Regional Alternative
Technical Memorandum #5

Paradise Sewer Project

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1. Introduction

The Town of Paradise (Town) is implementing the Paradise Sewer Project (Project), which involves identifying and implementing a long-term solution for collection, treatment, and reuse/disposal of its wastewater. HDR is under contract to assist the Town with the first two phases of the Project—final selection of a wastewater alternative (Phase 1), and preparation of an Environmental Impact Report (EIR) covering the selected alternative (Phase 2). This technical memorandum (TM) is part of the Phase 1 effort.

Two primary alternatives are under consideration for the Paradise Sewer Project—a local wastewater treatment plant (presented in TM #4 – Local Wastewater Treatment and Disposal Alternatives) and a regional alternative. The purpose of this TM #5 is to develop and evaluate the regional alternative, which consists of a regional pipeline transporting wastewater from the Town to the City of Chico Water Pollution Control Plant (WPCP) and a connection fee to be paid to the City of Chico. Collection system improvements in Paradise, presented in TM #3 – Evaluation of Collection System, are common to all alternatives.

The analysis in this TM consists of three primary components:

- Evaluation of two primary routes for the regional pipeline, shown in Figure 1. The evaluation includes conceptual construction costs, 20-year operations and maintenance (O&M) costs, and net present values. The two regional pipeline alternatives are the following:
    - Alternative A: Skyway Route
    - Alternative B: Neal Road Route
- Estimation of a range of potential connection fees for the Town to connect to the Chico WPCP.
- Analysis of potential environmental constraints associated with the regional alternative (see Appendix A).

This TM is organized as follows:

- Section 1: Introduction
- Section 2: Background
- Section 3: Regional Routing Alternatives Analysis
- Section 4: Summary of Environmental Constraints
- Section 5: Chico Connection Fee Evaluation
- Section 6: Chico Monthly Treatment User Fee Evaluation
- Section 7: Recommendation
- Section 8: Implementations Steps for the Regional Alternative

Supporting information for this TM is provided in the following appendices:

- Appendix A: Environmental Constraints Analysis
- Appendix B: Pipeline Cost Estimate Backup

- Appendix C: Pipeline Cross-Section and Trenchless Crossing Figures
- Appendix D: OMB Circular

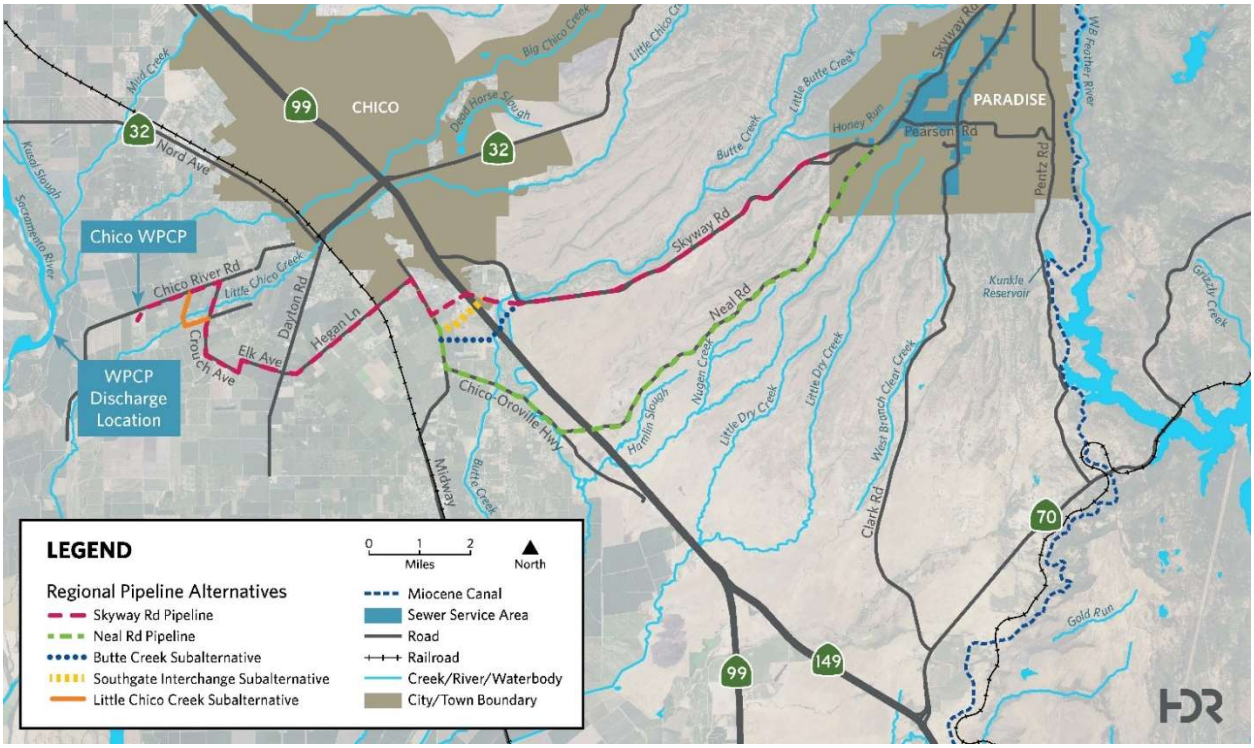

Figure 1. Proposed Regional Pipeline Routing Alternatives

2. Background

Prior to the Camp Fire, Paradise was the largest unsewered community in California. A new wastewater management solution is needed to improve the local economy (e.g., encourage opening of new businesses) and to stop degradation of groundwater quality caused by failed or failing septic systems.

The need for a centralized wastewater treatment solution for the Town has been studied in seven prior reports. The most recent study was prepared by Bennett Engineering in June 2017, *Town of Paradise Sewer Project, Alternative Analysis and Feasibility Report: Determining a Preferred Option for Implementation* (2017 Report). Figure 2 presents the proposed sewer service area (SSA) identified in the 2017 Report; the Town has directed that this be the proposed SSA for this effort. A new collection system (see TM #3) will be constructed in the proposed SSA to convey wastewater collected in the area to a new local wastewater treatment plant (WWTP; see TM #4) or to the Chico WPCP (evaluated in this TM). Based on the 2017 Report, the proposed SSA was defined to represent the area that had the most septic systems that had failed or were projected to fail within the next 5 years.

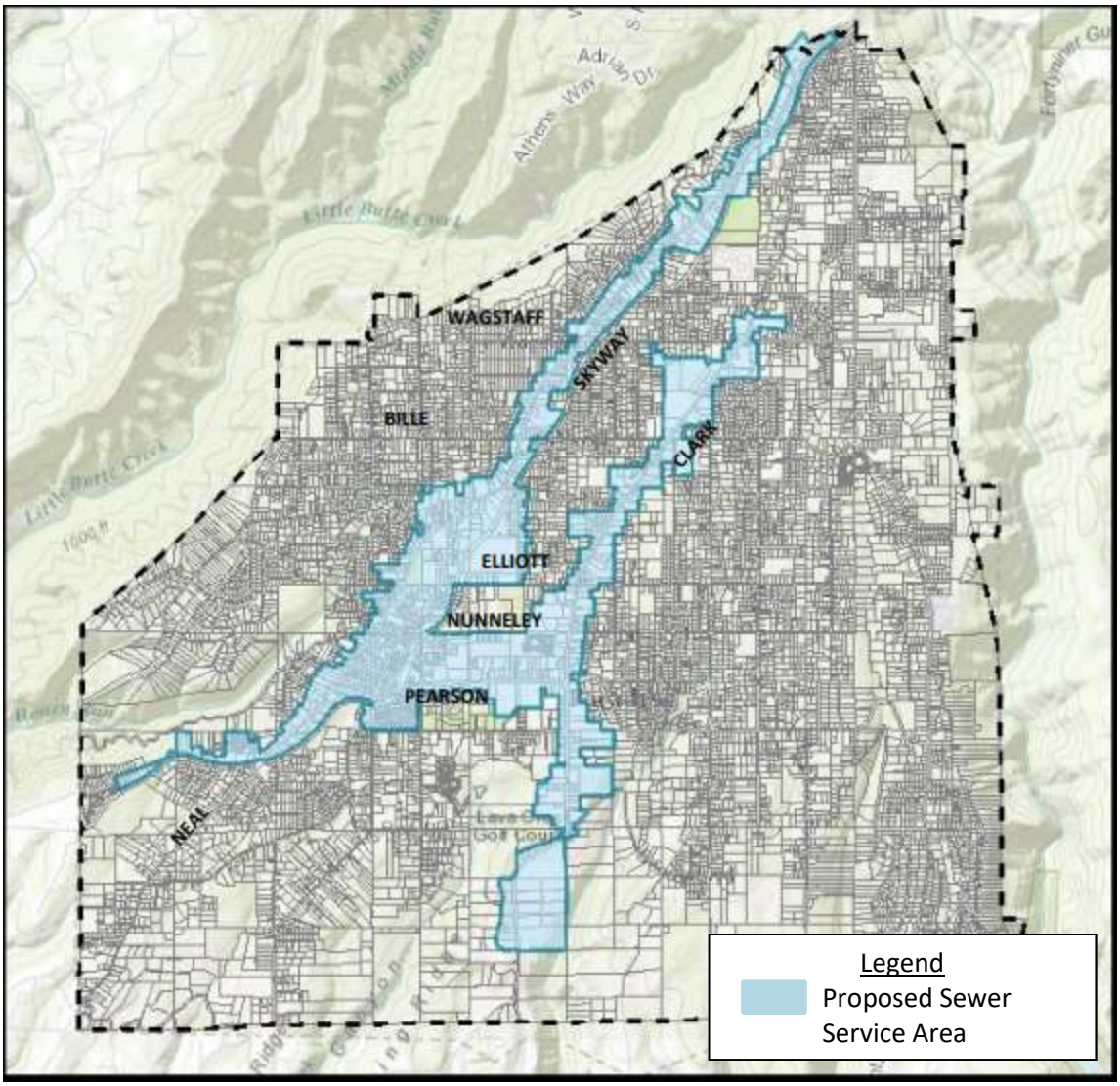

Figure 2. Proposed Town of Paradise Sewer Service Area

Some of the challenges in constructing a regional pipeline include the topography and the geology. The geology underlying Paradise is primarily Tuscan Formation made up of lava cap (andesite) and clays. The amount of permeable soil above the andesite varies throughout Paradise. Boulders can also be present. The unweathered state of the Tuscan Formation results in hard rock and course rock fragments that make trenching with a traditional bucket excavator difficult. Sections of trenching in this material may require a rock trencher, which can be efficient but is limited in depth of cut.

Because of the long distance (18 miles) to the Chico WPCP, one or more pump stations would be needed to convey Paradise wastewater. Therefore, the regional pipeline would be a pressure line, which could be installed with relatively shallow cover. Most of the pipeline construction issues would be mitigated by keeping the pipeline construction shallow, at a minimum depth of 3 feet. Both regional pipeline alternatives would also include one major creek crossing with levees (Butte Creek), two smaller creek crossings with no levees (Little Chico Creek and Comanche Creek), a crossing of Highway 99, and a crossing of the Union Pacific Railroad. This analysis was based on using trenchless technology for these crossings.

3. Regional Routing Alternatives Analysis

This section describes the two regional pipeline routes considered, discusses the agency coordination that took place during development of the proposed pipeline routes, and presents the cost estimates prepared for both alternatives.

Wastewater flows through the regional pipeline would vary significantly from start-up to build-out. An initial hydraulic analysis indicates that dual 6-inch force mains may be needed to help address initial low flows. Also, two pump stations may be needed to provide the energy to deliver sewer flows to the Chico WPCP, as follows:

- There would be approximately 1,200 feet of fall from Paradise to Chico (see profile in Appendix C). Despite this high amount of drop, calculations indicate that the initial low wastewater flow may lack the energy to maintain flow by gravity. Therefore, a pump station would be needed near Paradise.
- Because of the long length of the pipeline and associated head loss, a second pump station would be needed to convey the wastewater the remaining distance to the Chico WPCP. The second pump station would be adjacent to Butte Creek or Highway 99 at approximately 240 feet in elevation.

More detailed hydraulic analysis is planned for Phase 2 to optimize pipe size and pump station needs over the assumed flow range.

3.1 Routes Considered

The following two routes were evaluated for the regional pipeline and were shown previously in Figure 1:

- **Alternative A: Skyway Route.** Alternative A starts along Skyway at the end of the collection system and continues southwest along the north side of the southbound lane of Skyway. At the bend where Skyway turns north, Alternative A continues west cross-country. It makes a trenchless crossing (via horizontal directional drilling [HDD]) of Butte Creek and continues west along the old railroad alignment property. Then Alternative A makes a perpendicular trenchless crossing of Highway 99 to the east side of Entler Avenue at its intersection with Norfield Avenue. This crossing will be micro-tunneled with a steel casing as is typically required by Caltrans for a crossing permit. Alternative A continues north on the east side of Entler Avenue and then turns west along Entler Avenue to Midway. It continues northwest along Midway to the intersection of Midway and Hegan Lane. Alternative A then turns southwest and travels along Hegan Lane, with a bore-and-jack crossing of the Union Pacific Railroad on Hegan Lane. Alternative A continues southwest and then west along Hegan Lane to its intersection with Dayton Road and continues west along Elk Avenue. It turns south on Lone Pine Road then northwest on Crouch Avenue. It continues northwest and then north along Crouch Avenue, crossing two creeks (Comanche Creek and Little Chico Creek) before reaching Chico River Road. Alternative A turns west along Chico River Road and continues along Chico River Road until it reaches the Chico WPCP. Alternative A contains

three minor potential variations in routing, termed subalternatives, shown previously in Figure 1:

- **Butte Creek Subalternative.** At the bend where Skyway turns north, the Butte Creek Subalternative continues southwest cross-country. It crosses Butte Creek and Highway 99 with one trenchless HDD crossing south of the Highway 99 bridge abutment and continues west along Marybill Ranch Road. The Butte Creek Subalternative then turns north on Midway and rejoins Alternative A as it travels along Midway toward Hegan Lane.
- **Southgate Interchange Subalternative.** At the bend where Skyway turns north, Alternative A continues west cross-country and crosses Butte Creek. The Southgate Interchange Subalternative turns southwest and crosses Highway 99 with a trenchless crossing at Southgate Avenue. The Southgate Interchange Subalternative would parallel the future roadway extension from Skyway to the Southgate Interchange on Highway 99. The trenchless crossing of Highway 99 would be parallel to the future overpass. The Southgate Interchange Subalternative then turns north on Midway and rejoins Alternative A as it travels along Midway toward Hegan Lane.
- **Little Chico Creek Subalternative.** After Alternative A crosses Comanche Creek and turns north along Crouch Avenue, the Little Chico Creek Subalternative turns west along Chico Avenue. Then it turns north on Taffee Avenue and crosses Little Chico Creek. Then the Little Chico Creek Subalternative continues north to Chico River Road, where it turns west to rejoin Alternative A as it travels west along Chico River Road to the Chico WPCP.

- **Alternative B: Neal Road Route.** Alternative B starts at the intersection of Skyway and Neal Road and continues southwest along Neal Road. Alternative B follows Neal Road as it turns west, and it makes a perpendicular trenchless crossing (via micro-tunneling) at Highway 99. It continues along Neal Road until it reaches the Oroville-Chico Highway, where it turns northwest. Alternative B continues along the northern edge of the Oroville-Chico Highway and makes a trenchless crossing (via HDD) of Butte Creek. Then Alternative B turns north on Midway and continues along Midway until it reaches Hegan Lane. At Hegan Lane, Alternative B turns southwest and continues along the same route as Alternative A: Skyway Route to the Chico WPCP.

Both Alternatives A and B include the following:

- Two 6-inch polyvinyl chloride force mains with minimum cover of 3 feet and air release valves. Twin force mains are recommended to provide continued service if one pipeline breaks, and to handle initial low flows more efficiently. (Additional analysis on the size and number of force mains will be conducted in Phase 2.) See Appendix C, Plan and Section – Skyway, for a typical cross section along Skyway. Additional hydraulic modeling should be done in Phase 2 to confirm pipe sizes and the number. Pipeline installation will require coordination with and permits from Butte County, and purchase of rights-of-way from private property owners.

- A pump station at the start of the force main (near the southerly end of the Town boundary) and one after the force main reaches the flat topography near the City of Chico. The pump stations will be initially sized for startup flows of 114,000 gallons per day (gpd), with the ability to be upsized to the build-out flow of 448,000 gpd (both figures are average dry weather flow). Startup flows are estimated at approximately 20 percent of the build-out flows. Similar to the force mains, the number and location of the pump stations will be analyzed further in Phase 2.

- Capability at the pump station to handle screenings and grit. Included in the project cost currently is a mechanical screen and grit removal system, similar to what is used for handling septage, upstream of the submersible pumps (this requires routine maintenance, checking, and cleaning). The need for or type of screenings and grit removal system will be examined further in Phase 2. Odor control at the pump station. During very low flow periods, raw wastewater would sit for a considerable period of time in the pump station wet well, which could generate odors.

- Chemical injection into force mains to minimize odors at the Chico WPCP.

- A second pump station once in the vicinity of Highway 99. A second pump station maybe necessary to maintain a reasonable pump head. The need for a second pump station will be examined further in Phase 2.

- A micro-tunneled crossing of Highway 99. The crossings would be a minimum of 20 feet deep, with a 30-foot by 12-foot bore pit and a 12-foot by 12-foot receiving pit. See Appendix C for the Highway 99 crossing for each alternative. These trenchless crossings would require encroachment permit approval from Caltrans.

- An HDD crossing of Butte Creek. The HDD crossing would have a minimum depth of 20 feet below the creek, with a 10-foot by 5-foot launching and receiving pit on either end. Both pits would be shallow (approximately 5 feet deep). See Appendix C for the Butte Creek crossings for each alternative.

- HDD crossings of two small creeks (Comanche Creek and Little Chico Creek) along Crouch Avenue or Taffee Avenue.

- A termination structure at the Chico WPCP prior to Paradise flow being combined with Chico flow. This structure would have flow measurement, sampling, and odor control equipment.

It should also be noted that the Town would need to maintain an aggressive fats, oils, and grease program with its restaurants and citizens to minimize the potential for clogging the regional pipeline.

3.2 Coordination with Other Agencies

Routing of the regional pipeline required coordination with a number of agencies.

3.2.1 City of Chico

The City of Chico's Sanitary Sewer Master Plan Update (2013) identifies several key projects adjacent to both Alternative A: Skyway Route and Alternative B: Neal Road Route. The Sanitary

Sewer Master Plan Update identifies Project 17B (Southeast Trunk Sewer) that will extend from the intersection of Hegan Lane and Midway, south along Midway to Entler Avenue. This will be a 24-inch pipeline that will use the same route as Alternative A: Skyway Route. The four phases of Project 17 are anticipated to be constructed from 2021 to 2025. Project 17C will be a 12-inch sewer that extends southeast parallel to Highway 99.

Project 18A (Honey Run Trunk Sewer) will include an 18-inch trenchless crossing of Highway 99 and will tie into Project 17B. The anticipated Highway 99 crossing is in the same vicinity as Alternative A. The project construction timeline for Project 18A would be 2026 to 2030. It is presumed that Alternative A, if selected, would be constructed prior to the City of Chico's Project 18, but potentially concurrent with Projects 17B and 17C.

3.2.2 City of Chico, Caltrans, and Butte County Association of Governments

The City of Chico, in coordination with Caltrans and the Butte County Association of Governments, is advancing planning efforts on the Southgate Avenue Interchange Project. The project does not yet have funding and is expected to cost around $54M to design, permit, and construct.

Currently, the intersection of Southgate Avenue and Highway 99 is a signalized four-way intersection. A new interchange would provide an aerial crossing for Southgate Avenue with on- and off-ramps. Southgate Avenue would be extended east to tie into Skyway. The project would provide improved traffic safety on Highway 99 and improved ingress and egress for emergencies to and from Paradise. This project will need to secure rights-of-way (ROW) from parcels adjacent to Southgate Avenue and Entler Avenue. It would also need ROW for connection to Skyway.

The timeline for final permitting and design of this project is unknown. If Alternative A: Skyway Route is selected as the preferred route, the Southgate Interchange Subalternative could align adjacent to the preliminary alignment for the Southgate Avenue extension and the Notre Dame Boulevard extension to accommodate the development of the future interchange.

3.3 Opinion of Probable Construction Costs

Opinions of Probable Construction Costs (cost estimates) were prepared for both Alternative A: Skyway Route and Alternative B: Neal Road Route. The estimates are Class 4, associated with a 1 to 15 percent level of project definition. When needed, the 20-Cities Average version of the Engineering News-Record Construction Cost Index (ENR CCI) was used to update costs.

The pipeline cost estimates were developed with unit costs for open cut construction of the force mains, reflecting the cost of relatively shallow sewers in challenging geology (hard rock). Open cut unit costs have also been escalated since the 2017 Report. The cost estimate for the Neal Road Route is more than that for the Skyway Route because the length of open cut construction for the Neal Road Route is 3.9 miles (22 percent) longer. Many of the remaining components are similar between the alternatives, as discussed in Section 3.1. No costs were developed for the three subalternatives because it is expected that permitting and coordination with adjacent agencies during design will determine if these options are viable. A single HDD crossing of Butte Creek and Highway 99 has the potential to save construction costs. However, this crossing would likely require the installation of a casing pipeline prior to installation of the final pipeline per typical Caltrans requirements.

The cost estimates include the cost of a dual 6-inch force main with air release valves, a pump station, and trenchless crossings. Because of a lack of site-specific geotechnical information, lack of detailed survey data, and unknown construction challenges in the field, the regional pipeline alternative cost estimates include a 30 percent scope contingency and a 10 percent construction contingency. To develop a capital cost estimate, implementation (soft) costs of 39 percent of the escalated construction cost estimate were added. Tables 1 and 2 summarize the quantities and capital costs. More detailed cost estimates are provided in Appendix B.

Table 1. Capital Cost Estimate for Alternative A: Skyway Route

Sewer Component	Length (ft)	Quantity	Construction Cost ($)
Trunk Force Main	93,793		$23,261,000
HDD	1,660		$696,000
Bore and Jack	599		$1,080,000
Pump Stations and Structures		2	$1,211,500
Subtotal			**$26,248,500**
Undefined Scope (30%)			**$7,874,550**
Subtotal			**$34,123,050**
Construction Contingency (10%)			$3,412,305
Implementation (Soft) Costs (39%)			$14,638,790
TOTAL			**$52,174,145**

Table 2. Capital Cost Estimate for Alternative B: Neal Road Route

Sewer Component	Length (ft)	Quantity	Construction Cost ($)
Trunk Force Main	114,141		$28,307,000
HDD	1,031		$557,000
Bore and Jack	368		$872,000
Pump Stations and Structures		2	$1,061,500
Subtotal			**$30,797,500**
Undefined Scope (30%)			**$9,239,250**
Subtotal			**$40,036,750**
Construction Contingency (10%)			$4,003,675
Soft Costs (39%)			$17,175,770
TOTAL			**$61,216,195**

As construction funding is identified and more detailed design is developed, the project's contingency should decrease, and updated unit costs for construction could be used for budgeting purposes. To accomplish more accurate estimating, geotechnical borings along the pipeline alignment are necessary. This would assist cost estimators in evaluating appropriate shoring systems and pipeline installation production rates.

The cost estimates have assumed the use of a pump station with submersible non-clog pumps in a wetwell. This type of pump station is mostly serviceable from above grade without confined space entry required. It has a relatively small footprint and can be installed adjacent to existing parcels, and along road frontages and existing easements, depending on frontage or easement width and

adjacent power drop availability. Specific ROW acquisition costs, including parcel counts and area estimates, have not been included in the cost estimates. However, an allowance for ROW costs has been included as part of the implementation costs. Screening, grit removal, and odor control have been added to the pump station cost estimates. These elements are assumed due to low initial flows of the system and long residence times in the force mains and wet wells of the pump stations. Removal of grit protects the pumps and helps reduce the potential for clogging the 6-inch sewer force mains.

3.4 Operations and Maintenance Costs for Pipeline System

To estimate a net present value for the regional alternative, it was necessary to estimate annual O&M costs, which consist of two components: (1) O&M on the pipeline system, which (it is assumed) would be done by Town staff; and (2) O&M associated with treatment at the Chico WPCP. The approach to estimating O&M costs for the pipeline system is similar to that used in TM #3. (See Appendix B for a detailed evaluation of the components of the annual O&M costs for the pipeline system, including staffing and operations costs [including energy].) Table 3 summarizes the O&M costs and conversion of annual costs to present value for Alternative A: Skyway Route and Alternative B: Neal Road Route. While the two alternatives have different lengths, the demand for maintenance labor is roughly similar. The only differences between the alternatives are the length of force mains and additional air release valves and isolation valves, but these additional appurtenances are not expected to demand more labor with the Neal Road Route versus the Skyway Route. The additional 19,000 feet of force main for the Neal Road Route would incur additional pumping head loss and therefore would incur higher power costs. However, insufficient information exists at this time to estimate that difference, which would be minor, so the power costs are assumed to be the same. Hydraulic modeling of the system at startup and build-out will need to be completed and pumps selected appropriately.

Table 3. Annual Operations and Maintenance Costs for Regional Pipeline Alternatives

Alternative	Annual O&M ($/yr)	Net Present Value, 2020, 0.3%, 20 years ($)
Alternative A: Skyway Route	$254,542	$4,933,953
Alternative B: Neal Road Route	$264,000	$5,117,277

3.5 Chico Treatment User Fee Evaluation

The second ongoing O&M cost is that associated with treatment at the Chico WPCP, which (it is assumed) would be assessed through a monthly user fee charged to connected Town users and paid to the City of Chico. The treatment user fee was estimated as follows:

1. Information included in the SWRCB Connection Rate Report for 2016–2017 was used. This report, the most recent by SWRCB, compiles sewer user fee data from 963 wastewater agencies in California. The data are presented by individual agency, by population, and by county. The connection rates are reported as median, average, and high values.

2. Butte County data were extracted from the SWRCB report for use in this TM. These local data were felt to be more accurate than statewide data.

3. The data from 2016–2017 was updated to reflect 2020–2021 rates. The increase was calculated by using the San Francisco City ENR indexes from July 2016 and July 2020 and applying this percent increase to the 2016–2017 Butte County average sewer use fee.

4. Different monthly user fees for residential and commercial/industrial users is typical. For purposes of this TM, the monthly treatment user fee for non-residential users, such as commercial and light industrial, was estimated to be twice the rate for a residential user.

5. Over the next 20 years, it was assumed that Town connections would go from 357 connections in Year 1 (2027) to 901 connections in Year 20 (2046), or an average of 629 connections. Of these 629 connections, 44 percent are assumed residential and 56 percent non-residential.

Based on the information above, monthly treatment user fees for the Town were calculated and are presented in Table 8.

Table 8. Estimated Monthly and Annual Treatment User Fees

Connection Fee	No. of Connections	Monthly Treatment User Fee ($/connection)	Total Monthly Treatment User Fees	Total Annual Treatment User Fees
Residential	277	$41.73	$11,549	$138,600
Non-Residential	352	$83.46	$29,398	$352,800
Total	**629**		**$40,947**	**$491,400**

The total annual treatment user fee of $491,400 equates to a 20-year net present value of $9,525,000.

3.6 Net Present Value Costs of Pipeline Alternatives

To compare overall costs of Alternative A: Skyway Route and Alternative B: Neal Road Route (i.e., combining construction and O&M costs), a net present value cost analysis was done using a 20-year planning period. The net present value analysis also requires establishing a discount rate. A real discount rate of 0.3 percent was used, following the US Department of Agriculture (USDA) Bulletin 1780-2, which in turn refers to the real discount rate in the US Office of Management and Budget's Circular A-94 (see Appendix D).

Salvage value is the residual value of an asset after a certain time span up to the length of its useful life. Because the life spans of the collection system components exceed 20 years, salvage values were estimated based on the life span of the asset and a straight-line depreciation of the value of the asset over the analysis period of 20 years (per USDA Bulletin 1780-2 guidance for analysis of wastewater projects).

Assumed asset life spans and salvage values are shown in Tables 4 and 5. Cumulative salvage values for the two alternatives are shown.

Table 4. Asset Life Span and Salvage Value for Alternative A: Skyway Route

Asset	Life Span (yrs)	Salvage Value, 2040 ($)
Sewer – Public Right-of-Way	50	$14,649,600
Pump Stations	50	$576,900
TOTAL		**$15,226,500**

Table 5. Asset Life Span and Salvage Value for Alternative B: Neal Road Route

Asset	Life Span (yrs)	Salvage Value, 2040 ($)
Sewer – Public Right-of-Way	50	$17,469,000
Pump Stations	50	$486,900
TOTAL		$17,955,900

Calculations of the net present value of Alternative A: Skyway Route and Alternative B: Neal Road Route are included in Table 6. The total net present value of the alternatives is the capital cost of the alternative's construction plus the present value of the annual O&M cost over the time span minus the present value of the salvage value at the end of the time span. This methodology is consistent with USDA Bulletin 1780-2.

Table 6. 20-year Net Present Value of Regional Pipeline Alternatives

Alternative	Capital Cost ($) (A)	Present Value O&M, 0.3%, 20-yr ($) (B)	PW Salvage Value, 0.3%, 20-yr ($) (C)	Net Present Value ($) (A+B-C)
Alternative A: Skyway Route	$52,174,145	$4,933,953	$14,341,066	$42,767,033
Alternative B: Neal Road Route	$61,216,195	$5,117,277	$16,911,749	$49,421,723

4. Summary of Environmental Constraints

An environmental constraints review was completed to evaluate the potential environmental limitations or considerations associated with land use, biological resources, and cultural resources along the proposed regional pipeline routes. Appendix A includes the environmental constraints analysis of the regional alternative, with Table A-1 summarizing those constraints by project element. As noted, while there are environmental considerations and sensitivities identified throughout the study area, no constraints were found to be fatal flaws that could not be avoided or permitted through mitigation. The key variables in the regional alternative include the two pipeline routes between the Town of Paradise collection system and the connection to the existing City of Chico WPCP. Each of these routes has similar constraints associated with biological resources, with seasonal wetlands, vernal pools, and sensitive and protected species documented in each location. Moreover, each route would require the same types of permitting and regulatory consultation for these resources in Phase 2 of this planning process.

Near Highway 99, both routes cross an agricultural ditch and Butte Creek. Because the pipeline installation across these water bodies would done using trenchless methods, impacts on the water quality at these water bodies would be an issue only if those activities resulted in a frac-out (where pressurized drilling mud is released through fractured bedrock and travels up into a water body). Still, the Town would need to coordinate with the State Water Resources Control Board (SWRCB) as part of the environmental review process.

It should be noted that Alternative A: Skyway Route includes a much more developed set of data (60 percent of the study area surveyed) identifying sensitive historic and archaeological resources, and as a result, a higher number of resources are known in this area. Conversely, only 10 percent of the study area for Alternative B: Neal Road Route has been surveyed, meaning that the remainder of the route will require surveying if this route is selected.

5. Chico Connection Fee Evaluation

The capital cost of the regional alternative also includes payment of a treatment connection fee to the City of Chico. The connection fee is a charge to that is used to allow for future capital expenditures at the Chico WPCP as a result of flows from Paradise.

The actual connection fee would be negotiated between the Town of Paradise and the City of Chico during the early part of Phase 2. That negotiated fee could be developed from one of two general methods:

- **Charge the Town based on the City of Chico's existing connection fee schedule.** The City of Chico's current one-time wastewater connection fees are $1,551 per residential unit and $5,779 per non-residential unit. The City of Chico is in the process of developing new connection fees and monthly sewer rates, but those new fees and rates were not available at the time of this writing.

- **Determine costs for improvements needed at the Chico WPCP to treat and dispose of raw sewage conveyed from the Town.** To estimate a connection fee based on this method, the City of Chico's engineering consultant, Carollo Engineers, would need to analyze improvements needed at the WPCP to accommodate the Town's flow.

To compare alternatives in this Phase 1 effort, it was necessary to estimate the connection fee, which was done using the following method:

1. Information included in the SWRCB Connection Rate Report for 2016–2017 was used. This report, the most recent by SWRCB, compiles connection fee data from 591 wastewater agencies in California. The data are presented by individual agency, by population, and by county. The connection rates are reported as median, average, and high values.

2. Butte County data were extracted from the SWRCB report for use in this TM. These local data were felt to be more accurate than statewide data.

3. The data from 2016–2017 was updated to reflect 2020–2021 rates. The increase was calculated by using the San Francisco City ENR indexes from July 2016 and July 2020 and applying this percent increase to the 2016–2017 Butte County connection fee.

4. Different connection fees for residential and commercial/industrial users is typical. For purposes of this TM, the monthly sewer use fee for non-residential users, such as commercial and light industrial, was estimated to be twice the rate for a residential connection.

5. The connection fee was estimated for the build-out of the SSA (a total of 1,469 parcels).

Based on the information above, a range of potential connections fees for the Town was calculated and is presented in Table 7.

Table 7. Estimated Paradise Connection Cost for the Build-out of the Sewer Service Area

Description	No. of Connections	Connection Fee ($/connection)		Total Connection Cost	
		Current City of Chico	Average From SWRCB Report	Current City of Chico	Average From SWRCB Report
Residential	647	$1,551	$5,747	$1,003,497	$3,668,525
Non-Residential	822	$5,779	$11,494	$4,750,338	$9,321,570
Total Estimated Connection Fee				**$5,753,835**	**$12,990,095**

As shown in Table 7, the estimated connection cost ranges from approximately $5.8M to $13.0M. For the purposes of comparison of alternatives, the $12,990,095 connection cost will be used.

6. Recommendation

For the regional pipeline, Alternative A: Skyway Route is recommended for the following reasons:

- The capital cost and net present value of the Skyway Route are both less than the Neal Road Route, primarily due to the shorter length of the alignment.
- Although Skyway carries more traffic volume than Neal Road, it also has a larger ROW in which to install a pipeline while also handling traffic routing around a construction zone. Neal Road is quite narrow in several areas, with homes very close to the road and little available ROW.
- The environmental constraints on both alternatives are similar.

The subalternatives for Alternative A: Skyway Route will be carried forward into Phase 2 for further analysis.

The estimated cost for the regional alternative, using Alternative A: Skyway Route for the regional pipeline and average treatment user and connection fees, is shown in Table 9.

Table 9. Estimated Costs for the Regional Alternative

Description	Initial Cost	Net Present Value
REGIONAL PIPELINE COST (VIA SKYWAY ROUTE)		
Total Construction Cost	$37,535,400	
Total Capital Cost (includes implementation costs)	$52,174,100	
O&M Cost - Net Present Value (20 yrs., 0.3%)		$4,934,000
Salvage Value – Net Present Value (20 yrs., 0.3%)		-$14,341,100
CHICO TREATMENT USER FEE (AVERAGE FROM SWRCB REPORT)		
Annual Treatment User Fee – Net Present Value (20 yrs., 0.3%)		$9,525,000
CONNECTION FEE (AVERAGE FROM SWRCB REPORT)		
Connection Fee	$12,990,000	
TOTAL REGIONAL ALTERNATIVE COST		
Total Capital Cost with Connection Fee	**$65,164,100**	$65,164,100
Total Net Present Value (1)		**$65,282,000**

(1) NPV = Capital Cost + NPV of O&M – Salvage Cost + Monthly treatment user fee + Connection Fee

7. Implementation Steps for the Regional Alternative

If the regional alternative is selected by the Town as the preferred alternative, implementation would involve several key steps, particularly efforts associated with negotiating a legal agreement between the Town of Paradise and the City of Chico regarding the treatment of Paradise wastewater.

7.1 Steps to Develop a Town/City Legal Agreement

It is anticipated that the Town of Paradise and the City of Chico will negotiate an inter-municipal agreement for Paradise connection early in Phase 2. (The City of Chico has a provision in its municipal code, Section 15.40.285—Regulation of Waste Received from Other Jurisdictions, for such a situation.) One possible approach for this negotiation would be as follows:

1. A Working Committee is formed consisting of members of the Paradise Town Council and the Chico City Council, with support from their respective staff and consultants.
2. The Working Committee meets on a regular basis to develop a Memorandum of Understanding (MOU) that captures the agreed-upon principles of the legal contract.
3. Legal staff from the Town of Paradise and the City of Chico collaborate to turn the MOU into a draft contract.
4. The contract is reviewed and approved by the Paradise Town Council and the Chico City Council.

7.2 Potential Subjects Covered by the Town/City Legal Agreement

The legal agreement would need to cover numerous subjects, including the following:

- **Connection Fees.** How much should the initial connection fee be (e.g., for the initial Paradise flow or the ultimate flow)? If ongoing connection fees are to be collected for future connections, how much should they be (e.g., linked to the City of Chico's current connection fee schedule)? How should they be collected and paid to the City of Chico (e.g., collected by the Town of Paradise on an ongoing basis and paid to the City of Chico quarterly)?

- **Monthly User Fees.** How much should the monthly user fees charged to the Town be (e.g., linked to the treatment portion of the City of Chico's current monthly user fees)? How should they be collected and paid to the City of Chico?

- **Approval of Future Flows/Connections.** The agreement would need to specify a total amount of flow that the Town can send to the Chico WPCP in the future (i.e., the anticipated build-out flow for Paradise). It would also need some language regarding how to handle additional flows beyond that amount (e.g., if the Town decides to sewer additional parts of Paradise). This language would need to address these additional questions:

    - What if the City of Chico decides at some point to limit growth within the city and/or limit expansion of the Chico WPCP? How can the Town of Paradise be assured it will be able to continue to increase flow to the WPCP?

    - What if a major Paradise development comes forward that would add a large amount of flow, and the Chico WPCP is not be able to accommodate that flow at that time?

    - In some situations, there is a limit set on the ratio of wet weather to dry weather flow to make sure that a contributor limits leakage into a collection system. The Town of Paradise would have a new collection system with low infiltration during wet weather, so this might not be an issue.

- **Measurement of Paradise Flow.** Where will the Paradise wastewater flow rate be measured? Will it be sampled and tested? If so, how often, for what constituents, and by whom? Who is responsible to calibrate and maintain the flow measuring equipment (e.g. flow meter)?

- **Measurement of the Strength of Paradise Sewage.** Where will samples be taken to analyze the various components of the sewage?

- **O&M of Facilities.** The Town of Paradise would construct the regional pipeline (with blow-off valves, pigging stations, etc.) and a termination structure at the Chico WPCP. The Town would own the regional pipeline and be responsible for O&M of the pipeline. Who is responsible for O&M and future repairs/replacements on the termination structure at the Chico WPCP?

- **WPCP Operational Issues.** What happens if the Chico WPCP has a problem with constituents in its effluent or biosolids, causing it to violate its permit, and there is reason to believe the Paradise wastewater is responsible?

- **Industrial Dischargers.** All Paradise industrial dischargers would likely be subject to the City of Chico's industrial pretreatment program. How would that effort be implemented? Would the Town of Paradise have its own pretreatment staff, or would the Town pay for the City of Chico to do it? Are any specific constituents limited by the City of Chico's current industrial pretreatment program? Does the Town of Paradise have any issue with those constituents?

- **Water Recycling.** What happens if the City of Chico decides to implement a water recycling project in the future and realizes some revenue for the recycled water. Would the Town of Paradise have any rights to that "revenue"? What happens if the Town of Paradise implements its own water recycling facility in the future in Paradise? Will that be allowed? What if the Town still wants to send the biosolids from such a facility down to the Chico WPCP?

7.3 Other Implementation Issues

Several other issues would need to be addressed during implementation, including the following:

- **LAFCO Process.** The purpose of a Local Agency Formation Commission (LAFCO) is to encourage orderly and efficient provision of services among the various agencies within its jurisdiction. The Butte LAFCO covers Butte County LAFCO issues. During Phase 2, the Town would work with Butte LAFCO to determine what, if any, LAFCO steps need to be taken to implement the regional alternative.

- **Butte County.** Ongoing coordination would be needed with Butte County because a majority of the length of the regional pipeline would pass through unincorporated Butte County.

- **Special Permitting Requirements and Challenges.** Special permitting requirements and challenges would need to be considered. For example, there are currently long delays in obtaining construction permits for crossings from Union Pacific Railroad. The regional pipeline would make one crossing of the Union Pacific Railroad.

- **Right-of-Way Acquisition.** ROW would need to be acquired from various landowners along the regional pipeline route.

A

Environmental Constraints Analysis

A.1

National Wetlands Inventory Aquatic Features and Critical Habitat

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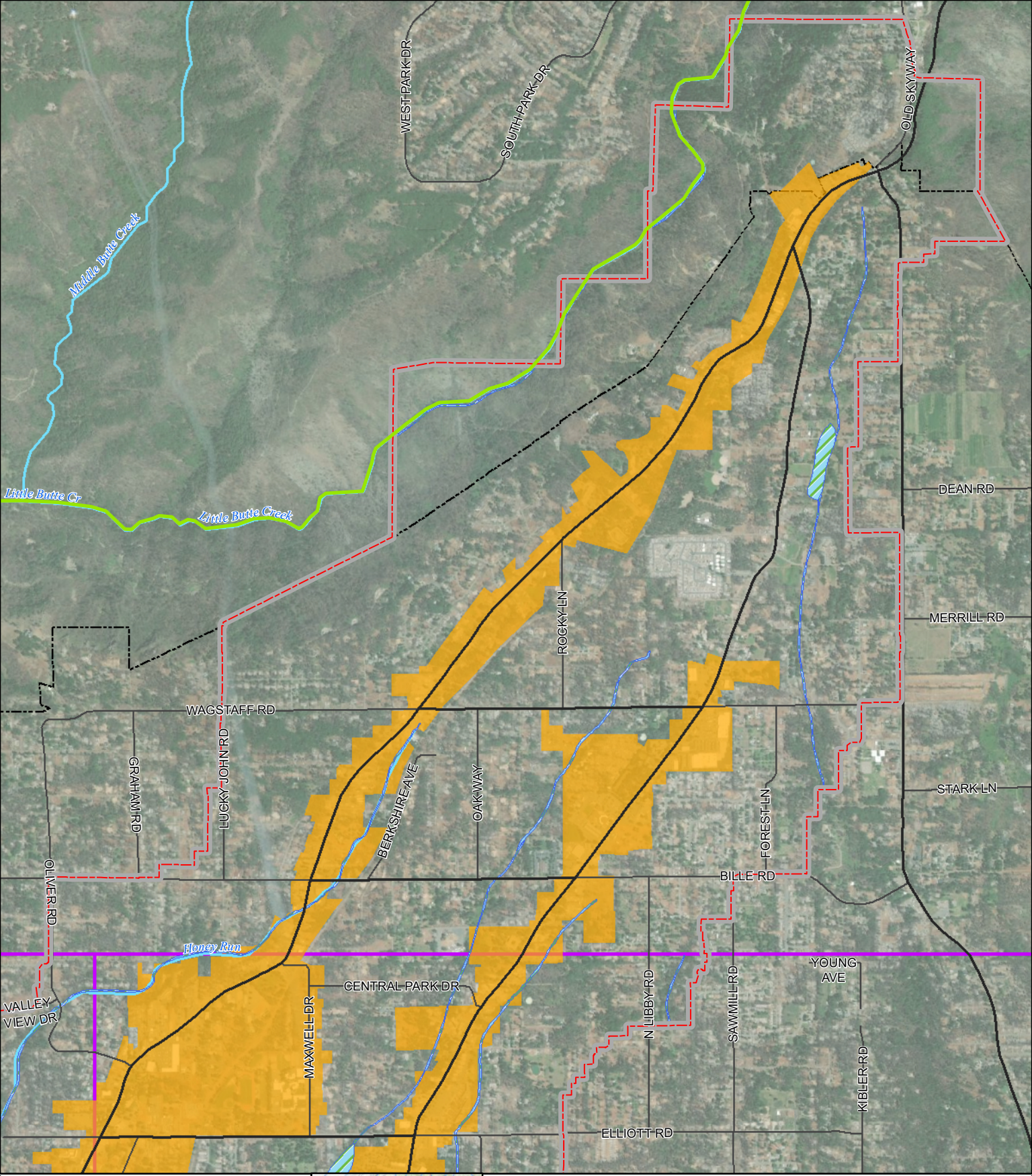

REGIONAL CRITICAL HABITAT AND NWI WETLANDS

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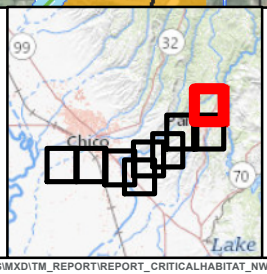
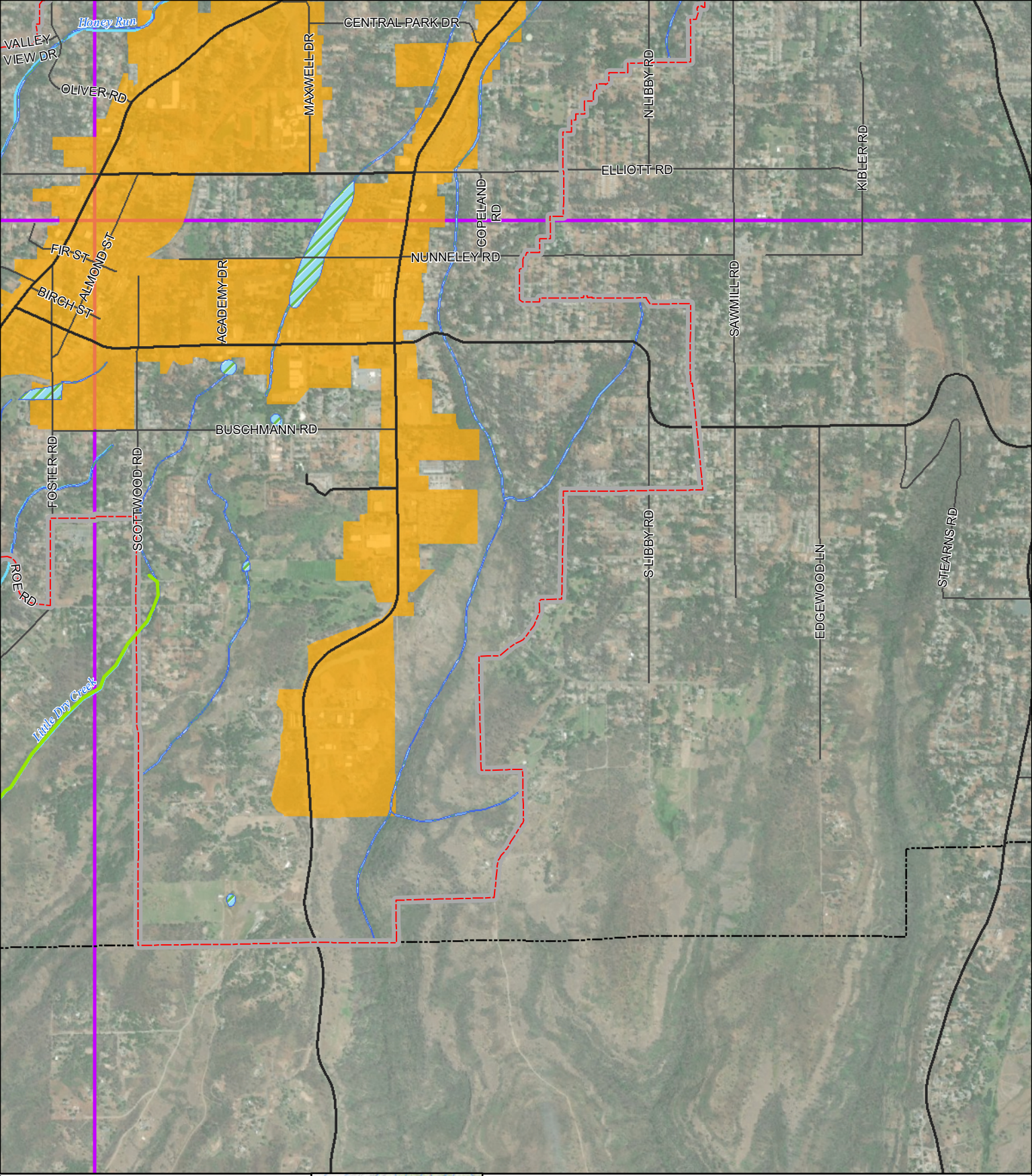


Critical Habitat

- Vernal pool tadpole shrimp
- Chinook Salmon and Steelhead
- Steelhead

- NWI Wetlands
- Waterbodies
- Rivers and Creeks
- Sewer Service Area



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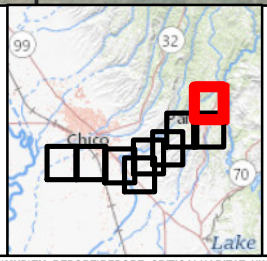

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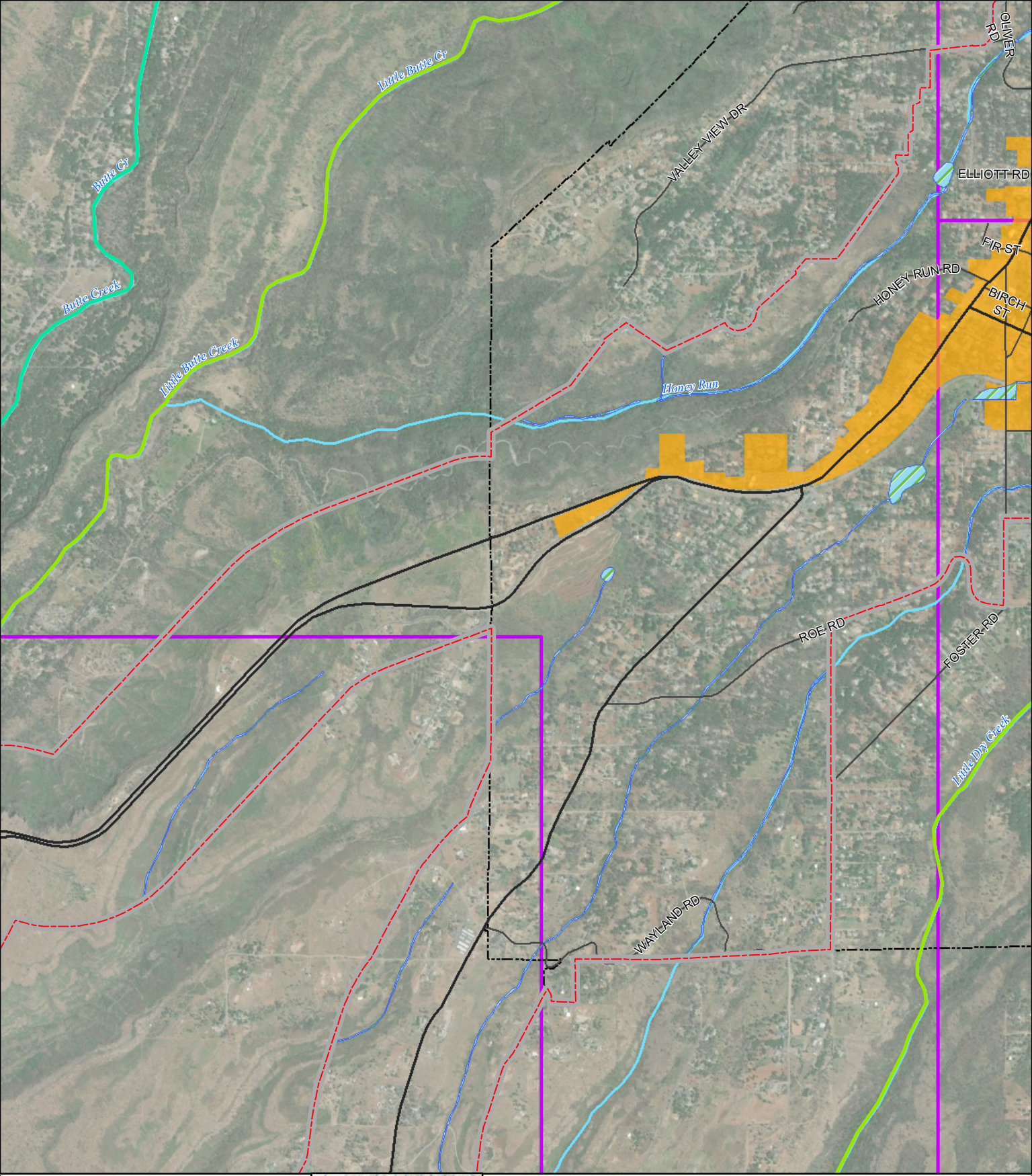

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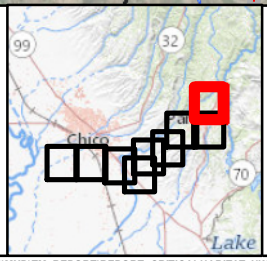

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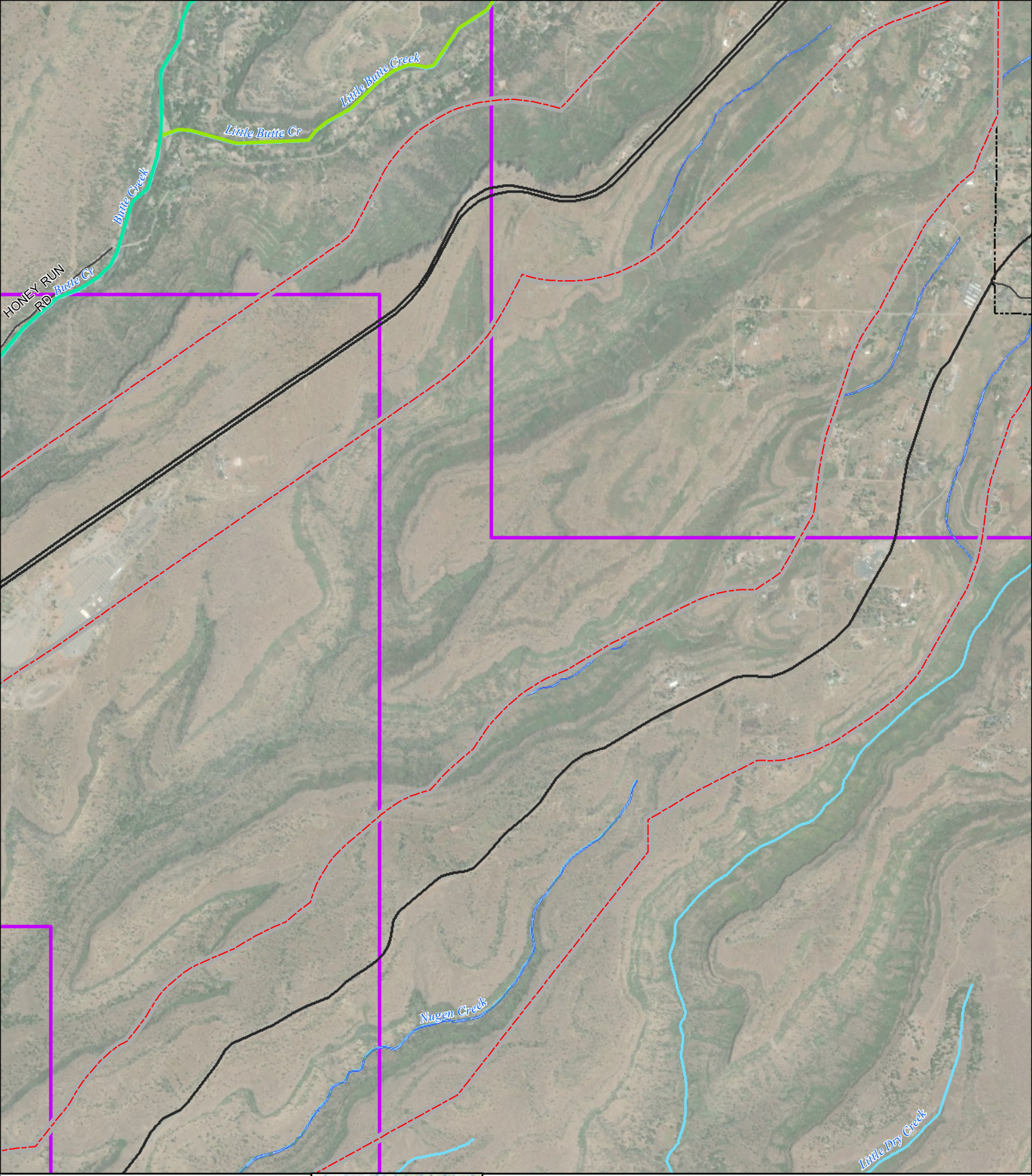

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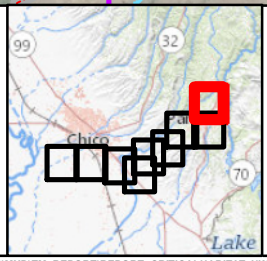

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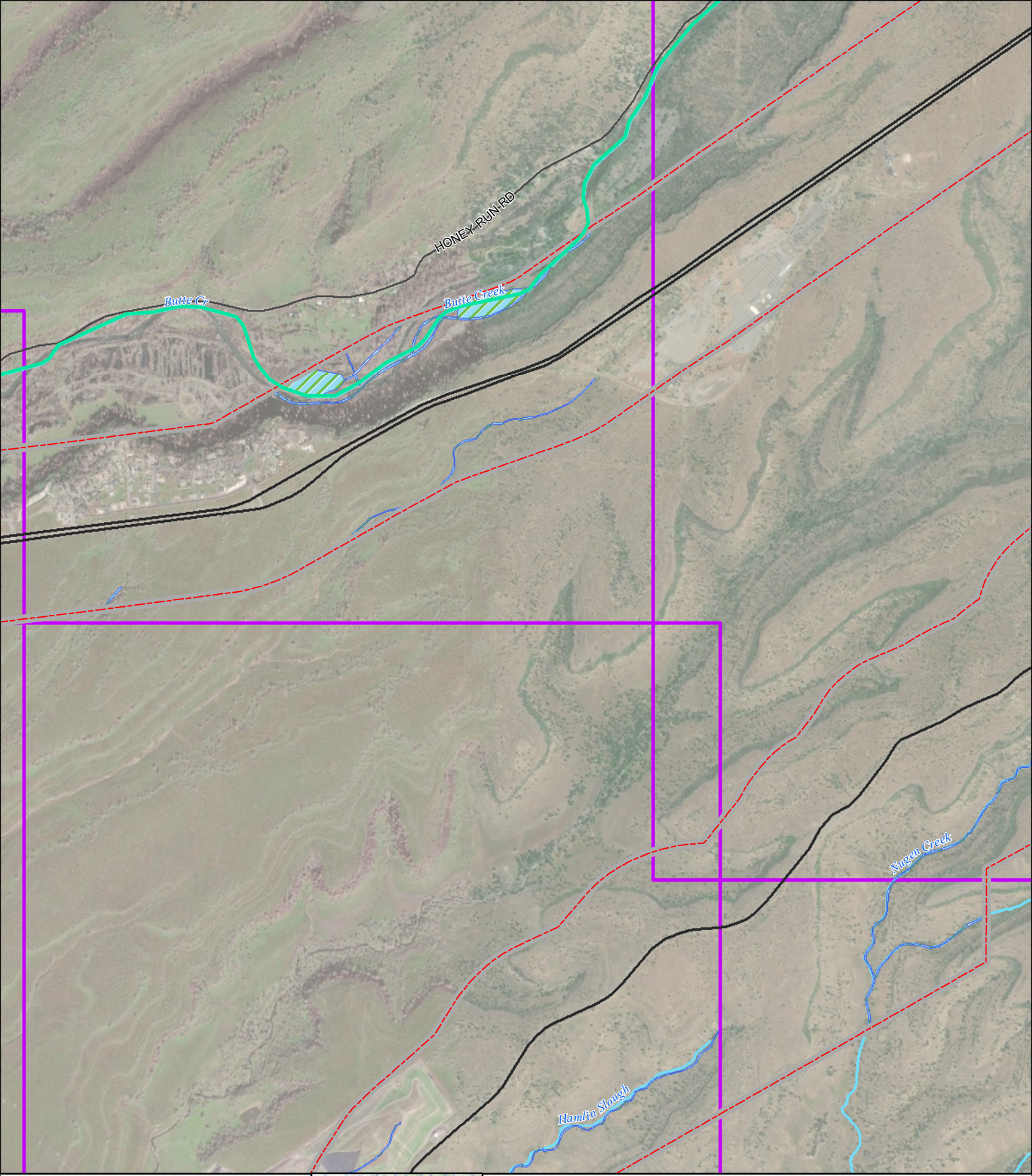

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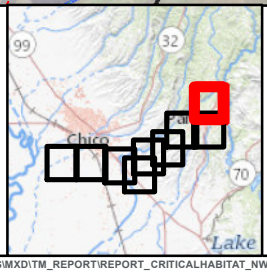

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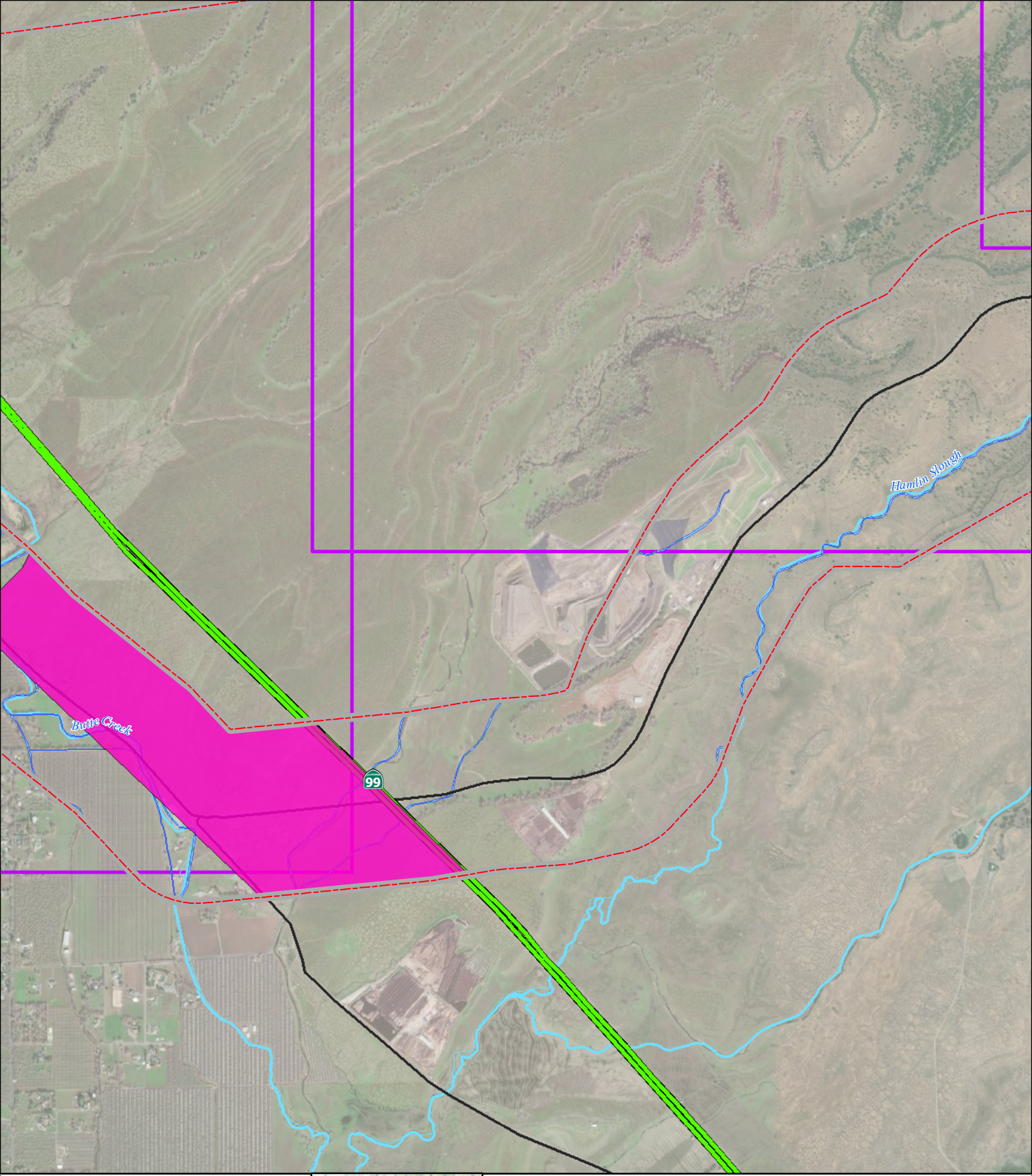

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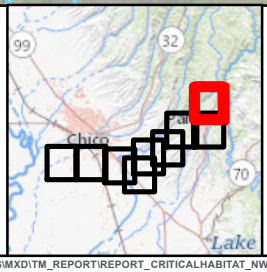

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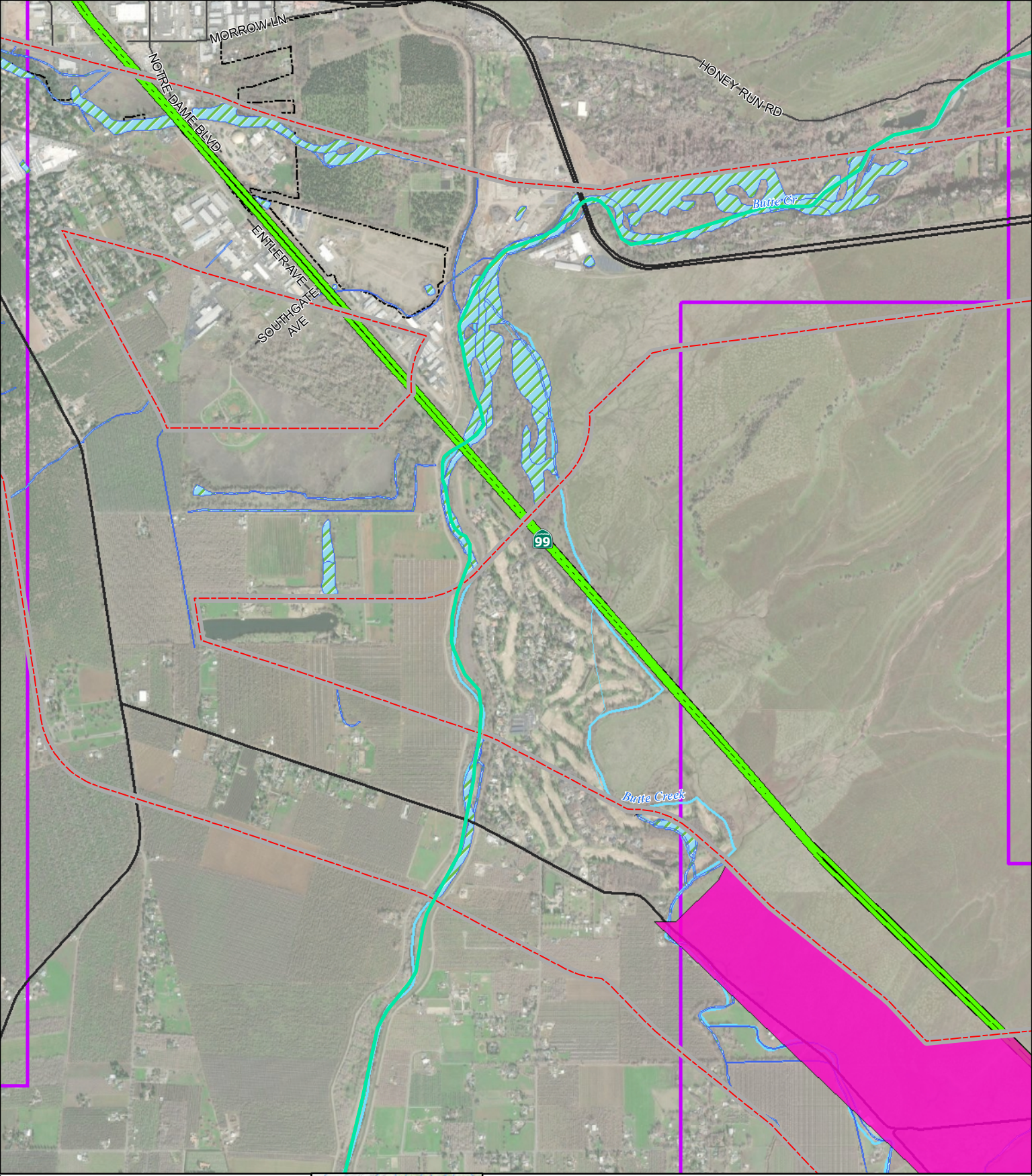

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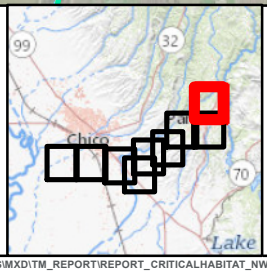

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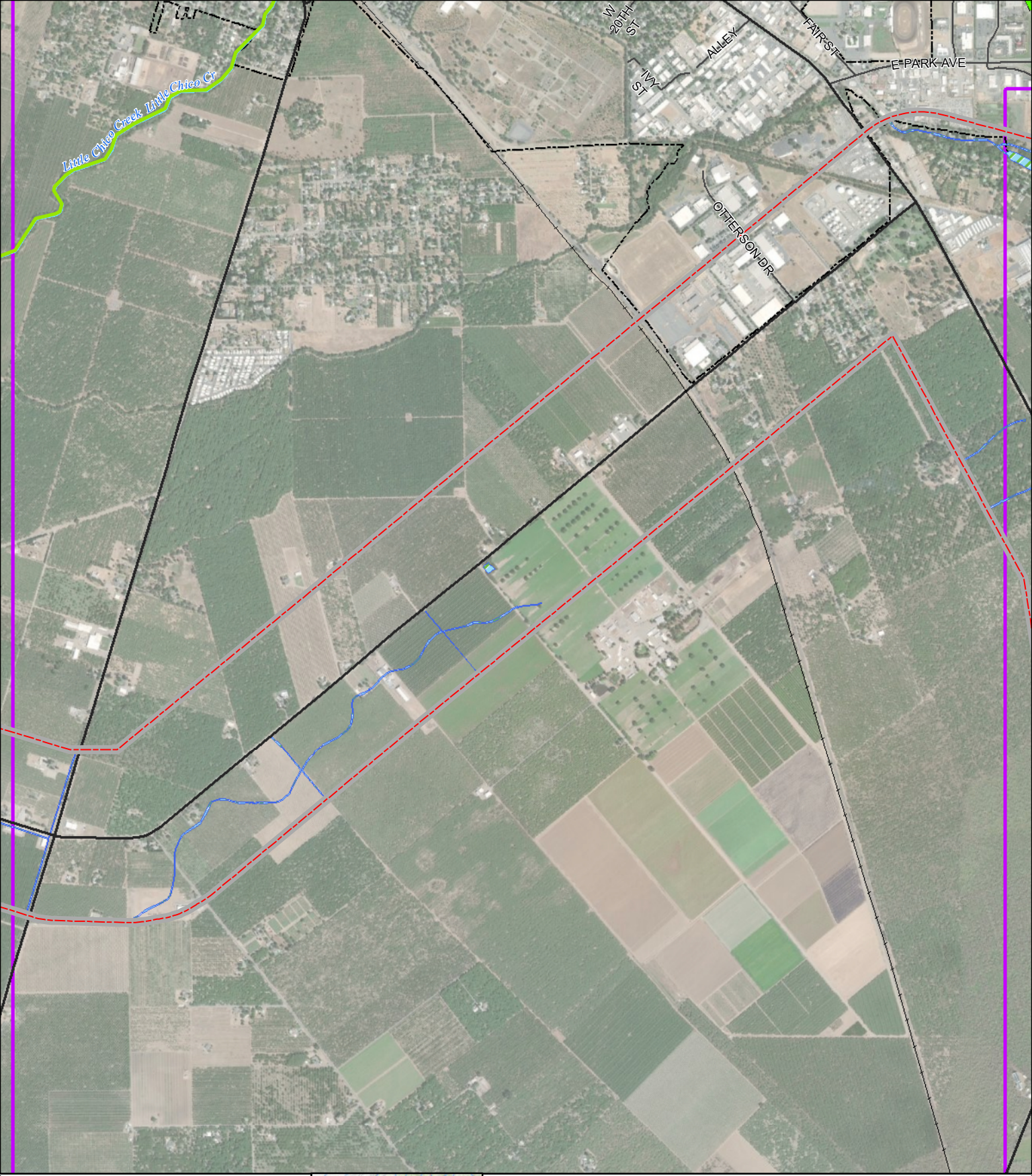

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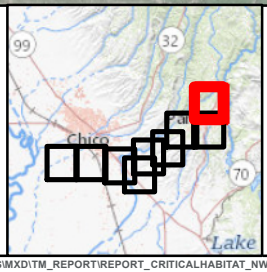

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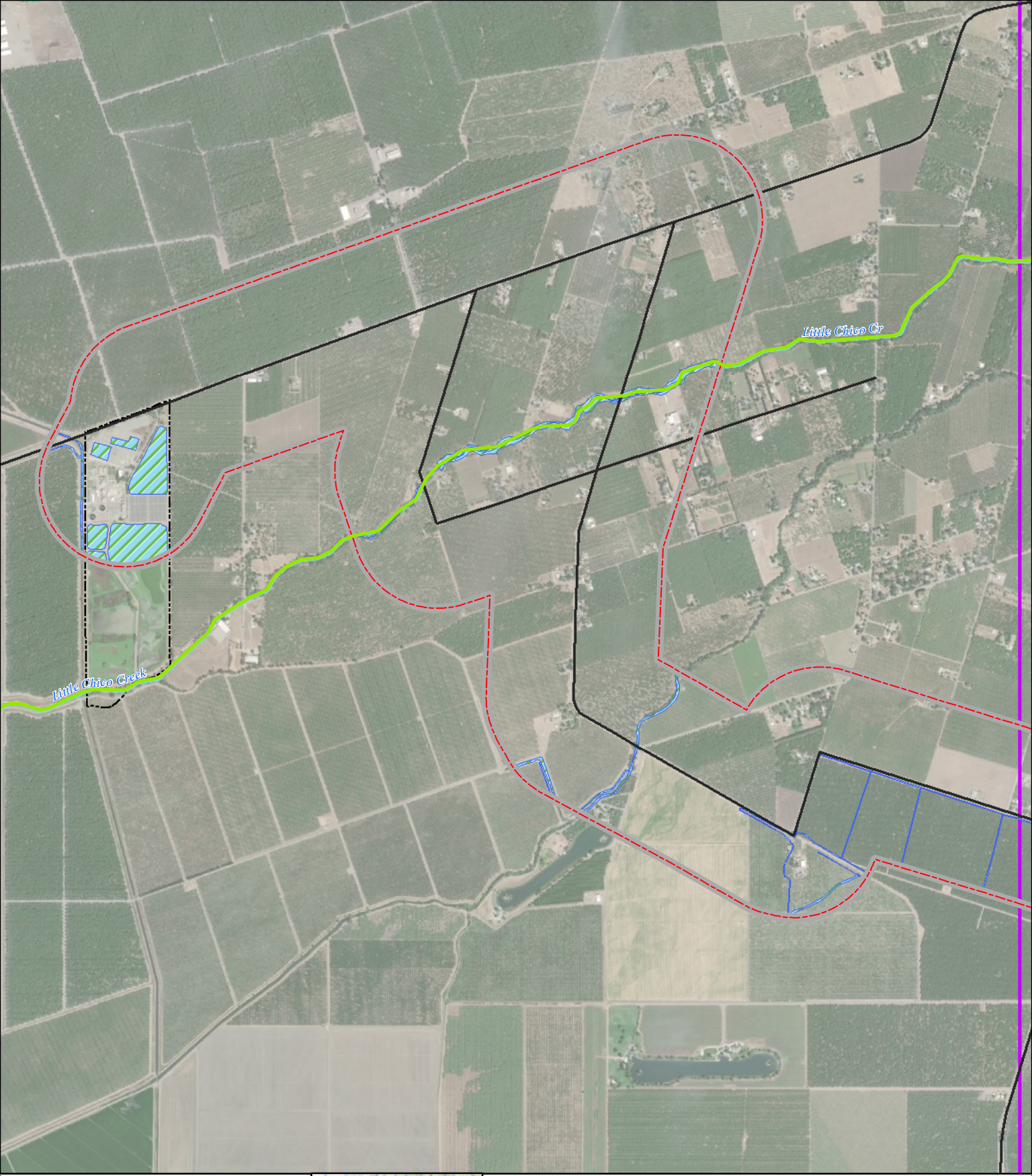

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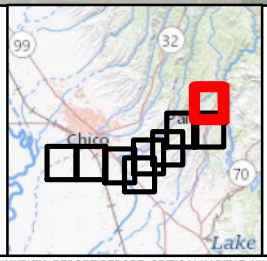

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A.2

Sensitive Biological Resources

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Attachment A.2 – Sensitive Biological Resources

Table A.2-1. Sensitive Biological Resources with Potential to Occur in the Study Area (Regional)

Scientific Name	Common Name	Federal Status	State Status	State Rare Plant Rank	General Habitat Characteristics	Potential to Occur in Study Area	Project Component
Plants							
Allium jepsonii	Jepson's onion	None	None	1B.2	Serpentine or volcanic soils in chaparral, cismontane woodland, and lower montane coniferous forest. Elevation: 980–4,330 feet. Blooming period: April–August	Y	Collection System, Pipeline/Infrastructure – Neal Road and Skyway Road
Astragalus tener var. ferrisiae	Ferris' milk-vetch	None	None	1B.2	Meadows, seeps, and subalkaline grassland. Elevation: 5–245 feet. Blooming period: April–May	Y	Pipeline/Infrastructure – Neal Road and Skyway Road, Pipeline/Infrastructure – Butte Creek and Little Chico Creek Subalternatives
Balsamorhiza macrolepis	big-scale balsamroot	None	None	1B.2	Occasionally in serpentine soils in chaparral, cismontane woodland, and grassland. Elevation: 295–5,100 feet. Blooming period: March–June	Y	Collection System, Pipeline/Infrastructure – Neal Road and Skyway Road
Botrychium crenulatum	scalloped moonwort	None	None	2B.2	Bogs, fens, meadows, seeps, marshes, freshwater swamps, montane coniferous forests. Elevation: 4,159–10,758 feet. Sporing period: June–September	N	Entire proposed project area is below the elevational range of the species.
Botrychium minganense	Mingan moonwort	None	None	2B.2	Mesic soils in bogs, fens, lower and upper montane coniferous forest. Elevation: 4,773–7,152 feet. Sporing period: July–September	N	Entire proposed project area is below the elevational range of the species.
Botrychium montanum	western goblin	None	None	2B.1	Mesic soil in meadows, seeps, and montane coniferous forest. Elevation: 4,805–7,150 feet. Sporing period: July–September	N	Entire proposed project area is below the elevational range of the species.
Brasenia schreberi	watershield	None	None	2B.3	Freshwater marshes and swamps. Elevation: 95–7,220 feet. Blooming period: June–September	N	There is no marsh habitat within the study area.

Scientific Name	Common Name	Federal Status	State Status	State Rare Plant Rank	General Habitat Characteristics	Potential to Occur in Study Area	Project Component
Campylopodiella stenocarpa	flagella-like atractylocarpus	None	None	2B.2	Cismontane woodland, roadsides. Elevation: 935–1,410 feet. (Bryophyte)	Y	Collection System, Pipeline/Infrastructure – Neal Road and Skyway Road
Cardamine pachystigma var. *dissectifolia*	dissected-leaved toothwort	None	None	1B.2	Chaparral, lower montane coniferous forest, Serpentine outcrops and gravelly serpentine talus. Elevation: 984-3,117 feet.	Y	Collection System, Pipeline/Infrastructure – Neal Road and Skyway Road reservoir
Carex xerophila	chaparral sedge	None	None	1B.2	Serpentine and gabbro soils in chaparral, cismontane woodland, and lower montane coniferous forest. Elevation: 1,440–2,525 feet. Blooming period: March–June	Y	Collection System, Pipeline/Infrastructure – Neal Road and Skyway Road
Castilleja rubicundula var. *rubicundula*	pink creamsacs	None	None	1B.2	Serpentine soils in meadows, seeps, grassland, cismontane woodland, and openings of chaparral. Elevation: 65–2,985 feet. Blooming period: April–June	Y	Potential to occur within any of the project components
Clarkia gracilis ssp. albicaulis	white-stemmed clarkia	None	None	1B.2	Sometimes on serpentine soils in chaparral and cismontane woodland. Elevation: 800–3,560 feet. Blooming period: May–July	Y	Collection System, Pipeline/Infrastructure – Neal Road and Skyway Road
Clarkia mildrediae ssp. *mildrediae*	Mildred's clarkia	None	None	1B.3	Sandy, usually granitic, soils in cismontane woodland and lower montane coniferous forest. Elevation: 800–5,610 feet. Blooming period: May–August	Y	Collection System, Pipeline/Infrastructure – Neal Road and Skyway Road
Clarkia mosquinii	Mosquin's clarkia	None	None	1B.1	Rocky soils and roadsides in cismontane woodland and lower montane coniferous forest. Elevation: 605–4,890 feet. Blooming period: May–July	Y	Collection System, Pipeline/Infrastructure – Neal Road and Skyway Road
Cryptantha crinita	silky cryptantha	None	None	1B.2	Rocky volcanic soils, gravelly streambanks, gravel bars, foothill woodland. Elevation: 295—3,675 feet. Blooming period: Mar--Jun	Y	Potential to occur within any of the project components
Delphinium recurvatum	recurved larkspur	None	None	1B.2	Alkaline soils in chenopod scrub, cismontane woodland, and grassland. Elevation: 9–2,591 feet. Blooming period: March–June	Y	Potential to occur within any of the project components
Downingia pusilla	dwarf downingia	None	None	2B.2	Vernal pools and mesic grassland. Elevation: 0–1,460 feet. Blooming period: March–May	Y	Collection System, Pipeline/Infrastructure – Neal Road and Skyway Road

Scientific Name	Common Name	Federal Status	State Status	State Rare Plant Rank	General Habitat Characteristics	Potential to Occur in Study Area	Project Component
Eremogone cliftonii	Clifton's eremogone	None	None	1B.3	Usually in granitic soils in openings of chaparral and montane coniferous forests. Elevation: 1,490–6,825 feet. Blooming period: April–September	Y	Collection System
Eriogonum umbellatum var. *ahartii*	Ahart's buckwheat	None	None	1B.2	Serpentine soils on slopes in openings of chaparral and cismontane woodland. Elevation: 1,310–6,560 feet. Blooming period: June–September	Y	Collection System
Erythranthe filicifolia	fern-leaved monkeyflower	None	None	1B.2	Usually in slow–draining ephemeral seeps that are among exfoliating granitic slabs in meadows, chaparral, and lower montane coniferous forest. Elevation: 1,360–5,610 feet. Blooming period: April–June	Y	Collection System
Euphorbia hooveri	Hoover's spurge	FT	None	1B.2	Vernal pools. Elevation: 80–820 feet. Blooming period: July–October	Y	Pipeline/Infrastructure – Neal Road and Skyway Road
Frangula purshiana ssp. *ultramafica*	Caribou coffeeberry	None	None	1B.2	Serpentine soils in chaparral, montane coniferous forests, meadows, and seeps. Elevation: 2,705–6,330 feet. Blooming period: May–July	N	Entire proposed project area is below the elevational range of the species.
Fritillaria pluriflora	adobe-lily	None	None	1B.2	Adobe soils in chaparral, cismontane woodland, and grassland. Elevation: 195–2,315 feet. Blooming period: February–April	Y	Potential to occur within any of the project components
Gratiola heterosepala	Boggs Lake hedge-hyssop	None	SE	1B.2	Clay soils in vernal pools and lake margins of marshes and swamps. Elevation: 30–7,790 feet. Blooming period: April–August	Y	Pipeline/Infrastructure – Neal Road and Skyway Road
Hibiscus lasiocarpos var. *occidentalis*	woolly rose-mallow	None	None	1B.2	Often in riprap on sides of levees in freshwater marshes and swamps. Elevation: 0–395 feet. Blooming period: June–September	Y	Pipeline/Infrastructure – Neal Road and Skyway Road, Pipeline/Infrastructure – Butte Creek and Little Chico Creek Subalternatives
Imperata brevifolia	California satintail	None	None	2B.1	Mesic soils in chaparral, coastal scrub, Mojavean desert scrub, riparian scrub, meadows and seeps (often alkali). Elevation: 0–3,985 feet. Blooming period: September–May	Y	Collection System, Pipeline/Infrastructure – Neal Road and Skyway Road

Scientific Name	Common Name	Federal Status	State Status	State Rare Plant Rank	General Habitat Characteristics	Potential to Occur in Study Area	Project Component
Juncus leiospermus var. *leiospermus*	Red Bluff dwarf rush	None	None	1B.1	Vernally mesic soils in chaparral, cismontane woodland, meadows, seeps, grassland, and vernal pools. Elevation: 110–4,100 feet. Blooming period: March–June	Y	Pipeline/Infrastructure – Neal Road and Skyway Road
Lasthenia glabrata ssp. coulteri	Coulter's goldfields	None	None	1B.1	Coastal salt marsh, coastal salt swamps, playas, vernal pools. Elevation: 3–4,001 feet. Blooming period: February–June	Y	Pipeline/Infrastructure – Neal Road and Skyway Road
Layia septentrionalis	Colusa layia	None	None	1B.2	Sandy serpentine soils in chaparral, cismontane woodland, and grassland. Elevation: 325–3,595 feet. Blooming period: April–May	Y	Collection System, Pipeline/Infrastructure – Neal Road and Skyway Road
Lewisia cantelovii	Cantelow's lewisia	None	None	1B.2	Mesic and granitic soils and occasionally serpentine seeps in broadleafed upland and lower montane coniferous forests, chaparral, and cismontane woodland. Elevation: 1,080–4,495 feet. Blooming period: May–October	Y	Collection System, Pipeline/Infrastructure – Neal Road and Skyway Road
Limnanthes floccosa ssp. *californica*	Butte County meadowfoam	FE	SE	1B.1	Vernal pools and mesic grassland. Elevation: 150–3,050 feet. Blooming period: March–May	Y	Pipeline/Infrastructure – Neal Road and Skyway Road, Pipeline/Infrastructure – Butte Creek Subalternative
Monardella venosa	veiny monardella	None	None	1B.1	Heavy clay soils in cismontane woodland and grassland. Elevation: 195–1,345 feet. Blooming period: May and July	Y	Pipeline/Infrastructure – Neal Road and Skyway Road, Pipeline/Infrastructure – Butte Creek Subalternative
Orcuttia pilosa	hairy Orcutt grass	FE	SE	1B.1	Vernal pools. Elevation: 150–655 feet. Blooming period: May–September	Y	Pipeline/Infrastructure – Neal Road and Skyway Road
Orcuttia tenuis	slender Orcutt grass	FT	SE	1B.1	Often in gravelly soils in vernal pools. Elevation: 110–5,775 feet. Blooming period: May–October		Pipeline/Infrastructure – Neal Road and Skyway Road
Packera eurycephala var. *lewisrosei*	Lewis Rose's ragwort	None	None	1B.2	Serpentine soils in chaparral, cismontane woodland, and lower montane coniferous forest. Elevation: 895–6,200 feet. Blooming period: March–September	Y	Collection System, Pipeline/Infrastructure – Neal Road and Skyway Road

Scientific Name	Common Name	Federal Status	State Status	State Rare Plant Rank	General Habitat Characteristics	Potential to Occur in Study Area	Project Component
Paronychia ahartii	Ahart's paronychia	None	None	1B.1	Cismontane woodland, grassland, and vernal pools. Elevation: 95–1,675 feet. Blooming period: February–June	Y	Potential to occur within any of the project components
Penstemon personatus	closed-throated beardtongue	None	None	1B.2	Metavolcanic soils in chaparral and montane coniferous forests. Elevation: 3,490–6,955 feet. Blooming period: June–October	N	Entire proposed project area is below the elevational range of the species.
Poa sierrae	Sierra blue grass	None	None	1B.3	Openings in lower montane coniferous forest. Elevation: 1,195–4,920 feet. Blooming period: April–July	Y	Collection System, Pipeline/Infrastructure – Neal Road and Skyway Road
Rhynchospora californica	California beaked-rush	None	None	1B.1	Bogs, fens, meadows, seeps, freshwater marshes and swamps, and lower montane coniferous forest. Elevation: 145–3,315 feet. Blooming period: May–July	Y	Potential to occur within any of the project components
Rhynchospora capitellata	brownish beaked-rush	None	None	2B.2	Mesic soils in meadows, seeps, marshes, swamps, and montane coniferous forests. Elevation: 145–6,560 feet. Blooming period: July–August	Y	Potential to occur within any of the project components
Rupertia hallii	Hall's rupertia	None	None	1B.2	Roadsides and openings of cismontane woodland and lower montane coniferous forest. Elevation: 1,785–7,380 feet. Blooming period: June–September	Y	Collection System
Sagittaria sanfordii	Sanford's arrowhead	None	None	1B.2	Fresh water marshes and swamps that are typically shallow. Elevation: 0–2,132 feet. Blooming period: May–October	N	There is no marsh habitat within the study area.
Sedum albomarginatum	Feather River stonecrop	None	None	1B.2	Serpentine soils in chaparral and lower montane coniferous forest. Elevation: 850–6,400 feet. Blooming period: May–June	Y	Collection System, Pipeline/Infrastructure – Neal Road and Skyway Road
Sidalcea robusta	Butte County checkerbloom	None	None	1B.2	Chaparral and cismontane woodland. Elevation: 295–5,250 feet. Blooming period: April–June	Y	Collection System, Pipeline/Infrastructure – Neal Road and Skyway Road
Stuckenia filiformis ssp. *alpina*	slender-leaved pondweed	None	None	2B.2	Shallow freshwater marshes and swamps. Elevation: 15–7,055 feet. Blooming period: May–July	N	There is no marsh habitat within the study area.

Scientific Name	Common Name	Federal Status	State Status	State Rare Plant Rank	General Habitat Characteristics	Potential to Occur in Study Area	Project Component
Trifolium jokerstii	Butte County golden clover	None	None	1B.2	Mesic grassland and vernal pools. Elevation: 160–1,575 feet. Blooming period: March–May	Y	Pipeline/Infrastructure – Neal Road and Skyway Road, Pipeline/Infrastructure – Butte Creek Subalternative
Tuctoria greenei	Greene's tuctoria	FE	SR	1B.1	Vernal pools. Elevation: 95–3,510 feet. Blooming period: May–September	Y	Pipeline/Infrastructure – Neal Road and Skyway Road
Wolffia brasiliensis	Brazilian watermeal	None	None	2B.3	Shallow freshwater marshes and swamps. Elevation: 65–330 feet. Blooming period: April and December	N	There is no marsh habitat within the study area.
Invertebrates							
Branchinecta conservatio	Conservancy fairy shrimp	FE	None	---	Endemic to California vernal pools, almost entirely in the Central Valley, with the exception of one population along the central coast in Ventura County. Majority of sites inhabited by this species are large and turbid pools which remain inundated much longer than typical vernal pools (USFWS 2012).	Y	Pipeline/Infrastructure – Neal Road and Skyway Road
Branchinecta lynchi	vernal pool fairy shrimp	FT	None	---	Endemic to the grasslands of the Central Valley and the Central and South Coast Range mountains of California, and the Agate Desert of southern Oregon. Found only in cool water vernal pools and vernal pool-like habitats; does not occur in riverine, marine, or other permanent bodies of water (USFWS 2007).	Y	Pipeline/Infrastructure – Neal Road and Skyway Road
Desmocerus californicus dimorphus	valley elderberry longhorn beetle	FT	None	---	Dependent on host plant, elderberry (*Sambucus* spp.), which most commonly grows in riparian woodlands, but also in some upland habitats such as oak savannas and annual grasslands. Current presumed range in Central Valley extends from Shasta County south to Fresno County, including the valley floor and lower foothills up to about 500 feet in elevation (USFWS 2017).	Y	Pipeline/Infrastructure – Neal Road and Skyway Road, Pipeline/Infrastructure – Butte Creek and Little Chico Creek Subalternatives, Sacramento River

Scientific Name	Common Name	Federal Status	State Status	State Rare Plant Rank	General Habitat Characteristics	Potential to Occur in Study Area	Project Component
Lepidurus packardi	vernal pool tadpole shrimp	FE	None	---	Found only in ephemeral freshwater habitats, including alkaline pools, clay flats, vernal lakes, vernal pools, vernal swales, and other seasonal wetlands. Patchily distributed across the Central Valley from Shasta County south to Tulare County with isolated occurrences in the East Bay Area (USFWS 2007).	Y	Pipeline/Infrastructure – Neal Road and Skyway Road (Critical Habitat present)
Fish							
Acipenser medirostris	green sturgeon (southern DPS)	FT	SSC	---	Spawning occurs primarily in the Sacramento River, but those that spawn in the Feather and Yuba Rivers are also part of the southern DPS. Oceanic waters, bays, and estuaries during non-spawning season. Enters San Francisco Bay late winter through early spring, and spawn occurs from April through early July. Spawn in cool sections of river mainstems in deep pools containing small to medium-sized gravel, cobble, or boulder substrate (NMFS 2015).	Y	Sacramento River
Hypomesus transpacificus	delta smelt	FT	SE	---	Endemic to open waters of San Francisco Bay and Sacramento-San Joaquin River Delta. Distribution includes San Pablo Bay up through Suisun Bay, upstream through the delta to the Sacramento River below Isleton, and the San Joaquin River below Mossdale. Spawning has not been observed in the wild, but is thought to take place in sloughs and shallow edge-water channels in the upper delta and in Montezuma Slough near Suisun Bay. (USFWS 2010).	N	The proposed project area is completely outside the range of this species.

Scientific Name	Common Name	Federal Status	State Status	State Rare Plant Rank	General Habitat Characteristics	Potential to Occur in Study Area	Project Component
Mylopharodon conocephalus	hardhead	None	SSC	---	Small to large streams in low to mid-elevation environments. May also inhabit lakes or reservoirs. Preferred stream temperature might easily exceed 68ºF, though these fish do not favor low dissolved oxygen levels. Usually found in clear deep streams with a slow but present flow. Though spawning may occur in pools, runs, or riffles, the bedding area will typically be characterized by gravel and rocky substrate. Occurs from Sacramento-San Joaquin and Russian River drainages from the Pit River, Modoc County in the north, to the Kern River, Kern County in the south (UC Davis 2017).	Y	Potential to occur in any of the project components
Oncorhynchus mykiss irideus (pop. 11)	steelhead (Central Valley DPS)	FT	None	---	Includes naturally spawned anadromous steelhead originating below natural and manmade impassable barriers from the Sacramento and San Joaquin Rivers and their tributaries; excludes such fish originating from San Francisco and San Pablo Bays and their tributaries. This DPS does include steelhead from two artificial propagation programs: Coleman National Fish Hatchery Program and Feather River Fish Hatchery Program. Spawning habitat includes gravel-bottomed, fast-flowing, well-oxygenated rivers and streams. Non-spawning habitat includes estuarine and marine waters (NOAA 2019).	Y	Potential to occur in any of the project components (Critical Habitat present)
Oncorhynchus tshawytscha (pop. 6)	chinook salmon (Central Valley spring-run ESU)	FT	ST	---	Currently found in the Sacramento-San Joaquin River Delta, the Sacramento River and its tributaries, including American, Yuba and Feather Rivers, and Mill, Deer, and Butte Creeks. The numbers of adults are dependent on pool depth and volume, amount of cover, and proximity to gravel. Water temperatures greater than 80°F are lethal to adults (NMFS 2016).	Y	Potential to occur in any of the project components (Critical Habitat and Essential Fish Habitat present)

Scientific Name	Common Name	Federal Status	State Status	State Rare Plant Rank	General Habitat Characteristics	Potential to Occur in Study Area	Project Component
Oncorhynchus tshawytscha (pop. 7)	chinook salmon (Sacramento River winter-run ESU)	FE	SE	---	Currently found in the Sacramento River below Keswick Dam. Spawns in the Sacramento River but not its tributaries. Requires clean, cold water over gravel beds with water temperatures between 42 and 57°F for spawning (NMFS 2011).	Y	Sacramento River (Critical Habitat and Essential Fish Habitat present)
Amphibians							
Rana boylii	foothill yellow-legged frog	None	ST, SSC	---	Ranges in the northern half of California except for the Central Valley, Modoc Plateau, and eastern side of the Sierra Nevada Mountains. Generally found in shallow flowing streams and rivers with at least cobble sized substrate. Breeding generally occurs at the margins of wide shallow channels with reduced flow variation near tributary confluences. Specifically, egg masses are placed in low flow locations on or under rocks with preferred substrates being boulders, cobbles, or gravel. Eggs have been found at depths to 34 inches in water velocities of 0 – 0.69 feet per second and at most 40 feet from shore. Maximum water temperature for breeding is 79°F and 48 to 70°F is the preferred range. Tadpoles avoid areas below 55°F and prefer temperatures between 62°F and 72°F (Thomson et al. 2016).	Y	Collection System, Pipeline/Infrastructure – Neal Road and Skyway Road, Pipeline/Infrastructure – Butte Creek Subalternative
Rana cascadae	Cascades frog	None	SCE, SSC	---	Ranges in the Cascade Mountains in Shasta, Siskiyou, and Trinity Counties and the northern Sierra Nevada Mountains in Butte, Plumas, Shasta and Tehama Counties. Generally found in a wide range of aquatic habitats and wet meadows that do not freeze. Not often seen on land. Breeding habitat generally consists of montane lentic areas with a preference for small shallow spring fed ponds (Thomson et al. 2016).	N	The proposed project area is completely outside the range of this species.

Scientific Name	Common Name	Federal Status	State Status	State Rare Plant Rank	General Habitat Characteristics	Potential to Occur in Study Area	Project Component
Rana draytonii	California red-legged frog	FT	SSC	---	Ponds and streams in humid forests, woodlands, grasslands, coastal scrub, and streamsides with plant cover in lowlands or foothills. Breeding habitat includes permanent or ephemeral water sources; lakes, ponds, reservoirs, slow streams, marshes, bogs, and swamps. Ephemeral wetland habitats require animal burrows or other moist refuges for estivation when the wetlands are dry. Occurs from sea level to 5,000 feet in elevation. Occurs along the Coast Ranges from Mendocino County south to northern Baja California, and inland across the northernmost reaches of the Sacramento Valley and locally south through portions of the Sierra Nevada foothills as far south as northern Tulare County (Nafis 2020).	Y	Collection System, Pipeline/Infrastructure – Neal Road and Skyway Road
Spea hammondii	western spadefoot	None	SSC	---	Generally found in grasslands, oak woodlands, coastal sage scrub, and chaparral in washes, floodplains, alluvial fans, playas, and alkali flats. Natural and artificial water bodies are used for breeding. Specifically, vernal pools used by this species have an average ponding duration of 81 days, and successful recruitment occurs in ponds that last on average 21 days longer than larval development time. Pool temperature requirements are from 48 to 90°F. Pools with invasive species, such as crayfish (*Pacifasticus* spp.), or bullfrogs (*Lithobates catesbeianus*) often, but not always, exclude this species. (Thomson et al. 2016).	Y	Potential to occur within any of the project components
Reptiles							
Actinemys marmorata	northwestern pond turtle	None	SSC	---	Generally occurs in various water bodies including permanent and ephemeral systems either natural or artificial. Upland habitat that is at least moderately undisturbed is required for nesting and overwintering, in soils that are loose enough for excavation (Thomson et al. 2016).	Y	Potential to occur within any of the project components

Scientific Name	Common Name	Federal Status	State Status	State Rare Plant Rank	General Habitat Characteristics	Potential to Occur in Study Area	Project Component
Phrynosoma blainvillii	Blainville's horned lizard	None	SSC	---	Ranges in the southern half of California outside of the desert, along the foothills of the Sierra Nevada Mountains to Butte County, and along the Central Coast ranges up to Contra Costa County. Generally occurs in sage scrub, dunes, alluvial scrub, annual grassland, chaparral, oak, riparian, and Joshua tree woodland, coniferous forest, and saltbush scrub. Needs loose, fine soils for burrowing, open areas for basking, and dense foliage for cover. Negatively associated with Argentine ants (*Linepithema humi*) (Thomson et al. 2016).	Y	Potential to occur within any of the project components
Thamnophis gigas	giant gartersnake	FT	ST	---	Marshes, sloughs, ponds, small lakes, low gradient streams, irrigation and drainage canals, rice fields and their associated uplands from sea level to 400 feet in elevation. Upland habitat should have burrows or other soil crevices suitable for snakes to reside during their dormancy period (November- mid March). Formerly ranged in the Central Valley from Butte County to Buena Vista Lake in Kern County, but now thought to be absent south of Fresno and in Stanislaus County (USFWS 2012).	Y	Pipeline/Infrastructure – Neal Road and Skyway Road, Pipeline/Infrastructure – Butte Creek and Little Chico Creek Subalternatives, Sacramento River
Birds							
Accipiter gentilis	northern goshawk	None	SSC	---	Nests in mature and old-growth coniferous forests at high elevations in the Sierra Nevada, Cascade, North Coast, and Transverse Ranges. Prefers stands with Pacific Ponderosa pine (*Pinus ponderosa* var. *pacifica*), Jeffrey pine (*Pinus jeffreyi*), Lodgepole pine (*Pinus contorta*), Douglas-fir (Pseudotsuga menziesii), and rarely pinyon-juniper (*Pinus monophylla* and *Juniperus* spp.) or quaking aspen (*Populus tremuloides*). Prefers stands with larger trees, denser canopies, and relatively open understories (Shuford and Gardali 2008).	Y	Collection System

Scientific Name	Common Name	Federal Status	State Status	State Rare Plant Rank	General Habitat Characteristics	Potential to Occur in Study Area	Project Component
Agelaius tricolor	tricolored blackbird	None	ST, SSC	---	Mostly a year-round resident in California. Common locally throughout Central Valley and in coastal districts from Sonoma County south. Breeds locally in northeastern California. In winter, becomes more widespread along the central coast and San Francisco Bay area, and can be found in portions of the Colorado Desert (Hamilton 2004). Preferred nesting habitat includes cattails (*Typha* spp.), bulrushes (*Schoenoplectus* spp.), Himalayan blackberry (*Rubus armeniacus*), and agricultural silage. Dense vegetation is preferred but heavily lodged cattails not burned in recent years may preclude settlement. Need access to open water. Strips of emergent vegetation along canals are avoided as nest sites unless they are about 30 feet or more wide but in some ponds, especially where associated with Himalayan blackberries and deep water, settlement may be in narrower fetches of cattails. (CDFW 2020).	Y	Pipeline/Infrastructure – Neal Road and Skyway Road, Pipeline/Infrastructure – Butte Creek and Little Chico Creek Subalternatives, Sacramento River
Aquila chrysaetos	golden eagle	BGEPA	SFP	---	Uncommon resident in hills and mountains throughout California, and an uncommon migrant and winter resident in the Central Valley and Mojave Desert. Prefers rolling foothills and mountain terrain, wide arid plateaus deeply cut by streams and canyons, open mountain slopes, cliffs, and rock outcrops. (CDFW 2020).	Y	Collection System, Pipeline/Infrastructure – Neal Road and Skyway Road
Athene cunicularia	burrowing owl	None	SSC	---	Resident in much of the state in open, dry grasslands and various desert habitats. Requires open areas with mammal burrows; especially those of California ground squirrel (*Otospermophilus beecheyi*) Inhabits rolling hills, grasslands, fallow fields, sparsely vegetated desert scrub, vacant lots and other open human disturbed lands such as airports and golf courses. Absent from northwest coast and elevations above 5,500 feet (CDFW 2020).	Y	Pipeline/Infrastructure – Neal Road and Skyway Road, Pipeline/Infrastructure – Butte Creek and Little Chico Creek Subalternatives

Scientific Name	Common Name	Federal Status	State Status	State Rare Plant Rank	General Habitat Characteristics	Potential to Occur in Study Area	Project Component
Buteo swainsoni	Swainson's hawk	None	ST	---	Nests in oak savanna and cottonwood riparian areas adjacent to foraging habitat of grasslands, agricultural fields, and pastures where they often follow farm equipment to gather killed and maimed rodents. Increasingly also nests in sparse stands of gum trees (*Eucalyptus* spp.) and Australian pines (*Casuarina equisetifolia*) and often forage along roadsides and grassy highway medians. Breeding resident in the Central Valley, Klamath Basin, Northeastern Plateau, and in juniper-sagebrush flats of Lassen County. Limited breeding reported from Lanfair Valley, Owens Valley, Fish Lake Valley, and Antelope Valley. Winters primarily in Argentina, with most birds absent from California October through February, though a few overwinter in the Sacramento-San Joaquin River Delta. Prolific migrant through southern California in spring and fall, with large mixed-age groups of birds frequently observed kettling high overhead on thermals or foraging together on freshly cut agricultural fields (CDFW 2020).	Y	Pipeline/Infrastructure – Neal Road and Skyway Road, Pipeline/Infrastructure – Butte Creek and Little Chico Creek Subalternatives, Sacramento River
Circus hudsonius	northern harrier	None	SSC	---	Nests on the ground in patches of dense, tall vegetation in undisturbed areas. Breed and forage in a variety of open habitats such as marshes, wet meadows, weedy borders of lakes, rivers and streams, grasslands, pastures, croplands, sagebrush flats, and desert sinks (Shuford and Gardali 2008).	Y	Pipeline/Infrastructure – Neal Road and Skyway Road, Pipeline/Infrastructure – Butte Creek and Little Chico Creek Subalternatives

Scientific Name	Common Name	Federal Status	State Status	State Rare Plant Rank	General Habitat Characteristics	Potential to Occur in Study Area	Project Component
Coccyzus americanus occidentalis	western yellow-billed cuckoo	FT	SE	---	Has declined drastically in California due primarily to loss of habitat. Requires riparian woodland with dense cover; primarily old-growth cottonwood (*Populus* spp.) forests with willow (*Salix* spp.) understory, but will also nest in overgrown orchards adjacent to streams and dense thickets alongside marshes. Persists in small numbers along the Sacramento River between Red Bluff and Colusa, the Feather River between Yuba City and the Bear River, Owens Valley, the Kern River Valley, the Colorado River Valley, the Santa Ana River near Prado Basin, and the San Luis Rey River in northern San Diego County (USFWS 2019).	Y	Sacramento River
Contopus cooperi	olive-sided flycatcher	None	SSC	---	Nests in a wide variety of forest and woodland habitats below 9,000 feet in elevation in the coastal and mountainous portions of California. Occurs only as a migrant elsewhere in the state. Prefers forests and woodlands with adjacent meadows, lakes, or open terrain for foraging (CDFW 2020)	Y	Collection System
Elanus leucurus	white-tailed kite	None	SFP	---	Fairly common resident of the Central Valley, coast, and Coast Range Mountains. Nests in oak savanna, oak and willow riparian, and other open areas with scattered trees near foraging habitat. Forages in open grasslands, meadows, farmlands, and emergent wetlands. Often seen hover foraging over roadsides or grassy highway medians (CDFW 2020).	Y	Pipeline/Infrastructure – Neal Road and Skyway Road, Pipeline/Infrastructure – Butte Creek and Little Chico Creek Subalternatives, Sacramento River
Empidonax traillii brewsteri	little willow flycatcher	None	SE	---	Uncommon summer resident in wet meadows and montane riparian habitats from 2,000 to 8,000 feet in elevation. Breeds in California from Tulare County north, along the western side of the Sierra Nevada and Cascade Ranges, extending to the coast in northern California (Craig and Williams 1998).	Y	Collection System

Scientific Name	Common Name	Federal Status	State Status	State Rare Plant Rank	General Habitat Characteristics	Potential to Occur in Study Area	Project Component
Falco peregrinus anatum	American peregrine falcon	None	SFP	---	Breeds near wetlands, lakes, rivers, or other waters on cliffs, banks, dunes or mounds, mostly in woodland, forest, and coastal habitats. Nest is a scrape on a depression or ledge in an open site. May use man-made structures (such as bridges, skyscrapers, or electrical towers), large snags, or trees for nesting (CDFW 2020).	Y	Collection System, Pipeline/Infrastructure – Neal Road and Skyway Road
Haliaeetus leucocephalus	bald eagle	BGEPA	SE, SFP	---	Permanent resident in the highest Coast Range mountains, across the Cascade Range, and down the Sierra Nevada to the eastern Transverse Ranges of San Bernardino and Riverside Counties. Uncommon migrant and winter visitor to lowland rivers, lakes, and reservoirs. Nests in large, old-growth, or dominant live trees with open branchwork, especially ponderosa pine (*Pinus ponderosa*). Requires large bodies of water or rivers with abundant fish, and adjacent snags (CDFW 2020).	Y	Collection System. Pipeline/Infrastructure – Neal Road and Skyway Road
Icteria virens	yellow-breasted chat	None	SSC	---	Nests in early-successional riparian habitats with a well-developed shrub layer and an open canopy. Restricted to narrow borders of streams, creeks, sloughs, and rivers. Often nest in dense thickets of blackberry (Rubus spp.) and willow (Salix spp.) (Shuford and Gardali 2008).	Y	Potential to occur within any of the project components
Lanius ludovicianus	loggerhead shrike	None	SSC	---	Shrublands and open woodlands with a fair amount of grass cover and areas of bare ground. Requires tall shrubs or trees, fences, or power lines for hunting perches and territorial advertisement. Also requires open areas of short grasses, forbs, or bare ground for hunting, large shrubs or trees for nest placement, and thorny vegetation or barbed wire fences for impaling prey. Ranges across most of the state, but absent from the highest mountains and the northwest forests and coast (Shuford and Gardali 2008).	Y	Pipeline/Infrastructure – Neal Road and Skyway Road, Pipeline/Infrastructure – Butte Creek and Little Chico Creek Subalternatives

Scientific Name	Common Name	Federal Status	State Status	State Rare Plant Rank	General Habitat Characteristics	Potential to Occur in Study Area	Project Component
Laterallus jamaicensis coturniculus	California black rail	None	ST, SFP	---	Saline, brackish, and fresh emergent wetlands. Scarce, but true abundance difficult to determine due to small size and extremely secretive nature. Known to nest at scattered locations in the San Francisco Bay Area and Delta region, Point Reyes National Seashore, San Luis Obispo and Orange Counties, as well as the Imperial and Lower Colorado River Valleys. Appears intermittently and sparingly at a few locations in the Sacramento Valley (CDFW 2020).	Y	Pipeline/Infrastructure – Neal Road and Skyway Road
Melospiza melodia	song sparrow (Modesto population)	None	SSC	---	Often found in emergent freshwater marshes dominated by bulrushes (*Scirpus* spp.), cattails (*Typha* spp.), and willow (*Salix* spp.). Also nests in riparian forests of valley oak (*Quercus lobata*) with a sufficient understory of blackberry (*Rubus* spp.), along vegetated irrigation canals and levees, and in recently planted valley oak restoration sites. Found throughout the Sacramento Valley, from the delta north to Chico (Shuford and Gardali 2008).	Y	Pipeline/Infrastructure – Neal Road and Skyway Road, Pipeline/Infrastructure – Butte Creek and Little Chico Creek Subalternatives, Sacramento River
Progne subis	purple martin	None	SSC	---	Present in California from mid-March through late September. Requires concentrations of nesting cavities, relatively open air space above accessible nest sites, and relatively abundant aerial insect prey. In the coastal mountains, Cascade Range, and Sierra Nevada foothills, inhabits open forests, woodlands, and riparian areas. Extirpated as a breeder from most of the Central Valley except the Sacramento area where it has taken to nesting in hollow-box bridges.	Y	Collection System

Scientific Name	Common Name	Federal Status	State Status	State Rare Plant Rank	General Habitat Characteristics	Potential to Occur in Study Area	Project Component
Riparia riparia	bank swallow	None	ST	---	A colonial nester in riparian and lacustrine bluffs or cliffs with fine-textured or sandy soils into which the nest cavities are dug. Also nests in earthen banks as well as sand and gravel pits. Declined drastically in the state over the 20th Century due to loss of riparian habitat and stabilization of natural banks. Currently most numerous in the Sacramento Valley along the Sacramento, Feather, and American Rivers, and Cache Creek in western Yolo County. Scarce and very local on the central coast. Occurs elsewhere in the state as an uncommon to rare migrant (CDFW 2020).	Y	Sacramento River
Setophaga petechia	yellow warbler	None	SSC	---	Usually found in riparian deciduous habitats in summer: cottonwoods (*Populus* ssp.), willows (*Salix* ssp.), alders (*Alnus* ssp.), and other small trees and shrubs typical of low, open-canopy riparian woodland. Also breeds in montane shrubbery in open coniferous forests (CDFW 2020).	Y	Potential to occur within any of the project components
Strix nebulosa	great gray owl	None	SE	---	Breeds in red fir (*Abies magnifica*), lodgepole pine (*Pinus contorta* ssp. *murrayana*), and mixed coniferous habitats, always near wet meadows. Nests in large, broken-topped snags usually 25 to 72 feet above the ground. A rarely seen resident at 4,500 to 7,500 feet in elevation in the Sierra Nevada Range, from the vicinity of Quincy south to the Yosemite region. (CDFW 2020).	N	The proposed project area is completely below the elevation range of this species.
Strix occidentalis occidentalis	California spotted owl	None	SSC	---	Older forests in areas of high canopy cover, with a multi-layered canopy, old decadent trees, a high number of large trees, and coarse downed woody debris. In California, ranges throughout the west slopes of the Sierra Nevada Mountains, and down the Coast Range Mountains from Carmel south through the Transverse Ranges nearly to Baja California (Shuford and Gardali 2008).	Y	Collection System

Scientific Name	Common Name	Federal Status	State Status	State Rare Plant Rank	General Habitat Characteristics	Potential to Occur in Study Area	Project Component
Vireo bellii pusillus	least Bell's vireo	FE	SE	---	Once occupied much of the Central Valley, but has disappeared from most its former range, and is now restricted to southern California from southern Inyo and Monterey Counties south through the South Coast and Inland Empire regions. Obligate riparian breeder, favoring cottonwood (*Populus* spp.), willow (*Salix* spp.), and oak (*Quercus* spp.) woodlands, and mule fat (*Baccharis salicifolia*) scrub along watercourses (USFWS 2006).	N	Extirpated from Sacramento Valley since the mid-1980's.
Xanthocephalus xanthocephalus	yellow-headed blackbird	None	SSC	---	Nests in fresh marshes with tall, emergent vegetation such as bulrushes (*Schoenoplectus* ssp.) and cattails (*Typha* ssp.) adjacent to deep water (Shuford and Gardali 2008).	N	There is no marsh habitat within the study area.
Mammals							
Antrozous pallidus	pallid bat	None	SSC	---	Ranges across nearly all of California except for high elevation portions of the Sierra Nevada Mountains and Del Norte, western Siskiyou, Humboldt, and northern Mendocino Counties. Generally found in a wide variety of habitats but with some preference for drier areas. Day roosts are in caves, crevices, mines, and occasionally in hollow trees and buildings (CDFW 2020).	Y	Potential to occur within any of the project components
Aplodontia rufa californica	Sierra Nevada mountain beaver	None	SSC	---	Ranges across the Sierra Nevada Mountains from Shasta and Lassen Counties south to Tulare County. Generally found in dense riparian forests and open shrubscapes around most forest types. Specifically found in forests with open to moderate canopy cover and a dense understory near water. Requires deep friable soils and a cool moist microclimate (CDFW 2020).	N	The proposed project area is completely outside the range of this species.

Scientific Name	Common Name	Federal Status	State Status	State Rare Plant Rank	General Habitat Characteristics	Potential to Occur in Study Area	Project Component
Corynorhinus townsendii	Townsend's big-eared bat	None	SSC	---	Ranges throughout California except for high elevation portions of the Sierra Nevada Mountains. Generally prefers mesic habitats but known to occur in all non-alpine habitats of California. Roosting occurs in caves, tunnels, mines, buildings, or other structures and this species may use different roosting sites for day and night (CDFW 2020).	Y	Potential to occur within any of the project components
Eumops perotis californicus	western mastiff bat	None	SSC	---	Ranges throughout all of Southern California, the central coast, and the Sierra Nevada Mountains. Generally occurs in open, arid, or semi-arid habitats. Roosts in rock crevices and buildings. (CDFW 2020).	Y	Potential to occur within any of the project components
Lasiurus blossevillii	western red bat	None	SSC	---	Ranges across the Central Valley, as well as the coast and Coast Range mountains from Mendocino County south, and east across the Los Angeles area into the Inland Empire region. Occurs in most habitats except desert and alpine areas. Roosts in trees, sometimes shrubs, and typically at the margins of habitats (CDFW 2020).	Y	Potential to occur within any of the project components
Pekania pennanti	fisher (West Coast DPS)	None	ST, SSC	---	Large areas of mature, dense forest stands with snags and greater than 50% canopy closure. Uncommon permanent resident of the Sierra Nevada, Cascades, and Klamath Mountains; also found in a few areas in the North Coast Ranges (USFWS 2014).	Y	Collection System
Taxidea taxus	American badger	None	SSC	---	Ranges across nearly all of California except northernmost Humboldt and Del Norte Counties. Most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils (CDFW 2020).	Y	Pipeline/Infrastructure – Neal Road and Skyway Road, Pipeline/Infrastructure – Butte Creek and Little Chico Creek Subalternatives, Sacramento River

Status: Federal Endangered (FE); Federal Threatened (FT); State Endangered (SE); State Threatened (ST); State Candidate Endangered (SCE); State Fully Protected (SFP); State Rare (SR); State Species of Special Concern (SSC); Bald and Golden Eagle Protection Act (BGEPA); California Native Plant Society (CNPS) State Rare Plant Rankings: 1B = Rare, Threatened, or Endangered in California and Elsewhere, 2B = Rare, Threatened, or Endangered in California, but More Common Elsewhere, Threat Ranks – 0.1 = Seriously threatened in California, 0.2 = Fairly threatened in California, 0.3 = Not very threatened in California

The CWHR habitat types mapped in the project area include:

- Annual Grassland (AGS)
- Barren (BAR)
- Blue Oak-Foothill Pine (BOP)
- Blue Oak Woodland (BOW)
- Cropland (CRP)
- Deciduous Orchard (DOR)
- Irrigated Row and Field Crops (IRF)
- Lacustrine (LAC)
- Mixed Chaparral (MCH)
- Montane Hardwood Conifer (MHC)
- Montane Hardwood (MHW)
- Montane Riparian (MRI)
- Pasture (PAS)
- Ponderosa Pine (PPN)
- Riverine (RIV)
- Urban (URB)
- Valley Oak Woodland (VOW)
- Valley Foothill Riparian (VRI)

Table A.2-2. Special-Status Species with the Potential to Occur in the Project Area and Associated CWHR Habitats

Scientific Name	Common Name	USFWS	CDFW	CRPR	CWHR Habitat Associations[a]
Plants					
Allium jepsonii	Jepson's onion	—	—	1B.2	BOP, BOW, MCH, MHC, MHW, PPN
Astragalus tener var. *ferrisiae*	Ferris' milk-vetch	—	—	1B.2	AGS, PAS
Balsamorhiza macrolepis	big-scale balsamroot	—	—	1B.2	AGS, BOP, BOW, MCH, MHC, MHW, PAS, PPN, VOW
Campylopodiella stenocarpa	flagella-like atractylocarpus	—	—	2B.2	BAR, BOP, BOW, MHC, MHW, MRI, PPN, VOW
Cardamine pachystigma var. *dissectifolia*	dissected-leaved toothwort	—	—	1B.2	BOP, BOW, MCH, MHC, MHW, PPN
Carex xerophila	chaparral sedge	—	—	1B.2	BOP, BOW, MCH, MHC, MHW, PPN
Castilleja rubicundula var. *rubicundula*	pink creamsacs	—	—	1B.2	AGS, BOP, BOW, MCH, MHC, MHW, MRI, PAS, PPN, VRI, VOW
Clarkia gracilis ssp. *albicaulis*	white-stemmed clarkia	—	—	1B.2	BOP, BOW, MCH, MHC, MHW, PPN
Clarkia mildrediae ssp. *mildrediae*	Mildred's clarkia	—	—	1B.3	BOP, BOW, MHC, MHW, PPN
Clarkia mosquinii	Mosquin's clarkia	—	—	1B.1	BAR, BOP, BOW, MHC, MHW, PPN
Delphinium recurvatum	recurved larkspur	—	—	1B.2	AGS, BOP, BOW, MCH, MHC, MHW, MRI, PAS, PPN, VRI, VOW
Downingia pusilla	dwarf downingia	—	—	2B.2	AGS, PAS
Eremogone cliftonii	Clifton's eremogone	—	—	1B.3	BOP, MCH, MCP, MHC, MHW, MRI, PPN
Eriogonum umbellatum var. *ahartii*	Ahart's buckwheat	—	—	1B.2	BOP, BOW, MCH, MCP, MHC, MHW, PPN
Erythranthe filicifolia	fern-leaved monkeyflower	—	—	1B.2	BOP, MCH, MHC, MRI, PPN
Euphorbia hooveri	Hoover's spurge	FT	—	1B.2	AGS, PAS
Fritillaria pluriflora	adobe-lily	None	None	1B.2	AGS, BOP, BOW, MCH, MHC, MHW, PAS, PPN, VRI, VOW
Gratiola heterosepala	Boggs Lake hedge-hyssop	None	SE	1B.2	AGS, PAS

Scientific Name	Common Name	USFWS	CDFW	CRPR	CWHR Habitat Associations[a]
Hibiscus lasiocarpos var. *occidentalis*	woolly rose-mallow	None	None	1B.2	BAR, PAS
Imperata brevifolia	California satintail	None	None	2B.1	MCH, MCP, MHC, MRI, VRI
Juncus leiospermus var. *leiospermus*	Red Bluff dwarf rush	None	None	1B.1	AGS, BOP, BOW, MCH, MHC, MHW, MRI, PAS, PPN, VRI, VOW
Lasthenia glabrata ssp. *coulteri*	Coulter's goldfields	None	None	1B.1	AGS, BAR, PAS
Layia septentrionalis	Colusa layia	None	None	1B.2	AGS, BOP, BOW, MCH, MCP, MHC, MHW, PAS, PPN, VOW
Lewisia cantelovii	Cantelow's lewisia	None	None	1B.2	BOP, BOW, MCH, MHC, MHW, MRI, PPN
Limnanthes floccosa ssp. *californica*	Butte County meadowfoam	FE	SE	1B.1	AGS, PAS
Monardella venosa	veiny monardella	None	None	1B.1	AGS, BOP, BOW, MHC, MHW, PAS, PPN, VOW
Orcuttia pilosa	hairy Orcutt grass	FE	SE	1B.1	AGS, PAS
Orcuttia tenuis	slender Orcutt grass	FT	SE	1B.1	AGS, PAS
Packera eurycephala var. *lewisrosei*	Lewis Rose's ragwort	None	None	1B.2	BOP, BOW, MCH, MHC, MHW, PPN, VOW
Paronychia ahartii	Ahart's paronychia	None	None	1B.1	AGS, BOP, BOW, MHC, MHW, MRI, PAS, PPN, VRI, VOW
Poa sierrae	Sierra blue grass	None	None	1B.3	BOP, MHC, PPN
Rhynchospora californica	California beaked-rush	None	None	1B.1	BOP, MHC, MRI, PPN
Rhynchospora capitellata	brownish beaked-rush	None	None	2B.2	BOP, MHC, MRI, PPN
Rupertia hallii	Hall's rupertia	None	None	1B.2	BAR, BOP, BOW, MHC, MHW, PPN
Sedum albomarginatum	Feather River stonecrop	None	None	1B.2	BOP, MCH, MHC, PPN
Sidalcea robusta	Butte County checkerbloom	None	None	1B.2	BOP, BOW, MCH, MHC, MHW, MRI, PPN
Trifolium jokerstii	Butte County golden clover	None	None	1B.2	AGS, PAS
Tuctoria greenei	Greene's tuctoria	FE	SR	1B.1	AGS, PAS
Invertebrates					
Branchinecta conservatio	Conservancy fairy shrimp	FE	None	---	AGS, PAS
Branchinecta lynchi	vernal pool fairy shrimp	FT	None	---	AGS, PAS
Desmocerus californicus dimorphus	valley elderberry longhorn beetle	FT	None	---	AGS, VRI
Lepidurus packardi	vernal pool tadpole shrimp	FE	None	---	AGS, PAS
Fish					
Acipenser medirostris	green sturgeon (southern DPS)	FT	SSC	---	RIV
Mylopharodon conocephalus	hardhead	None	SSC	---	LAC, RIV
Oncorhynchus mykiss irideus (pop. 11)	steelhead (Central Valley DPS)	FT	None	---	RIV
Oncorhynchus tshawytscha (pop. 6)	chinook salmon (Central Valley spring-run ESU)	FT	ST	---	RIV

Scientific Name	Common Name	USFWS	CDFW	CRPR	CWHR Habitat Associations[a]
Oncorhynchus tshawytscha (pop. 7)	chinook salmon (Sacramento River winter-run ESU)	FE	SE	---	RIV
Amphibians					
Rana boylii	foothill yellow-legged frog	—	ST, SSC	—	MRI, RIV
Rana draytonii	California red-legged frog	FT	SSC	—	AGS, LAC, MCH, MHC, MRI, PPN, RIV
Spea hammondii	western spadefoot	None	SSC	---	AGS, BOP, BOW, LAC, MRI, PAS, RIV
Reptiles					
Actinemys marmorata	northwestern pond turtle	None	SSC	---	LAC, MRI, RIV, VRI
Phrynosoma blainvillii	Blainville's horned lizard	None	SSC	---	AGS, BAR, BOP, BOW, MCH, MHC, MRI, PPN, VRI, VOW
Thamnophis gigas	giant gartersnake	FT	ST	---	LAC, RIV
Birds					
Accipiter gentilis	northern goshawk	—	SSC	—	BOP, MRI, PPN
Agelaius tricolor	tricolored blackbird	None	ST, SSC	---	AGS, CRP, PAS, VRI
Aquila chrysaetos	golden eagle	—	FP	—	AGS, BOP, MHC, PAS
Athene cunicularia	burrowing owl	None	SSC	---	AGS, BAR, CRP, PAS, URB
Buteo swainsoni	Swainson's hawk	None	ST	---	AGS, BOW, CRP, PAS, URB, VRI, VOW
Circus hudsonius	northern harrier	None	SSC	---	AGS, CRP, PAS
Coccyzus americanus occidentalis	western yellow-billed cuckoo	FT	SE	---	RIV, VRI
Contopus cooperi	olive-sided flycatcher	—	SSC	—	BOP, LAC, MHC, MRI, PPN, RIV
Elanus leucurus	white-tailed kite	—	FP	—	AGS, BOP, BOW, CRP, PAS, URB, VRI, VOW
Empidonax traillii brewsteri	little willow flycatcher	—	SE	—	MRI
Falco peregrinus anatum	American peregrine falcon	None	SFP	---	BOP, MRI, PPN, URB
Haliaeetus leucocephalus	bald eagle	—	SE, FP	—	LAC, MHC, MRI, PPN, RIV
Icteria virens	yellow-breasted chat	None	SSC	---	MRI, VRI
Lanius ludovicianus	loggerhead shrike	None	SSC	---	AGS, BAR, BOW, CRP, PAS, VOW
Laterallus jamaicensis coturniculus	California black rail	None	ST, SFP	---	PAS
Melospiza melodia	song sparrow (Modesto population)	None	SSC	---	VRI
Progne subis	purple martin	None	SSC	---	BOP, MHC, MHW, MRI, PPN
Riparia riparia	bank swallow	None	ST	---	RIV, VRI
Setophaga petechia	yellow warbler	—	SSC	—	BOP, MHC, MRI, PPN, VRI
Strix occidentalis occidentalis	California spotted owl	—	SSC	—	BOP, MHC, MRI, PPN
Mammals					
Antrozous pallidus	pallid bat	—	SSC	—	AGS, BAR, BOP, BOW, MCH, MHC, MHW, MRI, PPN, URB, VRI, VOW
Corynorhinus townsendii	Townsend's big-eared bat	—	SSC	—	AGS, BAR, BOP, BOW, MCH, MHC, MHW, MRI, PPN, URB, VRI, VOW

Scientific Name	Common Name	USFWS	CDFW	CRPR	CWHR Habitat Associations[a]
Eumops perotis	western mastiff bat	—	SSC	—	AGS, BAR, BOP, BOW, MCH, MHC, MHW, PPN, URB, VOW
Lasiurus blossevillii	western red bat	None	SSC	---	AGS, BAR, BOP, BOW, MCH, MHC, MHW, MRI, PPN, URB, VRI, VOW
Pekania pennanti	fisher	FC	ST, SSC	—	MHC, PPN
Taxidea taxus	American badger	—	SSC	—	AGS, BAR

[a] Associations are derived from detailed habitat description in species table.

CWHR habitat acronyms are defined in text above.

Notes: FE = federal endangered; FT = federal threatened; FC = federal candidate; SE = state endangered; ST = state threatened; FP = fully protected; SSC = species of special concern; SR = state rare; CRPR = California Rare Plant Rank; 1B = plants rare, threatened, or endangered in California and elsewhere; 2B = plants rare, threatened, or endangered in California, but more common elsewhere.

A.3

California Wildlife Habitat Relationships Habitat Types

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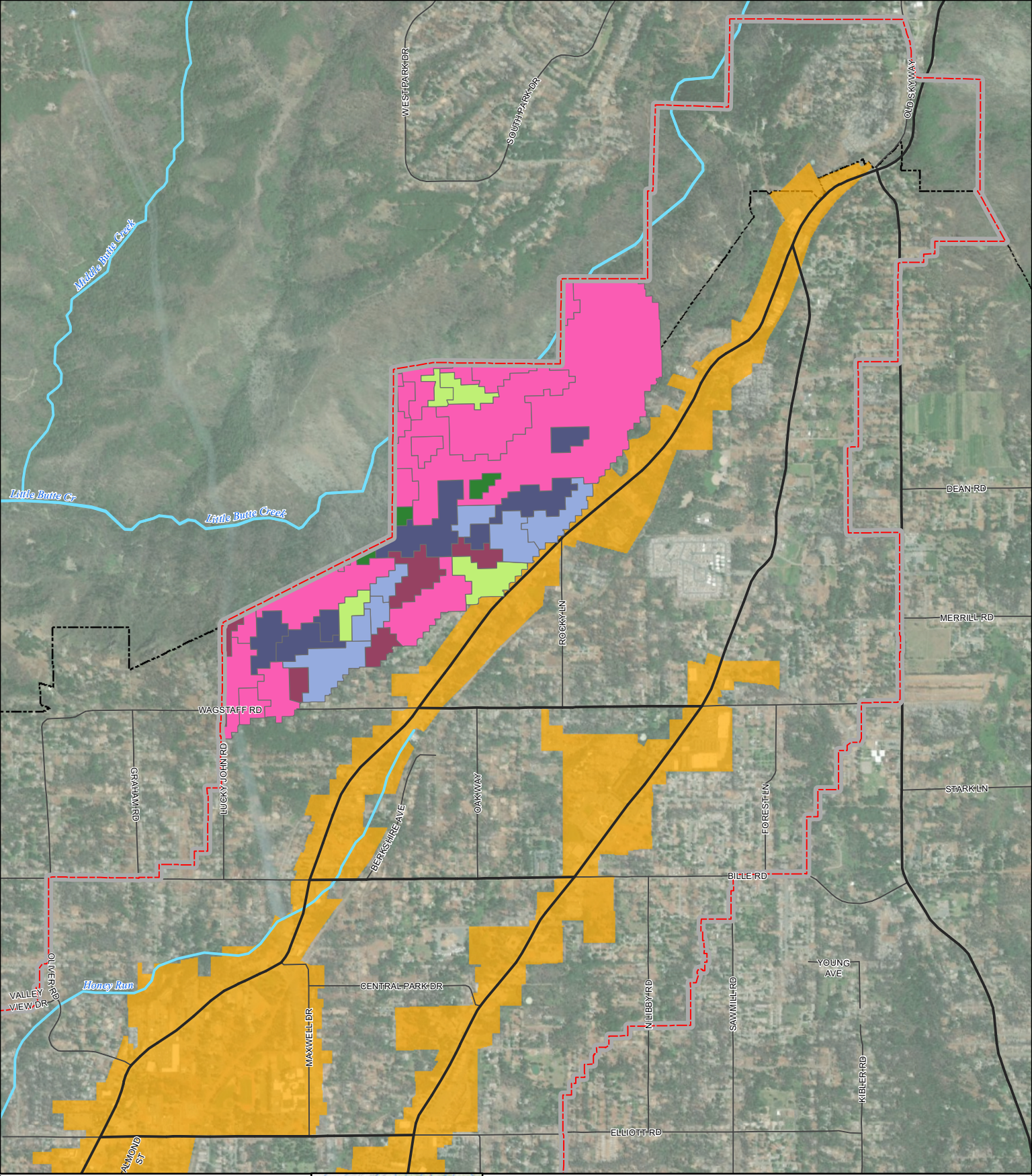
2365 Iron Point Road, Suite 300, Folsom, CA 95630-8709
T: (916) 817-4700 **F:** (916) 817-4747



REGIONAL CWHR VEGETATION

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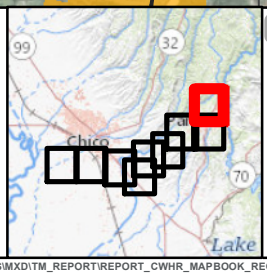
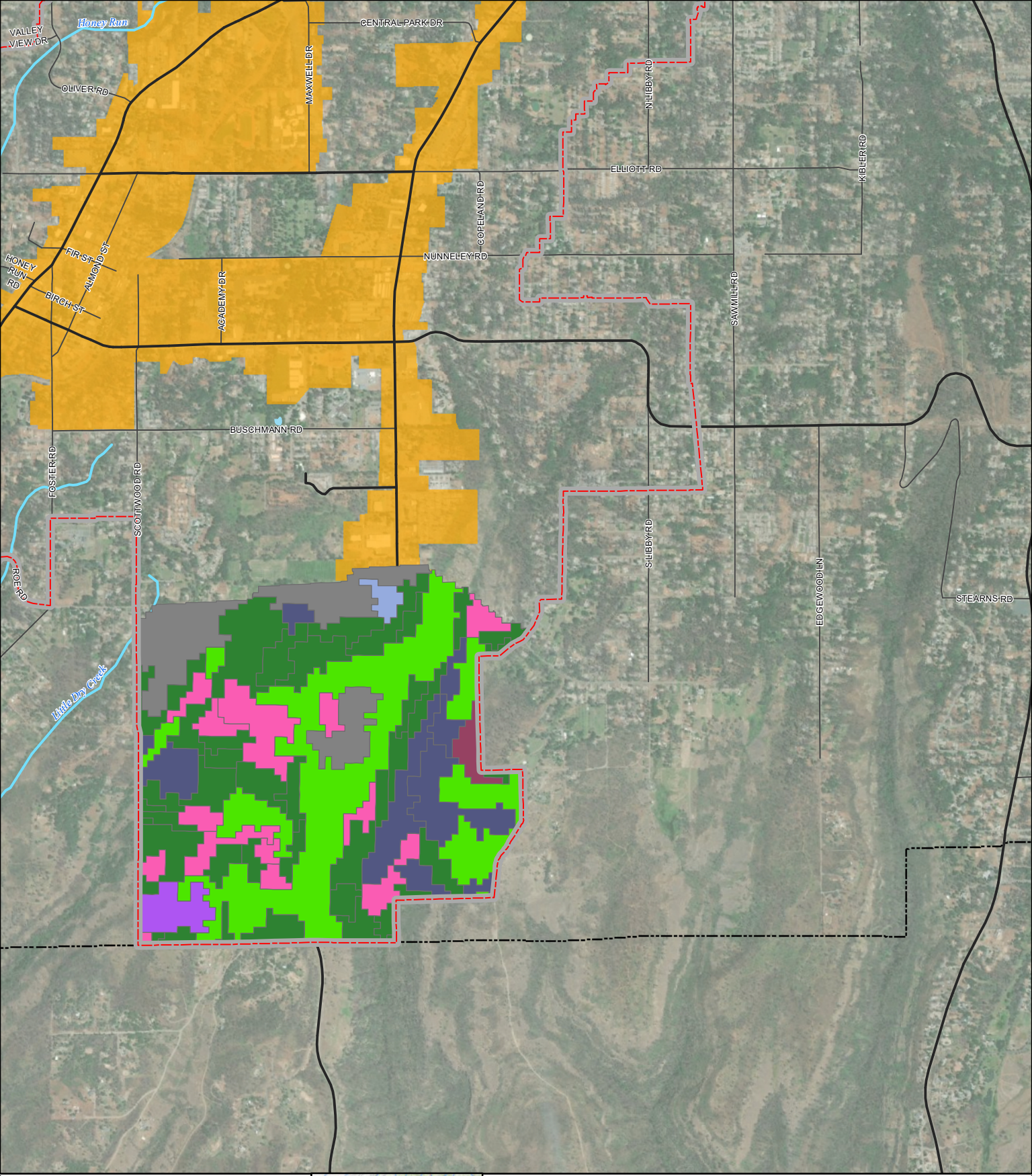
Scale in Feet



PSD_Regional_Study_Area_
Sewer Service Area

CWHR Vegetation Type

- BOW - Blue Oak Woodland
- BOP - Blue Oak-Foothill Pine
- MCH - Mixed Chaparral
- MHW - Montane Hardwood
- MHC - Montane Hardwood-Conifer
- PPN - Ponderosa Pine



REGIONAL CWHR VEGETATION

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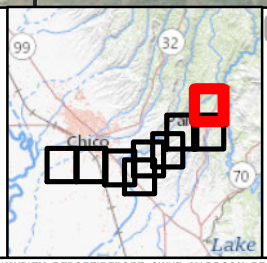
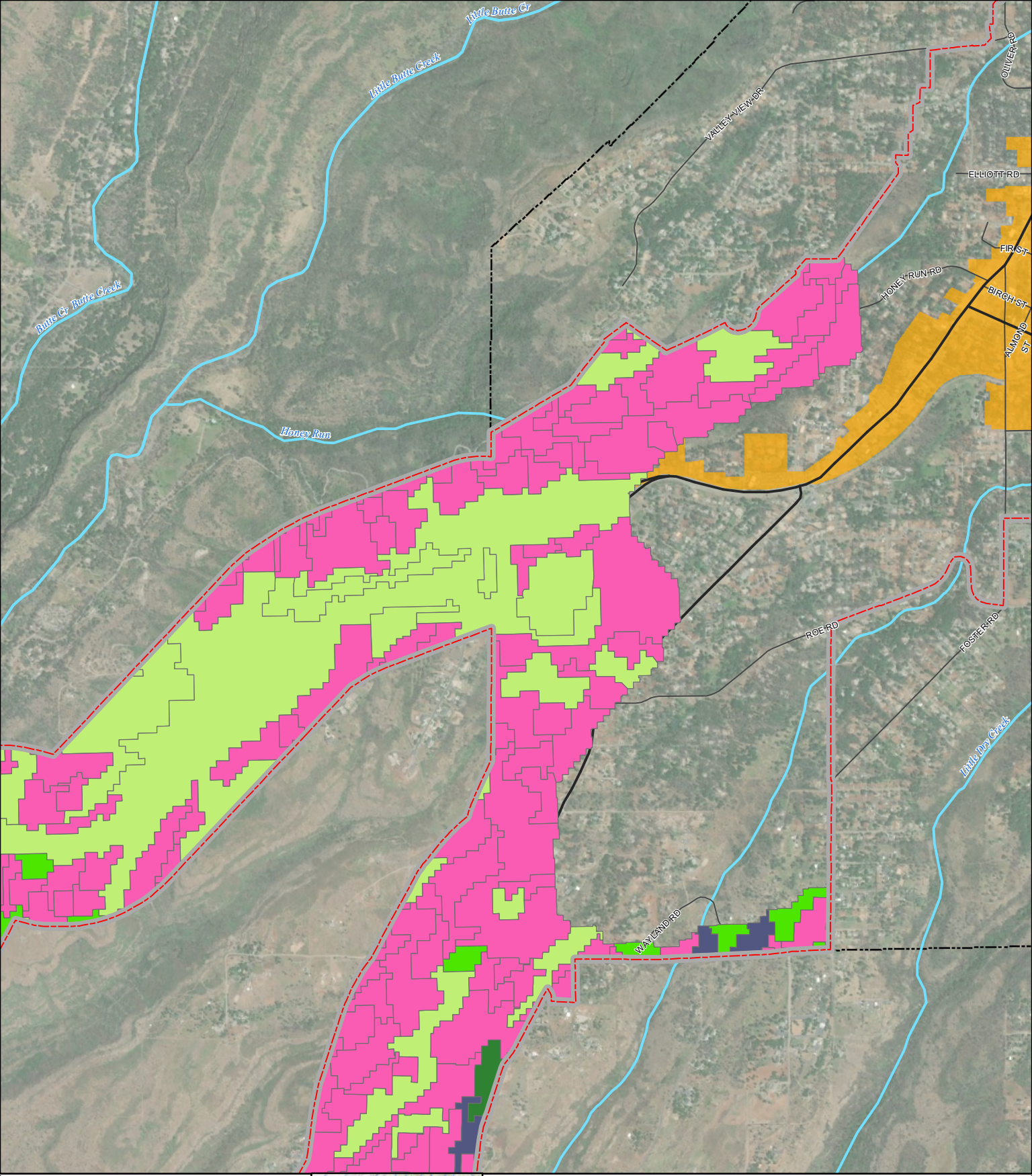
Scale in Feet



PSD_Regional_Study_Area_
Sewer Service Area

CWHR Vegetation Type

- AGS - Annual Grassland
- BOW - Blue Oak Woodland
- BOP - Blue Oak-Foothill Pine
- CRP - Cropland
- MHW - Montane Hardwood
- MHC - Montane Hardwood-Conifer
- PPN - Ponderosa Pine
- URB - Urban



REGIONAL CWHR VEGETATION

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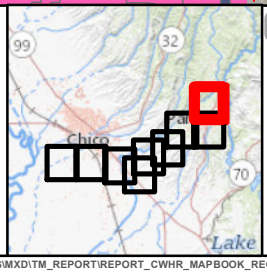
Scale in Feet



PSD_Regional_Study_Area_
Sewer Service Area

CWHR Vegetation Type

- AGS - Annual Grassland
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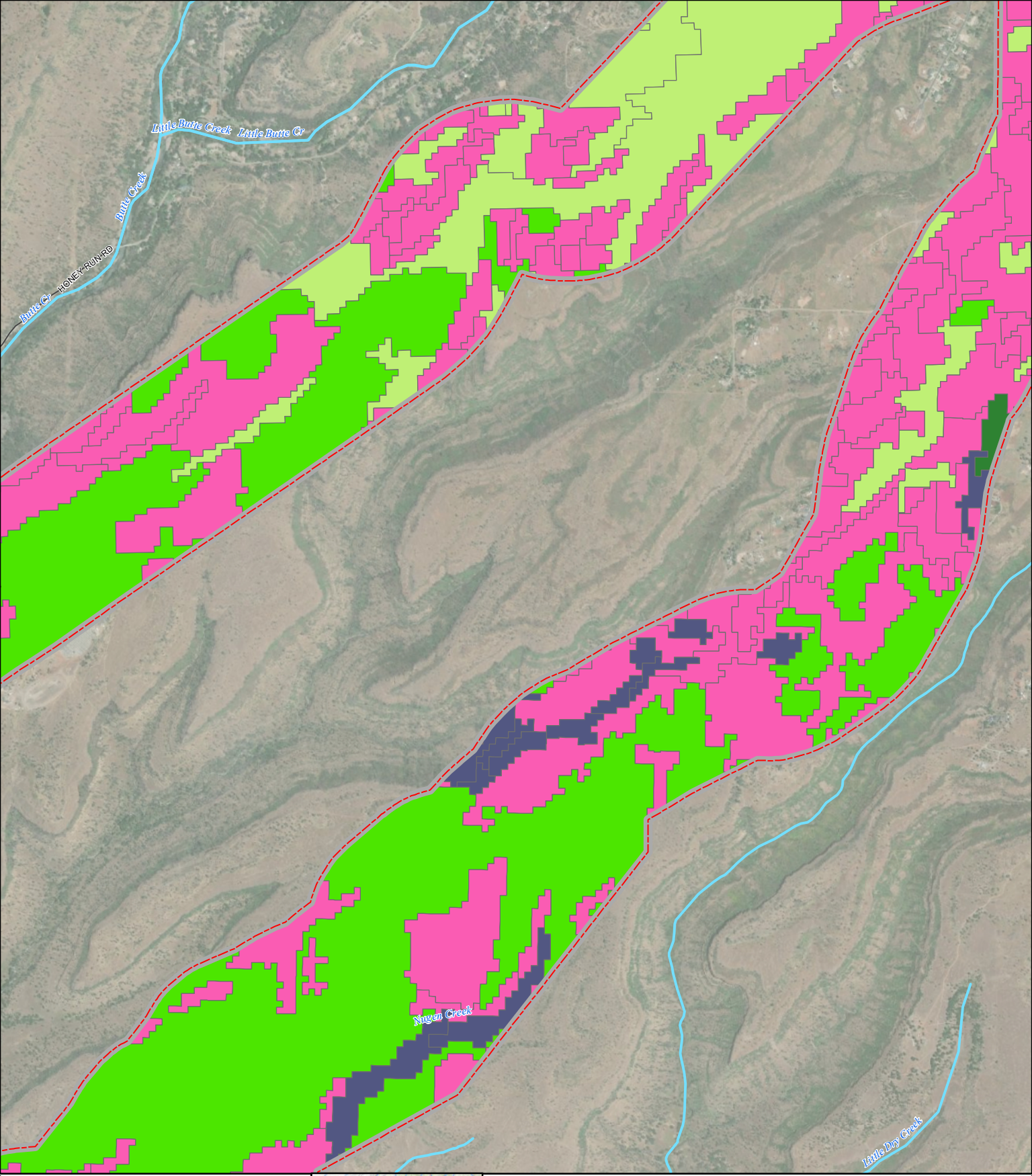
- BOP - Blue Oak-Foothill Pine
- MCH - Mixed Chaparral
- MHW - Montane Hardwood
- URB - Urban



REGIONAL CWHR VEGETATION

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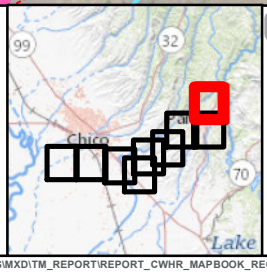
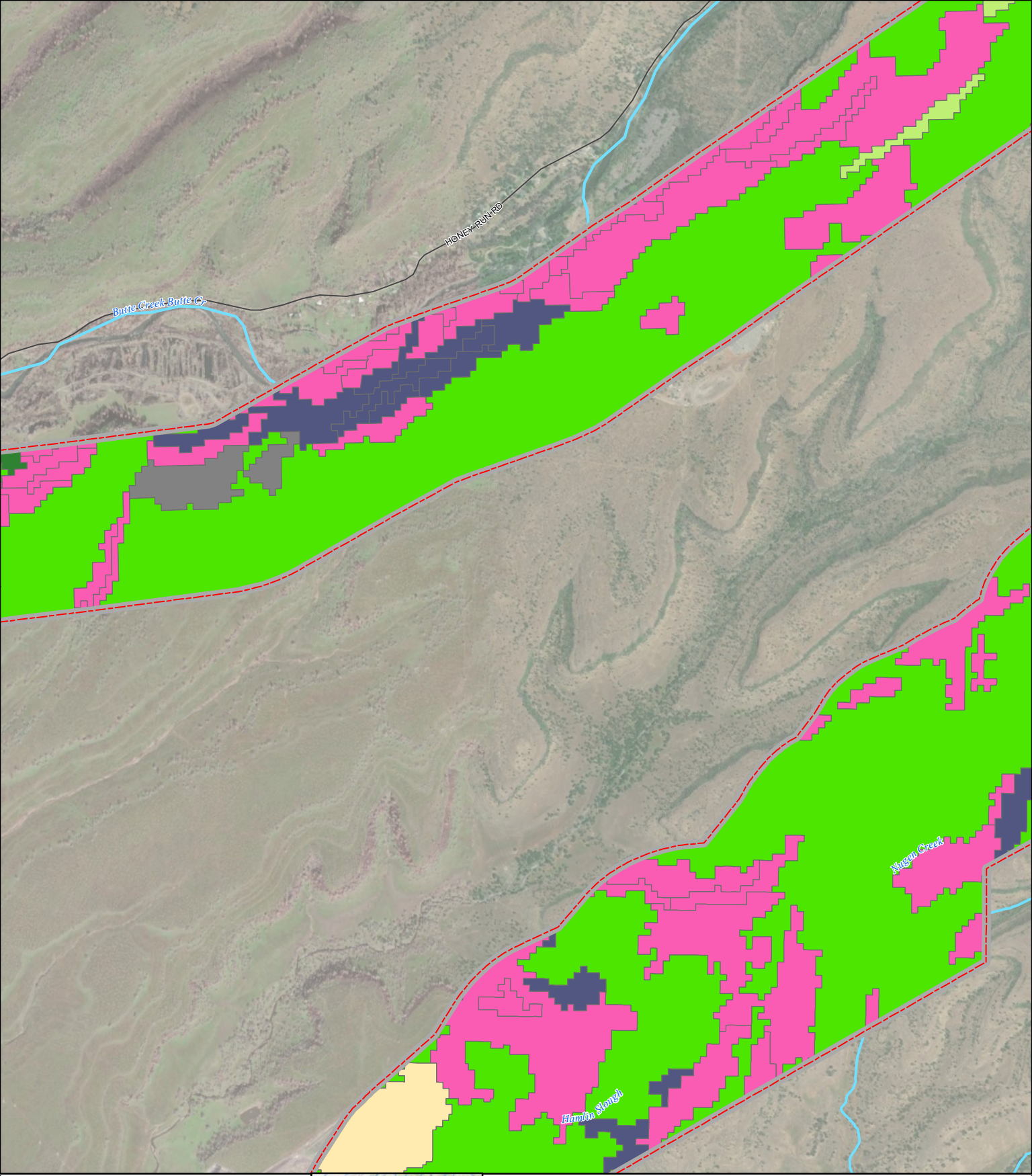


PSD_Regional_Study_Area_
Sewer Service Area

CWHR Vegetation Type

AGS - Annual Grassland
BOW - Blue Oak Woodland
BOP - Blue Oak-Foothill Pine
MCH - Mixed Chaparral
MHW - Montane Hardwood



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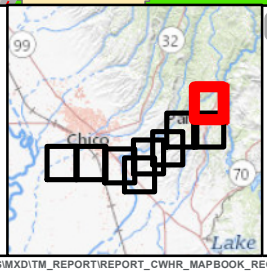
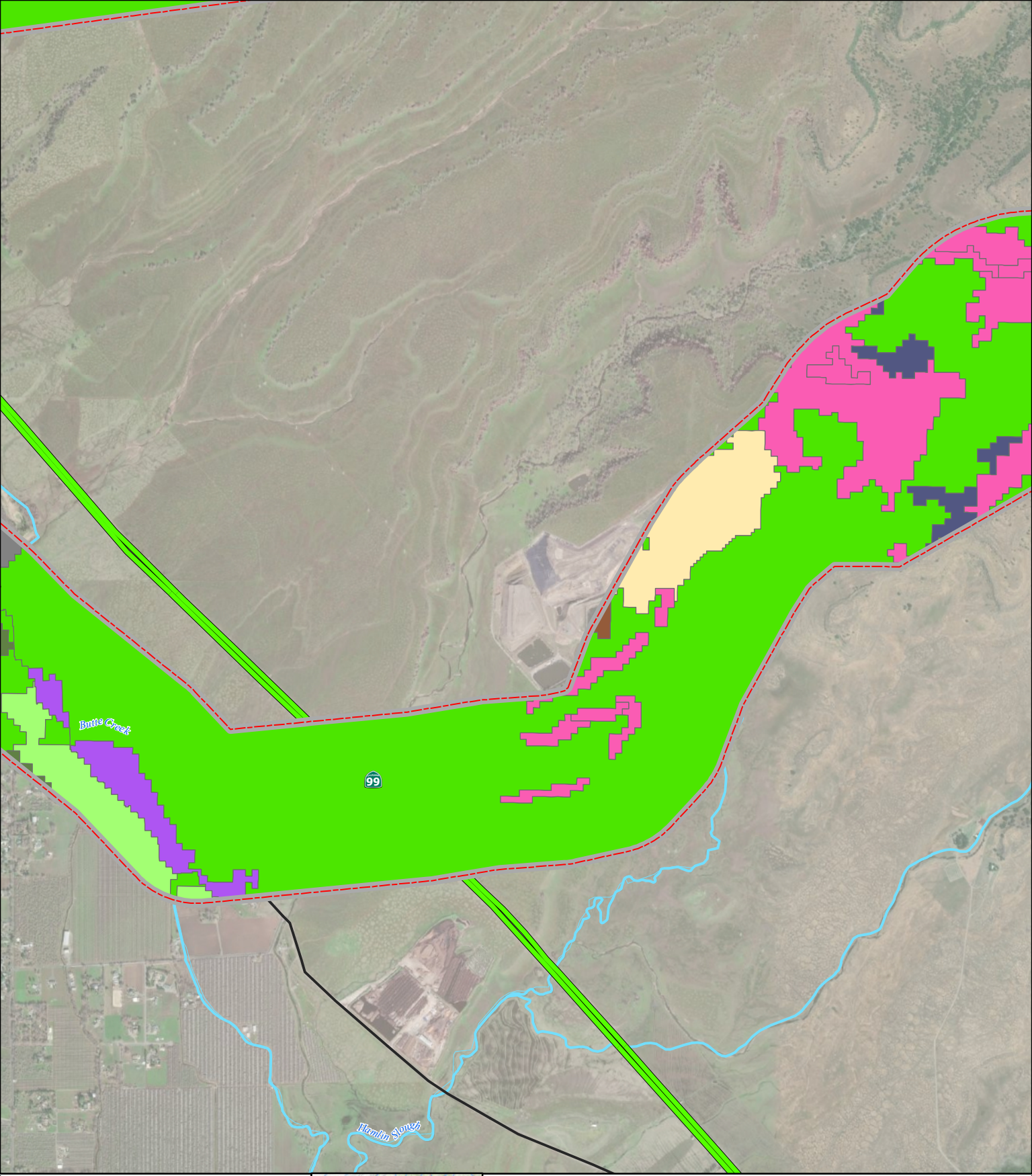


PSD_Regional_Study_Area_
Sewer Service Area

CWHR Vegetation Type

- AGS - Annual Grassland
- BAR - Barren
- BOW - Blue Oak Woodland
- BOP - Blue Oak-Foothill Pine
- MCH - Mixed Chaparral
- MHW - Montane Hardwood
- MRI - Montane Riparian
- URB - Urban



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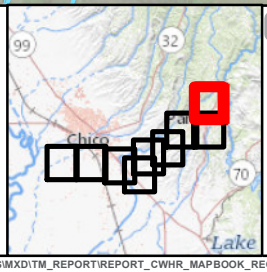
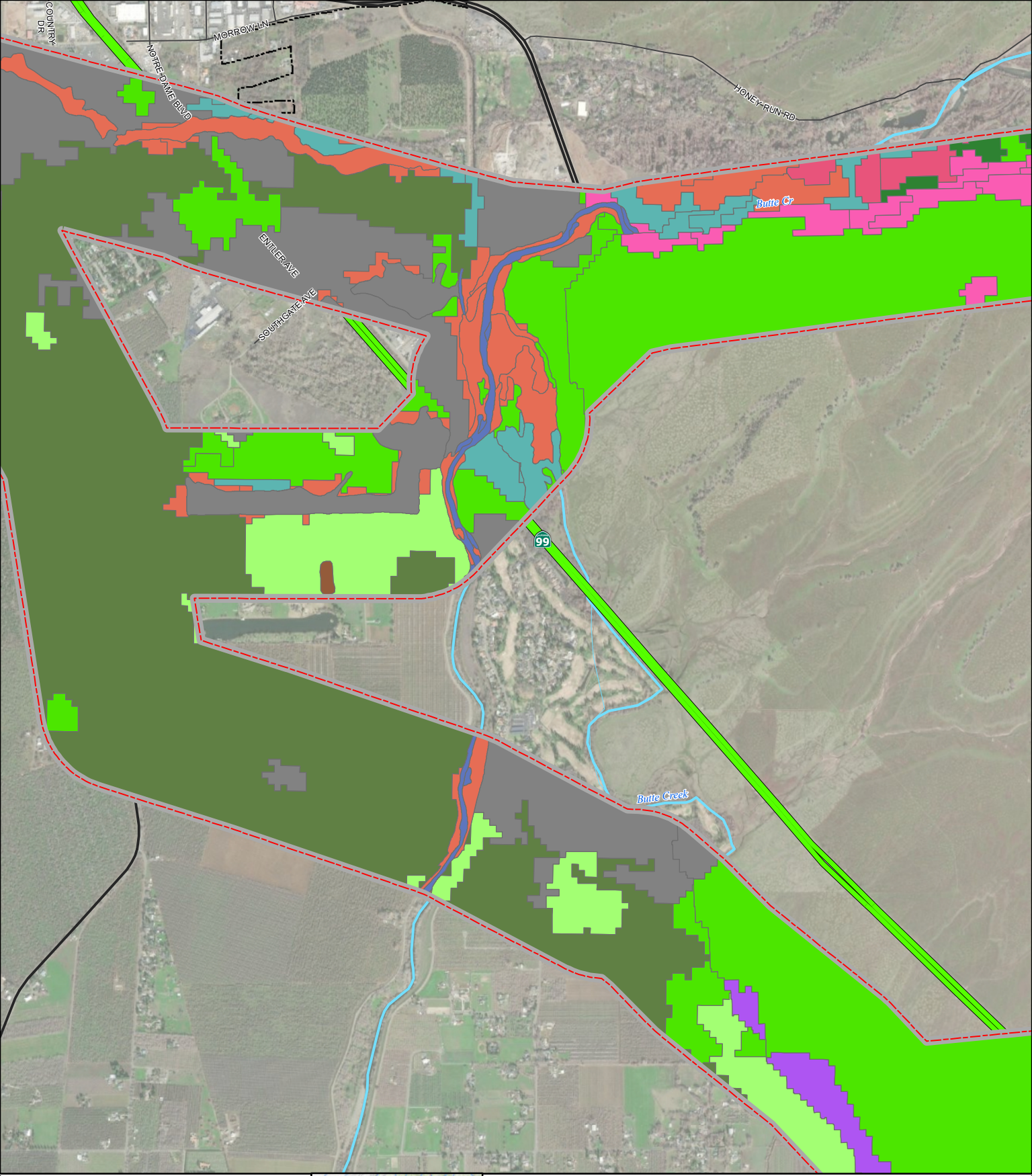


PSD_Regional_Study_Area_
Sewer Service Area

CWHR Vegetation Type

- AGS - Annual Grassland
- BAR - Barren
- BOW - Blue Oak Woodland
- BOP - Blue Oak-Foothill Pine
- CRP - Cropland
- DOR - Deciduous Orchard
- LAC - Lacustrine
- PAS - Pasture
- URB - Urban



REGIONAL CWHR VEGETATION

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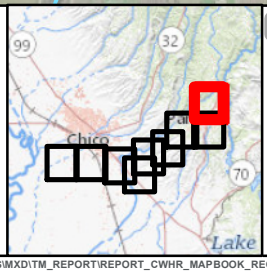
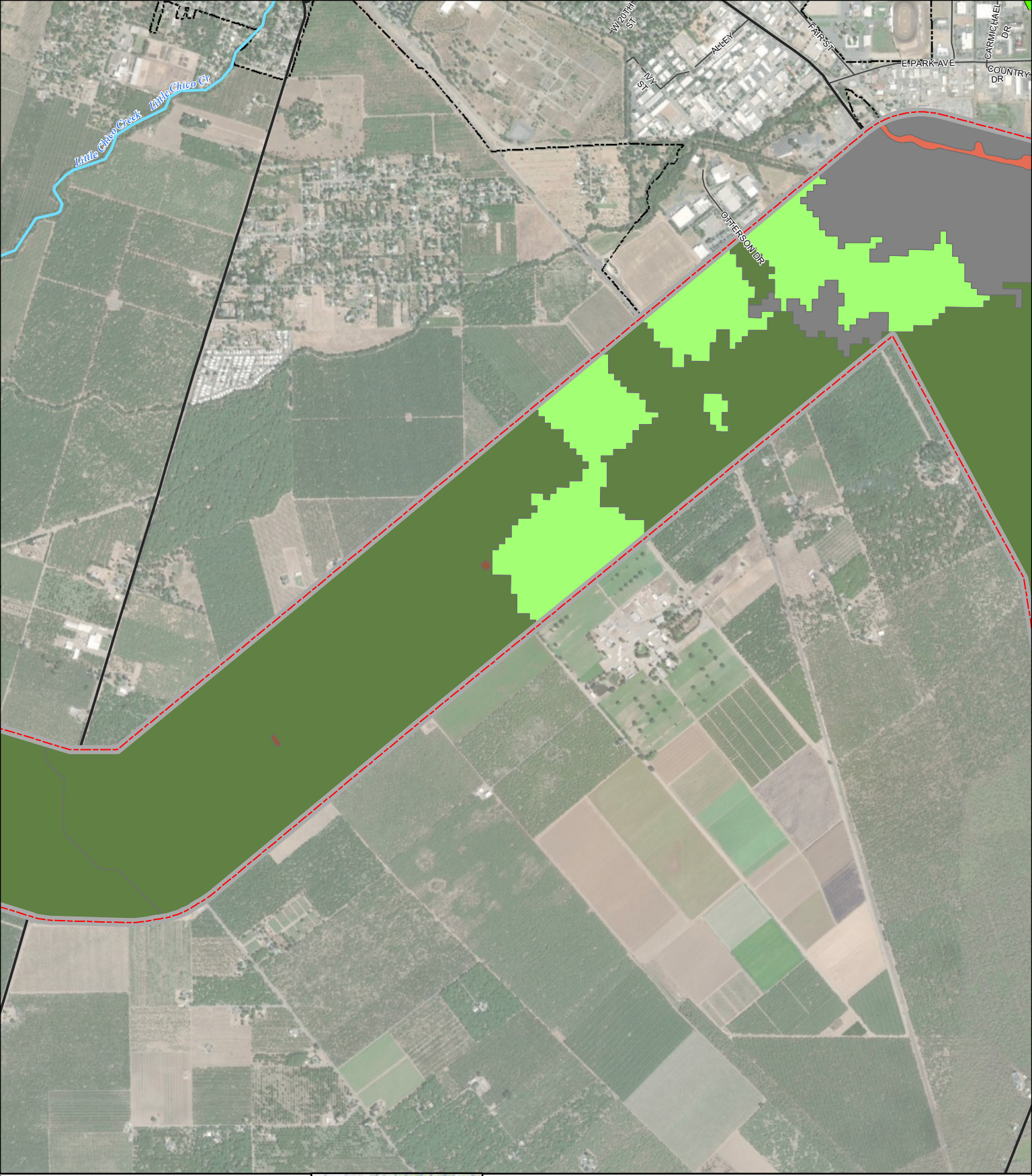


PSD_Regional_Study_Area_
Sewer Service Area

CWHR Vegetation Type

- AGS - Annual Grassland
- BOW - Blue Oak Woodland
- CRP - Cropland
- DOR - Deciduous Orchard
- LAC - Lacustrine
- MHW - Montane Hardwood
- MRI - Montane Riparian
- PAS - Pasture
- RIV - Riverine
- URB - Urban
- VRI - Valley Foothill Riparian
- VOW - Valley Oak Woodland



REGIONAL CWHR VEGETATION

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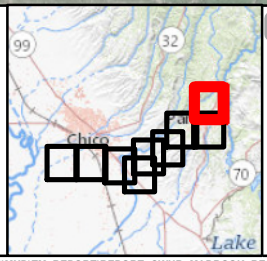
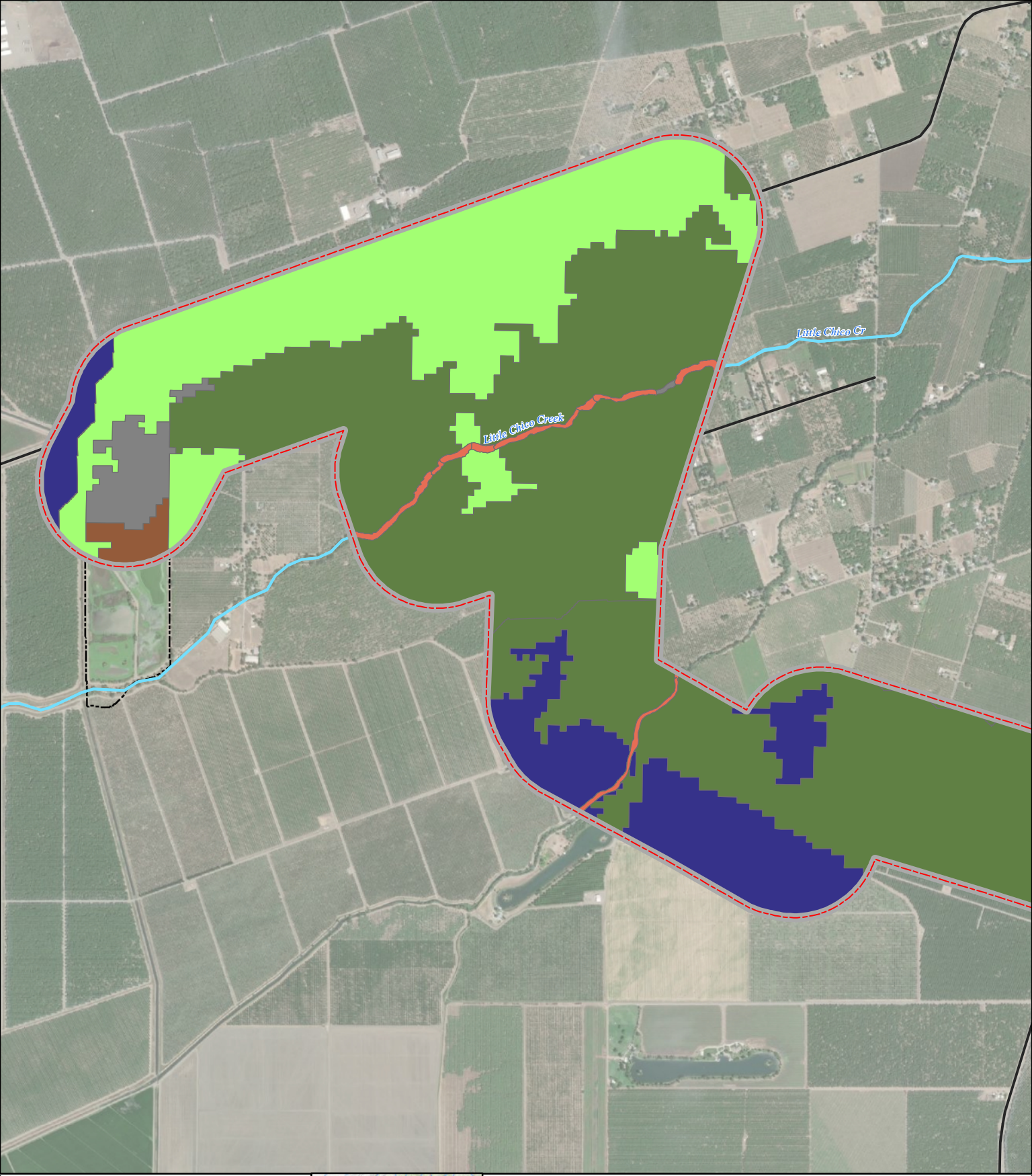


PSD_Regional_Study_Area_
Sewer Service Area

CWHR Vegetation Type

DOR - Deciduous Orchard
LAC - Lacustrine
PAS - Pasture
URB - Urban
VRI - Valley Foothill Riparian



REGIONAL CWHR VEGETATION

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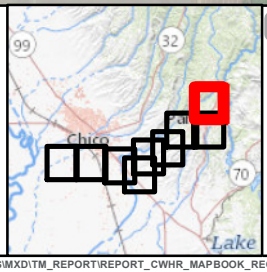


PSD_Regional_Study_Area_
Sewer Service Area

CWHR Vegetation Type

DOR - Deciduous Orchard
IRF - Irrigated Row and Field Crops
LAC - Lacustrine
PAS - Pasture
URB - Urban
VRI - Valley Foothill Riparian

B

Pipeline Cost Estimate Backup

Opinion of Probable Construction Cost - Capital

Town of Paradise

Paradise - Sewer Feasibility - Regional Skyway

Location		**QTY. BY**	**ESTIMATE LEVEL**
Town of Paradise Regional Pipeline		L. Edwards	**CONCEPT**
Limits		**QTY. CHCK**	**PRICED BY**
Proposed Paradise Sewer Service Area		M.Massaro	L.Edwards
BEN|EN PROJECT NO.		**AGENCY**	
19-216 TO1		Town of Paradise	10/26/2020

Item No.	Item	Estimated Quantity	Unit	Unit Price	Total	Salvage Value at 20 yrs
SEWER-Public ROW						
1	Trunk Forcemain - Dual 6 - inch, less than 10 feet depth	93,793	LF	$248	$23,261,000	$13,956,600
2	Termination structure - Flow Meter, Sampler, Odor Control	1	EA	$250,000	$250,000	$150,000
3	HDD	1,660	LF	$220	$366,000	$219,600
4	HDD mobilization and demobilization	3	EA	$50,000	$150,000	
5	HDD Launch Pit	3	EA	$40,000	$120,000	
6	HDD Receiving Pit	3	EA	$20,000	$60,000	
7	Bore and Jack	599	LF	$900	$539,000	$323,400
8	Bore and Jack mobilization and demobilization	2	EA	$138,161	$277,000	
9	Bore and Jack Jacking Pit	2	EA	$100,481	$201,000	
10	Bore and Jack Receiving Pit	2	EA	$31,400	$63,000	
11	Regional Pump Station 0.5 - 1 MGD	2	EA	$250,000	$500,000	$300,000
12	Screening and Grit Regional PS	1	EA	$261,500	$261,500	$156,900
13	Odor Control - Regional PS	1	EA	$200,000	$200,000	$120,000
	Subtotal	96,051	LF		$26,248,500	**$15,226,500**
				Estimated Construction Cost	**$26,248,500**	
				Undefined Scope (30%)	$7,874,550	
				Construction Contingency (10%)	$3,412,305	
				Estimated Construction Total	**$37,535,355**	
				Soft Costs (39%)	$14,638,790	
				Total Pipeline Capital Cost	**$52,174,145**	
				Total Pipeline Salvage Value (2040)		**$15,226,500**

BENNETT ENGINEERING SERVICES ASSUMES NO RESPONSIBILITY FOR DIFFERENCES BETWEEN THESE QUANTITIES AND FINAL PAY QUANTITIES.

ANNUAL OPERATIONS AND MAINTENANCE COST - Regional Pipeline

Item No.	Item	Estimated	Unit	List Price	Total
1	~~Chico WPCP Treatment Annual O&M Charge~~	0	LS	$0	$0
2	Receptionist (Assume 1 full 1 part time employee)	0	LS	$60,000	$0
3	Accountant	0	LS	$100,000	$0
4	Operations - Pipeline				
5	Operations Manager	0	LS	$130,000	$0
6	Field Crew/Utility Worker (assume 3)	2	LS	$65,000	$130,000
7	On-Site Service Tech.	0	LS	$65,000	$0
8	PS Power Requirements ($/yr)				
9	Regional PS 350 to 750 GPM	2	EA	$27,271	$54,542
10	Miscellaneous PS Repairs ($/yr)	2	LS	$10,000	$20,000
11	Annual Maintenance ($/yr)	1	LS	$50,000	$50,000
12	Septage Hauling	0	EA	$1,000	$0
13	Building Cost (assumed service district housed at City Hall)	0	LS	$18,000	$0
14	IT Support ($/mo)	0	EA	$1,000	$0
15	Planning ($/yr)	0	LS	$30,000	$0
16	Miscellaneous Expenses ($/yr)	0	LS	$10,000	$0
	Total Annual O&M				**$254,542**

All Staff is basied on total pay + benefits (transparent california) similar agencies (PID, TOP, GV, PCWA)

NET PRESENT VALUE

Capital cost	Annual O&M	PW O&M P/A, 0.3%, 20 yrs	Salvage Value	PW Salvage P/F, 0.3%, 20 yrs	Net Present Value
$52,174,145	$254,542	$4,933,953	$15,226,500	$14,341,066	$42,767,033

Paradise Sewer Project
Capital Cost Estimate
Alternative A: Skyway Route

In June 2020 dollars

Component	Deep Gravity System Factor		Amount ($)	Notes
Construction Costs:				
Base Construction Cost		$	26,248,500	
Undefined Scope	30%	$	7,874,550	Varies from 50% at planning to 5% at final design
SUBTOTAL		$	34,123,050	
Mobilization/Demobilization	0%	$	-	Zero out if included in Base Construction Unit Cost
Sales Tax	0%	$	-	Zero out if included in Base Construction Unit Cost
Contractor Profit	0%	$	-	Zero out if included in Base Construction Unit Cost
Bonds & Insurance	0%	$	-	Zero out if included in Base Construction Unit Cost
SUBTOTAL	0%	$	34,123,050	
Construction Contingency	10%	$	3,412,305	Held in reserve for construction phase (change orders, etc.)
CONSTRUCTION COST TOTAL		$	37,535,355	
Implementation (Soft) Costs:				
Project Administration	5%	$	1,876,768	
Legal Counsel/Bond Counsel	1%	$	375,354	
Planning	3%	$	1,126,061	Zero out if past the planning stage
Design	10%	$	3,753,536	7% design services, 3% survey/geotechnical
Environmental Documentation/Permitting	3%	$	1,126,061	2% CEQA, 1% permitting. Prior to construction.
ROW Acquisition	3%	$	1,126,061	Varies significantly, depending on public ROW vs. private
Construction Management	8%	$	3,002,828	Includes materials testing
Engineering Services During Construction	3%	$	1,126,061	O&M manual, record drawings, response to RFIs, etc.
Env. Monitoring/Regulatory Compliance	1%	$	375,354	During construction
Environmental Mitigation	2%	$	750,707	Payments made for mitigation
IMPLEMENTATION COST TOTAL	39%	$	14,638,788	
TOTAL CAPITAL COST		**$**	**52,174,143**	
O&M Cost (annual)		$	254,542 /yr	
O&M Cost NPV (20 yrs, 0.3%)		$	4,933,953	*assumed equivalent for staffing and labor, pump volume-power*
Salvage Value NPV (20 yrs, 0.3%)		$	14,341,066	
TOTAL NET PRESENT VALUE		$	42,768,000	*rounded*

Opinion of Probable Construction Cost - Capital

Town of Paradise

Paradise - Sewer Feasibility - Alternative B: Neal Road Route

Location		**QTY. BY**	**ESTIMATE LEVEL**
Town of Paradise Regional Pipeline		L. Edwards	**CONCEPT**
Limits		**QTY. CHCK**	**PRICED BY**
Proposed Paradise Sewer Service Area		M.Massaro	L.Edwards
BEN|EN PROJECT NO.		**AGENCY**	
19-216 TO1		Town of Paradise	10/26/2020

Item No.	Item	Estimated Quantity	Unit	Unit Price	Total	Salvage Value at 20 yrs
SEWER-Public ROW						
1	Trunk Forcemain - Dual 6 - inch, less than 10 feet depth	114,141	LF	$248	$28,307,000	$16,984,200
2	Termination structure - Flow Meter, Sampler, Odor Control	1	EA	$250,000	$250,000	$150,000
3	HDD	1,031	LF	$220	$227,000	$136,200
4	HDD mobilization and demobilization	3	EA	$50,000	$150,000	
5	HDD Jacking Pit	3	EA	$40,000	$120,000	
6	HDD Receiving Pit	3	EA	$20,000	$60,000	
7	Bore and Jack	368	LF	$900	$331,000	$198,600
8	Bore and Jack mobilization and demobilization	2	EA	$138,161	$277,000	
9	Bore and Jack Jacking Pit	2	EA	$100,481	$201,000	
10	Bore and Jack Receiving Pit	2	EA	$31,400	$63,000	
11	Regional Pump Station 0.5 - 1 MGD	2	EA	$250,000	$500,000	$300,000
12	Screening and Grit - Regional PS	1	EA	$261,500	$261,500	$156,900
13	Odor Control - Regional PS	1	EA	$50,000	$50,000	$30,000
	Subtotal	115,539	LF		$30,797,500	$17,955,900
				Estimated Construction Cost	**$30,797,500**	
				Undefined Scope (30%)	$9,239,250	
				Construction Contingency (10%)	$4,003,675	
				Estimated Construction Total	**$44,040,425**	
				Soft Costs (39%)	$17,175,770	
				Total Collection System Cost	**$61,216,195**	
				Total Collection System Salvage Value (2040)		**$17,955,900**

BENNETT ENGINEERING SERVICES ASSUMES NO RESPONSIBILITY FOR DIFFERENCES BETWEEN THESE QUANTITIES AND FINAL PAY QUANTITIES.

ANNUAL OPERATIONS AND MAINTENANCE COST - Regional Pipeline

Item No.	Item	Estimated	Unit	List Price	Total
1	~~Chico WPCP Treatment Annual O&M Charge~~	0	LS	$0	$0
2	Receptionist (Assume 1 full 1 part time employee)	0	LS	$60,000	$0
3	Accountant	0	LS	$100,000	$0
4	Operations - Collection System				
5	Operations Manager	0	LS	$130,000	$0
6	Field Crew/Utility Worker (assume 3)	2	LS	$65,000	$130,000
7	On-Site Service Tech.	0	LS	$65,000	$0
8	PS Power Requirements ($/yr)				
9	Regional PS 350 to 750 GPM	2	EA	$32,000	$64,000
10	Miscellaneous PS Repairs ($/yr)	2	LS	$10,000	$20,000
11	Annual Maintenance ($/yr)	1	LS	$50,000	$50,000
12	Septage Hauling	0	EA	$1,000	$0
13	Building Cost (assumed service district housed at City Hall)	0	LS	$18,000	$0
14	IT Support ($/mo)	0	EA	$1,000	$0
15	Planning ($/yr)	0	LS	$30,000	$0
16	Miscellaneous Expenses ($/yr)	0	LS	$10,000	$0
	Total Annual O&M				**$264,000**

All Staff is basied on total pay + benefits (transparent california) similar agencies (PID, TOP, GV, PCWA)

NET PRESENT VALUE

Capital cost	Annual O&M	PW O&M P/A, 0.3%, 20 yrs	Salvage Value	PW Salvage P/F, 0.3%, 20 yrs	Net Present Worth
$61,216,195	$264,000	$5,117,277	$17,955,900	$16,911,749	$49,421,723

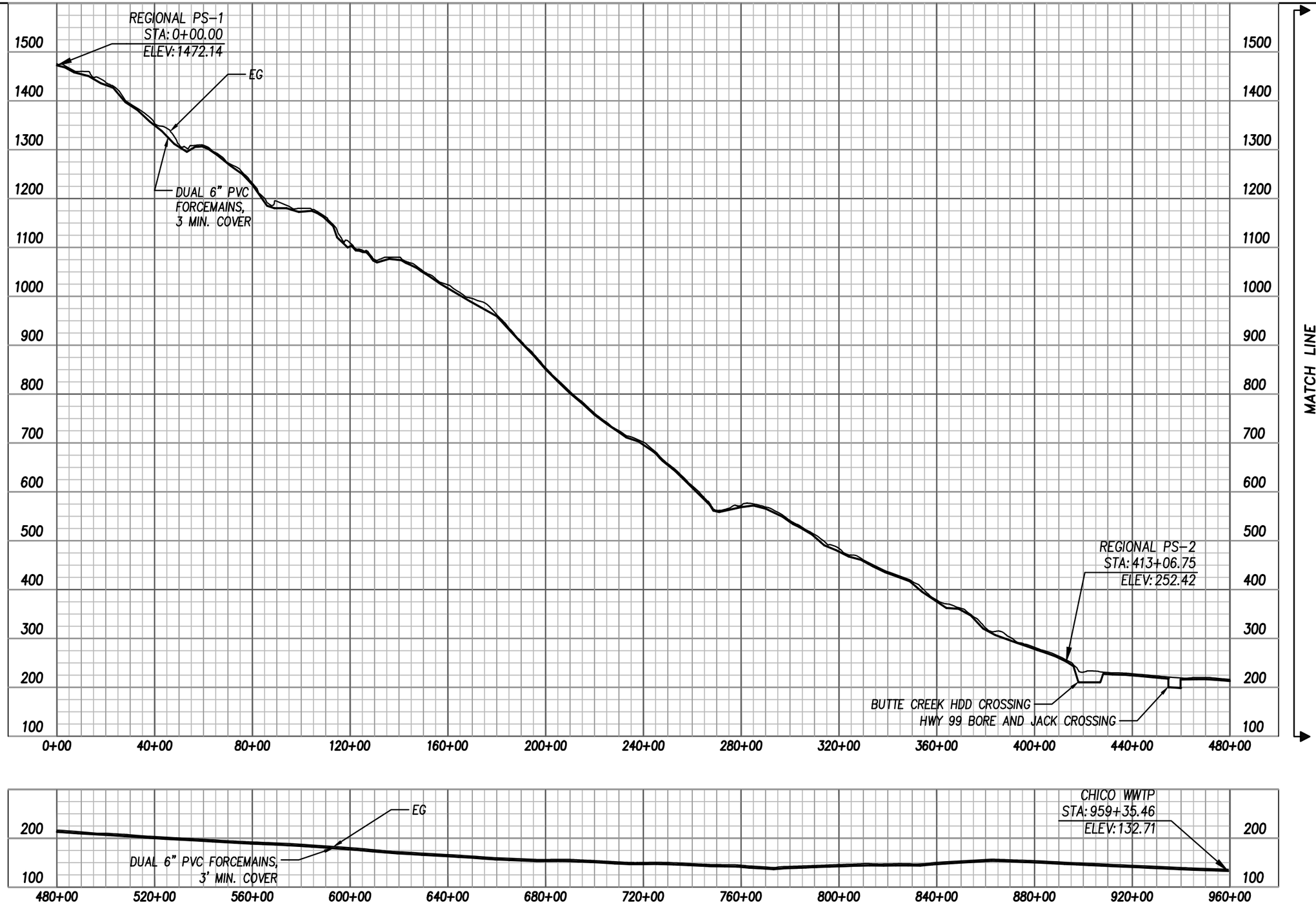
Paradise Sewer Project
Capital Cost Estimate
Alternative B: Neal Road Route

In June 2020 dollars

Component	Deep Gravity System Factor		Amount ($)		Notes
Construction Costs:					
Base Construction Cost		$	30,797,500		
Undefined Scope	30%	$	9,239,250		Varies from 50% at planning to 5% at final design
SUBTOTAL		$	40,036,750		
Mobilization/Demobilization	0%	$	-		Zero out if included in Base Construction Unit Cost
Sales Tax	0%	$	-		Zero out if included in Base Construction Unit Cost
Contractor Profit	0%	$	-		Zero out if included in Base Construction Unit Cost
Bonds & Insurance	0%	$	-		Zero out if included in Base Construction Unit Cost
SUBTOTAL	0%	$	40,036,750		
Construction Contingency	10%	$	4,003,675		Held in reserve for construction phase (change orders, etc.)
CONSTRUCTION COST TOTAL		$	44,040,425		
Implementation (Soft) Costs:					
Project Administration	5%	$	2,202,021		
Legal Counsel/Bond Counsel	1%	$	440,404		
Planning	3%	$	1,321,213		Zero out if past the planning stage
Design	10%	$	4,404,043		7% design services, 3% survey/geotechnical
Environmental Documentation/Permitting	3%	$	1,321,213		2% CEQA, 1% permitting. Prior to construction.
ROW Acquisition	3%	$	1,321,213		Varies significantly, depending on public ROW vs. private
Construction Management	8%	$	3,523,234		Includes materials testing
Engineering Services During Construction	3%	$	1,321,213		O&M manual, record drawings, response to RFIs, etc.
Env. Monitoring/Regulatory Compliance	1%	$	440,404		During construction
Environmental Mitigation	2%	$	880,809		Payments made for mitigation
IMPLEMENTATION COST TOTAL	39%	$	17,175,766		
TOTAL CAPITAL COST		**$**	**61,216,191**		
O&M Cost (annual)		$	264,000	/yr	
O&M Cost NPV (20 yrs, 0.3%)		$	5,117,277		*assumed equivalent for staffing and labor, pump volume-power*
Salvage Value NPV (20 yrs, 0.3%)		$	16,911,749		
TOTAL NET PRESENT VALUE		$	49,422,000		*rounded*

C

Pipeline Profile, Cross-Section and Trenchless Crossing Figures



NOVEMBER 2020

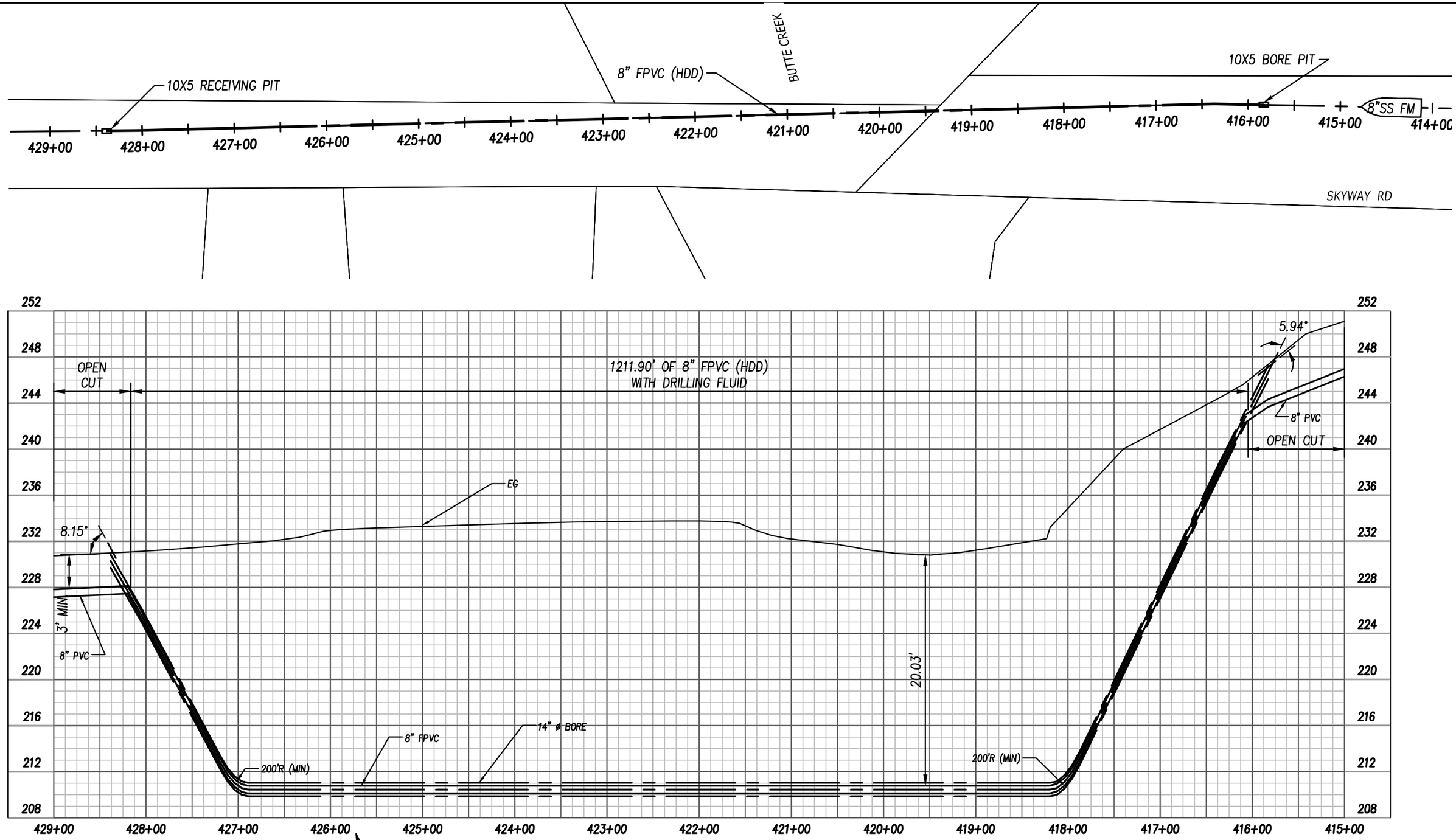
BEN|EN
TRUSTED ENGINEERING ADVISORS

SCALE: 1"=4000'

PROFILE - SKYWAY
STA 0+00 to STA 960+00
Paradise Collection System: Regional

PROJECT No. 19216

SHEET 1 OF 1



AUGUST 2020

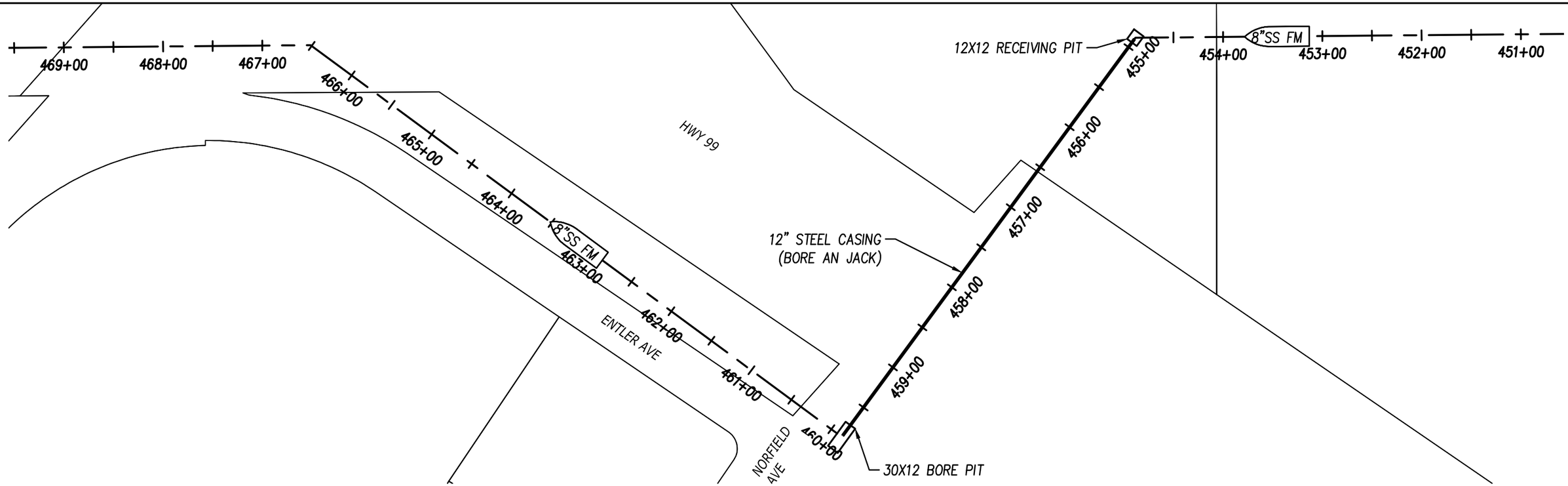
BEN|EN
TRUSTED ENGINEERING ADVISORS

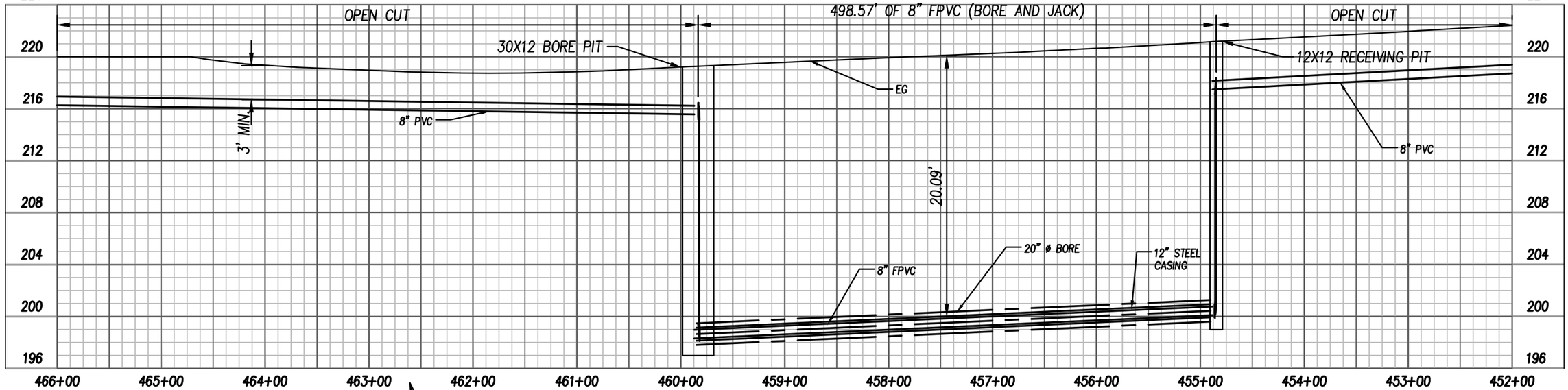
SCALE: 1"=100'

PLAN AND PROFILE BUTTE CREEK CROSSING - SKYWAY
STA 415+00 to STA 429+00

Paradise Collection System: Regional

PROJECT No. 19216





AUGUST 2020

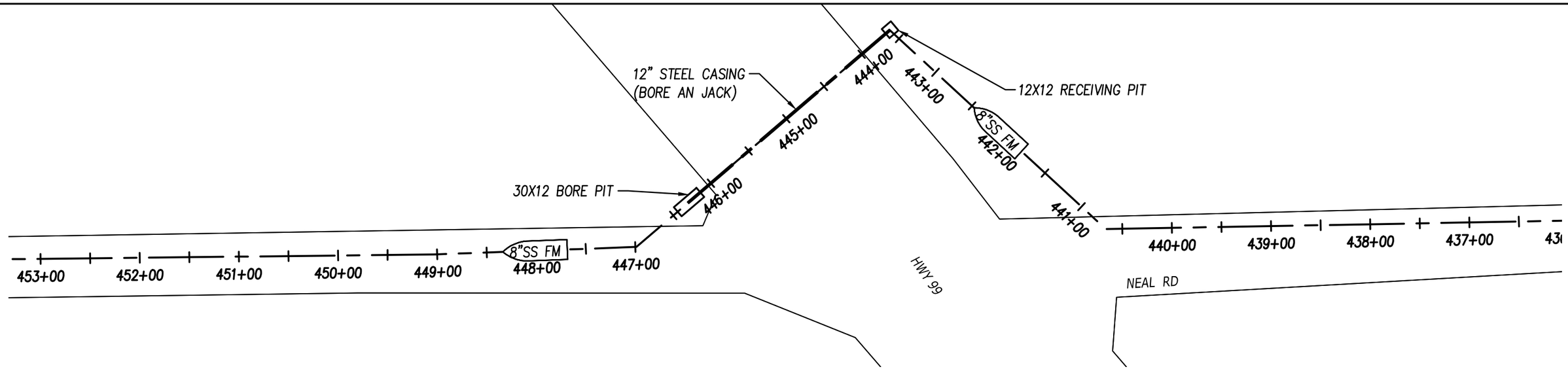
BEN|EN
TRUSTED ENGINEERING ADVISORS

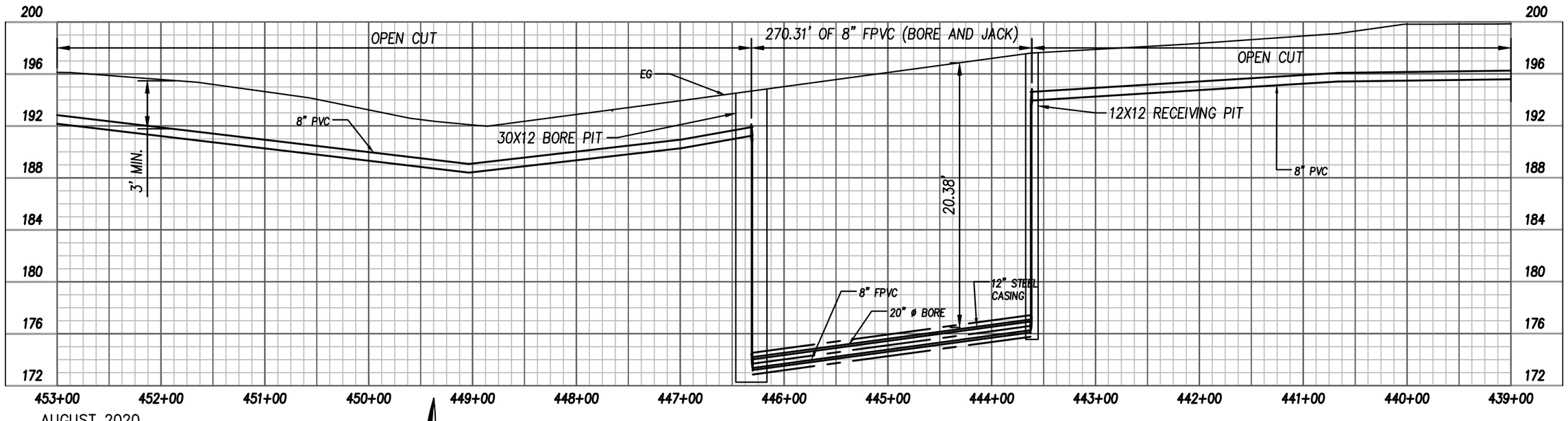
SCALE: 1"=100'

PLAN AND PROFILE HWY 99 CROSSING - SKYWAY
STA 452+00 to STA 466+00

Paradise Collection System: Regional

PROJECT No. 19216





AUGUST 2020

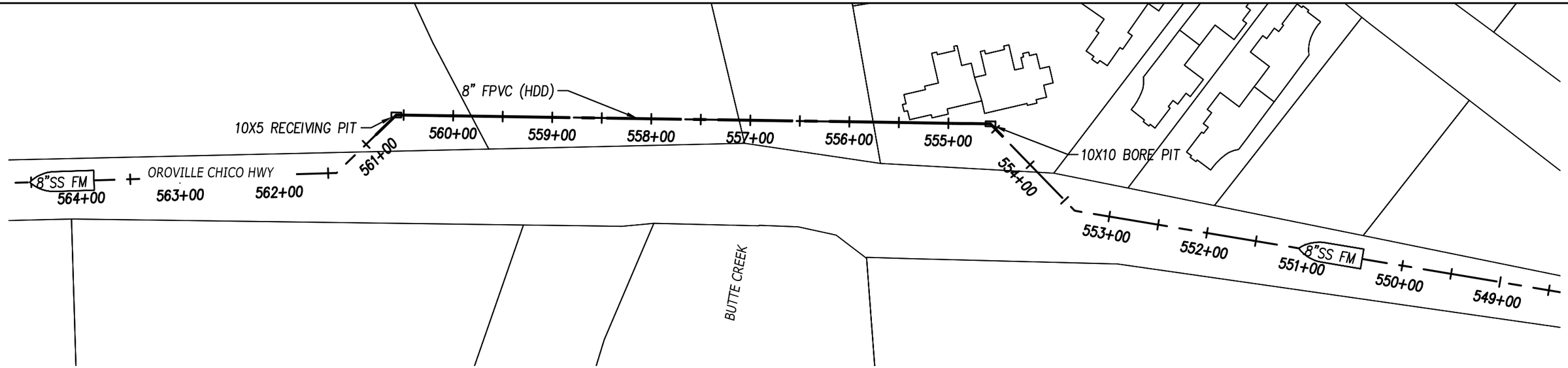
BEN|EN
TRUSTED ENGINEERING ADVISORS

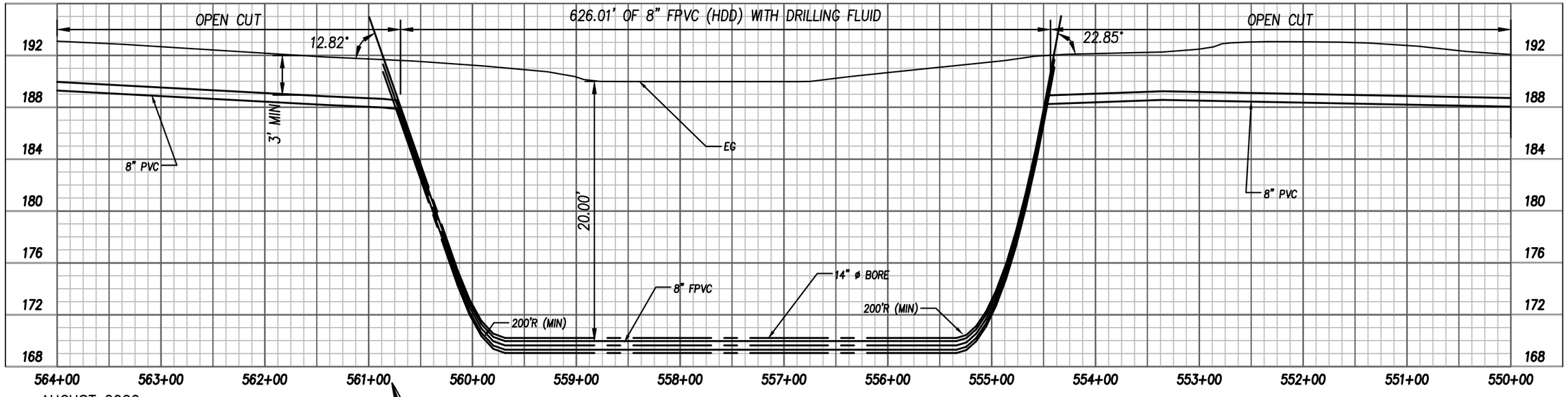
SCALE: 1"=100'

PLAN AND PROFILE HWY 99 CROSSING - NEAL RD
STA 439+00 to STA 453+00

Paradise Collection System: Regional

PROJECT No. 19216





AUGUST 2020

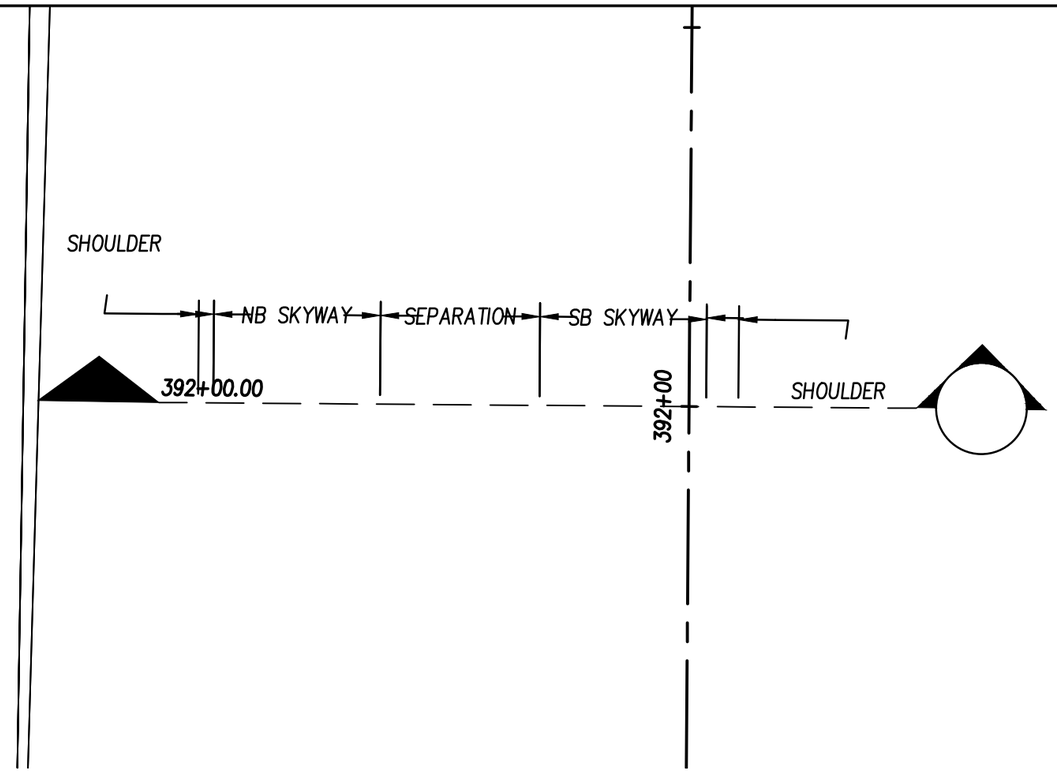
BEN|EN
TRUSTED ENGINEERING ADVISORS

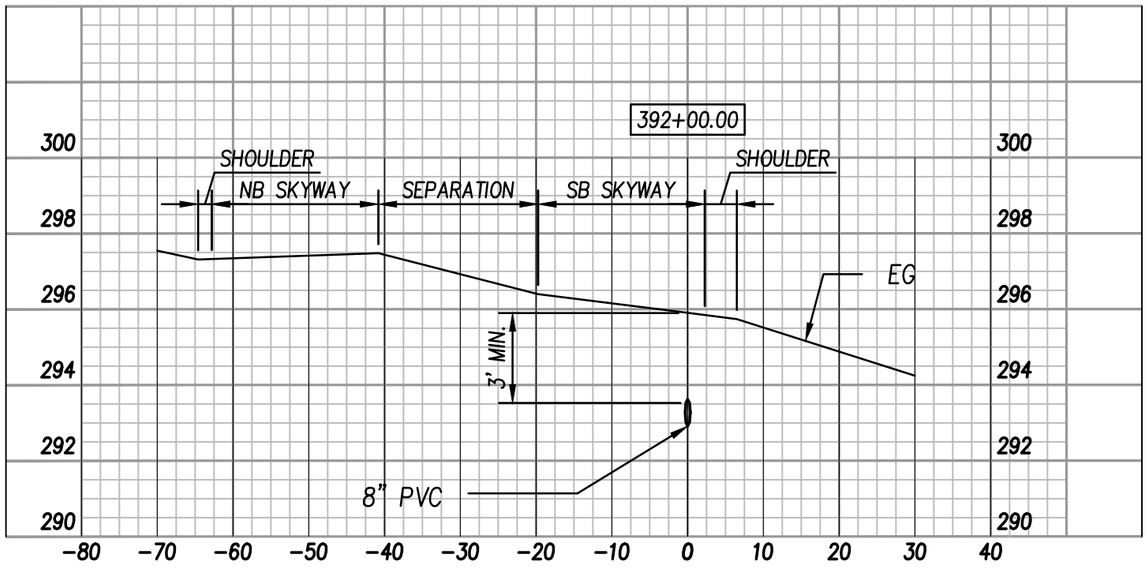
SCALE: 1"=100'

PLAN AND PROFILE BUTTE CREEK CROSSING - NEAL RD
STA 550+00 to STA 564+00

Paradise Collection System: Regional

PROJECT No. 19216





PLAN AND SECTION - SKYWAY
STA 321+50 to STA 322+50

Paradise Collection System: Regional

AUGUST 2020

BEN|EN
TRUSTED ENGINEERING ADVISORS

SCALE: 1"=20'

PROJECT No. 19216

SHEET 6 OF 6

D

OMB Circular

APPENDIX C
(Revised November 2019)

DISCOUNT RATES FOR COST-EFFECTIVENESS, LEASE PURCHASE, AND RELATED ANALYSES

Effective Dates. This appendix is updated annually. This version of the appendix is valid for calendar year 2020. A copy of the updated appendix can be obtained in electronic form through the OMB home page at https://www.whitehouse.gov/wp-content/uploads/2019/12/Appendix-C.pdf. The text of the Circular is found at https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/circulars/A94/a094.pdf, and a table of past years' rates is located at https://www.whitehouse.gov/wp-content/uploads/2019/12/discount-history.pdf. Updates of the appendix are also available upon request from OMB's Office of Economic Policy (202-395-3585).

Nominal Discount Rates. A forecast of nominal or market interest rates for calendar year 2020 based on the economic assumptions for the 2021 Budget is presented below. These nominal rates are to be used for discounting nominal flows, which are often encountered in lease-purchase analysis.

Nominal Interest Rates on Treasury Notes and Bonds of Specified Maturities (in percent)

3-Year	5-Year	7-Year	10-Year	20-Year	30-Year
1.6	1.7	1.8	2.0	2.3	2.4

Real Discount Rates. A forecast of real interest rates from which the inflation premium has been removed and based on the economic assumptions from the 2021 Budget is presented below. These real rates are to be used for discounting constant-dollar flows, as is often required in cost-effectiveness analysis.

Real Interest Rates on Treasury Notes and Bonds of Specified Maturities (in percent)

3-Year	5-Year	7-Year	10-Year	20-Year	30-Year
-0.4	-0.3	-0.2	0.0	0.3	0.4

Analyses of programs with terms different from those presented above may use a linear interpolation. For example, a four-year project can be evaluated with a rate equal to the average of the three-year and five-year rates. Programs with durations longer than 30 years may use the 30-year interest rate.