Russian River Floodplain Restoration Project

Project Description

Endangered Habitats Conservancy

February 2024

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Table of Contents

Figure Index

Table Index

Image Index

1. Background

The Russian River Floodplain Restoration Project (Project) proposes to restore a functional floodplain at a former gravel quarry of approximately 358-acres of private land along the middle reach Russian River near Windsor, CA. The natural process-based project design will improve the functions and values of the Russian River for ecological benefit, flood management, improved water quality and public enjoyment. Development of the Project to date is documented in the *Hanson Russian River Ponds Floodplain Restoration: Feasibility Study and Conceptual Design* (Feasibility Study, EHC 2016).

The Project Area is defined in the Feasibility Study and consists of the primary 358-acre Hanson Aggregates Mid-Pacific Inc. (Hanson) parcels and several adjacent privately owned parcels (Figure 1 – Project Location, Figure 2 – Project Area and Figure 3 Existing Habitat Types). The Hanson parcels comprise a former gravel quarry including four remnant gravel mining ponds on the east bank of the Russian River near the Town of Windsor. Hanson's intention is to transfer the property to Endangered Habitats Conservancy (EHC) before the end of 2023, thereby ensuring the feasibility of the habitat restoration and the opportunity for public access improvements in the future.

The Project addresses the extensive modification of the Russian River for land development, mining and flood control purposes. Gravel mining ponds excavated along now leveed and disconnected former floodplains comprise over 800-acres of floodplain through the Middle Reach of the Russian River. Once abundant, functional floodplains are rare features in the Russian River watershed today. The loss of seasonally inundated floodplains, and elimination of associated seasonal and perennial off-channel habitat features has increased the intensity of storm flows, decreased important groundwater infiltration into local aquifers, and has contributed to the decline of Russian River salmonid populations and a host of other plant and animal species, while exacerbating flooding events downstream.

Compounding the loss of floodplain habitat, the mining ponds act as biological sinks for native juvenile fish stranded after high flow events. Non-native predatory fish species thrive in the calm, warm waters of the gravel ponds, and prey on the trapped native fish. The gravel ponds also promote biogeochemical processes that cycle and accumulate metals and nutrients (e.g., mercury and phosphorous) creating water quality risks locally. Additionally, the levees and infrastructure associated with these deep gravel ponds are unstable, have low ecological value and are costly to maintain.

For off-channel mining operations, reclamation plans commonly require levees to maintain separation from the main river channel and adjacent ponds on the historical floodplain. On the Project Area, there were originally four reclamation plans approved by Permit Sonoma and the Division of Mine Reclamation (DMR) under the California Surface Mining and Reclamation Act (SMARA) for the Project Area. Only one plan remains outstanding and as of August 2022, a reclamation plan amendment was approved by Permit Sonoma and DMR. The purpose of the amendment was to reduce the reclamation area to those parts of the site that do not meet performance standards of the approved 1997 reclamation plan. The approved amended reclamation plan covers approximately 29.1 acres split between APNs 066-300-011 and -049 and outstanding reclamation items include repair of the internal levee, installation of an engineered flow control

structure between the two pits, and revegetation of the internal levee and other areas in the vicinity of the historic aggregate processing plant on the Piombo parcel.

However, the levee system is unstable and poses high risk of pit capture. Pit capture involves the re-routing of the river to flow through one or more of the gravel pits. Water quality of gravel pits is generally poor with elevated turbidity, nutrients, metals, temperature, and low dissolved oxygen. If water is released or rivers flow though these pits, river water quality will be impaired resulting in long-term detrimental impacts to federally-listed salmonids – native Coho Salmon, Chinook Salmon, and steelhead. Pit capture would also result in highly altered instream habitat conditions that are favorable to non-native predatory fish. The Project proposes to make the site more resilient to high flow events and eliminate risks of pit capture by eliminating the ponds, levees, and internal mine drainage infrastructure altogether.

The Project seeks to improve geological, hydrological and ecological outcomes, as well as provide public access benefits that are incidental to the primary Project outcomes and replace existing unregulated and undesigned public access to the site with amenities that are well-engineered and largely outside the floodplain and along the perimeter restoration areas.

If successful, the Project would help guide similar efforts to ecologically restore gravel mining pits elsewhere along the Russian River and throughout the state. In order to restore the Russian River floodplain, the Project proposes to fill the mining ponds and remove internal levees, roads and mining infrastructure. The floodplain would be reconfigured to reestablish the natural floodplain topography and function.

2. Purpose, Need, and Project Overview

The primary purpose of the Project is to re-establish functional riparian floodplain and thereby enhance the Russian River's native ecosystems and contribute to the recovery of three federally and/or state listed (and once abundant) salmonids: Coho, Chinook and steelhead. The Project would restore seasonal wetland floodplain ecotones, floodplain connectivity, and the riparian corridor, providing valuable habitat for fish and wildlife. Floodplain restoration increases the floodplain volume, attenuates high flow events, and improves groundwater recharge and water quality. Heavily vegetated floodplains would reduce Russian River streamflow velocities and peak flood water surface elevations.

The Project would enhance connectivity between the river and floodplain restoring riverine processes to benefit a variety of native aquatic and terrestrial species. The restoration design fills the four existing mining ponds by redistributing onsite material. Removal of the ponds would eliminate existing processes that accumulate metals and nutrients, which threaten water quality. The existing levees and infrastructure surrounding the ponds are unstable, of low value ecologically and are costly to maintain. Via grading and revegetation, a broad seasonally inundated self-sustaining river floodplain would be restored. Public access opportunities via a high eastern river-bank terrace would be retained.

Removing the riverbank levee would restore the historic seasonal connection between the river and its floodplain. Earthwork, re-establishment of native vegetation communities, and improved dynamic river processes would restore habitats that meet the life history requirements and promote the

genetic diversity of federally listed anadromous fish species. Other at-risk species that would likely benefit from the restoration are native Russian River Tule Perch, Western Pond Turtle, Foothill Yellow-legged Frog, migrating waterfowl and songbirds, and other avian, botanic, aquatic and herpetological floodplain and riparian-dependent native species.

The 30% civil and riparian designs are based on the Feasibility Study design and incorporate floodplain channels intended to enhance river floodplain connectivity, support floodplain conveyance and flood recession, and promote natural fluvial processes (GHD 2021, Figure 4 – Proposed Floodplain Design). Floodplain grading and revegetation provide seasonally appropriate hydraulic connections and would support habitat for multiple life history stages of juvenile salmonids. The integration of the off-channel habitats, seasonally inundated floodplain wetlands and native riparian vegetation communities would begin to reverse the prevalent loss of critical ecosystems in the Russian River Basin. The Project would provide numerous ecological services including water quality enhancement, aquifer recharge, nutrient and fine sediment processing, flood attenuation, and provision of habitat for native flora and fauna as an integral component of the greater Russian River ecosystem.

Additionally, the Project creates the opportunity for ancillary public access amenities that are compatible with the floodplain restoration. Proposed public access will be well regulated and incorporates recreational and educational opportunities designed in coordination with Sonoma County Regional Parks (GHD 2022). Amenities would include, but are not limited to parking, picnic areas, a small craft boat launch and boat-in campground facilities. These amenities replace illegal and unregulated trespassing, camping, fishing and hunting, and off-road vehicle use.

In addition to ecological benefits achieved by restoring the floodplain, the Project would also result in additional benefits related to wildlife-dependent public access and education, including:

- Provide a new point for fishing access by improving non-motorized, low-impact boating access for fishing and other wildlife dependent access;
- Provide a signed restroom for boaters midway between Healdsburg and Forestville, thereby reducing environmental pollution from recreational use;
- Facilitate environmental education as a study site by public schools, colleges, and universities;
- Manage the currently unmanaged land, which will reduce trespass grows, vandalism, off-road vehicle intrusions, fishing without a license, facilitate responsible use, and support access for enforcement; and
- Interpretive signage will educate, inspire, and provide information on rules and habitat sensitivities.

3. Project Location and Land Use

The Project is located within the Middle Reach of the Russian River, west of the Town of Windsor, Sonoma County, California. The Project site is on the east bank of the Russian River, between the confluences of Dry Creek (north) and Mark West Creek (south). The four ponds are located within

the 358-acre Hanson Aggregates parcels. Access to the site is via Eastside Road. The Project is located within the 100-year FEMA floodplain and floodway (Figure 5 – FEMA Special Flood Hazard Zones).

3.1 Land Use, Zoning, Easements, and Utilities

Land use is dominated by the four former gravel ponds owned by Hanson (now Martin Marietta). The Project Area includes the Hanson property plus portions of adjacent properties owned by severalprivate landowners.. Landowners within the established grading limit are summarized by assessor parcel number (APN) in Table 3.1 (Figure 6 – Williamson Act Properties). Additional APNs adjacent to but outside the project boundary are under the ownership of Syar Industries, Inc., Ledbetter Farms, Inc., Town of Windsor, Windsor Water District, Jackson Family Investments III LLC, and Ferrari Carano Vineyard & Winery, LLC. Existing easements are summarized in

Table 3.2 and included in the design plan sheets (GHD 2021).

The General Plan land use and base zoning of all parcels within the Project boundary are Land Intensive Agricultural (LIA). Additional zoning designations within the Project boundary include combining districts for Floodway (F), Mineral Resources (MR), Riparian Corridor (RC), and Valley Oak Habitat (VOH).

The Project proposes to remove the MR combining zone from all project parcels that currently have this MR combining district zoning. The Project also proposes to change General Plan land use and base zoning from LIA to LEA for APNs 066-300-011, 110-110-016, and 110-110-015 to allow development and operation of a small public campground. Change in General Plan land use will require a General Plan amendment.

The Project is not located near any sensitive land uses, such as residences, hospitals, or schools. There are no utilities located within the grading boundary.

Table 3.1 Land Ownership and Zoning

Assessor Parcel Number	Landowner	Existing Zoning	Zoning Change
066-290-042-000	Passalacqua, Thomas R TR	LIA B6 60, F1 RC200/100	No change
066-290-043-000	Passalacqua, Thomas R TR	LIA B6 60, F1 RC200/100	No change
066-290-044-000	Calplan River Vineyard II	LIA B6 60 Z, F1 F2 RC200/100 SR VOH	No change
110-120-030-000	G3 Enterprises	LIA B6 60, F1 RC200/100	No change
110-120-028-000	Syar Industries Inc	LIA B6 60, F1 RC200/100	No change
110-120-022-000	Syar Industries Inc	LIA B6 40, F1 RC200/100 VOH	No change
110-120-023-000	Syar Industries Inc	LIA B6 60, F1 RC200/100	No change
110-110-018-000	Syar Industries Inc	LIA B6 60, F1 RC200/100 VOH	No change

Assessor Parcel Number	Landowner	Existing Zoning	Zoning Change
110-110-020-000	Syar Industries Inc	LIA B6 60, F1 RC200/100	No change
110-160-011-000	Estate Vineyards LLC	LIA B6 60, F1 RC200/100	No change
110-160-016-000	Estate Vineyards LLC	LIA B6 60 Z, F1 F2 HD RC50/25 RC200/100 SR VOH	No change
066-290-050-000	Hanson Aggregates Mid-Pacific, Inc.	LIA B6 60, F1 F2 VOH	No change
066-290-049-000	Hanson Aggregates Mid-Pacific, Inc.	LIA B6 60 Z, F1 F2 MR RC200/100 VOH	Remove MR
066-290-052-000	Hanson Aggregates Mid-Pacific, Inc.	LIA B6 60, F1 F2 RC200/100 VOH	No change
*** 066-290-053-000	Jackson Family Investments III LLC	LIA B6 60, F2 VOH	No change
066-300-027-000	Hanson Aggregates Mid-Pacific, Inc.	LIA B6 60, F1 F2 MR RC200/100 VOH	Remove MR
066-300-049-000	Hanson Aggregates Mid-Pacific, Inc.	LIA B6 60, F1 F2 MR RC200/100 VOH	Remove MR
066-300-011-000	Hanson Aggregates Mid-Pacific, Inc.	LIA B6 60, F1 F2 MR RC200/100 VOH	Change base zoning to LEA. Remove MR.
110-110-016-000	Hanson Aggregates Mid-Pacific, Inc.	LIA B6 60, F1 MR RC200/100 VOH	Change base zoning to LEA. Remove MR.
110-110-015-000	Hanson Aggregates Mid-Pacific, Inc.	LIA B6 40, F1 RC200/100	Change base zoning to LEA.

*** Parcel not bisected by restoration grading. Parcel may be used for site access.

Table 3.2 Summary of Existing Easements within Project Area

Easement	Location
30 feet access and utility easement to Vimark, Inc.	Between Eastside Road and Vimark Pond
Agricultural purpose easement to Jordan	Off Eastside Road, between Richardson Pond and Piombo Pond
Agricultural access easement to FRE (Jackson Family Wines)	Off Eastside Road, between Richardson Pond and Piombo Pond
Water access and utility easement to FRE (Jackson Family Wines)	Richardson Pond
Open space easement to County of Sonoma	Covers Vimark Pond, APN 066-290-049
Waterline and surface right of way to the Windsor Water District	Northeast corner of project boundary, east of Mariani Pond.

3.2 Williamson Act Consistency

Within the Project boundary, agricultural areas (e.g., vineyards) located between the ponds and Eastside Road are considered prime agricultural land and enrolled in Williamson Act contracts. Properties within the project boundary that are enrolled in the Williamson Act are shown in Figure 6 – Williamson Act Properties. Approximately 11.3 acres of Williamson Act property is located within the grading boundary (construction footprint). However, none of the Williamson Act property that would be affected by construction is currently under agricultural production. Instead, Williamson Act property within the grading boundary is entirely riparian and not cultivated (Table 3.3). The affected 1.8 acres on APN 110-160-011 and 8.7 acres on APN 110-120-022 are riparian areas immediately adjacent to the Russian River.

Table 3.3 Summary of Williamson Act Properties Intersected by the Project Grading1

APN and Landowner	Total APN acreage	Area of APN within Grading Boundary (acres)	Percent of APN within Grading Boundary (%)	Area of Affected Agricultural Production (acres)
066-290-044 Caplin River Vineyard II	78.5	0.8	1.0%	0
110-160-016 Estate Vineyards LLC	50.4	1.8	3.5%	0
110-160-011 Estate Vineyards LLC	25.3	8.7	34.4%	0
Total		**11.3**		**0**

Notes: [1]Public access may also modestly involve APNs 066-300-054 and 066-290-053, which are enrolled in the Williamson Act. Impacts to both parcels, if any, are not expected to exceed 0.1 acres.

4. Existing Conditions

The grading area is currently dominated by the four existing mining ponds and surrounding levees (see Figure 2 – Project Area). The grading area is bound on the west by the Russian River.

4.1 Existing Topography

Riverine topography shows an incised channel and steepened banks. The river is separated from the floodplain by constructed but unreinforced levees surrounding the ponds and a riparian berm adjacent to the river channel. The riverbed in the Middle Reach of the Russian River has continued to incise since it was channelized in the 1950s, although the localized deep dredge ponds have partially filled.

Gravel removal has included periodic bar skimming which in recent times has been approved by regulatory agencies. Topographic analysis of historical maps indicates the channel thalweg is

progressively deepening, and bank erosion due to the collapse of high steep banks, is increasing in frequency. In the Project Area, only a narrow earthen levee separates the river channel from the ponds. The eastern riverbank is comprised primarily of trees and steep banks. Less than 1,000 linear feet of the bank is currently reinforced with rock to provide added stability where overbank floodwaters currently return to the main river channel.

The existing riparian berm serves as a levee, maintaining separation between the river and the four ponds. Riparian vegetation, primarily mature walnut trees, exists parallel to the channel in a strata of compacted native material. The elevation of the riparian berm varies but is approximately 24 to 26 feet higher than the adjoining channel thalweg. An approximately 20-acre former processing and equipment area at the northern edge of the Project Area has highly compacted soils and remains denuded of riparian vegetation. The area is highly impacted by former and current anthropogenic use.

Riverbank erosion is ongoing in the Project Area. Stabilization and maintenance of riverbanks is required to maintain separation between the ponds and the river channel. Re-connecting a seasonally inundated floodplain would abate channel incision in the Project reach, and reduce risks associated with bank failure, levee breaching, pit capture, and discharge of pond water and sediments.

4.1.1 Hanson Ponds Topography and Bathymetry

The Project Area encompasses four ponds, Mariani, Piombo, Richardson and Vimark, ranging in size from approximately 20 to 84 acres. Key bathymetry attributes for each of the four ponds are summarized in Table 4.1. Ponds and surrounding levees and surfaces range in elevation from approximately 20 feet to 30 feet.

Table 4.1 Existing Dimension of the Hanson Ponds (From EHC 2016)

Pond	Ave. Depth (feet)	Max Depth (feet)	Lowest Pond Bottom Elevation (feet NAVD88)	Adjacent Approximate River Thalweg Elevation (feet NAVD88)	Measured Area (acres)
Mariani	13.4	38.2	6.34	43	19.6
Piombo	21.2	35.3	9.36	43	19.8
Richardson	17.3	37.1	14.65	41	83.8
Vimark	17.8	42.7	-0.5	40	25.1

4.2 Existing Vegetation

Existing plant communities were mapped by H.T. Harvey (2020), and shown in Figure 3 – Existing Habitat Types. The area between the ponds and the adjoining reach of the Russian River, the largest of the mapped vegetation types, was mapped as a Walnut-Dominated Riparian Forest. The levees surrounding the ponds were predominantly mapped as Coyote Brush Scrub with islands of Fremont Cottonwood Forest. Smaller areas of Smartweed-cocklebur Patches, Valley Oak Woodland, and Water Primrose Wetland (invasive, non-native) were also mapped (H.T. Harvey 2020).

The plant communities at the Project site have been significantly altered by agriculture followed by gravel mining. Approximately 135 acres of the site is open water (deep stratified water associated with the four ponds), with another 80.9 acres of disturbed shrub/grassland dominated by non-native species. Despite the disturbed nature of the site, there are roughly 96 acres of developing riparian forest on the western edge of the property along the river channel.

Riparian forest on the levees and areas between the ponds and river, and on some of the levees between the ponds, is predominantly cottonwood (*Populous fremontii*), California black walnut (*Juglans californica*), and coyote brush (*Baccharis pilularis*), with dense stands of invasive giant reed (*Arundo donax*) and some Eucalyptus spp. Prior reclamation efforts and natural recruitment have created a fringe of native willow species *(Salix spp*.) surrounding all four ponds on the relatively steep levee slopes just above the water surface elevation. Reclamation efforts around two of the four ponds have resulted in the higher elevations of the pond levees to be revegetated with coyote brush (*Baccharis pilularis*) and young oaks (*Quercus spp.).* Invasive Himalayan blackberry (*Rubus armeniacus and/or Rubus discolor*) generally separates the tops of the pond levees from the adjacent vineyards to the south and east. The Richardson Pond, as the most frequently inundated of the four ponds, includes a fringe of invasive floating aquatic vegetation, *Ludwigia spp.*

Special Status Plants

Special status plant species with a moderate to high likelihood to occur at or near the Project are summarized in Table 4.2. To ensure construction-related impacts would be less than significant, avoidance and minimization measures for these species are included in the 30% Basis of Design Report (GHD 2021).

Table 4.2 Special Status Plants

Species	Likelihood to Occur
Baker's navarretia (*Navarretia leucocephala*)	Moderate potential
Many-flowered navarretia (*Navarretia leucocephala ssp. plieantha)*	Moderate potential
Burke's goldfields (*Lasthenia burkei*)	Moderate potential
Marsh scorzonella (*Microseris paludosa)*	Moderate potential
congested-headed hayfield tarplant (*Hemizonia congesta ssp. congesta*)	Moderate Potential
short-leaved evax (*Hesperevax sparsiflora var. brevifolia*)	Moderate Potential
Sebastopol meadowfoam (*Limnanthes vinculans*)	Moderate Potential

Invasive Plant Species

Invasive plants are major stressors on the ecosystem processes, habitats, and species that are the focus of restoring the Hanson Ponds (H.T. Harvey 2020). Predominant upland and aquatic invasive plant species present are smartweed-cocklebur patches and water primrose (H.T. Harvey 2019). Smartweed-cocklebur patches are located along the western edge of the Richardson Pond levee. Water primrose was mapped along the edges of all four ponds (H.T. Harvey 2019). Giant reed and Himalayan blackberry are also present (H.T. Harvey 2020).

4.3 Town of Windsor Groundwater Wells

Existing nearby infrastructure located outside of but near the Project Area includes the Town of Windsor's municipal supply wells #7 through #85, which supply 85% of the potable supply to the Town of Windsor. The wells are located in a row extending north from the west end of Fontana Road (Figure 2). They are located 1,000 to 1,530 feet north of Piombo Pond and 1,000 to 1,150 feet northwest.

4.4 Existing Public Access

Under existing conditions, there is no legal public access to the Project Area. It is regularly accessed illegally from the river bar and the network of informal roadways and trails visible on Google Earth. This roadway and trail network totals approximately 24,870 linear feet (4.7 miles). An informal riparian trail extends onto the Project Area from the downstream Riverfront Regional Park. Private gravel roads are also accessed illegally from Eastside Road, Richardson Road, and Fontana Road. It is presently difficult to monitor and curtail illicit overnight camping on the Project Area.

Presently, the Project Area is illegally accessed by approximately eight to ten people each day. Many trespassers seek to fish for bass in the ponds, sometimes from boats they have carried in, from the shore. Vehicles presently illegally access the Project Area from the south for unsanctioned camping, off-road vehicle use, weekend bonfires, and theft of California black walnut trees. Boaters on the Russian River also illegally camp within the Project Area. At least four wildfires caused by trespassers have occurred in the Project Area since 2020, requiring emergency services from local fire departments and CalFire. Three illegal cannabis grows have been removed in the last four years.

Barriers have been placed by Russian Riverkeeper to prevent illegal vehicle access but have been quickly removed by trespassers.

5. Proposed Project Elements

5.1 Overview of Project Elements

The project design would re-grade on-site earth materials to restore a floodplain across the approximate 358-acre Project Area (Figure 4 – Proposed Floodplain Design). The process-based project design would improve the functions and values of the Russian River for ecological improvement, groundwater infiltration, flood attenuation and public enjoyment. By restoring the floodplain, the design would promote habitat-forming fluvial processes, such as sediment deposition and sorting. These processes in turn will increase floodplain complexity, benefiting a variety of species, including native salmonid populations. Project elements, as described in this section, reflect the Feasibility Study (EHC, 2016) design and are detailed in the 30% Basis of Design Report and associated 30% design plans (GHD 2021).

5.1.1 Description of Project Limits

The Project boundary extends to the eastern limit of the Hanson Aggregate's property, Fontana Road to the north, and the southern boundary of APN 066-290-043 (Passalacqua), south of the

Vimark Pond (Figure 2). The western project boundary consists primarily of the Russian River channel. Within the project boundary, grading limits encompass the riparian corridor between the Russian River, the four ponds, and the levees surrounding each pond. The agricultural properties located east of the four ponds are excluded from the grading limits (see Figure 6 – Williamson Act Properties).

Beyond the Project boundary, the area of influence includes the Russian River upstream and downstream of the Project Area. Restoring riverbed sediment deposition processes would occur gradually and without predicted adverse consequences for channel stability upstream or downstream from the project. Implementation of the design would not increase the flood elevation; all model runs as documented in the Feasibility Study showed a decrease in water surface elevations above and below the Project Area at all modeled streamflows. The mainstem channel immediately upstream and downstream of the Project Area could experience minor geomorphic adjustment. Modeling predicts that gravel would deposit in the upstream area of the project where the river flows onto the new floodplain, be re-worked by subsequent flows, and potentially form a large, clean gravel deposit.

The Project will improve surface water quality upstream and downstream of the Project Area by removing conditions that promote mercury methylation and the transport of methylated mercury into the groundwater and ultimately the surface water, and by providing a floodplain where high sediment loads can be deposited at lower velocities.

5.2 Riparian Corridor Floodplain Restoration

5.2.1 Floodplain Restoration

Topographic and riparian design elements include: (1) filling the four ponds and re-grading the Project Area to restore a broad floodplain (2) constructing side channels with perennial alcoves connected to existing deep river pools (3) replace an existing water supply use from the terrace pits with a small pond to be located at the northeast corner of Richardson Pond, and (4) revegetation. In addition, existing infrastructure used to access the Project Area would be replaced with modest amenities that would be used for public access and long-term Project monitoring and management. These amenities would be incidental to the overall Project purpose of ecological restoration of a functioning floodplain of the Russian River.

Floodplain Restoration

As the four ponds are filled, the restored floodplain would be graded at gradual slopes likely not exceeding 5 (horizontal):1 (vertical) to match grades in the upstream and downstream terrain. In the upstream to downstream direction, slope across the broad floodplain would primarily vary from 0.3 to 0.1 percent paralleling the thalweg of the adjoining Russian River. An elevated riparian terrace (riparian levee) along the bank of the Russian River would largely remain, although it would be lowered in some locations, predominantly at the upper and lower ends of the Project Area, to improve floodplain connectivity. Grading along the riparian terrace would result in some loss of existing walnut-dominated riparian forest, while creating a net increase in overall riparian forested area.

Existing levees surrounding the ponds would be lowered and tied into the floodplain. As an exception, the levees to the east of Vimark, Richardson, and Mariani ponds would remain, although grading would change the western slope gradient. The lowered active floodplain surface would be located between the riverine terrace and the eastern levee, creating an overland flow path between the two higher elevation surfaces.

The Project would also include large wood placement, and large wood habitat structures to enhance floodplain ecological function. Large riparian trees lost to accommodate grading will be repurposed on-site as large wood for habitat purposes. Public Access amenities are modest and located largely outside of the restoration area proper and are compatible with floodplain restoration design.

5.2.2 Floodplain Channels

Two floodplain channels (4,850 feet total) would be constructed within the regraded broad floodplain surface. In normal and low flow conditions, the two channels would have direct mainstem connectivity at the downstream end only and would be inundated by backwater flows. Flow inputs from the upstream end would be limited to hyporheic flow, seasonal groundwater connectivity, and high flows that result in floodplain activation. Compared to a typical side channel, the channel area is relatively large in order to concentrate floodplain conveyance and promote natural formation of alluvial micro-topography. These floodplain channels have an approximate width of 100 feet, and slope gently to depths of between five and ten feet. During larger bed-mobilizing flows, natural processes would shape evolving geomorphic features such as channel width, meander wavelength, bar configuration, and small islands. Floodplain channels would include perennial alcoves that could provide habitat connectivity to existing deep river pools and would include large wood placement.

5.2.3 Water Supply Pond and Retention of Water Right

An approximate 5-acre (45-acre-foot) water supply pond would be retained at the northeast corner of Richardson Pond to maintain Jackson Family Wines' existing access and water rights that support their adjacent vineyard. The water right is used for both irrigation and frost protection. The retained portion of the pond will accommodate Jackson's existing pump intakes that currently draft water from Richardson Pond so no modification to diversion infrastructure will be necessary. The residual pond will have a depth of roughly 15 feet with earthen embankments. Consistent with the existing conditions, the residual pond will not be lined and the water level of the pond will be controlled by water table elevations of the adjacent alluvial aquifer system. Embankment height will not trigger additional seismic concerns or Division of Safety of Dams (DSOD) jurisdiction. Additional refinements to the residual pond's geometry may be considered in the future, in consultation with Jackson Family Wines.

5.2.4 On-Site Infrastructure

Existing on-site water related infrastructure includes culverts, wells, piping, and pond-related drainage structures. On-site infrastructure that conflicts with the design or would no longer be necessary as a result of pond filling would be removed. Infrastructure to be removed includes:

- An abandoned water pipe at the southeast corner of Piombo Pond
- The riprap spillways at the southwest corner of Piombo Pond, north edge of Richardson Pond, and the eastern edge of Richardson Pond (rip rap would be salvaged for re-use)

- The concrete spillway south of Vimark Pond

Existing on-site water related infrastructure to remain in place, or potentially be modified includes:

- A drainage ditch and associated culverts along Fontana Road
- A well on the eastern edge of Mariani Pond
- The Jackson Family Wines existing irrigation diversion (pump) at the northeast corner of Richardson Pond

5.3 Proposed Habitats

As part of the 30% revegetation design (H.T. Harvey 2020 and GHD 2021), existing habitats were mapped and compared with anticipated future habitats (Figure 3 – Existing Habitat Types and Figure 7 – Restored Vegetative Conditions). Table 5.1 presents a summary of existing and proposed habitat types. These acreages include only areas below the 100-year floodplain.

Under existing conditions, and with the exception of the riparian corridor, habitats are low functioning and support invasive fish and aquatic plant species. Existing habitats are largely disassociated with floodplain function and the riverine ecosystem. Following construction, restored habitats would better provide for native species and integrate with floodplain function and adjacent riverine habitat.

Project implementation will eliminate three acres of low-quality aquatic backwater pool and channel habitat associated with the ponds and supportive of predatory non-native fish species and invasive water primrose, and be replaced with ten acres of riverine aquatic backwater pool and channel habitat via the channel analog features. Decreases in disturbed shrub/grassland habitat would be replaced with significant increases of seasonal wet meadow habitat. Existing poor-quality freshwater marsh habitat associated with the mining ponds would decrease as a result of project implementation, resulting in five acres of restored, functioning freshwater marsh following construction. The 135-acre open water footprint of the ponds would largely balance into increases of seasonal wet meadow and riparian forest habitats. Riparian forest habitat would increase from 112 acres to 135 acres (22-acre increase), while seasonal wet meadow would increase from four acres to 150 acres (146-acre increase). The footprint of riparian scrub habitat would remain unchanged at 42 acres. The resulting five acres of open water habitat is attributable to the water supply pond. Disturbed shrub/grassland and developed areas will decrease from 48 acres to 11 acres (37-acre decrease). Remaining developed areas will cover about 3% of the site and are largely for site access and maintenance and public access enhancements, including the perimeter multi-use trail and site access road, parking areas, and boat-in campground.

Table 5.1 Existing and Proposed Habitat Types (H.T. Harvey 2020 and GHD 2021)

Regulated Habitat Type	Existing Area (Acres)	Restored Area (Acres)	Change in Habitat (Acres)
Aquatic backwater pool and channel	3[1]	10	7
Disturbed shrub/grassland/developed	48	11	-37
Freshwater marsh	14	5	-9
Open water	135	5	-130

Regulated Habitat Type	Existing Area (Acres)	Restored Area (Acres)	Change in Habitat (Acres)
Riparian forest	112	134	22
Riparian scrub	42	42	0
Seasonal wet meadow	4	150	146
Total	**357[2]**	**357**	**0**

Notes:

[1] Existing aquatic backwater pool and channel habitat is associated with the ponds only and is not riverine habitat.

[2] Total project acres differ slightly from the overall Project Area of 358 acres, as only the footprint within the 100-year FEMA floodplain was considered during analysis.

5.4 Public Access Design

Public access amenities are incidental to restoration goals and objectives of the Project. Formalization of public use through trails and a small campground would curtail the illicit use currently experienced at the site, which results in vandalism, litter, increased fire risk, potential for poaching, and risk to riparian habitat. Environmental benefits achieved by public access amenities include decreased environmental degradation, decreased disturbances from unregulated anthropogenic activity, and decreased fire-related effects on vegetation communities. Formalized public access would also improve water quality and aquatic habitat conditions by reducing erosion, litter, illegal dumping, and pathogens from anthropogenic sources. The applicant expects to donate the property to Sonoma County Regional Parks after floodplain restoration is complete; alternatively, another public agency or non-profit could serve as the operator of the public park.

Following construction, public access amenities would be developed into a public park and trail facility. See attached Public Access Plans that depict and detail public access elements. These amenities are limited in scope and incidental to the overall ecological restoration. They also replace and reduce existing unregulated public access to the project area. The public access design would be integrated into the overall restoration design to ensure compatibility with planned restoration elements, final grading, and revegetation. Operational considerations, such as periods of use, are discussed in Section 10. The public access design integrates a number of considerations to disperse use and ensure rule compliance to maximize ecological restoration and protection, including:

- The south and north day use parking areas (see below) will be set back approximately half a mile from the river, thus reducing intensity of the day use at the river area;
- The multi-use trail will be set furthest from the river near the eastern Project boundary to separate exercise-oriented trail users from river-dependent users. The access road and trail are on the perimeter of the project site farthest from the river and leaves 95% of the Project Area as unfragmented habitat;
- The multi-use trail will serve operation and maintenance access for restoration monitoring, invasive species removal, visitor rule enforcement, trash removal from the river, and emergency purposes;
- Seasonal, tent only, low-impact overnight camping primarily for paddlers will include on-site camp hosts to ensure rule enforcement and education; and
- Garbage and waste collectors will be provided.

There are currently no legal trails within the Project Area that are open to the public. There are existing unmanaged trails and existing unimproved private roadways for access to the mining site and ponds on the floodplain and levee tops, as well as a large flat area in the northwest corner of the Project Area where gravel processing equipment and parking was located when mining was active. With the removal of levees and filing of ponds, existing unimproved roads and trails would be removed.

Roadways within the Project Area currently bisect the site and fragment existing habitat. Existing internal roads and trails would be replaced with the proposed developed trails that are largely along the Project perimeter. The Project includes approximately 12,000 linear feet of multi-use trail, 4,000 linear feet of seasonal trail, and 1,000 linear feet of boat portage trail, which is less than the 24,700 linear feet of existing internal roadways and trails.

The seasonal boat-in campground would be located in the former 20-acre aggregate processing area at the northern edge of the Project Area, which is currently highly disturbed and denuded of vegetation due its former use for gravel processing and current use by off road vehicles. The seasonal campground would be approximately 2 acres in size, and the remaining 18 acres of the aggregate processing area would be restored.

The Project will replace existing parking and regulate parking with the north and south day use parking areas, discussed below.

5.4.1 South Day Use Parking Area

The south day-use parking area would include 25 standard parking stalls, two Americans with Disabilities Act (ADA) parking stalls, and seven double length stalls for trailers and RVs (Image 1 – Image 4) and would replace currently unregulated parking throughout the Project Area. The south day-use area would provide access to the multi-use trail. Restrooms, trash receptacles, bike racks, and wayfinding signage would be included. The parking area will be bordered by a split rail fencing. The restroom will be an ADA accessible, flood proof, fire resistant module with a single vault sewer. The restroom would be surrounded with a concrete surface for ADA access. The remaining parking area will be surfaced with class II aggregate base.

Two options are presented for the location of the South Day Use Parking Area (see section 5.4.2 and the attached Public Access Designs – Project Overview: Key Map).

Image 1. Conceptual Overview of South Day Use Parking Area

Image 2. Rendering of Trail Entry Showing Signage in Background

Image 3. Rendering of ADA Restroom

Image 4. Rendering of Parking Lot

5.4.2 Access to South Day Use Parking Area

Two options are presented for the location of public vehicle access to the South Day Use Parking Area (See Public Access Designs – Project Overview: Key Map).

Option "A" would provide vehicle access via an existing access road that intersects Eastside Road across from Windsor River Road. The Option "A" access road would be positioned in the fee title

parcel owned by Hanson. The Option "A" access road has an agricultural access easement for egress and ingress to and from adjacent vineyard properties, as well as allowance for installation, repair, and maintenance of water pipelines and utility lines or conduits over, across, under, within, and through the access strip. A minor alternative connection with Eastside Road for the Option A is shown in the Public Access Designs that would align the access driveway directly across from Windsor River Road, however an easement from Jackson Family Wines would be necessary on the eastern end to accommodate this alternative.

An alternative South Day Use Parking Area Access Option B (Option "B") connection with Eastside Road is presented in the Public Access Designs that intersects Eastside Road approximately 2,700 feet south of Windsor River Road. Option "B" will require development of a new driveway near the southern edge of APN 066-290-053. An easement from Jackson Family Wines would be necessary to accommodate Option "B".

Should the South Day Use Parking Area Option "B" be developed for public vehicle access, the Option "A" access road would still be used for emergency and pedestrian access. Pedestrian access using Option "A" would eliminate the need for pedestrian visitors coming from Windsor River Road to walk, bike, or otherwise travel along Eastside Road. Instead, pedestrian visitors could cross Eastside Road and access the site safely along the existing Option "A" driveway. Visitors coming by car would drive to the Option "B" access road in order to access and park at the South Day Use Parking Area.

For either South Day Use Parking Area access option, signage will include hours of use and other descriptors. Access would be managed with a timer-controlled pedestrian access gate and barrier with an emergency access override. The two-way roadway would have a 25-foot-wide right-of-way.

5.4.3 Access to Seasonal Campground and North DayUse Parking

Existing Fontana Road will provide controlled access to the seasonal campground and North Day Use parking area (Image 5 – Conceptual Rendering of Separated Access for the Town of Windsor on Fontana Road). A separate parallel access road to Town of Windsor water utility facilities will be maintained. Two roadways already exist.

The road will provide ADA access to the seasonal campground, and be used for site monitoring and maintenance. Access will be managed with a timer-controlled pedestrian access gate and barrier and would include an emergency access override. No parking will be permitted and no parking signs will be posted along the roadway.

The existing Windsor Water District access road will be retained and secured from the public access. A vegetated median buffer will be planted between the road to the seasonal campground access and the road to the Town of Windsor water utility facility. Boulders will also be installed along the entire median length to provide a barrier between the two separated access routes.

Image 5. Conceptual Rendering of Separated Access for the Town of Windsor on Fontana Road

Image 6. Conceptual Rendering of Access Road Turnout on Fontana Road

5.4.4 North Day Use Parking Area

The north day-use parking area is a staging area that would subsequently be converted to a parking area, and provide access to the multi-use trail and supplemental parking for walk-in or boat-in

campers. The north day-use parking area would include 20 standard parking stalls, and three double length stalls.

5.4.5 Seasonal Campground

The seasonal campground would be approximately 2 acres and located in the vicinity of a former mine processing area where aggregate processing equipment was located along with offices and parking. The seasonal campground would be used primarily by boaters and accessed via the boat portage and nature trail (see Section 5.4.6). Vehicular access would be limited to ADA use and organized groups. All use would be managed by a reservation system (Image 7 – Image 11). The campground will replace and regulate the current illegal camping that regularly occurs on the Project Area and reduce unregulated camping and impacts on bars along the Russian River.

The campground would include two ADA sites with ADA parking, ten individual (boat-in) sites, and one group site with 10 tent pad spaces. Campsites may include a food locker, barbeque, and anchored picnic table.

The restroom will be flood proof, fire resistant module with a single vault sewer. The restroom will be ADA accessible, surrounded with a concrete surface with access to ADA parking stalls and ADA camp sites.

A 5,000-gallon potable water storage tank would be installed on a tower to provide water to the campground while maintaining a minimum reserve of water for fire suppression. The water tank and tower would be constructed using fire resistant materials.

A split-rail fence would encompass the campground. Along the northern boundary the campsite would be set back to provide area for the existing drainage swale and earthen mound. In this setback area, vegetation would be planted to provide screening and separation from the existing municipal groundwater wells. The vegetative screening and physical surface features are strategies to reduce visibility and deter trespass.

Image 7. Overview of the Seasonal Campground Site Layout

Image 8. Campsite-scale View Showing Entrance Road and Walkways

Image 9. Campsite-scale View Showing Restroom and ADA Parking

Image 10. Campsite-scale View Showing ADA Campsite and Group Camping

Image 11. Campsite-scale View Showing Individual Campsites

5.4.6 Boat Portage Trail

A boat portage trail that meets ADA standards would connect the seasonal campground to the seasonal riverside boat portage. This trail would serve non-motorized vessels and would act as the main point of entry into the seasonal campground. Signage at the campground would provide pertinent access information and maps. The trail's surface would be aggregate base rock and would be reinforced with structural mat at the lower and steeper reach of the trail. No additional infrastructure is proposed at the seasonal boat portage.

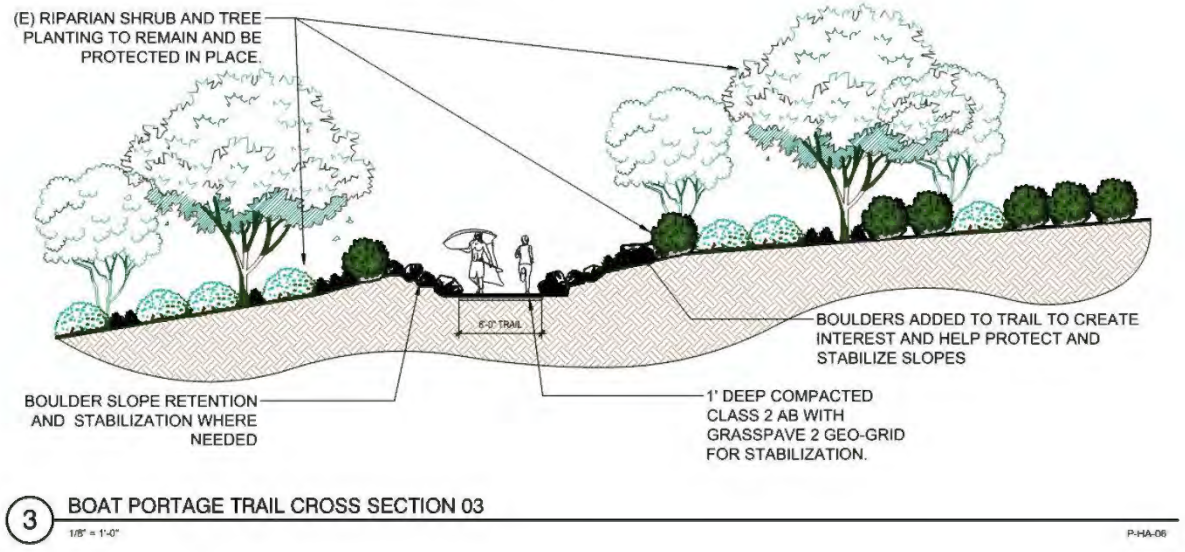

Image 12. Typical Cross-Section of Boat Portage Trail

5.4.7 Multi-Use Trails

The Project includes approximately 2.3 miles of multi-use trails. During initial project phases the multi-use trails will be used for construction, revegetation, monitoring, as well as for emergency access. The access road will be converted into a multi-use trail for public access, and replace the existing unregulated access roads that bisect the project site. Multi-use trails would have a width of 12 feet (two four-foot travel lanes with a two-foot shoulder on each side) and have an aggregate base rock surface (Image 13 – Typical Cross-Section for Multi-Use Trail).

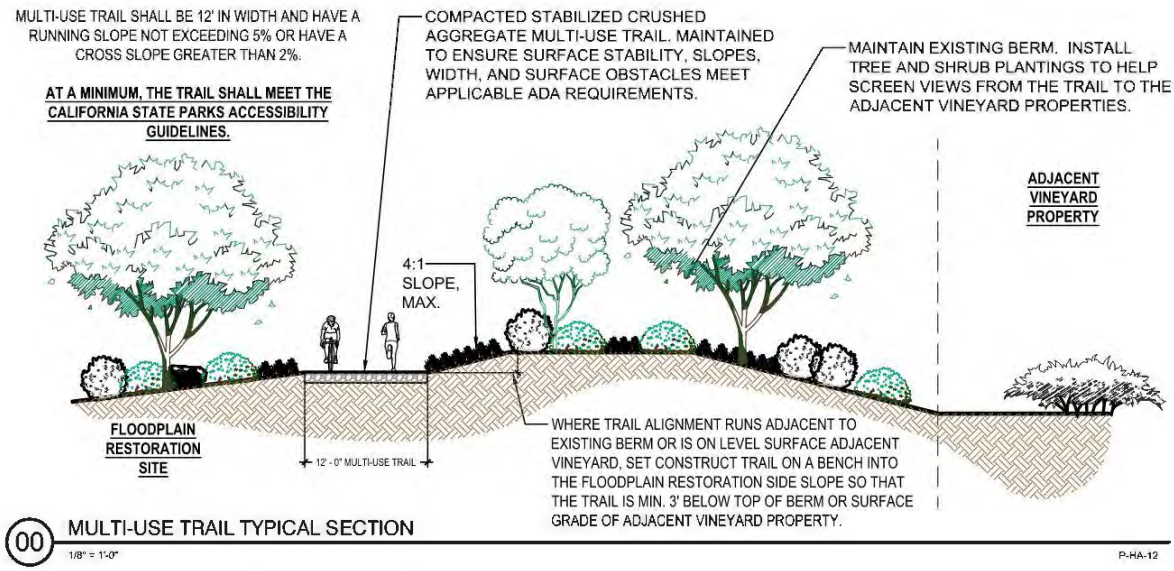

Image 13. Typical Cross-Section of Multi-Use Trail

5.4.8 Seasonal Nature Trail

A seasonal nature trail would provide access to the restored floodplain and river. The trail would be compacted dirt and maintain running slopes of 5% or less (Image 14 – Typical Cross-Section of Seasonal Nature Trail). The seasonal nature trail replaces existing undesigned and unregulated social trails used by the public for accessing the river and terrace pits. The nature trail would meander and not result in tree removal.

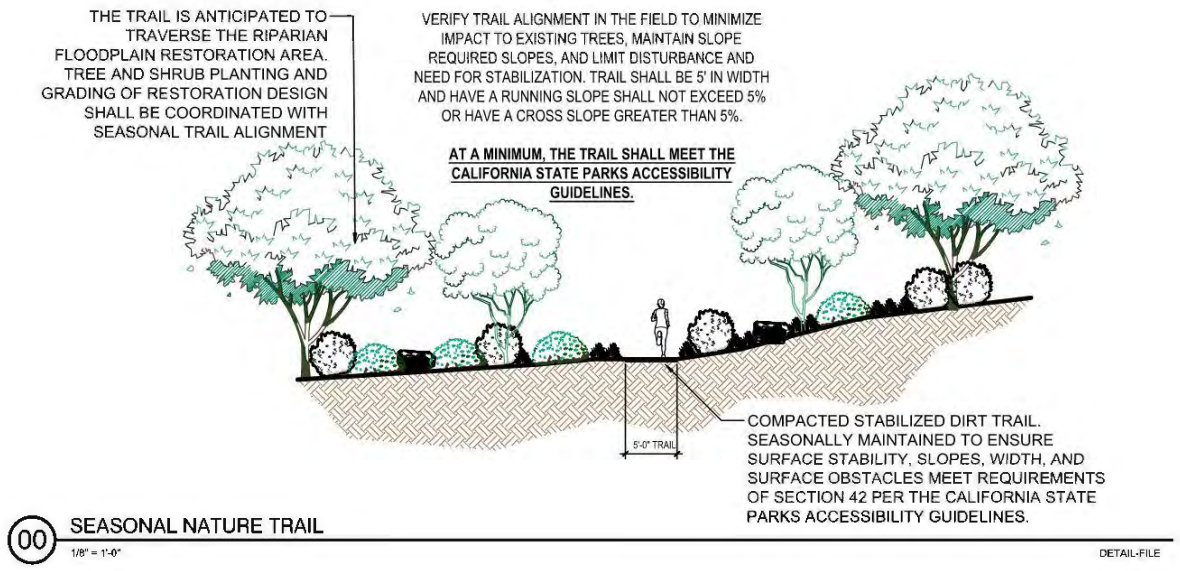

Image 14. Typical Cross-Section of Seasonal Nature Trail

5.4.9 Accessibility Requirements

The north and south day-use parking areas, all restroom facilities, multi-use trail system, and seasonal campground public access components would meet ADA standards. The boat portage trail and seasonal nature trail would meet applicable ADA standards; however, due to conflicts with site conditions, required slopes, and surface treatments, these facilities will require routine maintenance and signage that makes all users aware of trail conditions and limits of use. At a minimum all facilities will be required to meet the California State Parks Accessibility Guidelines.

5.4.10 Fire and Emergency Services

Public access design elements are compliant with applicable emergency access and fire-related code requirements). Fire-resistant features have been incorporated into the design, such as water storage in the seasonal campground, fireproof steel gates, and fire-resistant restroom facilities. Public access designs have been preliminarily reviewed by the Sonoma County Fire Marshall to confirm that fire and emergency service requirements have been met. Timer controlled vehicle access gates, turnouts, turnarounds, roadside vegetation clearance, road grades and dimensions, and roadway surfaces have been designed to ensure compatibility with fire and emergency service requirements.

6. Project Constraints

Environmental and construction constraints are evaluated below. In addition, please see Section 3.1 – Land Use for identification of surrounding land uses, easements, and utilities. Williamson Act consistency as it applies to farmland operations within the project boundary are discussed in Section 3.2 – Williamson Act Consistency.

6.1 Environmental Constraints

6.1.1 Proximity to Groundwater

Vegetation communities depend on both rainfall and connectivity to shallow groundwater. The depth to groundwater is a controlling factor in determining the composition of floodplain plant communities. Willow and cottonwood depend on perennial, shallow groundwater for their water supply, whereas plant species typical of mixed riparian forest and valley oak riparian habitats tolerate drier conditions. All newly planted vegetation will require irrigation for the first two to three seasons of growth.

Construction activities during the dry season, when Russian River flows are lowest and groundwater flows toward the river are most prevalent, pose the greatest potential for off-site impacts. Proposed construction phasing minimizes the potential for pond fill to displace water from the ponds and drive the poor-quality pit water toward the Russian River.

6.1.2 Floodplain Accretion Rates

Natural accretion of sediments is expected to occur on the restored floodplain. The rate of accretion varies spatially and temporally and is not expected to be uniform year after year. The Project design establishes a template for floodplain evolution and relies on natural depositional processes for floodplain aggradation. The expansive floodplain area and the predominance of coarse alluvial gravels will result in aggradation in the mainstem Russian River around newly established floodplain confluences. Within the Project site coarse alluvium deposits will form lobes (deltas) expanding into the site over time. High rate fine (suspended) sediment deposition will be more broadly distributed across the site(s). Rapid aggradation of fine sediments is anticipated for several years due to recent fires.

6.1.3 Invasive Plant Species

Establishment of hydrologic conditions that support target habitat of seasonally inundated floodplain are critical to project success in providing foraging and rearing habitat for salmonids. To reduce the risk of invasive aquatic and emergent species (e.g., *Ludwigia*) dominance on the restored floodplain, the design minimizes the extent of Project Area that is perennially inundated and saturated.

6.1.4 Forest Habitat / Tree Protection

Project construction will remove most of the existing walnut-dominated riparian forest. This relatively young (e.g., ~5–6 decades) riparian stand established on human-made levees currently provides moderate to high riparian and wildlife functions and is a regulated habitat. The design maintains existing mature stands to the extent feasible; however, trees will not be preserved at the expense of the project's over-arching process-based restoration objectives.

Re-establishment of riparian stands on the floodplain is constrained by the Project's large floodplain area and the costs associated with active revegetation. The design relies on natural recruitment as the primary strategy for establishment of native woody obligate riparian habitat on the restored floodplain. Willow and cottonwood depend on perennial, shallow groundwater for their water supply, whereas plant species typical of mixed riparian forest and valley oak riparian habitats tolerate drier conditions.

On the terrace adjoining the active floodplain, upland habitat will be actively planted to maximize wildlife habitat and structural diversity of the restored habitats. The primary strategy for establishment of native valley oak woodland on slopes and upland areas is to plant nursery-grown stock, and maintain plant establishment for three to five years via irrigation, weed control, and browse protection. As on the floodplain, upland soils conditions require that designs support both target habitat establishment and minimize the potential for invasive weed dominance. Where favorable soils are scarce, the rate of natural recruitment of willow, cottonwood, and mulefat can be increased at low cost via harvest and installation of cuttings in strategic locations. Species selection will avoid species that have the potential to detrimentally affect the health of the adjacent vineyard. The applicant will coordinate with Jackson Family Wines to review the proposed species list.

6.1.5 Seasonally-Wet Meadow Restoration

The composition of self-forming riparian floodplain habitats is constrained by water supply. Regulated base-flows and Mirabel Dam operations influence the depth to late summer groundwater in the Project Area, and in turn, the minimum suitable elevation for floodplain grading. Where funding permits, restoration of seasonally-wet meadow requires heavy seeding with a native annual and perennial forb pioneer "cover crop" to inhibit weed colonization and dominance. Seeding should include translocation of vegetative propagules (sod fragments, plugs, etc.) of native clonal perennial ground cover where native plants may not readily colonize the site on their own. To overcome this constraint, stands of native wet meadow species (e.g., willows, sedges, rushes, and grasses) could potentially be salvaged, stored, and/or grown and transplanted on the graded floodplain.

6.1.6 Surface and Groundwater Resources

Earthwork associated with filling the Hanson Ponds has the potential to impact water quality in the Russian River and the Town of Windsor production wells, as evaluated in LSCE (2022). LSCE (2022) concludes that Sonoma Water's Wohler Collection Wells are located significantly downstream of the Project Area such that water quality would not be impacted.

Potential impacts to the Russian River and Town of Windsor production wells were comparatively assessed using two different construction scenarios: one construction season and three construction seasons. The LSCE study concludes that a phased approach to construction would result in reduced potential increases to methyl mercury, temperature, and turbidity mobilization, when compared to single season construction (LSCE 2022).

Water quality standards include the Regional Water Quality Control Board Environmental Screening Levels for methyl mercury and the Low Threat Discharge Permit for water temperature. Projected increases in methyl mercury in both the Russian River and the Town of Windsor wells do not exceed allowable thresholds (LSCE 2022).

Available standards for turbidity are 5 NTU for drinking water (wells) and a 5 NTU increase in receiving waters (when background concentration is less than 25 NTU). The high-end conservative estimate for one construction season exceeds the 5 NTU increase standard for the Russian River; the three-year estimate does not exceed allowable standards in the Russian River. The increased turbidity estimates for the Town of Windsor production wells are within the drinking water standard (LSCE 2022). Following the short-term construction impacts period, the Project is expected to improve water quality into the future and make the reach more resilient to impact events, such as

high turbidity runoff periods. The Project will implement the recommendations for avoidance, minimization, and monitoring during construction as recommended by LCSE (2022) to ensure groundwater resources are protected. These recommendations are detailed in the accompanying Basis of Design Report.

6.2 Construction Constraints

6.2.1 Cut and Fill Balance

Proposed grading is constrained by the practical requirement to balance cut and fill on site to avoid additional costs, impact and time required for importing additional material. If cost were not a constraint, additional fill would be preferred to achieve design goals. As such, the capacity to raise the floodplain elevations is constrained by available fill. This is a primary constraint identified in the 30% Basis of Design Report (GHD 2021) because targeted vegetation communities require seasonal inundation, and so does suppression of invasive non-native vegetation. Summer groundwater elevations are consistent as dictated by summer base flows and the Mirabel Dam and range from 45 ft-NAVD88 at the northern end of the project site, to 42 ft-NAVD88 at the southern Project Area boundary (LSCE 2022). As a result, minimum floodplain elevations one foot above the seasonal low groundwater elevation are critical to successful restoration of seasonally saturated floodplain wetlands targeted to provide habitat for salmonids.

6.2.2 Geotechnical Constraints

Geotechnical conditions in the coarse alluvial gravels that dominate site conditions pose constraints in both construction and design as described by Miller Pacific Engineering Group (2020). Design and construction implementation planning requires considering varying rates of work and site stability criteria dependent on the proximity to groundwater. Consistent with operational and reclamation plans, grading and work on stable slopes ranges from >6H:1V to 2H:1V within and above the water table respectively. Similarly, the equipment deployed for construction varies with distance from the water table. Scrapers, excavators and dump trucks are feasible within three feet of the water table. Earthwork within the ponds, at and below the water table, requires swamp dozers, dredging equipment and draglines.

Compaction and consolidation also require careful consideration given the large volumes of fills placed below the groundwater table, and that design objectives and costs preclude use of traditional methods of work in dry conditions compacting fill in lifts. Earthwork designs and estimated costs are described in the geotechnical studies prepared to support the Project (MPEG 2020).

Differential settlement poses the most significant challenges in design and construction given the deep fills; expected invasive plant dominance where floodplain elevations dip to within 1-2 feet of the water table; and the need to avoid low ponded areas without connection to the main-stem river where juvenile salmonids could be stranded when floodwaters recede. To reduce long-term consolidation of the pond backfill to undesired low elevations, each pond is proposed to be filled and surcharged (overfilled) with several feet of material above target finish grades during the first construction season. In the second season, finished grading across the floodplain would occur to remove excess fill from the surcharged area.

6.2.3 Construction-Related Noise

Existing ambient noise is generally low limited to noise generated by agricultural operations and Eastside Road. Construction would generate short-term noise. Construction would not include vibratory pile driving or similar construction methods that result in potentially high levels of construction-generated noise. There are no sensitive receptors located near the Project and construction would adhere to daytime hours as stated in the Conditional Use Permit, which reflect Sonoma County noise thresholds.

6.2.4 Hazards

Geotracker does not include any known hazardous sites within the project boundary. Water quality methyl mercury considerations are discussed in Section 6.1.6 above. Phase I and II studies completed during the Feasibility Study, which included soil testing in and around the ponds, did not indicate any concerns.

7. Project Construction

7.1 Construction Phasing and Schedule

To reduce potential construction-related impacts to the riverine environment and Town of Windsor groundwater wells, the construction will be phased over a minimum of three years. Phasing construction would allow for a gradual displacement of pond surface water to flow sub-surface towards the Russian River during backfilling. Phasing construction would also be used to accommodate anticipated water quality requirements relative to the downstream zone of dilution for turbidity, methylmercury, and other water quality constituents of concern, avoiding potential impacts to the Russian River. Construction phasing would be divided into three spatial phases, each that balance cut and fill volumes and include 1) Vimark Pond area, 2) Richardson Pond area and 3) Piombo and Mariani Pond area (Figure 4, Table 7.1). Alternatively, the phasing could be reversed (downstream to upstream). Each year, the pond or ponds from the prior phase would be backfilled and surcharged with soil. The following year the finished floodplain grading would occur. Construction is anticipated to start on the downstream phase (Vimark Pond) and progress upstream, however the final sequence will be based on final design and regulatory requirements related to water management and species relocation.

Each year of construction is assumed to span 120 days during the dry season. A longer, or year-round, construction season may be feasible given the history of year-round mining operations on the Project site. Riverine construction would be limited to the permitted in-water work window, typically June 15th through October 31st. Construction would be limited to daytime hours, Monday through Saturday, or as allowed in the Sonoma County Conditional Use Permit.

Development of public access amenities would follow completion of restoration. Depending upon available funding, implementation of the public access design could occur many years after restoration is complete.

Table 7.1 Example construction sequence scenario from down- to upstream*

Phase	Description	Year 0	Year 1	Year 2	Year 3	Year 4
0	Amend reclamation plan for Piombo and Marini ponds to convert it to a restoration plan					
1	Vegetation removal/salvage Vimark Pond; set-up on-site plant propagation					
1	Backfill Vimark Pond					
1	Finish grading; Vimark Pond revegetation					
2	Vegetation removal/salvage Richardson Pond					
2	Backfill Richardson Pond					
2	Finish grading; Richardson Pond revegetation					
3	Vegetation removal/salvage for Piombo and Mariani ponds					
3	Backfill Piombo and Mariani ponds					
3	Finish grading; Piombo and Mariani ponds revegetation					
4	Public Access Development Phase	Timeline TBD and may occur many years after restoration is complete				

* Alternatively phasing can be reversed to be downstream to upstream and will be subject to additional modeling and design.

7.2 Construction Activities and Equipment

One of the primary design criteria described in the Feasibility Study was to balance on-site cut and fills and eliminate the costly expense of importing soil from a currently unidentified source. Construction would include a total cut volume of approximately 4,700,000 cubic yards with an equivalent fill volume. Off-site material disposal would not occur except for the demolition of solid waste described above (i.e., spillways, pipes, etc.). The Project has been designed to balance total cut/fills onsite. However, opportunities to import soil for beneficial reuse (e.g., top soil) would improve the ecological outcomes of the Project. Project partners may accept imported fill for beneficial reuse as part of another project's approvals or as part of this Project, subject to the following: 1) imported volume is not anticipated to exceed 1% of the total earthwork volume, 2) the soil would be clean based on an approved testing and sampling plan, and 3) the soil would be temporarily placed in suitable areas following appropriate BMPs.

Construction would primarily include site preparation such as trimming and/or removal of trees, vegetation, followed by excavation, grading, and sediment placement within the grading boundary. Water from the ponds would be used for dust control and compaction.

All construction activities would be accompanied by both temporary and permanent erosion and sediment control best management practices (BMPs). Project construction would include the following activities:

- Clearing and grubbing – To clear trees, vegetation, and brush from the grading limits. Clearing and grubbing would occur prior to excavation and pond filling. Vegetative debris removed would be chipped and reused onsite for mulch, retained for use in large wood habitat structures or buried in the pond backfills.
- Fill placement and compaction – Most of the excavated material from the levees surrounding the existing ponds would be placed directly into the ponds; however, some would also be used to re-contour the floodplain banks.
- Grading – To achieve final design topography across the restored floodplain surface and floodplain channels.
- Soil Segregation – To support revegetation, soil segregation during construction would be required to ensure topsoil is compatible with the final revegetation plan. In soil segregation, the finer grained soils are segregated for reuse in the upper lightly compacted fills along the re-contoured floodplain banks with the balance of the material placed as backfill in the ponds.
- Invasive Plant Removal and Burial During Grading - Invasive plant propagules (seed and viable meristematic tissue) would be removed during grading. Earthwork/clearing and grubbing would be designed to remove and bury the existing weed seed bank at least several feet below the design grade. Heavy equipment, such as bulldozers or excavators, would be used to mechanically remove invasive plant infestations from the Project Area. Invasive plant material excavated from uplands would be buried in the bottom of the ponds. Existing invasive aquatic vegetation in the ponds (e.g., water primrose) would also be buried onsite well below the design grades.
- Hauling – Transport of excavated sediment within the Project Area; hauling of imported material to the Project Area.

Equipment required for construction would include tracked excavators, backhoes, graders, scrapers, bulldozers, dump trucks, water trucks, skid-steers, loaders, pick-up trucks, motorboats, portable conveyor systems and dredgers. It is not anticipated that any temporary utility extensions, such as electric power or water, would be required for construction.

7.2.1 Site Access

Site access for construction ingress and egress would be achieved via Fontana Road and up to four possible locations along Eastside Road. The perimeter access road (later converted to multi-use trail) would provide north south access on the east side of the project site. Pending discussions with landowners, temporary internal haul roads may be developed outside the grading limits but within the project boundary, through agricultural properties east of the pond.

7.2.2 Stockpiling and Staging

One temporary staging area would be established for each of the three proposed construction phases. The Phase 1 temporary staging area would be located northeast of Vimark Pond; the Phase 2 temporary staging area would be located northeast of Richardson Pond; and the Phase 3 temporary staging area would be located northeast of Mariani Pond. Staging area locations are included in the design plans (GHD 2021).

7.2.3 Traffic and Access Control

The anticipated access route to and from the Project Area utilizes Eastside Road. Aside from annual equipment staging, traffic related to construction would be limited to daily workforce traffic arriving and departing the job site. Temporary lane closures on Eastside Road would not be necessary. Cut and fill of the project balance and no import of fill is necessary to achieve the final grading.

7.2.4 Water Management and Diversion

If dewatering is required for any work areas, pump inlets will be screened, and coffer dams or barrier nets would be placed to block off the area. Any native fish remaining inside the coffer dams or barriers would be carefully removed by a qualified biologist. Initial relocation and isolation measures for special status fish are anticipated during grading operations juxtaposed to the active river channel. To minimize potentially adverse effects to aquatic organisms, all translocation/removal of fishes would be conducted by qualified fisheries biologists. Any fish that cannot be herded by seines from the work areas and must be physically handled would be immediately released in suitable habitat away from the action area, with comparable habitat and water quality conditions. Immediately following completion of in-channel work, any cofferdams or block nets would be removed allowing free fish passage through the Project Area during the remainder of the construction period.

Given the pond bottoms are below the river thalweg and regional seasonal low groundwater levels, dewatering of the ponds by pumping down during backfilling is not feasible. If lateral sub-surface flow towards the Russian River is less than estimated pond fill rate, some pumping of pond water may be necessary to avoid elevating pond water levels that could slow construction efficiency and/or alter groundwater gradients. Pumped pond water would be discharged to an adjoining pond or infiltrated into an upland site or restored floodplain. Pumping directly to the Russian River will likely not be feasible due to the anticipated elevated turbidity in the pond water relative to the receiving Russian River. BMPs to reduce potential water quality impacts to groundwater and receiving surface waters are described below.

- Conduct surface and groundwater monitoring during construction and adjust BMPs described below to maintain compliance with regulatory permits and avoid offsite impacts. At a minimum, this would include groundwater monitoring in the existing well between the Piombo Pond and Town of Windsor wells and anticipated surface water monitoring in the Russian River per the Regional Board Clean Water Act Section 401 water quality certification.
- During backfilling of the Piombo and Mariani ponds, monitor pond levels to avoid potential rise from displacement and alteration to the groundwater gradient towards the Town of Windsor wells and pump pond water at the same rate of pond backfilling to maintain levels

during backfilling. Depending upon the construction sequencing of other phases, the pumped pond water could be discharged to the Richardson Pond (or the former Richardson Pond site, if filled prior to Piombo and Mariani ponds as a result of construction phasing) and/or infiltrated across the restored floodplain.

- Install turbidity curtains in the ponds during initial pond filling activities to minimize potential for migration of higher turbidity pond water to the Russian River and Town of Windsor production wells. Alternatively, without use of turbidity curtains, filling the ponds could start on the western side of each pond closest to the Russian River and northern side of Piombo Pond closest to the Town of Windsor wells, thereby resulting in the initial addition of a greater thickness of sediments between the remaining pond area, the Russian River, and Town of Windsor production wells to provide greater filtration and travel times through sediments before reaching groundwater resources.
- Coordinate with the Town of Windsor to shift well field pumping to the three northernmost wells (Wells 9, 10 and 11) during filling of Mariani and Piombo Ponds. This would shift the pumping depression as far away from the ponds as possible and decrease the potential for flow from the ponds toward the wells.

7.2.5 Site Re-vegetation and Stabilization

The revegetation strategy is based on a restored floodplain surface designed to support hydrologic and geomorphic processes that facilitate the natural colonization of wind- and water-dispersed native riparian-wetland obligate plant species, combined with active (direct planting) upland revegetation.

To support revegetation, existing stands of native wet meadow species would be salvaged and propagated at an onsite sod farm to increase the amount of native wet meadow sod that can be used during revegetation (H.T. Harvey 2020). The onsite sod farm would be located on graded benches at the final construction phase area (Mariani Pond) where groundwater and irrigation are available. The sod fragments would be transplanted from the sod farm onto the floodplain seasonal wet meadow and freshwater marsh revegetation zones. Salvaged material would be harvested in fall and transplanted and grown at the onsite sod farm. After one or two growing seasons, sod would be harvested from the sod farm and planted across the floodplain surface during each construction phase (H.T. Harvey 2020, see Section 7.1 for a description of construction phasing). Additional planting of sod blocks may also be undertaken in adaptive management

Revegetation requires implementation of a variety of methods, specific to revegetation zones and target habitats, summarized in Table 7.2. In addition to passive floodplain colonization, revegetation methods recommended include seeding, sod translocation sprigging, cutting, live wood transplants, and direct planting of container stock. Existing riparian vegetation would be preserved to minimize potential impacts to the extent feasible.

Floodplain revegetation. Due to the large surface area of the floodplain and associated costs of active revegetation, the recommended primary strategy for establishment of native woody obligate riparian habitat on the restored floodplain is passive, natural recruitment (H.T. Harvey 2020). The project's floodplain elevation would be raised by approximately one foot to better support passive colonization of target floodplain habitats (e.g., a mosaic of willow/cottonwood riparian and wet

meadow habitats). Ideal water table depth and substrate conditions to promote rapid vegetation growth are likely to occur across the floodplain.

Upland Revegetation. The primary strategy for establishment of native valley oak woodland on slopes and upland areas should be active planting of nursery grown stock and 3–5 years of plant establishment maintenance (e.g., irrigation, weed control, browse protection). Irrigation would be required for the first two to three years following planting, to support plant establishment and survival. During construction, irrigation water would come from the existing ponds during phased construction. Once all the ponds are removed, viable legal options to support irrigation water be explored in the next phase and include (1) use of geyser water (2) raw water from Town of Windsor wells (3) drafting from the irrigation pond (4) available, existing on-site agricultural irrigation wells, or similar legal use of existing water sources. Required agreements would be executed as needed.

A variety of native trees and shrubs that currently occur on and near the Project Area should be established. The locations where each plant species could be established would be based on the predicted post-construction soil texture, plant-available soil moisture, and water availability. To maintain local genetic diversity and integrity, all propagules (seeds, cuttings, and root masses) should originate from the Project Area or similar sites within the Russian River watershed and from locations with soils, elevations, and hydrology that is similar to the Project Area.

Table 7.2 Revegetation Methods by Zones and Target Habitats (From H.T. Harvey 2020)

Revegetation Method	Revegetation Zone – Target Habitat					
	Floodplain Seasonal Wet Meadow	Floodplain Aquatic Backwater Pool and Channel	Floodplain Freshwater Marsh	Lower Slope Riparian Scrub	Mid-Slope Riparian Forest	Upper Slope Riparian Forest
Seeding of herbaceous wetland species	x	x	x	X		
Seeding of herbaceous upland species					x	x
Seeding of acorns and California buckeye					x	x
Sod (rootmat) translocation	x		x			
Vegetative sprigging	x		x			
Cuttings				X		
Livewood transplants				X		
Livewood transplants					x	x
Container plants					x	x

8. Anticipated Long-Term Evolution of the Project Area

The Project would restore connectivity between the mainstem Russian River and an expansive floodplain. Within the reconnected floodplain, two incipient channel features would be constructed to focus flood conveyance, and provide perennially backwatered, low-flow off-channel habitat. Given the depositional setting of the restored floodplain and the existing alluvial river system, the Project Area is expected to be dynamic and self-evolving into the long-term future.

8.1 Channel Evolution

Following construction, the channel features are expected to evolve in dynamic equilibrium in response to hydrologic conditions and sediment supply. The channels would be constructed as broad shallow features with a deeper low flow channel. Narrowing, widening and sinuosity is expected to evolve as the channels mature as an integrated part of the evolving revegetated riparian floodplain landscape. Deposition is expected to dominate channel evolution initially, with interior features, bar and pool complexes evolving from the upstream end as sediments prograde into the system during high flow events. Geomorphic processes, including local bed mobility and sorting, burial, scour and translocation of riparian vegetation, formation and movement of bar features would evolve over time as flood energy reworks the post-construction grading on the alluvial floodplain. Sediment deposition and thus bar formation is expected during high flow events. The channel features consolidate floodplain flows and concentrate geomorphic processes within the forming floodplain channel complex. The floodplain system would be self-forming, and self-maintaining, with the expansive channels providing adequate room for lateral and longitudinal channel migration.

The floodplain channel template focuses flood flows and flow recession, providing fish-friendly hydraulic flow structure on the floodplain post-construction. Maintenance or repair is not anticipated. A mosaic of streambed and floodplain habitat is anticipated, with form dependent on sediment supply and flood energy. Post-construction, the floodplain template is likely to form a braded anastomosing channel complex providing abundant food sources and shelter for aquatic and riparian species.

8.2 Mainstem Russian River Evolution and Expected Geomorphic Adjustment

Lowering and removal of the riparian berm and removal of existing levees surrounding the four ponds would reestablish connectivity between the mainstem channel and adjacent, restored floodplain. The mainstem channel through the Project Area is expected to adjust as a result, resulting in improved riverine function and salmonid habitat quantity and quality over a range of streamflows. The Project seeks to restore an integrated alluvial river floodplain complex consistent with Russian River channel form prior to watershed development. Increased, sinuosity and dynamic form and alignment all correlate with increased channel and riparian complexity which benefit both salmonids and wildlife. During an extreme flood event, mainstem capture onto the restored floodplain would result in increased sinuosity and lateral migration of the Russian River.

Modeling completed as part of the Feasibility Study predicted geomorphic change following construction, including response in the Russian River and evolution of the restored floodplain for selected design flows. Results show the areas of greatest post-construction bed change would be the upstream floodplain inlet where a delta form is predicted, and the adjacent river channel where deposition is predicted. At the floodplain inlet, deposition of a delta between six and seven feet thick during simulated peak flows is predicted to be followed by a similar scale channel formation during flood recession. The predicted grain sizes transported by a 2-yr to 5-yr event were less than 1 inch and suitable for spawning. Resulting prolonged floodplain inundation would further support spawning habitat.

8.3 Floodplain Evolution

The restored floodplain is expected to be predominantly depositional, although local scour and fill would be expected in some locations (e.g., upstream end of the Project Area). The restored floodplain supports natural sediment and nutrient depositional processes in ecologically desirable locations. A deposition zone for suspended Russian River sediment would improve water quality downstream from the project for all flows that engage the floodplain. Restoring river-bed sediment deposition processes would occur gradually and without adverse consequences for channel stability upstream or downstream from the project. Following winter/spring high flow events and associated sediment sorting/deposition and vegetation establishment, floodplain topography would adjust over time, increasing in variability. In addition to floodplain channels, additional backwater or high flow secondary channels may naturally form as permanent or transient features.

8.4 Large Wood

Large wood would be incorporated into the floodplain and potentially the mainstem channel design during construction. Over time, large wood and/or large wood habitat structures are expected to evolve, and function as a locus for the accumulation of wrack and retention of naturally-borne large wood. Depending on the final design and bed mobility around installed large wood, large wood may mobilize and migrate downstream during high flow events. Large wood designed as key pieces would cultivate sediment capture and bar formation, increasing channel complexity. Following completion of initial construction, long-term large wood maintenance or augmentation may be recommended as an adaptive management measures to accelerate development of an ecologically complex floodplain habitat. Large wood sourced from on-site salvaging and reuse will be prioritized to limit long-term maintenance costs.

8.5 Anticipated Changes in Salmonid Habitat

As described in the Feasibility Study, salmonid habitat for rearing juveniles is predicted to increase by more than an order of magnitude. Spawning gravel deposits are anticipated to form around the upstream entry to the floodplain, and in the existing and restored floodplain channels where current annual floods scour gravel deposits.

As a result of post-construction variability of floodplain elevations and bar features (mainstem and within the floodplain channels), increases in habitat availability are expected during all streamflow conditions to benefit all life stages for Chinook Salmon, Coho Salmon, and steelhead. Hydraulic

modeling to support final designs will confirm constructed floodplain elevations appropriately correspond with key streamflows and target life stages.

Given the restored floodplain and the mainstem channel are expected to be dynamic and self-maintaining, increases in salmonid habitat are also expected to persist through time. During high flow conditions, newly available floodplain and off-channel habitats would greatly increase the amount of refugia habitat available to juvenile salmonids. Lower streamflow velocities in the mainstem would reduce the risk of red scour, and increased availability of spawning habitat would reduce the risk of red superimposition.

8.6 Riparian and Upland Vegetation Evolution

The proposed restored floodplain and associated uplands would support a large and diverse gradient of native flora and fauna and would be monitored and adaptively managed towards a goal of self-sustainability. Following restoration, floodplain vegetation is expected to be predominantly seasonally wet meadow due to the target seasonal low groundwater relationships. Riparian trees would naturally regenerate in floodplain bars and along mainstem channel and floodplain channel margins, and geomorphically interact with channel and floodplain project elements and provide salmonid habitat, cover, and food sources. With the expansive and geomorphically dynamic floodplain activated, the width and species diversity of the riparian corridor would expand across the floodplain, resulting in a significant benefit when compared to linear stands under present conditions. Both upland and floodplain vegetation are expected to be self-maintaining. As a permit condition, vegetation monitoring is likely to be required for a period of at least five years to ensure survivability. If upland survivability is poor, some replanting or maintenance may be required to achieve compliance. Following the permit compliance window, no long-term vegetation maintenance is proposed.

9. Adaptive Management and Monitoring

At minimum, post-construction monitoring will meet permitting compliance monitoring requirements, which would likely include monitoring to confirm revegetation success. Performance monitoring (e.g., fisheries use, design function, etc.) would occur as funding allows or as required by the granting agency.

Construction and revegetation methods would be designed to minimize the potential for invasive species by promoting conditions favorable to desired native species and effectively eradicating weed sources and invasive species during implementation. However, invasive species may inevitably establish across the project site to varying degrees. Long-term maintenance and removal of invasive species would occur as part of adaptive management to the extent practical and subject to available funding and resources.

Given the Project Area is expected to be dynamic following construction (see Section 8 – Anticipated Long-Term Evolution), adaptive management may result in future activities to better achieve Project goals, as funding allows. Such future activities could include additional large wood augmentation, coarse sediment augmentation, or floodplain grading modifications, for example, and would be

guided by a future Resource Management Plan. Such actions would be addressed through separate, future CEQA and permitting processes.

10. Operations of Public Access Amenities

10.1 Hours of Operation

Day-use public access amenities would be open sunrise to sunset year-round. Limited public safety closures may occur due to flood or fire conditions. The seasonal campground would be available for reservations, primarily in summer and fall months, and pursuant to streamflow conditions in the Russian River. Use of the seasonal nature trail on the floodplain would also be limited to periods of use pursuant to streamflow conditions in the Russian River. Outside of the seasonal campground, use of the facility beyond daylight hours will not be permitted except for special programs administered by the park operator.

10.2 Parking and Circulation

Two points of vehicle entry would depart Eastside Road to provide circulation into the property for public access and maintenance [see Section 5.4.1 – South Two-Way Road Access (Option A and Option B) and Section 5.4.3 – North One-Way Road Access]. The north and south access roads would not be connected within the property. The South DayUse parking area would include 25 parking stalls, two ADA parking stalls, and seven double length stalls for trailers and RVs. The North Day Use parking area would include 20 parking stalls, and three double length stalls for trailers and RVs.

10.3 Traffic Generation

Use of the property for public access would generate additional vehicle trips. Operational traffic use modeling, such as Vehicle Miles Traveled (VMT), has not been completed. Sonoma Public Infrastructure has reviewed the Project and has not requested or recommended a traffic study due to the limited scope of public access and existing traffic conditions of East Side Road,. Given the facility is promoting multi-modal transportation, potential climate-related impacts are likely to be offset.

10.4 Solid Waste Disposal

Trash and recycling receptacles would be located at the North and South Day Use parking areas as well as at the seasonal campground to minimize litter and nuisance garbage impacts to wildlife. Trash and recycling receptacles would be emptied and maintained by the park operator.

10.5 Sewage Disposal

Public access amenities would include two flood proof vault toilets – one at the south day-use parking area and a second at the seasonal campground. Vault toilets would be pumped at the end of each season and through the year on a scheduled or as-needed basis, to be managed by the park operator.

11. Required Regularity Permits and CEQA

The project would require completion of CEQA review and federal, state, and local permits. While this strategy does not include consideration of NEPA, receipt of federal funds would trigger NEPA environmental review processes, in addition to CEQA. Given the large scale, multi-year nature of the project, combined with potential impacts to water quality, salmonids, and other environmental factors, the CDFW Statutory Exemption for Restoration Projects (SERP) process, Regional Water Quality Control Board's General Order (GO) Programmatic EIR (PEIR) for Restoration Projects or Environmental Impact Report (EIR) is anticipated to be the likely CEQA pathway with Sonoma County as lead agency. The CDFW SERP process would reduce the regulatory timeline by as much as two to four years. A more efficient regulatory process would preserve funds for implementation and matching grants. Permitting pathways likely to be required for the Project Area summarized in Table 11.1.

Table 11.1 Permitting Pathway and CEQA Summary

Agency	Approval/Permit
US Army Corps of Engineers	CWA Section 404 Permit
ESA Section 7 USFWS and NMFS	Concurrence Letter or BA/BO
NHPA Section 106	Submission of cultural resources investigation documenting impacts to cultural resource would not occur
Regional Board	Clean Water Act Section 401 Water Quality Certification
	SWPPP or Water Pollution Control Plan
California Department of Fish and Wildlife	Section 1602 Streambed Alteration Agreement
	CESA Compliance
Sonoma County	Conditional Use Permit
Sonoma County	Grading Permit (issued prior to construction with final plans)
CEQA	CDFW's SERP Process or Regional Board GO PEIR or an Environmental Impact Report, both requiring tribal consultation

12. References

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