects of the action (Section 2.5) to the environmental baseline (Section 2.4) and the cumulative effects (Section 2.6), taking into account the status of the species and critical habitat (Section 2.2), to formulate the agency's biological opinion as to whether the proposed action is likely to: (1) reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing its numbers, reproduction, or distribution; or (2) appreciably diminish the value of designated or proposed critical habitat as a whole for the conservation of the species.

2.7.1. Integrated analysis of the effects of the proposed action on the federally listed species

Summary of the effects of the proposed action on federally listed species

Table 6, in section 2.5 Effects of the action, covers the anticipated effects of the proposed project. The project will cause either short-term adverse effects or no adverse effects to federally

listed species. Short-term adverse effects of construction include increased sediment mobility and turbidity, risk of contaminants, increased noise and sound pressure, changes to the habitat, and injury associated with relocation and/or entrapment. CV spring-run Chinook salmon and CCV steelhead are likely to be present in Clear Creek, and CV spring-run Chinook salmon, CCV steelhead, SR winter-run Chinook salmon and sDPS North American green sturgeon are likely to be present in the Sacramento River during construction activity.

Chronic exposure to high turbidity and suspended sediment could affect growth and survival by impairing respiratory function, reducing tolerance to disease and contaminants, and causing physiological stress (Waters 1995). Contaminants may result from accidental spills associated with construction activity. The severity of effects from exposure to toxic substances depends on the contaminant, the concentration, duration of exposure, and sensitivity of the affected life stage; however, high concentrations of contaminants are lethal to fish. Construction activity will also result in noise, and may result in sound pressure if workers have to use pile driving to install cofferdams. The impacts of sound pressure on fish can include tissue damage, neuro-trauma, hearing loss, and reduced fitness making them more susceptible to predation (Oestman 2009).

Bank and channel modification will occur and could harm federally listed species. Bank modification will result in temporary losses to riparian habitat. Effects of the action that contribute to the loss of riparian habitat and in-stream cover will result in a probable change in fitness of reduced growth and/or reduced survival probability. Channel modification will temporarily reduce the amount of benthic habitat available and may temporarily affect essential habitat types and PBFs present. Upon completion of construction, the disturbed area will see reduced biological diversity and nutrients contained within the channel substrate, and the physical changes will include a small reduction in benthic habitat availability. Disturbed areas should rapidly recolonize by drifting organisms and sediments from abundant upstream sources.

Summary of the environmental baseline and status of the species

Section 2.2, Range-wide status of the species and critical habitat covers the status of the species. Recent research has indicated that worsening habitat conditions continue to threaten the viability of federally listed species. The effects of climate change including drought events, increased stream flow, and potentially lethal water temperatures greatly affect SR winter-run Chinook salmon, CV spring-run Chinook salmon, CCV steelhead, and sDPS North American green sturgeon. Other threats to the species include habitat fragmentation, poaching, and domestic influence from hatcheries. Despite these threat, the action area currently provides many quality PBFs, and the current conditions of the action area are conducive to the long-term recovery goals laid out for federally listed species. Recommended future actions for threat reduction include research on the impact of habitat restoration and modification, continued efforts to remove barriers to migration, efforts to reduce entrainment of juveniles at water diversions through the development of screening and fish passage criteria, and efforts to reduce poaching (Vick *et al.* 2021).

Summary of the impact of cumulative effects

The 2022 County Level Economic Forecast predicts that the population, number of jobs, and available housing will all increase in Shasta County in the coming years, albeit slowly. (Caltrans

2022). Impacts to federally listed species secondary to urbanization include increased resource allocation, waste and wastewater production, and use of water resources. Climate change has affected winter precipitation resulting in more rainfall than snow, the loss of which leads to less streamflow in the late spring/early summer and potentially more streamflow in winter (Sun *et al.* 2016) and urbanization stands to put further pressures on water availability. In addition, increased recreational water use puts further stress on federally listed fish species and riparian habitat. Hatcheries influences and recreational fishing are coupled as fishing regulations are determined based on hatchery and natural stock, increasing the chance of bycatch.

Jobs in the farming sector are anticipated to decrease slightly, but stay roughly the same (Caltrans 2022); therefore, there is no anticipated decline in the risks posed to federally listed species by agricultural activity. Agricultural practices in the Sacramento River may adversely affect riparian and wetland habitats through upland modifications of the watershed that lead to increased siltation, discharge of chemicals into the waterway, or reductions in water flow.

Survivability based on viability criteria

We cannot achieve salmonid or green sturgeon recovery without providing sufficient habitat (NMFS 2014; 2018). Delisting criteria for salmonids and sDPS North American green sturgeon are addressed in Table 9. Delisting salmonids will require the reestablishment of historical diversity groups. Diversity Groups (population groups) are salmonid ecoregions based on climatological, hydrological, and geological characteristics (NMFS 2014). Delisting the sDPS North American green sturgeon will require an increase in spawning success and population growth. The proposed action may affect salmonid species in the Basalt and Porous Lava Diversity Group and the Northwestern California Diversity Group, and may affect sDPS North American green sturgeon present in the action area within the Sacramento River.

Table 9. Delisting criteria for salmonids (NMFS 2014) and sDPS North American green sturgeon (NMFS 2018).

CV spring-run Chinook salmon	SR winter-run Chinook Salmon	CCV steelhead	sDPS North American green sturgeon
One population in the Northwestern California Diversity Group at low risk of extinction Two populations in the Basalt and Porous Lava Diversity Group at low risk of extinction Four populations in the Northern Sierra Diversity Group at low risk of extinction Two populations in the Southern Sierra Diversity Group at low risk of extinction Maintain multiple populations at moderate risk of extinction	Three populations in the Basalt and Porous Lava Diversity Group at low risk of extinction	One population in the Northwestern California Diversity Group at low risk of extinction Two populations in the Basalt and Porous Lava Flow Diversity Group at low risk of extinction Four populations in the Northern Sierra Diversity Group at low risk of extinction Two populations in the Southern Sierra Diversity Group at low risk of extinction Maintain multiple populations at moderate risk of extinction	Population remains at or above 3,000 for three generations Population size must be at least 500 individuals in any given year Successful spawning in at least two rivers within historic range Net positive trend in juvenile and sub-adult abundance is observed over the course of 20 years The population is characterized by a broad distribution of size classes representing multiple cohorts for over 20 years

Taking into consideration the effects of the project on the action area, the baseline and status of the species, and the impacts of cumulative effects, the proposed action should not reduce the likelihood of both the survival and recovery of the federally listed species. While the project action area serves as spawning, rearing, and migratory habitat for federally listed species, the effects of the project will be short-term and AMMs will help to mitigate those short-term impacts.

2.7.2. Integrated analysis of the effects of the proposed action to critical habitat

Summary of the effects of the proposed action on critical habitat

Table 6, in section 2.5 Effects of the action, includes the anticipated effects of the proposed action on critical habitat and EFH. The proposed action is not expected to adversely affect North American green Sturgeon critical habitat; however, short-term, minimal adverse effects to salmonid critical habitat and Pacific Chinook salmon EFH are expected. Construction activity that may adversely affect critical habitat and EFH include noise and sound pressure, bank modification, and physical habitat change. Pile driving and trench digging will result in substrate disturbance, and bank modification will result in temporary loss to SRA habitat. After construction, the streambed will be relatively sterile and will recover through natural recruitment. Stream banks will be restored, and riparian planting will create/restore habitat to at least three

times its previous vegetation amount. The effects of the proposed project on critical habitat and EFH, though adverse, will be short-term, and minimal.

Summary of the environmental baseline and status of the critical habitat

At present, the action area within the Sacramento River provides critical spawning, rearing, and migratory habitat for SR winter-run Chinook salmon, CV spring-run Chinook salmon, CCV steelhead, and sDPS North American green sturgeon. The action area within Clear Creek provides critical rearing and migratory habitat for CV spring-run Chinook salmon, and spawning, rearing, and migratory habitat for CCV steelhead. The action area within Olney Creek provides critical rearing habitat to CV spring-run Chinook salmon and spawning, rearing, and migratory habitat to CCV steelhead.

In the lower Clear Creek, there are small areas with some gravel and cobble bars, but low flow and a shortage of quality substrate suggest that there is limited suitable spawning habitat available for federally listed species. In Olney Creek, some cobbles and gravel are present in the area, and spawning and migration habitat may be present in the rainy months starting in November when temperatures and flow are suitable for federally listed species. In the Lower Clear Creek, there is limited riparian shading. Olney Creek and unnamed creek support woody riparian shrub and willow species. Some critical habitat and EFH will experience short-term adverse effects, but the project will create habitat through riparian planting that will improve the conditions of the critical habitat in the action area.

Summary of the impact of cumulative effects

Increased urbanization could threaten critical habitat by affecting the PBFs of the waterway. Urbanization results in altered watersheds, increased stormwater runoff, additional burdens on water resources and infrastructure, more impervious surfaces, and increased recreational activities in the waterway. Consequences of urbanization include altered watershed conditions, increased runoff contamination, and habitat degradation. Another consequence of urbanization is agricultural activity. Grazing activities from cattle operations can degrade or reduce suitable critical habitat for listed salmonids by increasing erosion and sedimentation as well as introducing nitrogen, ammonia, and other nutrients into the watershed, which then flow into the receiving waters of the associated watersheds.

Overall effects to critical habitat

The proposed action will not likely appreciably diminish the value of designated or proposed critical habitat as a whole for the conservation of the species. The proposed project will result in an increase in riparian vegetation in Clear Creek, Olney Creek, and unnamed creek that will improve the quality of critical habitat and EFH in the action area. Species that will benefit from riparian planting include the CV spring-run Chinook salmon and the CCV steelhead. During construction, the action area will continue to serve as a migratory corridor for federally listed species and will only experience short-term, minimal adverse effects. The project will not likely improve critical habitat for SR winter-run Chinook salmon or sDPS North American green sturgeon because construction activity and conservation actions will not take place on the

Sacramento River; however, critical habitat in the Sacramento River will not likely be impacted by the proposed project.

2.8. Conclusion

After reviewing and analyzing the current status of the listed species and critical habitat, the environmental baseline within the action area, the effects of the proposed action, the effects of other activities caused by the proposed action, and the cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of SR winter-run Chinook salmon, CV spring-run Chinook salmon, CCV steelhead, and sDPS North American green sturgeon, or destroy or adversely modify their designated critical habitat.

2.9. Incidental Take Statement

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined by regulation to include significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering (50 CFR 222.102). "Harass" is further defined by interim guidance as to "create the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering." "Incidental take" is defined by regulation as takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant (50 CFR 402.02). Section 7(b)(4) and section 7(o)(2) provide that taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA if that action is performed in compliance with the terms and conditions of this ITS.

2.9.1. Amount or extent of take

In the biological opinion, NMFS determined that incidental take is reasonably certain to occur as follows:

NMFS anticipates that listed fish species will be harassed, harmed, or killed due to impacts related to water quality, physical disturbance effects, acoustic effects from pile driving, and fish capture and relocation. It is not practical to quantify or track the number of individuals taken due to the proposed action because there are is a lot of variation in the timing of spawning and migration, individual habitat use within the action area, and difficulty in observing injured or dead fish. However, it is possible to estimate the extent of incidental take by designating ecological surrogates, and it is practical to quantify and monitor the surrogates to determine the extent of incidental take that is occurring. The most appropriate thresholds for incidental take due to construction are ecological surrogates of temporary habitat disturbance expected to occur during in-water construction and pile-driving activities, and permanent habitat disturbance expected to occur from temporary riparian removal.

Construction activity, turbidity, and modification of the environment will result in fish behavioral modifications, entrainment, harm, injury, or death. Temporary riparian removal

reduces primary productivity, decreases prey availability, and increases the presence of predatory fish, leading to harm and death. NMFS anticipates incidental take will be limited to the following forms:

Take in the form of harm, injury, or death to listed fish during in-stream construction activities

Habitat disruption (due to instream construction, pile driving, and bank and channel modification) will affect the behavior of federally listed species resulting in displacement, increased predation, and decreased feeding, resulting in decreased survival. The timing of in-water work varies. In Clear Creek, the placement of concrete blocks for the work bridges will begin after June 1. Once the blocks are in place, construction will hold until after the completion of the mid-June pulse flows from the Whiskeytown Dam or July 1, whichever is first. In-water work in Olney Creek and unnamed creek will take place July 1–November 1.

The presence of at least one life stage of federally listed fish species exists in Clear Creek year round. Adult CV spring-run Chinook salmon migrate through lower Clear Creek to cooler waters upstream, in part, because of cold water pulse flows from the Whiskeytown Dam. Other anticipated species and life stages in Clear Creek include adult CCV steelhead, and migrating and juvenile CV spring-run Chinook salmon and CCV steelhead. Downstream of construction activity, adult and juvenile salmonids and sDPS North American green sturgeon may be present in the Sacramento River. Olney Creek and unnamed creek may support rearing and migrating juvenile CV spring-run Chinook salmon and CCV steelhead.

Limiting channel excavation in Clear Creek until after pulse flow migration will help mitigate some adverse effects on adult CV spring-run Chinook salmon. In-water work will occur during daylight and only one-half of Clear Creek will be under construction at a time. If construction occurs after 7:00pm, it will be to tie-in sewer lines and will only occur after City approval. Olney Creek and unnamed creek may exhibit low-flow conditions, and temperature restrictions will limit the presence of federally listed species. The use of AMMs will limit take of federally listed species; thus, a small number of fish will be injured or killed during construction activity. The in-water work window has a large impact on the effects of construction activity on federally listed species. If in-water work occurs beyond June 1–November 1, the anticipated incidental take levels are exceeded, thus triggering the need to reinitiate consultation. In addition, any construction during the pulse flow event has the potential to inhibit spring-run migratory success. If construction activity of any kind occurs during the pulse flow event, take levels are exceeded, thus triggering the need to reinitiate consultation.

Take in the form of harm, injury and death to listed fish, due to handling during relocation

Fish may need relocated during in-channel construction activity. Fish inspection will occur before the commencement of in-water work. If the applicant notes the presence of federally listed fish species, they will herd the fish away for the work area using seines. Qualified fish biologists will relocate federally listed fish species that need removed from completely enclosed work areas. Proposed fish herding is unlikely to be 100 percent effective at removing all individuals, but experienced biologists are expected to remove greater than 95 percent of the fish present. Fish that evade relocation and remain in the construction area will be injured or killed from construction activities.

Adult and juvenile CV spring-run Chinook salmon and CCV steelhead will be present in areas where relocation is necessary. Adult and juvenile SR winter-run Chinook salmon and sDPS North American green sturgeon should not be present in areas where relocation is necessary. Guidance to determine incidental mortality rates of Pacific salmon related to handling indicates that the mortality risk for the actions proposed in the project range from 0-5% (Patterson *et al.* 2017). Incidental mortality is expected to be less than 5% of fish captured and released. If mortality greater than 5% occurs, the anticipated incidental take levels described are also exceeded, triggering the need to reinitiate consultation.

Take in the form of harm to listed fish from loss and degradation of riparian habitat

Construction activity will result in temporary losses of riparian vegetation and SRA habitat, which will cause reduced growth and/or reduced survivability to federally listed fish species. The applicant will minimize the impacts of construction through AMMs; however, construction will affect approximately 3.99 acres of riparian vegetation through the utility corridor and 0.46 acre of SRA habitat in Clear Creek, 0.06 acres in Olney Creek and 0.09 acres in the unnamed channel. Adult and juvenile CV spring-run Chinook salmon and CCV steelhead will be present in areas where bank modification will occur. Removal of vegetation is reasonably certain to result in harm to the species through modification or degradation of the PBFs for spawning, rearing, and migration that will result in temporary displacement of individuals, loss of cover, increased predation, and reduced growth due to decreased food inputs. If habitat destruction exceeds the estimates for riparian vegetation and SRA habitat, the anticipated incidental take levels are exceeded, trigger the need to reinitiate consultation.

2.9.2. Effect of the take

In the biological opinion, NMFS determined that the amount or extent of anticipated take, coupled with other effects of the proposed action, is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

2.9.3. Reasonable and prudent measures

"Reasonable and prudent measures" are measures that are necessary or appropriate to minimize the impact of the amount or extent of incidental take (50 CFR 402.02).

NMFS believes the following reasonable and prudent measures are necessary and appropriate to minimize take of SR winter-run Chinook salmon, CV spring-run Chinook salmon, CCV steelhead, and sDPS of North American green sturgeon:

1. Measures shall be taken to minimize the amount or extent of incidental take of listed salmonids and green sturgeon resulting from the placement of structures or materials in the wetted channel, dewatering of the channel, the capture and relocation of fish, and general construction related activities.

2. Measures shall be taken to handle or dispose of any individual SR winter-run Chinook salmon, CV spring-run Chinook salmon, CCV steelhead, and/or sDPS of North American green sturgeon killed during project activities.

3. Measures shall be taken by USACE, including any and all individuals and/or employees contracted to carry out the work, to minimize the effects of temporary and permanent habitat loss of riverine and riparian habitat.

4. Measures shall be taken to develop a Stormwater Pollution and Prevention Plan (SWPPP) to address BMPs that will be used to prevent erosion and sediment loss within the project site.

5. Measures shall be taken to ensure that project monitoring obtain specific project information to better assess the effects and benefits of project avoidance, mitigation, and minimization efforts. The applicant will provide NMFS with reports describing incidental take during project activities and annual reports detailing habitat revegetation for three years following project actions.

2.9.4. Terms and conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the Federal action agency must comply (or must ensure that any applicant complies) with the following terms and conditions. USACE or any applicant has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this ITS (50 CFR 402.14). If the entity to whom a term and condition is directed does not comply with the following terms and conditions, protective coverage for the proposed action would likely lapse.

1. The following term and condition implements reasonable and prudent measure number 1:

    a) Any observed injuries or mortality from construction-specific activities shall be reported to NMFS within 48 hours. Any fish injury or mortality specific to relocation activities greater than 5% of the number of fish handled shall be reported to NMFS within 48 hours and relocation activities shall cease until a NMFS biologist is on site to supervise the remainder of relocation activities.
    b) The city must receive approval from NMFS to allow for construction activities outside of the proposed working limits. All activities are expected to occur within proposed working limits.
    c) When artificial lighting is used on the worksite, lights will not be pointed directly towards the water, but will be oriented up or across the water. Lights will be turned off at the end of the workday.
    d) If turbidity exceeds the levels described in the Water Quality Control Plan, as mentioned in the Biological Assessment, work shall cease until turbidity levels fall within the accepted standards defined by the California Regional Water Quality Control Board. This applies to turbidity associated with all construction activity.
    e) All in-channel or out-of-channel activity that may impact channel conditions shall cease during the mid-June pulse flow event.
    f) The applicant shall refer to the updated 2023 NOAA Fisheries West Coast Region Anadromous Salmonid Passage Design Manual to minimize the amount or extent of incidental take of listed salmonids and green sturgeon.

2. The following term and condition implements reasonable and prudent measure number 2:

    a) All Chinook salmon, steelhead, and green sturgeon mortalities must be retained, placed in an appropriately sized whirl-pak or zip-lock bag, labeled with the date and time of collection, fork length, location of capture, and frozen as soon as possible. Frozen samples must be retained until specific instructions are provided by NMFS.

3. The following term and condition implements reasonable and prudent measure number 3:

    a) The contractor shall monitor and maintain all riparian plantings for three years, and provide irrigation, fertilization and replacement plantings as necessary to ensure full and rapid recovery of disturbed riparian habitat features. Appropriate interpretative signage shall be placed at the restoration site and additional revegetated areas to inform the public of riparian habitat restoration.

4. The following term and condition implements reasonable and prudent measure number 4:

    a) The SWPPP will be provided to NMFS upon completion.

5. The following term and condition implements reasonable and prudent measure number 5:

    a) The applicant shall annually submit to NMFS a report of the previous year's project monitoring activities for a period of three years following construction. The annual report shall include take associated with project actions, and a summary of the specific type and location of each monitoring survey.
    b) This report shall be submitted, preferably by email, annually by December 31 to the NMFS California Central Valley Office:
        ccvo.consultationrequests@noaa.gov (preference)
        National Marine Fisheries Service
        Assistant Regional Administrator
        California Central Valley Office
        650 Capitol Mall, Suite 5-100
        Sacramento, California 95814

2.10. Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Specifically, "conservation recommendations" are suggestions regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR 402.02). The following conservation recommendations are discretionary measures that NMFS believes are consistent with this obligation and therefore should be carried out by the applicant:

1. NMFS recommends that USACE encourage the applicants to use species' recovery plans to help ensure that their actions will address the underlying processes that limit fish recovery.

2. NMFS recommends that native riparian planting should occur immediately following completion of construction activities to avoid temporal delays and loss of riparian habitat. NMFS recommends an additional 1:1 ratio to account for the temporal loss of habitat (for each year that restoration activities are delayed (*e.g.*, If riparian planting is delayed a year, the current 3:1 replanting ratio for riparian habitat would become 4:1)). This conservation recommendation supports recovery action SAR-2.8 and CLC-2.1 in the Salmonid Recovery Plan (NMFS 2014).

3. If the proposed action will result in the removal of non-native riparian vegetation, NMFS recommends planting native riparian plant species at a 2:1 ratio within the vicinity of the construction area to offset these impacts and improve the quality of the riparian habitat for listed species. This conservation recommendation supports recovery action CLC-2.5 in the Salmonid Recovery Plan (NMFS 2014).

4. NMFS recommends that removed trees be placed in the streambed to provide large woody debris to improve instream refuge. This conservation recommendation supports recovery action SAR-2.11 in the Salmonid Recovery Plan (NMFS 2014).

5. NMFS recommends that the applicant place spawning gravel in the Lower Clear Creek to augment and improve existing critical habitat in the action area. This conservation measure supports recovery action SAR-1.2 in the Salmonid Recovery Plan (NMFS 2014).

6. NMFS recommends that USACE and/or the applicant post interpretative signage near critical habitat and waters that may contain federally listed species to provide information on those species that occur within the action area and actions that they can take to help and/or prevent further harm to those species. Signage should include information about the salmonid and green sturgeon lifecycles, including how to identify salmon redds. This conservation recommendation supports recovery action SAR-2.4 and CLC-2.6 in the salmonid recovery plan (NMFS 2014).

7. NMFS recommends the applicant communicate with BOR to determine the pulse flow schedule of the Whiskeytown Dam to optimize their construction schedule.

8. NMFS recommends measures are taken to ensure that contractors, construction workers, and all other parties involved with these projects implement the AMMs as detailed in the BA and this Biological Opinion. The Corps, or the implementing agency, shall provide a copy of this response to the prime contractor, in order to educate and inform all other contractors involved in the project as to the recommendations of this Biological Opinion.

9. NMFS recommends measures are taken to offset the effects of impervious surfaces by using elements of low impact design (LID). Examples of LID include additional tree planting, the use of vegetation buffers between development and waterbodies, or soil quality improvement and maintenance projects.

2.11. Reinitiation of Consultation

This concludes formal consultation for Westside Sewer Interceptor Phase 3 Project.

Under 50 CFR 402.16(a): "Reinitiation of consultation is required and shall be requested by the Federal agency or by the Service where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and: (1) If the amount or extent of taking specified in the incidental take statement is exceeded; (2) If new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion or written concurrence; or (4) If a new species is listed or critical habitat designated that may be affected by the identified action."

3. MAGNUSON–STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT ESSENTIAL FISH HABITAT RESPONSE

Section 305(b) of the MSA directs Federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect EFH. Under the MSA, this consultation is intended to promote the conservation of EFH as necessary to support sustainable fisheries and the managed species' contribution to a healthy ecosystem. For the purposes of the MSA, EFH means "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity", and includes the physical, biological, and chemical properties that are used by fish (50 CFR 600.10). Adverse effect means any impact that reduces quality or quantity of EFH, and may include direct or indirect physical, chemical, or biological alteration of the waters or substrate and loss of (or injury to) benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects on EFH may result from actions occurring within EFH or outside of it and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) of the MSA also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH. Such recommendations may include measures to avoid, minimize, mitigate, or otherwise offset the adverse effects of the action on EFH [CFR 600.905(b)].

This analysis is based, in part, on the EFH assessment provided by the NMFS and descriptions of EFH for Pacific Coast salmon (Pacific Fishery Management Council (PFMC) 2014) and NMFS 2014) contained in the fishery management plans developed by the PFMC and approved by the Secretary of Commerce.

3.1. Essential Fish Habitat Affected by the Project

EFH is designated under the Pacific Coast Salmon Fisheries Management Plan (FMP), which includes the action area of the proposed action. EFH in the action area consists of adult migration habitat, spawning habitat, and juvenile rearing and migration habitat for SR winter-run Chinook salmon, CV spring-run Chinook salmon, and fall- and late fall-run Chinook salmon. Habitat areas of particular concern (HAPCs) for Pacific Coast Salmon include (1) complex channels and floodplain habitats, (2) thermal refugia, (3) spawning habitat, (4) estuaries, and (5) marine and estuarine submerged aquatic vegetation; however, HAPCs are not present in the action area.

3.2. Adverse Effects on Essential Fish Habitat

The potential effects of the proposed action on EFH for Pacific Coast salmon include permanent effects to SRA habitat. Effects to EFH for Pacific Coast salmon are discussed in the context of effects to critical habitat PBFs as designated under the ESA and described in section 2.4.4.5., Factors affecting federally listed species critical habitat in the action area. The effects are expected to be similar to the impacts affecting critical habitat and include the following:

- Permanent habitat loss/modification
- Reduced shelter from predators
- Reduction/change in aquatic macroinvertebrate production
- Reduced habitat complexity
- Reduced shade
- Reduced supply of terrestrial food resources

3.3. Essential Fish Habitat Conservation Recommendations

NMFS determined that the following conservation recommendations are necessary to avoid, minimize, mitigate, or otherwise offset the impact of the proposed action on EFH.

1. To address the adverse effects of permanent habitat loss/modification, NMFS recommends implementation of Section 2.9.4. Terms and Conditions 3(a).

Fully implementing these EFH conservation recommendations would protect, by avoiding or minimizing the adverse effects described in section 3.2, above, for Pacific Coast salmon.

3.4. Statutory Response Requirement

As required by section 305(b)(4)(B) of the MSA, USACE must provide a detailed response in writing to NMFS within 30 days after receiving an EFH Conservation Recommendation. Such a response must be provided at least 10 days prior to final approval of the action if the response is inconsistent with any of NMFS' EFH Conservation Recommendations unless NMFS and the Federal agency have agreed to use alternative time frames for the Federal agency response. The response must include a description of the measures proposed by the agency for avoiding, minimizing, mitigating, or otherwise offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the Conservation Recommendations, the Federal agency must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the action and the measures needed to avoid, minimize, mitigate, or offset such effects [50 CFR 600.920(k)(1)].

In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, we ask that in your statutory reply to the EFH portion of this consultation, you clearly identify the number of conservation recommendations accepted.

3.5. Supplemental Consultation

The USACE must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH Conservation Recommendations [50 CFR 600.920(l)].

4. Data Quality Act Documentation and Pre-Dissemination Review

The Data Quality Act (DQA) specifies three components contributing to the quality of a document. They are utility, integrity, and objectivity. This section of the opinion addresses these DQA components, documents compliance with the DQA, and certifies that this opinion has undergone pre-dissemination review.

4.1. Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of this opinion are USACE and the City of Redding. Other interested users could include U.S. Fish and Wildlife Service or California Department of Fish and Wildlife. Individual copies of this opinion were provided to the USACE and the City of Redding. The document will be available within 2 weeks at the NOAA Library Institutional Repository (https://repository.library.noaa.gov/welcome). The format and naming adhere to conventional standards for style.

4.2. Integrity

This consultation was completed on a computer system managed by NMFS in accordance with relevant information technology security policies and standards set out in Appendix III, 'Security of Automated Information Resources,' Office of Management and Budget Circular A-130; the Computer Security Act; and the Government Information Security Reform Act.

4.3. Objectivity

Information Product Category: Natural Resource Plan

Standards: This consultation and supporting documents are clear, concise, complete, and unbiased; and were developed using commonly accepted scientific research methods. They adhere to published standards including the NMFS ESA Consultation Handbook, ESA regulations, 50 CFR 402.01 et seq., and the MSA implementing regulations regarding EFH, 50 CFR part 600.

Best Available Information: This consultation and supporting documents use the best available information, as referenced in the References section. The analyses in this opinion and EFH consultation contain more background on information sources and quality.

Referencing: All supporting materials, information, data and analyses are properly referenced, consistent with standard scientific referencing style.

Review Process: This consultation was drafted by NMFS staff with training in ESA and MSA implementation, and reviewed in accordance with West Coast Region ESA quality control and assurance processes.

5. REFERENCES

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