

TECHNICAL MEMORANDUM

Date:	April 8, 2019
To:	Dr. Alan Launer (Stanford University), Max Busnardo (HTH)
From:	Chris Campbell, Ben Taber
Project:	15-1009-3 – Stanford University HCP Upper Quarry CRLF Habitat Restoration
Subject:	Drainage Assessment

INTRODUCTION

The purpose of this document is to describe the existing and proposed hydrologic conditions for the proposed project and provide justification for why a detailed drainage analysis and calculations are not warranted to support the grading design for creating new California red-legged frog (CRLF) habitat on Stanford lands. The following sections describe the proposed project features and discuss how the proposed project will not impact the hydrologic functions of the abandoned quarry and downstream receiving waters.

Note: detailed hydrologic calculations are not provided.

PROJECT DESCRIPTION

The project implements the Stanford Habitat Conservation Plan by creating new habitat to support and increase the CRLF population on Stanford lands. The project site is an abandoned quarry in the Stanford foothills, within an existing conservation easement.

The project proposes to create up to four new CRLF breeding habitat ponds within the established forested wetland/riparian corridor on the site. Each of these ponds will have an excavated area of approximately 400–600 square feet with a maximum depth of 3–5 feet. The design of these ponds includes approximately 60% open water and 40% wetland vegetation, as well as the addition of habitat structural elements. These ponds will use groundwater to maintain the necessary ponding depth and duration for CRLF breeding habitat.

In addition, the project proposes to restore approximately 0.4 acre of oak-dominated riparian habitat, providing connectivity between existing riparian areas via active revegetation of a portion of the quarry floor. The riparian restoration will improve CRLF dispersal habitat, restore riparian vegetation within the

historically degraded drainage area, and ensure that the project results in a net ecological benefit to regulated woody riparian habitat along the Upper Quarry Historic Accessway and Drainage.

HYDROLOGY

EXISTING CONDITIONS

The project site is located in northwestern Santa Clara County and in the rain shadow of the Santa Cruz Mountains. The region's Mediterranean climate consists a cool, mild wet season and a warm, sunny dry season. The mean annual precipitation at the site is 20.3 inches. The wet season runs from November through April with 86% of the precipitation falling within this period. Precipitation is sparse from May through October and nearly absent during the summer months. Average temperatures in January range from a low of 38°F to a high of 56°F; in July, they vary from a low of 54°F to a high of 77°F. Total potential evapotranspiration losses are 49.3 inches, with 62% of these losses occurring from May through September.

Flows coming onto the project site are provided by natural rainfall-runoff via two small ephemeral streams terminating at Fall 1 and Fall 2. The first ephemeral streams routes runoff to Fall 1, via a 26.7-acre subwatershed, and enters the project site from the north. There is also localized runoff from the 8.5-acre abandoned quarry tributary to the quarry floor. Runoff infiltrates into the reclaimed quarry floor consisting of deep backfilled clayey loam soils that form a depression. In wetter years, the incoming runoff may exceed the infiltration capacity of the backfilled soils resulting in surface ponding within the depression area of the quarry floor. In extremely wet years, the depression in the quarry floor may fill to capacity and provide a surface water connection to the Upper Quarry Historic Accessway and Drainage. The second ephemeral stream routes runoff around the quarry floor via a berm and an approximately 400-foot long channelized section of stream terminating at Fall 2. Runoff from Fall 2, via a 45.4-acre subwatershed, enters the project site at the upstream end of the Upper Quarry Historic Accessway and Drainage low flow channel. Flows from the Upper Quarry Historic Accessway and Drainage are conveyed to Matadero Creek.

PROJECT CONDITIONS

Please refer to the attached restoration map for the location of key project features.

PROPOSED POND SITES

The proposed pond sites are located within the Upper Quarry Historic Accessway and Drainage, which receives a combination of surface runoff and groundwater. Surface runoff is provided by Fall 2 as well as an infrequent surface water connection with the quarry floor. The shallow perched groundwater prolongs the hydrologic regime of the Upper Quarry Historic Accessway and Drainage in the spring and the fall due to a combination of seep flow and surface runoff captured in the deep soils of the quarry floor.

The ponds within the Upper Quarry Historic Accessway and Drainage are designed to meet the CRLF hydroperiod requirements by daylighting the shallow perched groundwater which slowly draws down into the summer. The ponds will be constructed outside of the low flow channel within the floodplain of the Upper Quarry Historic Accessway and Drainage. In the winter, the ponds will initially be full due to groundwater and augmented by surface runoff. During wetter years, surface runoff may inundate the full width of the Upper Quarry Historic Accessway and Drainage thereby connecting the low flow channel and the ponds. However, the ponds will be constructed to not impede the low flow channel nor redirect surface runoff that would otherwise increase the delivery of sediment to Matadero Creek.

At the downstream end, a subsurface clay retention barrier may be installed immediately downstream of Pond Site 1 depending on the subsurface conditions encountered during construction. The purpose of the shallow subsurface barrier is to encourage shallow groundwater to stay relatively close to the surface in the dry season to maintain ample ponding depth to meet the CRLF hydroperiod requirements. The barrier will span most of the width of the Upper Quarry Historic Accessway and Drainage floodplain but will not cross the low flow channel. As such, low flows will not be impeded from entering Matadero Creek. Shallow subsurface flows will also not be impeded from entering Matadero Creek, but potentially enhanced, as the subsurface clay retention barrier is not designed to be completely impermeable and it is anticipated that hydraulic gradient across the downstream end of the project site will establish a new dynamic equilibrium.

At the upstream end, the construction access through the debris cleanup area will be re-naturalized with a swale constructed to resist erosion by potentially infrequent surface flows from the quarry floor. The bed of the swale will be constructed to the same slope as existing conditions, lined with geotextile fabric, and topped with locally sourced angular quarry rock. The banks of the swale will be seeded, mulched with straw, and lined with erosion control blanket. The swale has been designed to convey surface runoff from the quarry floor and to do so in a manner that would not increase the delivery of sediment to Matadero Creek.

PROPOSED RIPARIAN RESTORATION AREA

The proposed riparian restoration area is located on the quarry floor against the southern quarry wall and is intended to provide a habitat corridor between the existing upslope ponds to the west and the proposed ponds within the Upper Quarry Historic Accessway and Drainage. This planting area will enhance infiltration and will not alter surface water patterns as the potential surface water connection between the quarry floor and the drainage are very transitory.

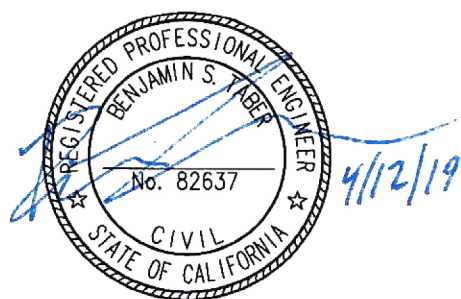
PROPOSED SPOILS PLACEMENT AREA

The proposed spoils placement area is located within the western portion of the quarry floor and within a portion of the depressional area of the quarry floor. However, the spoils placement area will not span the full width of the quarry floor to minimize changes to the current hydrologic function of the depressional area by not limiting infiltration and surface ponding nor impeding the potential surface water connection with the Upper Quarry Historic Accessway and Drainage in the wettest of years. Construction

of the spoils placement area will consist of excavating a shallow layer of the clayey loam topsoils, backfilling with excavated rocky material from the pond sites, covering the rocky material with the salvaged clayey loam topsoils, and mildly compacting with tracked equipment before seeding and mulching with straw. The spoils placement area will be constructed to not impede the natural surface water connection to the Upper Quarry Historic Accessway and Drainage nor redirect surface runoff that would otherwise increase the delivery of sediment to the drainage and ultimately to Matadero Creek. Regarding topsoil erosion by surface runoff within the quarry floor, the erosion potential is currently low due to the flat gradient, and the design of the spoils placement area will maintain that flat gradient. However, in the short term, should there be localized soil erosion until such time that vegetation fully matures, the sediment will be captured within the depressional area of the quarry floor where it will settle out and not be delivered downstream.

SUMMARY

The proposed project, as described above, will create new habitat to support CRLF populations on Stanford lands. The creation of new habitat requires a minimal amount of excavation and localized placement of excavated rocky material within the abandoned quarry. A detailed drainage analysis and calculations are not warranted as surface water quantity is not a design consideration as the project relies upon daylighting shallow groundwater and the proposed project is not within a regulatory floodway. Per the purpose of the grading design, the proposed project will not increase impervious area, will not redirect surface runoff within the quarry floor and drainage, will not impact the low flow channel within the drainage, will not impede the delivery of shallow subsurface flows to Matadero Creek, and will not increase the delivery of sediment to Matadero Creek.



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