Appendix B-3

Determination of Biologically Equivalent or Superior Preservation Report, Crescent Garden Cemetery
July 2024 updated October 2024
prepared by ELMT Consulting

Determination of Biologically Equivalent or Superior Preservation Report

Crescent Cemetery

CUP 230002

Permittee Name

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Applicant Name

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1 EXECUTIVE SUMMARY

This report contains the results of the Determination of Biologically Equivalent or Superior Preservation (DBESP) analysis to demonstrate compliance with the requirements of the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP) for impacts to riparian/riverine resources. The proposed project would construct a cemetery and related support facilities located in the unincorporated area of Riverside County in the community of Meadowbrook, north of Lake Elsinore.

One unnamed drainage feature (Drainage 1) was observed within the boundaries of the project site at the time of the investigation. Drainage 1 generally flows from south to north within the northwest portion of the project site. Drainage 1 enters the site on the southwest corner of the project site from Robert Street (also listed as Garfield Street) and flows in a west to east direction before flowing in a southeast to northwest direction across the western portion of the site. Drainage 1 conveys flows, primarily outside of the proposed limits of disturbance before terminating near the middle of the western half of the site. Drainage 1 receives flows from direct precipitation upstream and from the discharge waters of a well in the middle of the drainage, outside the proposed limits of disturbance, which was installed to provide water to onsite agricultural activities. The upstream portion of Drainage 1 appears to only support surface water immediately following storm events. Portions of Drainage 1, outside the proposed limits of disturbance, support a mixed riparian scrub plant community.

Approximately 0.93 acre (1,360 linear feet) of riparian/riverine habitat was mapped within the proposed project site. The riparian/riverine habitat is synonymous with the jurisdiction of the California Department of Fish and Wildlife (CDFW) jurisdictional streambed.

The proposed project design would create a permanent impact of 0.036 acre (96 linear feet) to the riverine habitat within Drainage 1 to install a culvert to support an interior roadway. The remaining 0.894 acre within Drainage 1 will be avoided by project design. The culvert would allow flows to pass through Drainage 1 as it does with the existing condition. The proposed mitigation area will be protected in perpetuity via a conservation easement. The conservation easement will be placed over the unimpacted 0.894 acre portion of Drainage 1 to ensure no building or disturbance occur over the long-term.

The applicant will mitigate impacts to 0.036 acre of riverine habitat through the annual management of 0.036 acres of the riverine/riparian habitat within the 0.894 acre conservation area through the implementation of a Habitat Mitigation Monitoring and Reporting Program (HMMP) to be approved by the County and/or regulatory agencies. Funding for long-term maintenance of the mitigation habitat will be directly funded by the development since grounds keeping staff is being proposed to conduct the long-term non-native species removal. The grounds keeping staff, responsible for managing the non-native removal, will need to be able to distinguish native California plant species from the non-native species in southern California's landscapes. The grounds keeping staff will be trained to distinguish native plant species from the non-natives. The training program and methods for ensuring that the training is kept current, both in terms of new weed or colonizing native species and staff turnover will be provided and approved in the HMMP.

The above actions would result in a net increase in the function and ecological value of riparian/riverine habitat within the region by preserving/encouraging high quality habitat within the existing drainage, and by ensuring that more than 95 percent of Drainage 1 would remain in its existing state in perpetuity through a conservation easement on future development over Drainage 1.

2 INTRODUCTION

This report contains the results of a Determination of Biologically Equivalent or Superior Preservation (DBESP) analysis to demonstrate compliance with the requirements of the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP) for impacts to riparian/riverine resources as a result of implementation of the proposed Crescent Cemetery (Project) located community of Meadowbrook.

Section 6.1.2 of the Western Riverside County MSHCP requires an assessment of the potentially significant effects of a project on Covered Species, riparian/riverine habitat, and vernal pools. This assessment is independent from considerations given to "waters of the United States" and "waters of the State" protected under the federal Clean Water Act (CWA) and the California Fish and Wildlife Code. Projects that propose to impact riparian/riverine or vernal pool resources within the MSHCP Plan Area, that cannot be avoided, require a mitigation strategy called a DBESP analysis to be completed to ensure that the proposed alternative provides for "replacement of any lost functions and values of Habitat as it relates to Covered Species." Conservation of these areas is intended to protect habitat that is essential to a number of listed, water-dependent amphibians, birds, fish, invertebrates, and plants.

As required by the MSHCP, a DBESP analysis must be conducted to address any impacts to riparian/riverine habitat. The objective of this report is to demonstrate that proposed mitigation would provide an equivalent or superior preservation of habitat function and value of riparian/riverine resources. The factors to be considered in analyzing the function and value include hydrologic regime, flood storage and flood flow modification, nutrient retention and transformation, sediment trapping and transport, toxicant trapping, public use, wildlife habitat, and aquatic habitat.

This DBESP analysis includes a detailed discussion of the riparian/riverine habitat on-site that is proposed to be impacted, and incorporates avoidance, minimization, and mitigation measures adequate to offset these impacts and bring them to a level of less than significant.

Based on the results of the Jurisdictional Delineation Report (Appendix A) prepared for the Project, approximately 0.93 acre (1,360 linear feet) was mapped and defined as Riparian/Riverine areas in the MSHCP because this feature is areas with fresh water flow during a portion of the year.

Based on the current design plan, approximately 0.036 acre of the 0.93 acre Drainage 1 would be permanently impacted by the installation of a culvert that would be approximately 8 feet wide by 2 feet high by 41 feet long. This would result in permanent impacts to approximately 0.036 acre (96 linear feet) of riparian/riverine habitat on the project site.

2.1 Project Area

The approximately 85-acre project site is generally located north and east of Interstate 15, south of State Route 74, and west of Interstate 215 in Riverside County, California. The project site is depicted on the Lake Elsinore quadrangle of the United States Geological Survey's (USGS) 7.5-minute topographic map within Section 22 of Township 5 South, Range 4 West. Specifically, the proposed project site is located south of River Road, west of the San Jacinto River, north of Canyon Lake, and east of Jarvis Street, and at the terminus of Garfield Street, within Assessor Parcel Numbers (APN) 349-170-003, -004, -005, -006, -007, -008, -009, -010, -011, -012, and -013; and 349-180-002, -004, -005, -006, -007, -008, -016, -017, -020, and -035 (lat 33.71705, long -117.281990). Refer to Exhibits 1-3 in Appendix A.

The project site is located at an approximate elevation of 1,540 to 1,670 feet above mean sea level and generally slopes from south to north with some areas bearing more defined sloping from southeast to northwest. The site occurs on the western periphery of the Temescal Mountains east of Railroad Canyon, resulting in hilly topography.

The 0.93 acre Drainage 1 and the 0.036 acre road culvert location are depicted on Exhibit 5.

2.2 Project Description

The project proposes to construct a 27-acre cemetery designed for approximately 20,000 gravesites, and related facilities located within approximately 84 acres in the unincorporated area of Riverside County in the community of Meadowbrook, north of Lake Elsinore (refer to Appendix B, *Site Plan*). The cemetery would be developed over approximately 15 years. Facilities include the following:

- Mortuary - approximately 5,500 square feet (sf) with around 43 of 137 parking spaces (1,300 sf for assembly area). The intent of the mortuary is for burial preparations and small family-oriented gatherings as needed. It will provide offices to support making funeral and burial arrangements, including religious services ancillary to the mortuary, with family attendance.

- Chapel – approximately 9,700 sf with 2,400 sf of assembly area. Parking for each land use is planned to be shared on both sides of the main entry. 77 parking spaces for the chapel of the 152 parking spaces. Total parking provided for this campus area is 137 parking spaces.

- Equipment Shed –approximately 1,400 sf.

- Caretaker Residence. A caretaker residence, approximately 2,200 sf, is planned. It may be a modular design with its own septic tank. It is located near the main chapel area where the site manager can monitor and service the cemetery.

- Three stormwater basins: two basins to be located within the western portion of the site immediately east of the proposed parking lot off of Garfield Road, and one located in the southeastern portion of the site.

- A series of interior paved roadways.

The main access to the site is from the eastern boundary, off of Garfield Street. The cemetery support facilities will also be located near the site entrance of Garfield Street. Access to the cemetery plots would be from a main interior roadway with branches to the various areas. The design of the interior roadways largely follow the existing pattern of dirt roads where possible.

2.2.1 – Road Culvert Description

The main interior roadway near the Garfield Street entrance, which serves as the main road to the branch roadways, currently exists as a dirt road. Drainage 1 currently flows over this dirt road as an "Arizona Crossing." As such, a culvert would be placed in Drainage 1 at its existing crossing in the dirt road to develop a safe, paved access road that feeds the branch roads to the cemetery grounds. The culvert would be approximately 8 feet wide by 2 feet high by 41 feet long, representing approximately 0.008 acre, with 0.028 acre supporting riprap.

Drainage 1 was studied as part of the overall Hydrology Study prepared for the Project (Appendix F) and is identified as an "existing swale" in the Hydrology Study. The Hydrology Study states that the existing swale running though the project site in Drainage Area A and the proposed roadway/culvert crossing were analyzed to determine the extent of the floorplan and the performance of the proposed road/culvert crossing using HEC-RAS software. Cross sections of the existing swale were developed and imported into the HEC-RAS Model. A 8' (W) x 2' (H) box culvert and the roadway embankment was added to the model. Peak flows of 200 cfs (100-year Storm) and 111 cfs (10-year Storm) as determined from node 110.5 of the Rational Analysis were used to run the HEC-RAS Model.

The results of the HEC-RAS model indicate that during the 100-year storm 134 cubic feet per second (cfs) will pass below the proposed roadway within the 8' (W) x 2' (H) box culvert. The remaining flow of 66 cfs will pass over the proposed roadway at a maximum depth of 8 inches, an average velocity of 2.1 fps, and a spread of 95 feet. The results of the model also indicated that entire 10-year peak flow (111 cfs) will pass below the roadway within the proposed culvert with no flow crossing the roadway. A cross section profile of the road and culvert is identified on the Project Grading Plans on file with the County, with an excerpt shown in Appendix F.

There are no other drainages on site. Given the terrain, there are no other developed or existing access roads or upland areas that could be utilized as the main access from Garfield to the cemetery plots. The proposed design avoids impacts to more than 95 percent of Drainage 1.

2.3 Existing Conditions

The project site primarily supports undeveloped land. Rural residential uses are located on the north, south, west, and northeastern boundaries. The entirety of the site has been subject to several decades of anthropogenic disturbances associated with historic agricultural land uses, grading activities, flood control infrastructure, weed abatement, and a dirt road network to support the previous activities and access for the

adjacent residences. Historic aerials show these activities have been ongoing since at least 1959. A more detailed historical timeline is provided below:

1967 - 1978: The project site and surrounding areas support primarily undeveloped, vacant land. Disturbances onsite include unpaved roadways. Scattered residential development occurs to the north and west. Robert Street is present to the west.

1978 - 1985: Additional residential development is present to the west, south, and southeast of the project site. Increased disturbance within the project site includes additional unpaved roadways. State Route 74 is constructed to the northwest.

1985 - 1994: Residential development continues to expand to the west and north of the project site. Bee boxes are installed in the northwest region of the site.

1994 - 2006: Minor development occurs within the boundaries of the project site concentrated in the northwest region. This development appears to be preliminary and is restricted to concrete footings for several small structures.

2006 - 2009: A well is installed in the northwest portion of the project site, within the parcel boundary, outside of the project footprint.

2009 - 2018: Minor disturbances continue onsite in association with the expansion of unpaved roadways, and intermittent stockpiling.

2018 - 2019: Onsite stockpiling increases. Storage containers are present near the northern boundary. Crops are visible to the southwest of the well.

2019 - 2021: More crops are visible to the west, north, east, and south southeast of the well.

2021 - Present: Trees have been cleared near the well and surrounding areas. Crops are no longer present.

Vegetation

The site consists of a mix of developed and undeveloped land that has been subject to a variety of anthropogenic disturbances. Two (2) natural plant communities were documented on the project site: Riversidean Sage Scrub (RSS) and Mixed Riparian Scrub. In addition, the site supports one (1) land cover type that would be classified as disturbed. Refer to Exhibit 4*, Vegetation*, in Appendix A.

Riversidean Sage Scrub

The more topographically variable portions of the project site, namely the northern and southern portions and the southeast periphery, support a Riversidean sage scrub plant consistent with other natural areas in the surrounding area. The RSS supported on-site is dominated by a variety of woody perennials and supports a robust herbaceous layer. Vegetative cover in the RSS supported by the project site generally varies from moderate (>50%) to dense (>80%) with pockets of complete cover. Common native plant

species observed in the RSS supported by the site include Deerweed (*Acmispon glaber*), fiddleneck (*Amsinckia sp.*), California sagebrush (*Artemisia californica*), golden stars (*Bloomeria crocea*), splendid mariposa-lily (*Calochortus splendens*), common sandaster (*Corethrogyne filaginifolia*), dove weed (*Croton setiger*), coyote melon (*Cucurbita palmata*), valley cholla (*Cylindropuntia bernardina*), sacred datura (*Datura wrightii*), fasciculated tarplant (*Deinandra fasciculata*), paniculate tarplant (*Deinandra paniculata*), bush sunflower (*Encelia californica*), brittlebush (*Encelia farinosa*), sapphire woollystar (*Eriastrum sapphirinum*), California buckwheat (*Eriogonum fasciculatum*), slender buckwheat (*Eriogonum gracile*), golden yarrow (*Eriophyllum confertiflorum*), rattlesnake sandmat (*Euphorbia albomarginata*), matchweed (*Gutierrezia californa*), heliotrope (*Heliotropium curassavicum*), chaparral yucca (*Hesperoyucca whipplei*), Californica juniper (*Juniperus californica*), chaparral bush mallow (*Malacothamnus fasciculatus*), wishbone bush (*Mirabilis laevis*), showy penstemon (*Penstemon spectabilis*), holly leaf cherry (*Prunus ilicifolia*), perennial tobacco species (*Pseudognaphalium sp.*), spiny redberry (*Rhamnus crocea*), fragrant sumac (*Rhus aromatica*), white sage (*Salvia apiana*), chia sage (*Salvia columbariae*), blue elderberry (*Sambucus mexicana*), wire lettuce (*Stephanomeria exigua*), and vinegar weed (*Trichostema lanceolatum*). Common non-native plant species observed in the RSS supported on-site include giant reed (*Arundo donax*), broadleaf filaree (*Erodium botrys*), red-stemmed filaree (*Erodium cicutarum*), mustard (*Hirschfeldia incana*), cheeseweed (*Malva parviflora*), horehound (*Marrubium vulgare*), Brazilian pepper (*Schinus terebinthifolius*), and milk thistle (*Silybum marianum*).

Mixed Riparian Scrub

The northwestern portion of the project site supports a mixed riparian scrub plant community on the banks of Drainage 1. Common native plant species observed in the plant community include, black willow (*Salix gooddingii*), baccharis (*Baccharis salicina*), pit seed goosefoot (*Chenopodium berlandieri*), coyote melon, sacred datura, giant wild rye (*Elysmus condensatus*), matchweed, heliotrope, wire rush (*Juncus balticus*), duck weed (*Lemna* sp.), chaparral bush mallow, arroyo willow (*Salix lasiolepsis*), rough hedge nettle (*Stachys rigida*), and stinging nettle (*Urtica dioica*). Common non-native plant species observed in this plant community include tree of heaven (*Ailanthus altissima*), red gum (*Eucalyptus camaldulensis*), horehound, tree tobacco (*Nicotiana glauca*), and London rocket (*Sisymbrium irio*).

It should be noted that several large red gum trees in this area appear to have been partially harvested, as several trunks remain intact while missing the majority of their mass above lateral chainsaw cuts. This portion of the site also appears to have supported some kind of horticultural or agricultural operation, as suggested by swathes of evenly spaced plants that are visible on historical aerial imagery from August 2019 to January 2023. The areas supporting growing operations were removed around January 2023.

Disturbed

Disturbed land generally encompasses areas where historic impacts or land uses have removed natural plant communities from an area and where routine disturbance prevents the re-establishment of a natural plant community. Within the boundaries of the project site, disturbed land is present throughout most of the southern portion of the site, in the western periphery of the site, and within and along a series of dirt trails and access roads that are routinely impacted by off-highway recreational vehicle access and other off-roading activities. Developed land supported on-site is generally barren and often supports dense

monocultures of such species as dove weed, paniculate tarplant, brittlebush, vinegar weed, mustard, and stinknet (*Oncosiphon pilulifer*), and remnant stands of long-lived perennials that are adapted to routine disturbance such as California juniper. Other common native plant species observed in the disturbed land supported by the project site include deerweed, bush sunflower, California buckwheat, slender buckwheat, rattlesnake sandmat, matchweed, heliotrope, and Californica juniper. Other common non-native plant species observed include oats (*Avena* spp.), foxtail brome (*Bromus madritensis*), red brome (*Bromus rubens*), tocalote (*Centaurea melitensis*), yellow star thistle (*Centaurea solstitialis*), broadleaf filaree, red-stemmed filaree, red gum, cheeseweed, tree tobacco, Jerusalem thorn (Parkinsonia aculeata), Russian thistle (Salsola tragus), milk thistle, and London rocket.

Jurisdictional Resources

One unnamed, ephemeral drainage feature (Drainage 1) was observed within the boundaries of the project site at the time of the investigation (refer to Exhibit 5 in Appendix A). Drainage 1 generally flows from south to north within the northwest portion of the project site. Drainage 1 enters the site on the southwest corner of the project site from Robert Street (also listed as Garfield Street) and flows in a west to east direction before flowing in a southeast to northwest direction across the western portion of the site. Drainage 1 conveys flows, primarily outside of the proposed limits of disturbance before terminating near the middle of the western half of the site. Drainage 1 receives flows from direct precipitation upstream and from the discharge waters of a well (i.e., leaking) in the middle of the drainage, outside the proposed limits of disturbance, which was installed to provide water to onsite agricultural activities. The upstream portion of Drainage 1 appears to only support surface water immediately following storm events. Portions of Drainage 1, outside the proposed limits of disturbance, support a mixed riparian scrub plant community.

3 RIPARIAN/RIVERINE MITIGATION (SECTION 6.1.2)

3.1 Methods

Section 6.1.2 of the MSHCP, identifies Riparian/Riverine resources as lands which contain habitat dominated by trees, shrubs, persistent emergent vegetation, or emergent mosses and lichens, which occur close to or which depend upon soil moisture from nearby fresh water sources, or areas with freshwater flow during all or a portion of the year.

Riverine habitat includes all wetlands and deep-water habitats contained in natural or artificial channels periodically or continuously containing flowing water or which forms a connecting link between the two bodies of standing water. Riverine habitat is bounded on the landward side by upland, by the channel bank (including natural and man-made levees), or by wetlands dominated by trees, shrubs, persistent emergents, mosses, or lichens. In braided streams, the system is bounded by the banks forming the outer limits of the depression within which the braiding occurs. Springs discharging into a channel are considered part of the riverine habitat.

The term riparian is used to define the type of wildlife habitat found along the banks of a river, stream, lake or other body of water. Riparian habitats are ecologically diverse and can be found in many types of environments including grasslands, wetlands and forests.

Based on the results of a Delineation of State and Federal Jurisdictional Waters Report (refer to Appendix D) prepared under a separate cover, one (1) unnamed drainage feature, identified as Drainage 1, was observed on the project site. Approximately 0.93 acre (1,360 linear feet) of riparian/riverine habitat was mapped within the proposed project site. The riparian/riverine habitat is synonymous with the jurisdiction of the California Department of Fish and Wildlife (CDFW) jurisdictional streambed. The western portion of the drainage feature, where the 0.036 acre of impacts will occur, does not support riparian habitat would be considered riverine habitat since it is ephemeral and primarily supports upland plant species. The middle portion of Drainage 1, outside of the proposed limits of disturbance, supports a mixed riparian scrub plant community that will be considered riparian habitat under the MSHCP. As a result, overall, Drainage 1 will be considered riparian/riverine habitat under Section 6.1.2 of the MSHCP.

The mixed riparian scrub associated with Drainage 1 provides low quality habitat for the State- and federally-listed as endangered least Bell's Vireo (*Vireo bellii pusillus* [LBVI]), outside of the proposed limits of disturbance. It is not expected to provide suitable habitat for the other riparian obligate species listed under the MSHCP that may occur within the regional vicinity, including southwestern willow flycatcher (*Empidonax traillii extimus*), or yellow-billed cuckoo (*Coccyzus americanus*).

The composition of the mixed riparian scrub supported on-site has been degraded by invasive plant species, namely tree of heaven, and previous agricultural activities. The mixed riparian scrub, located outside of the proposed limits of disturbance does not have a contiguous willow canopy, and does not provide the dense, multi-storied canopy for southwestern willow flycatcher and yellow-billed cuckoo. Due to incomplete canopy, limited acreage, and lack of riparian plant species diversity of the mixed riparian scrub supported

on-site, the habitat associated with the on-site drainage feature was determined not to provide suitable habitat for southwestern willow flycatcher and yellow-billed cuckoo.

However, the mixed riparian scrub plant community has the potential to provide low quality habitat for LBVI. LBVI do not require the dense multi-storied riparian canopy that southwestern willow flycatcher and yellow-billed cuckoo need. The mixed riparian scrub has a degraded and inconsistent canopy throughout the length of the drainage and generally provides limited nesting opportunities by LBVI. However, the area of project impact (the area where Drainage 1 crosses an existing dirt road that would be developed by the project) does not provide nesting opportunities due to the extreme degradation inconsistency of the canopy and presence significant invasive species that are not favored by LBVI.

Therefore, the project would not impact riparian species, including LBVI, due to the fact that riparian vegetation does not exist in the direct impact area of the project's road culvert. The degraded and inconsistent canopy does exist within several feet of the proposed road culvert improvements, but construction is not required in these areas to construct the road culvert. Further, a pre-construction nesting bird clearance survey is required, which would further ensure that there would be no impacts to bird species associated with riparian plant communities. Because of the poor quality of the habitat adjacent to the planned culvert, and that no riparian vegetation exists directly within the planned construction limits, no focused surveys are deemed necessary.

The portion of Drainage 1 that will be impacted is considered riverine.

Vernal Pools

One of the factors for determining the suitability of the habitat for fairy shrimp would be demonstrable evidence of seasonal ponding in an area of topographic depression that is not subject to flowing waters. These astatic pools are typically characterized as vernal pools. More specifically, vernal pools are seasonal wetlands that occur in depression areas without a continual source of water. They have wetland indicators of all three parameters (soils, vegetation, and hydrology) during the wetter portion of the growing season but normally lack wetland indicators of hydrology and/or vegetation during the drier portion of the growing season. Obligate hydrophytes and facultative wetlands plant species are normally dominant during the wetter portion of the growing season. The determination that an area exhibits vernal pool characteristics and the definition of the watershed supporting vernal pool hydrology is made on a case-by-case basis. Such determinations should be considered the length of time the areas exhibit upland and wetland characteristics and the manner in which the area fits into the overall ecological system as a wetland. The seasonal hydrology of vernal pools provides for a unique environment, which supports plants and invertebrates specifically adapted to a regime of winter inundation, followed by an extended period when the pool soils are dry.

Vernal pools are seasonally inundated, ponded areas that only form in regions where specialized soil and climatic conditions exist. During fall and winter rains typical of Mediterranean climates, water collects in shallow depressions where downward percolation of water is prevented by the presence of a hard pan or clay pan layer (duripan) below the soil surface. Later in the spring when rains decrease and the weather warms, the water evaporates and the pools generally disappear by May. The shallow depressions remain

relatively dry until late fall and early winter with the advent of greater precipitation and cooler temperatures. Vernal pools provide unusual "flood and drought" habitat conditions to which certain plant and wildlife species have specifically adapted as well as invertebrate species such as fairy shrimp.

The MSHCP lists two general classes of soils known to be associated with listed and special-status plant species; clay soils and Traver-Domino Willow association soils. The specific clay soils known to be associated with listed and special-status species within the MSHCP plan area include Bosanko, Auld, Altamont, and Porterville series soils, whereas Traver-Domino Willows association includes saline-alkali soils largely located along floodplain areas of the San Jacinto River and Salt Creek.

Based on the NRCS USDA Web Soil Survey, the project site is historically underlain by Cieneba rocky sandy loam (8 to 15 percent slopes, eroded), Cieneba rocky sandy loam (15 to 50 percent slopes, eroded), Lodo rocky loam (8 to 25 percent slopes, eroded), Lodo rocky loam (25 to 50 percent slopes, eroded), Vallecitos loam (thick solum variant, 8 to 15 percent slopes, eroded), and Vista coarse sandy loam (8 to 15 percent slopes, eroded). Refer to Exhibit 6, *Soils*, in Appendix A.

Therefore, none of the soil types associated with listed and/or special status species within the MSHCP are documented on site. Without the appropriate soils to create the impermeable restrictive layer, none of the special-status plant or wildlife species associated with vernal pools can occur on the project site.

There are three species of fairy shrimp with the potential to occur on-site: vernal pool fairy shrimp (*Branchinecta lynchi*), Riverside fairy shrimp (*Streptocephalus woottoni*), and versatile fairy shrimp (*Branchinecta lindahli*). Vernal pool (*lynchi*) fairy shrimp are federally listed as threatened, and Riverside fairy shrimp (*woottoni*) are federally listed as endangered, whereas the versatile fairy shrimp (*lindahli*) is relatively common and is not listed or considered sensitive. Vernal pool fairy shrimp (*lynchi*) have the widest geographic range of the federally listed vernal pool crustaceans and occur from southern Oregon to northern and central California, generally west of the Sierra Nevada, to southern California. The species' range extends south to Orange and Los Angeles counties and east to western Riverside County but is generally absent from San Diego County. Vernal pool fairy shrimp are found in vernal pools and other vernal pool-like habitats such as ephemeral ponds or features that can be formed from anthropogenic events such as tire ruts. Riverside fairy shrimp can be found in Riverside, Orange, and San Diego counties and occur in vernal pools and other ephemeral features with long inundation times. The versatile fairy shrimp (*lindahli*) is common in pools throughout California and can co-occur with vernal pool (*lynchi*) and Riverside fairy shrimp (*woottoni*).

To determine if the ponded areas onsite support the three species of fairy shrimp, Fairy Shrimp surveys were conducted in the dry season of 2023, the wet season of 23-24 and the dry season of 2024 (Helix 2023 and 2024, refer to Appendix E).

All survey events combined sampled a total of 38 features within the project site. Based on the information gathered from all surveys and factoring the nearest known location for vernal pool fairy shrimp (*B. lynchi)* it is presumed that the federally listed vernal pool fairy shrimp (*B. lynchi)* is absent from the site. Both results for wet and dry season surveys did not indicate presence of Riverside fairy shrimp (S. *woottoni*). As

a result, Riverside fairy shrimp (S. *woottoni*) is also presumed absent from the project site. According to the survey reports, the only species present on site is the non-listed versatile fairy shrimp (*B. lindahli*).

3.2 Results/Impacts

The on-site drainage patterns collectively performs the following functions within the local area of the watershed: regulation of nuisance flows, energy dissipation, nutrient cycling, retention of particulates, nutrient/particulate uptake from off-site, upstream development, and connectivity with similar habitat downstream. Drainage 1, within the project footprint, will be considered riverine habitat under the MSHCP. Water across the access road, where the culvert will be installed, within Drainage 1 will be maintained. No impacts to the flow of water within Drainage 1 are anticipated.

The culvert to be installed in Drainage 1 is designed to maintain the existing level of water flow in the drainage to downstream resources as indicated by the Hydrology Study and by the design as identified on Appendix F. Therefore, there would be no downstream effects to the flow of water within Drainage 1.

The proposed project generally avoids impacts to Drainage 1 except to install a culvert in the drainage to facilitate the development of one of the cemetery interior roadways. The culvert will be approximately 8 feet wide by 2 feet high by 41 feet long. This would result in permanent impacts to approximately 0.036 acre (96 linear feet) of riparian/riverine habitat on the project site.

The project has been designed to avoid 0.894 acre of the Drainage 1, which represents the majority of Drainage 1, with only 0.036 acre of impacts associated with the installation of the culvert within the existing dirt road that would serve as a main cemetery interior feeder road. There is no development planned for, nor is there an anticipated need to expand into the area that contains the 0.894 acre of Drainage 1. Therefore, by design, the project has south to avoid impacts to Drainage 1 to the maximum extent possible.

Table 1: Impacts to Riparian/Riverine Habitat

Jurisdictional Feature	Riparian/Riverine Habitat	
	Onsite Jurisdiction (acreage/linear feet)	**Project Impacts – Riverine** (acreage/linear feet)
Drainage 1	0.93 (1,360)	0.036 (96)
TOTAL	**0.93 (1,360)**	**0.036 (96)**

3.3 Mitigation and Equivalency

3.3.1 Direct Effects

Mitigation for the loss of 0.036-acre of riparian/riverine habitat within Drainage 1 would occur onsite as there are currently no available off-site restoration credits at approved mitigation banks. A conservation easement would be placed over the 0.894 acre remainder of Drainage 1 as shown on Exhibit 3.

As mitigation for the riverine/riparian impacts, the applicant would maintain and manage 0.036 acre of habitat within this 0.894 acre area. Management would be performed by the applicant in accordance with a HMMP to be submitted to the agencies for approval. Given the small size of the area, the applicant proposes to conduct the activities outlined in the HMMP in lieu of having a third party maintain 0.036 acre within a 0.894 acre area. Primary activities would include the removal of the extensive invasive species, such as Tree of Heaven, that is present within this 0.894 acre remainder of Drainage 1. The on-site maintenance activities would be conducted in accordance with an HMMP to be developed but are anticipated to occur annually and would be located anywhere within the 0.894 acre area as needed to remove invasive species. The maintenance activities would be designed promote the natural establishment of native riparian species in the 0.894 acre area by removing invasive species.

Funding for long-term maintenance of the mitigation habitat will be directly funded by the development since grounds keeping staff is being proposed to conduct the long-term non-native species removal. The grounds keeping staff, responsible for managing the non-native removal, will need to be able to distinguish native California plant species from the non-native species in southern California's landscapes. The grounds keeping staff will be trained to distinguish native plant species from the non-natives. The training program and methods for ensuring that the training is kept current, both in terms of new weed or colonizing native species and staff turnover will be provided and approved in the HMMP.

As noted in Section 3.1 of this document, the riparian habitat within Drainage 1 overall has been degraded by invasive plant species, namely tree of heaven, and previous agricultural activities. The mixed riparian scrub, located outside of the proposed limits of disturbance does not have a contiguous willow canopy, and does not provide the dense, multi-storied canopy for southwestern willow flycatcher and yellow-billed cuckoo, and only very limited nesting opportunities for LBVI outside of the area of disturbance. The riparian vegetation does not exist in the project impact area because this is the same location where Drainage 1 crosses an existing dirt road as an "Arizona Crossing."

Therefore, although the proposed project would not avoid all impacts to Drainage 1, the project would be biologically equivalent or superior to that which would occur under an avoidance alternative because the proposed design limits impacts to installation of a culvert in an existing dirt road crossing, maintains the existing drainage pattern of Drainage 1, provides for no development in any other area of Drainage 1, and provides for higher quality habitat to be developed on site, within the existing riverine/riparian habitat.

3.3.2 Indirect Effects

Approximately 0.894 acre within Drainage 1 will be avoided by design. A conservation easement would be put in placed over this 0.894 acre to restrict any building or modification of this 0.894 acre remainder of Drainage 1.

The project hydrology in the area is not expected to change with project implementation because the culvert will allow for flows to pass through the existing drainage, as identified by the Project Hydrology Study.

Additionally, the following minimization measures will be incorporated into the project design to ensure that all indirect project-related impacts to riparian/riverine habitat occurring west of the project site that will not be directly impacted, including impacts from fugitive dust, toxics, invasive plant species, and grading/land development, are avoided or minimized to the greatest extent feasible.

Fugitive Dust

During soil excavation, grading, or other subsurface disturbance, the construction superintendent shall supervise provision and maintenance of all standard dust control best management practices (BMPs) to reduce fugitive dust emissions, including but not limited to the following actions:

- Water any exposed soil areas a minimum of twice per day, or as allowed under any imposed drought restrictions. On windy days or when fugitive dust can be observed leaving the construction site, additional water shall be applied at a frequency to be determined by the on-site construction superintendent.
- Pave, periodically water, or apply chemical stabilizer to construction access/egress points.
- Minimize the amount of area disturbed by clearing, grading, earthmoving, or excavation operations at all times.
- Operate all vehicles on graded areas at speeds less than 15 miles per hour.
- Cover all stockpiles that will not be utilized within three days with plastic or equivalent material, to be determined by the on-site construction superintendent, or spray them with a non-toxic chemical stabilizer.

Runoff - Toxics

To address potential short-term impacts to water quality from construction runoff that may carry storm water pollutants downstream, a Storm Water Pollution Prevention Program (SWPPP) shall be implemented by the construction contractor as required by the California General Construction Storm Water Permit pursuant to State Water Quality Control Board and Regional Board regulations. The SWPPP shall identify BMPs related to the control of toxic substances, including construction fuels, oils, and other liquids. These BMPs will be implemented by the Applicant's contractor prior to the start of any ground clearing activity, shall be subject to periodic inspections by the County and the project's hydrological consultant, and shall be maintained throughout the construction period and remain in place until all landscape and permanent BMPs are in place. BMPs shall be monitored and repaired if necessary to ensure maximum erosion, sediment, and pollution control.

- Permittee shall prohibit the use of erosion control materials potentially harmful to fish and wildlife species, such as mono-filament netting (erosion control matting) or similar material, within and adjacent to jurisdictional areas.

- All fiber roles[1], straw waddles, and/or hay bales utilized within and adjacent to the project site shall be free of non-native plant materials.
- Permittee shall comply with all litter and pollution laws. All contractors, subcontractors, and employees shall also obey these laws and it shall be the responsibility of Permittee to ensure compliance.
- Permittee shall not allow water containing mud, silt, or other pollutants from grading, aggregate washing, or other activities to enter a lake, streambed, or flowing stream or be placed in locations that may be subjected to high storm flows.
- Spoil sites shall not be located within a lake, streambed, or flowing stream or locations that may be subjected to high storm flows, where spoil shall be washed back into a lake, streambed, or flowing stream where it will impact streambed habitat and aquatic or riparian vegetation.
- Raw cement/concrete or washings thereof, asphalt, paint, or other coating material, oil or other petroleum products, or any other substances which could be hazardous to fish and wildlife resources resulting from project related activities shall be prevented from contaminating the soil and/or entering the waters of the State. These materials, placed within or where they may enter a lake, streambed, or flowing stream by Permittee or any party working under contract or with the permission of Permittee, shall be removed immediately.
- No equipment maintenance shall be done within or near any lake, streambed, or flowing stream where petroleum products or other pollutants from the equipment may enter these areas under any flow.
- No broken concrete, cement, debris, soil, silt, sand, bark, slash, sawdust, rubbish, or washings thereof, oil or petroleum products, or other organic or earthen material from any construction or associated activity of whatever nature shall be allowed to enter into or be placed where it may be washed by rainfall or runoff into waters of the State. When operations are completed, any excess materials or debris shall be removed from the work area. No rubbish shall be deposited within 150 feet of the edge of any lake, streambed, or flowing stream.

Accidental Encroachments During Construction

The following measures shall also be incorporated into the construction documents and specifications, and implemented by the contractor, to avoid potential construction-related impacts to riparian/riverine habitat west of and outside of the approved disturbance limits:

- Construction worker training shall be provided by a qualified biologist at the first pre-construction meeting;
- No equipment shall be operated in areas of flowing water,

[1] Fiber rolls or erosion control mesh shall be made of loose-weave mesh that is not fused at the intersections of the weave, such as jute, or coconut (coir) fiber, or other products without welded weaves. Non-welded weaves reduce entanglement risks to wildlife by allowing animals to push through the weave, which expands when spread.

Post-Construction Human Disturbances

The project shall incorporate special edge treatments designed to minimize edge effects by providing a safe transition between developed areas and the adjacent riparian/riverine habitat, which would be compatible with project operation and the protection. Special edge treatments shall include approved landscaping on the boundary of the project site.

4 NARROW ENDEMIC PLANT SPECIES MITIGAITON (SECTION 6.1.3)

The Project site is not located within a Narrow Endemic Plant Species Survey Area (NEPSSA) area, therefore, no focused surveys are required. There would be no impacts, direct or indirect, and no mitigation required. No further consistency with the MSHCP is required regarding NEPSSA species.

5 ADDITIONAL SURVEY NEEDS (SECTION 6.3.2)

The project site falls within a survey area for only burrowing owl. The site does not fall within a boundary to conduct other surveys for amphibians, mammals or Delhi sands flower-loving fly. Therefore, only applicable species surveys are addressed in this section.

5.1 Criteria Area Species Survey Area – Plants

The Project site is not located within a Criteria Area Species Survey Area for plants; therefore, no focused surveys were required and no further consistency with the MSHCP is required in regard to Criteria Area Species Survey Area for plants.

5.2 Burrowing Owl

Burrowing owl is currently designated as a California Species of Special Concern. The burrowing owl is a grassland specialist distributed throughout western North America where it occupies open areas with short vegetation and bare ground within shrub, desert, and grassland environments. Burrowing owls use a wide variety of arid and semi-arid environments with level to gently-sloping areas characterized by open vegetation and bare ground. The western burrowing owl (*A.c. hypugaea*), which occurs throughout the western United States including California, rarely digs its own burrows and is instead dependent upon the presence of burrowing mammals (i.e., California ground squirrels, coyotes, and badgers) whose burrows are often used for roosting and nesting. The presence or absence of colonial mammal burrows is often a major factor that limits the presence or absence of burrowing owls. Where mammal burrows are scarce, burrowing owls have been found occupying man-made cavities, such as buried and non-functioning drain pipes, stand-pipes, and dry culverts. They also require low growth or open vegetation allowing line-of-sight observation of the surrounding habitat to forage and watch for predators. In California, the burrowing owl breeding season extends from the beginning of February through the end of August.

5.2.1 Methods

Under the MSHCP burrowing owl is considered an adequately conserved covered species that may still require focused surveys in certain areas as designated in Figure 6-4 of the MSHCP. The project site is not located within a MSHCP designated burrowing owl survey area. However, a habitat suitability assessment was conducted. In accordance with the MSHCP Burrowing Owl Survey Instructions (2006), survey protocol consists of two steps, Step I – Habitat Assessment and Step II – Locating Burrows and Burrowing Owls. The following section describes the methodology followed during the burrowing owl habitat assessment conducted for this project.

- Step I – Habitat Assessment: Step 1 of the MSHCP habitat assessment for burrowing owl consists of a walking survey to determine if suitable habitat is present onsite. The habitat assessment was conducted on November 15, and 16, 2023. Upon arrival at the project site, and prior to initiating the assessment survey, binoculars were used to scan all suitable habitats on and adjacent to the property, including perch locations, to establish owl presence.

All suitable areas of the project site were surveyed on foot by walking slowly and methodically while recording/mapping areas that may represent suitable owl habitat onsite. Primary indicators of suitable burrowing owl habitat in western Riverside County include, but are not limited to, native and non-native grassland, interstitial grassland within shrub lands, shrub lands with low density shrub cover, golf courses, drainage ditches, earthen berms, unpaved airfields, pastureland, dairies, fallow fields, and agricultural use areas. Burrowing owls typically use burrows made by fossorial mammals, but they often utilize man-made structures, such as earthen berms, cement culverts, cement, asphalt, rock, wood debris piles, openings beneath cement or asphalt pavement. Burrowing owls are often found within, under, or in close proximity to man-made structures.

According to the MSHCP guidelines, if suitable habitat is present, the biologist should also walk the perimeter of the property, which consists of a 150-meter (approximately 500 feet) buffer zone around the project site boundary. If permission to access the buffer area cannot be obtained, the biologist shall not trespass, but visually inspect adjacent habitats with binoculars. In addition to surveying the entire Project Site all bordering natural habitats located immediately adjacent to the Project Site were assessed. Results from the habitat assessment indicate that suitable resources (i.e., low growing vegetation that provides line of site opportunities) for burrowing owl are present throughout the project site. Accordingly, if suitable habitat is documented onsite or within adjacent habitats, both Step II, focused burrow surveys and the 30-day preconstruction surveys are required in order to comply with the MSHCP guidelines.

- Step II – Locating Burrows and Burrowing Owls: Concurrent with the initial habitat assessment, a detailed focused burrow survey was conducted and included documentation of appropriately sized natural burrows or suitable man-made structures that may be utilized by burrowing owl - as part of the MSHCP protocol, which is described below under Part A, Focused Burrow Survey. The MSHCP protocol indicates that no more than 100 acres should be surveyed per day/per biologist.

    - Part A – Focused Burrow Survey: A systematic survey for burrows, including burrowing owl sign, was conducted by walking across all suitable habitats mapped within the project site on November 13, and 16, 2023. Pedestrian survey transects were spaced to allow 100% visual coverage of the ground surface. The distances between transect centerlines were no more than 30 meters (approximately 100 feet) apart, and owing to the terrain, often much smaller. Transect routes were also adjusted to account for topography and in general ground surface visibility. Areas providing potential habitat for burrowing owls were surveyed for suitable burrows, consisting of natural and non-natural substrates in areas with low, open vegetation. All burrows encountered were examined for shape, scat, pellets, white-wash, feathers, tracks, and prey remains. Suitable burrows/sites, including rock piles and non-natural substrates, were thoroughly examined for signs of presence.

    - Part B – Focused Burrow Survey: Due to surrounding development to the west, a zone of influence was not able to be surveyed; however, these areas do not support suitable habitat for burrowing owls. Some areas to the north and east of the project site within 500 feet,

support dense vegetation and were determined not to provide suitable habitat. Survey transects on the project site were oriented north to west and were conducted at a maximum of 30-meter (approximately 100 feet) intervals to ensure 100% visual coverage of all areas in suitable habitat on the project site, and within the survey area. The focused burrowing owl surveys were conducted during the recognized timeframe (the breeding season is typically March through August) in the morning one hour before sunrise to two hours after sunrise.

Suitable burrows/sites, including rock piles and non-natural substrates, were thoroughly examined for signs of presence. All burrows encountered were examined for shape, scat, pellets, white-wash, feathers, tracks, and prey remains. The location of all suitable burrowing owl habitat, potential owl burrows, burrowing owl sign, and any owls observed were recorded and mapped, with a hand-held GPS unit, if observed. Methods to detect presence of burrowing owls included direct observation, aural detection, and signs of presence. Binoculars were used to observe distant birds and their activity around potential nesting habitat. The survey area was assessed on foot by qualified biologists Travis J McGill, Rachael A. Lyons, and Megan E. Peukert, who are knowledgeable in the habitats and behavior of burrowing owls.

5.2.2 Results/Impacts

Four focused burrowing owl surveys were conducted on May 10 and 31 and June 14 and 28, 2024. All surveys were completed between 0630 and 1030. The surveys were conducted to document the presence/absence of burrowing owl on the project site. Refer to Table 1, *Survey Data*, for a summary of the survey dates and times, personnel, weather conditions, and general findings.

Table 2: Burrowing Owl Survey Data

Survey No.	Survey Date	Surveyor	Time	Temperature (˚F)	Cloud Cover	Wind Speed (mph)	Burrowing Owl Detected On-Site
1	5/10/24	Travis J. McGill, Rachael Lyons & Megan E. Peukert	0630-1000	66-73	10%	0-5	No
2	5/31/24	Megan E. Peukert & Rachael Lyons	0700-1030	65-68	30%	0-5	No
3	6/14/24	Travis J. McGill, Rachael Lyons & Megan E. Peukert	0630-1030	65-69	30%	0-5	No
4	6/28/24	Megan E. Peukert & Rachael Lyons	0700-1030	67-74	0%	0-5	No

Based on the results of the 2024 burrowing owl focused surveys, no burrowing owls or evidence of recent or historic use by burrowing owls were observed on the project site. As a result, burrowing owls are presumed to be absent from the project site.

5.2.3 Mitigation and Equivalency

5.2.3.1 Direct Effects

To ensure burrowing owl remain absent from the project site, it is recommended that a 30-day burrowing owl pre-construction clearance survey be conducted in accordance with the *Burrowing Owl Survey Instructions for the Western Riverside Multiple Species Habitat Conservation Plan Area* prior to any ground disturbing activities. If burrowing owls and/or birds displaying nesting behaviors are observed within the project site during future construction, further review may be needed to ensure compliance with the MSHCP, MBTA and Fish and Game Code.

5.2.3.2 Indirect Effects

If no burrowing owls are found onsite during the pre-construction clearance survey, and with, no indirect effects to burrowing owl are expected to occur.

5.3 Mammals, Amphibians, Delhi Sands Flower-Loving Fly

Based on the MSHCP results, there are no overlays or habitat for any other mammal or amphibian species, or Delhi Sands Flower-Loving Fly. Therefore, no further discussion is warranted.

6 REFERENCES

Google, Inc. 2021. Google Earth Pro version 7.3.6.9796. Build date 2/22/2024.

ELMT Consulting Inc. 2024. Habitat Assessment and MSHCP Consistency Analysis for the Crescent Cemetery Project.

ELMT Consulting Inc. 2024. Delineation of State and Federal Jurisdictional Waters Report for the Crescent Cemetery Project.

Helix Environmental Planning. 2024. 2023 Dry Season Survey Report for the Meadowbrook-Crescent Garden Project

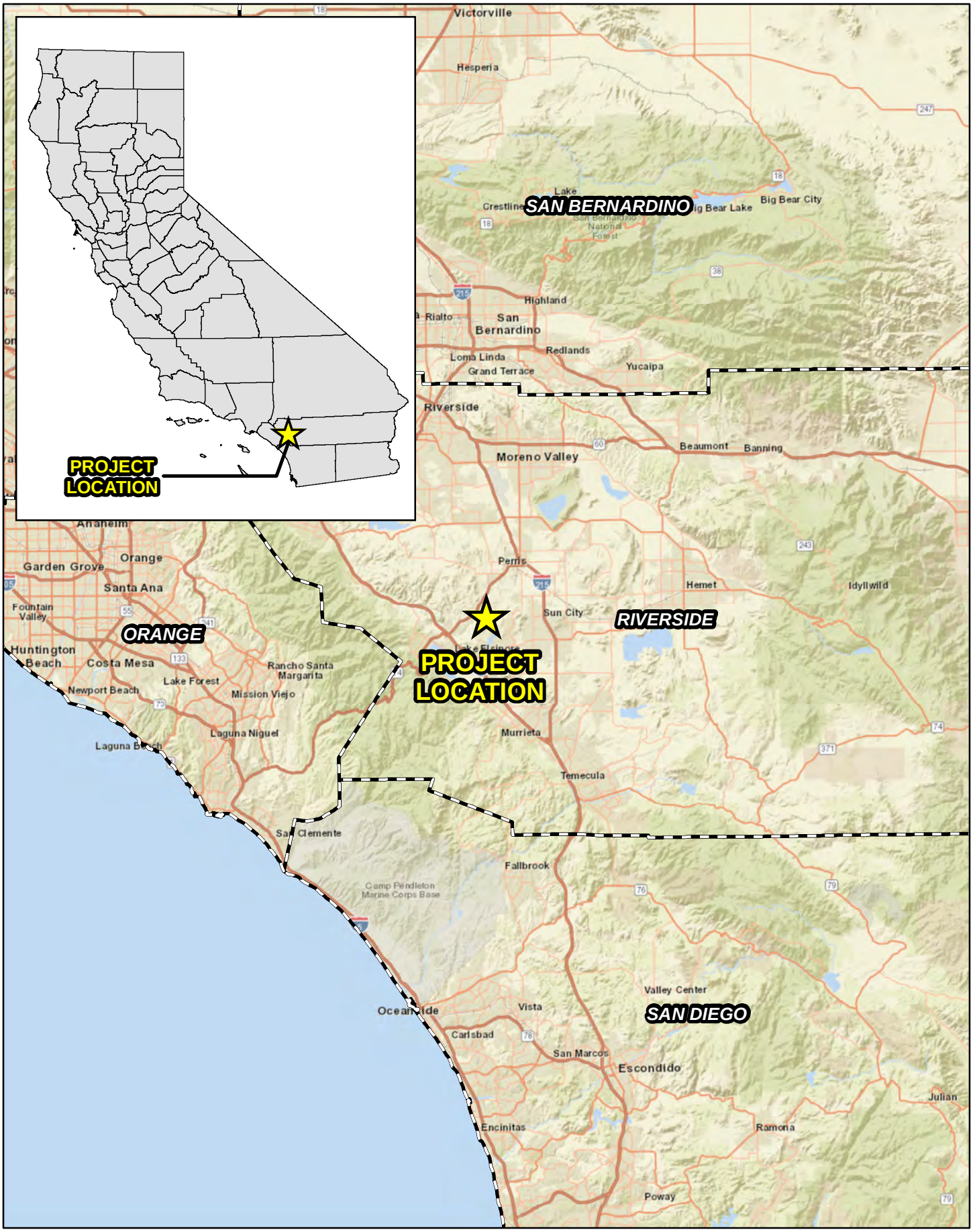
Riverside County. 2003 (June). Final Western Riverside County Multiple Species Habitat Conservation Plan. Available online at http://www.rcip.org/.

USFWS (United States Fish and Wildlife Service). 2000. Southwestern Willow Flycatcher Protocol Revision 2000. Sacramento, California: USFWS. https://www.fws.gov/pacific/ecoservices/endangered/recovery/documents/SWWFlycatcher.2000.protocol.pdf

USFWS. 2001. Least Bell's Vireo Survey Guidelines. January 19, 2001. Sacramento, California: USFWS. https://www.fws.gov/cno/es/Recovery_Permitting/birds/least_bells_vireo/LeastBellsVireo_SurveyGuidelines_20010119.pdf

USFWS. 2015. A Natural History Summary and Survey Protocol for the Western Distinct Population Segment of the Yellow-Billed Cuckoo. Prepared by M. Halterman, M.J. Johnson, J.A. Holmes, and S.A. Laymon. Sacramento, California: USFWS. April 2015. https://www.fws.gov/southwest/es/Documents/R2ES/YBCU_SurveyProtocol_FINAL_DRAFT_22Apr2015.pdf

Appendix A Project Exhibits



ELMT CONSULTING

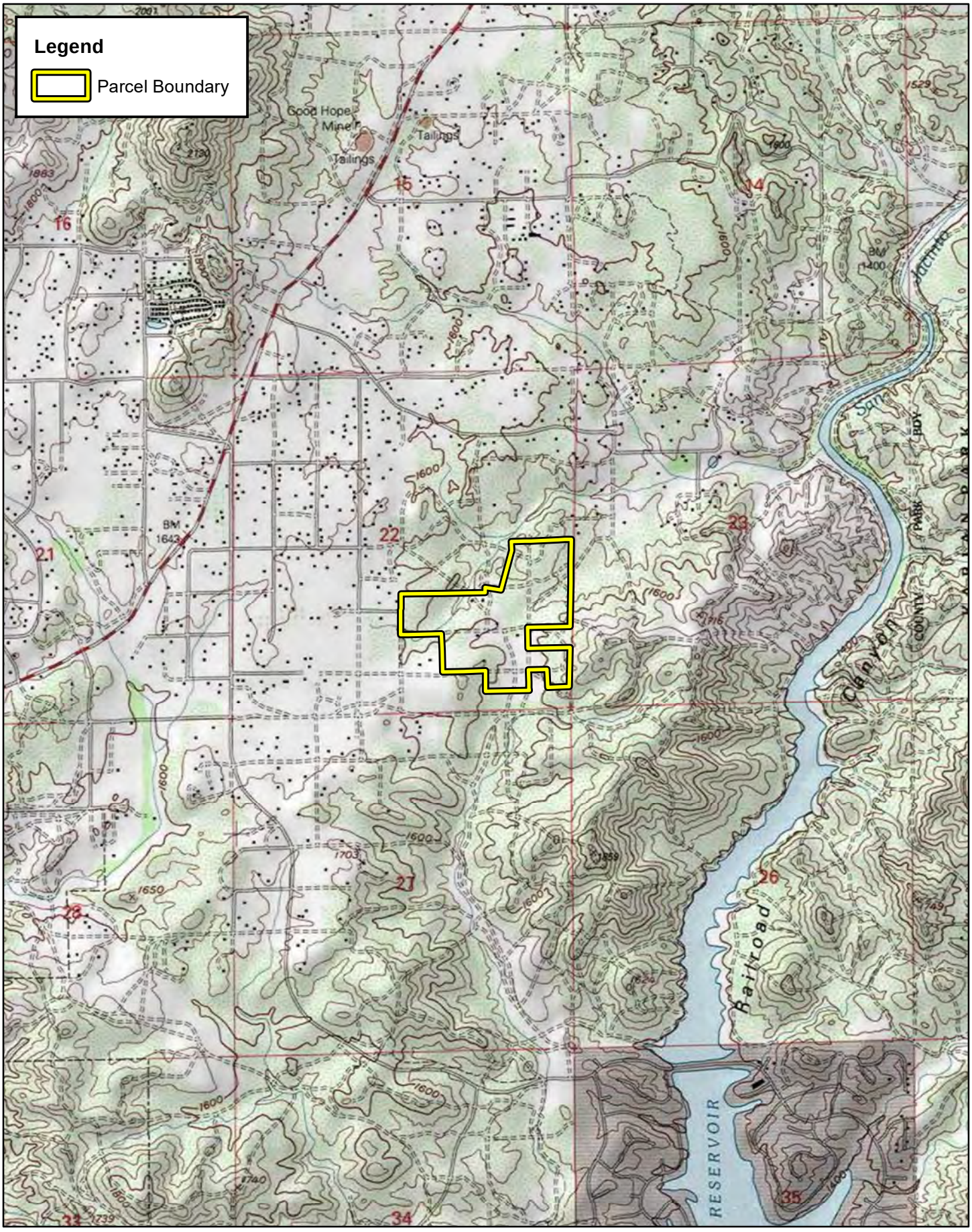
0 5 10 20 Miles

Source: World Street Map, Riverside County

CRESCENT CEMETERY

Regional Vicinity

Exhibit 1



ELMT CONSULTING

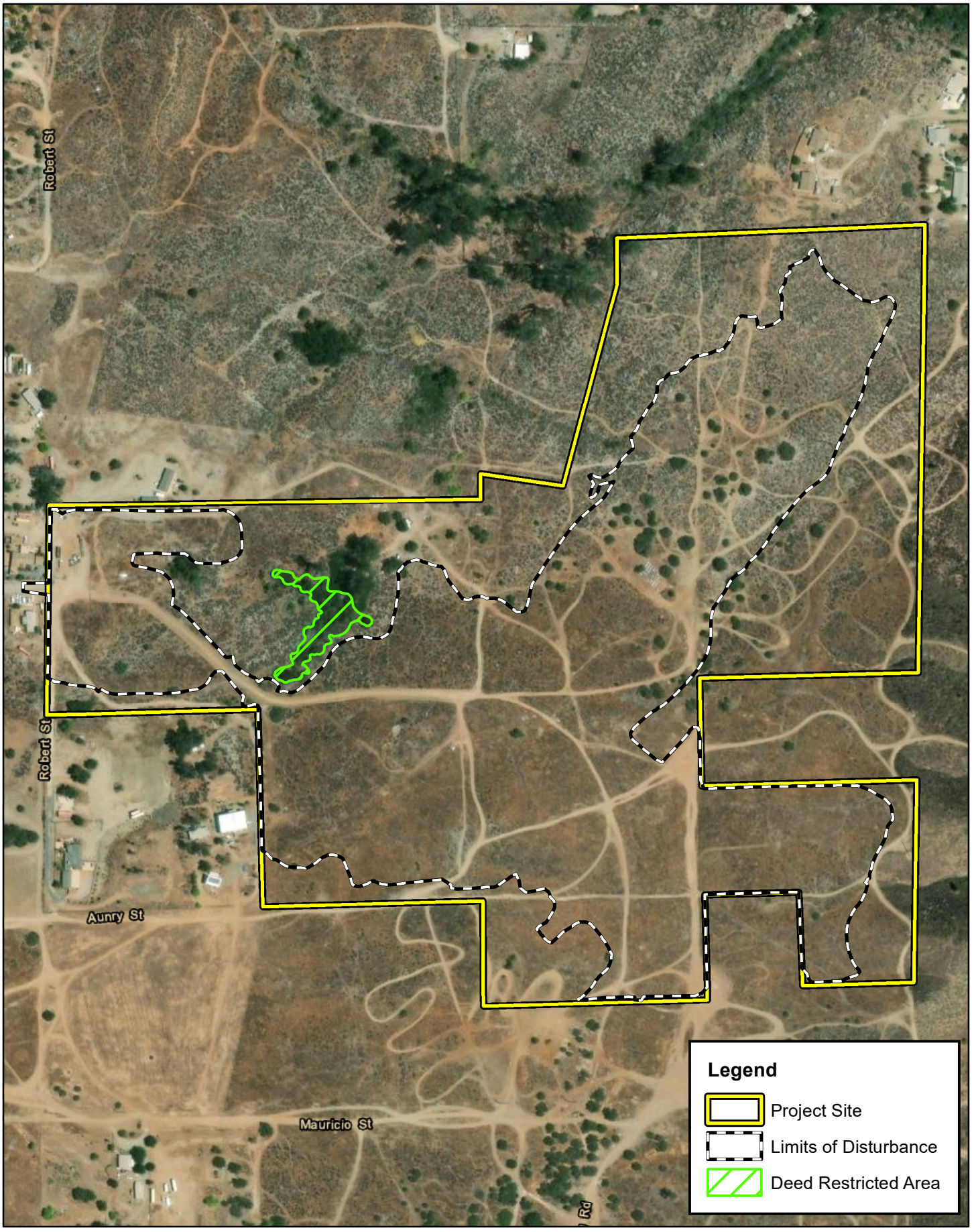
0 1,000 2,000 4,000 Feet

Source: USA Topographic Map, Riverside County

CRESCENT CEMETERY

Site Vicinity

Exhibit 2



ELMT CONSULTING

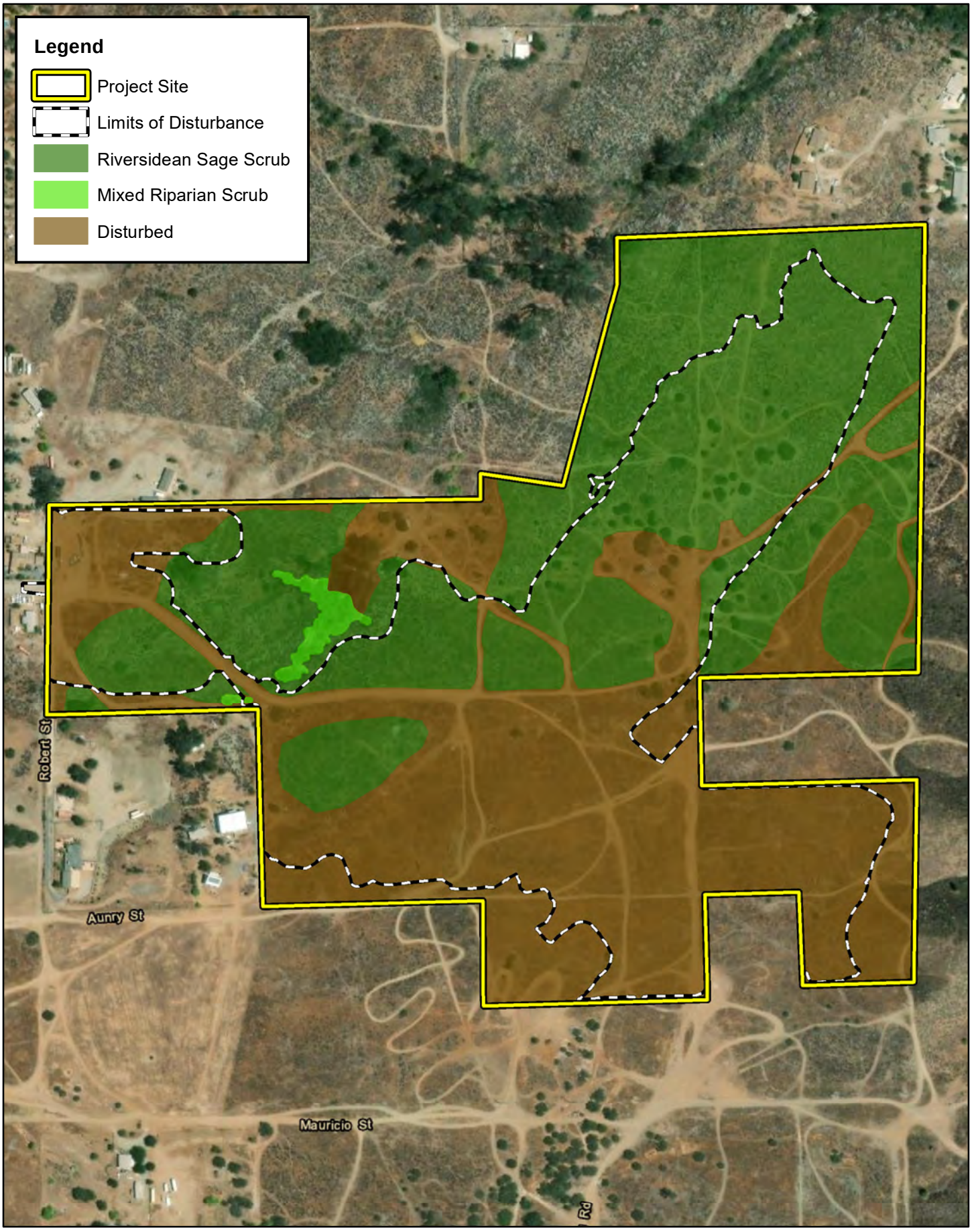
0 125 250 500 Feet

Source: ESRI Aerial Imagery, Riverside County

CRESCENT CEMETERY

Project Site

Exhibit 3



ELMT CONSULTING

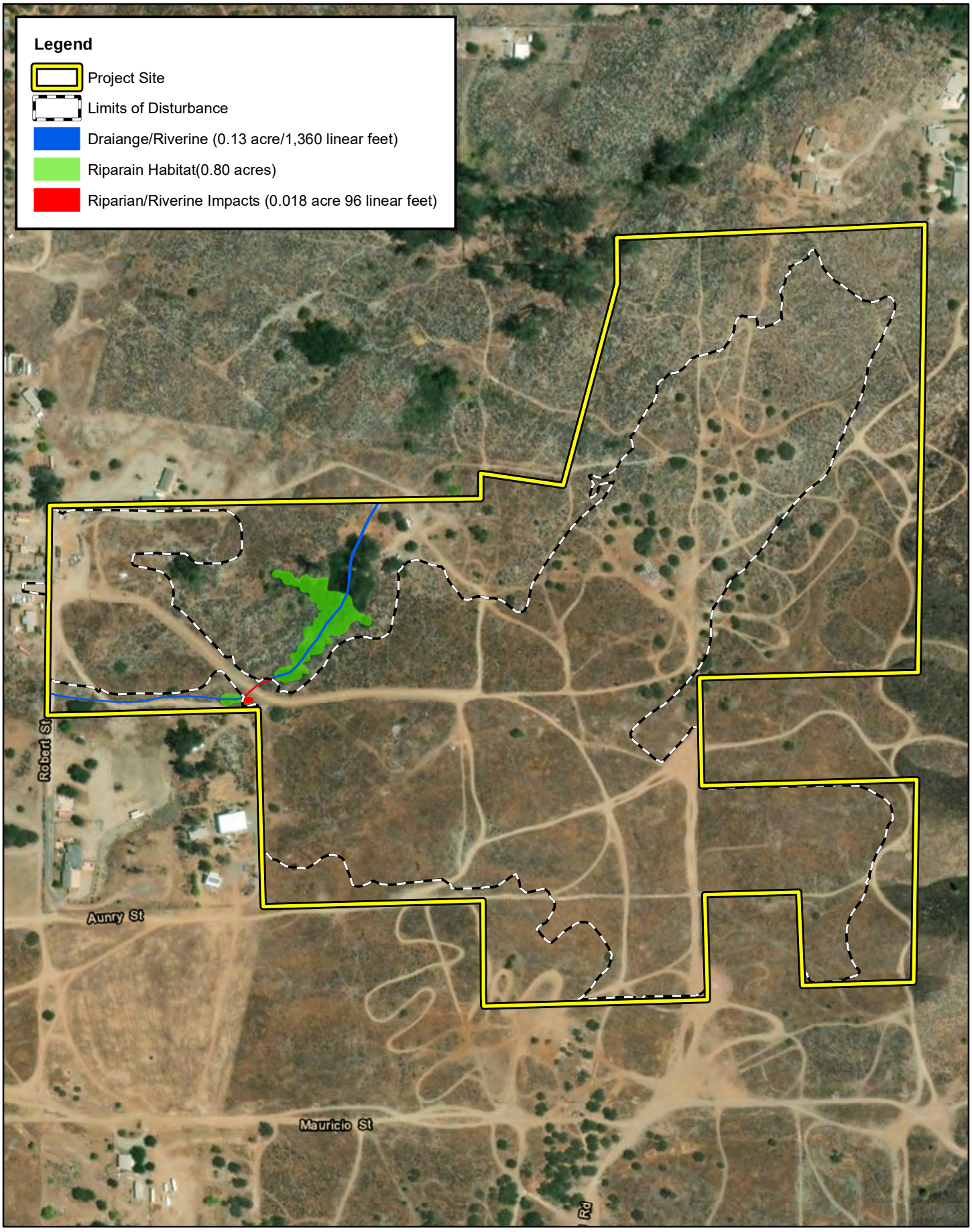
0 125 250 500 Feet

Source: ESRI Aerial Imagery, Riverside County

CRESCENT CEMETERY

Vegetation

Exhibit 4



ELMT CONSULTING

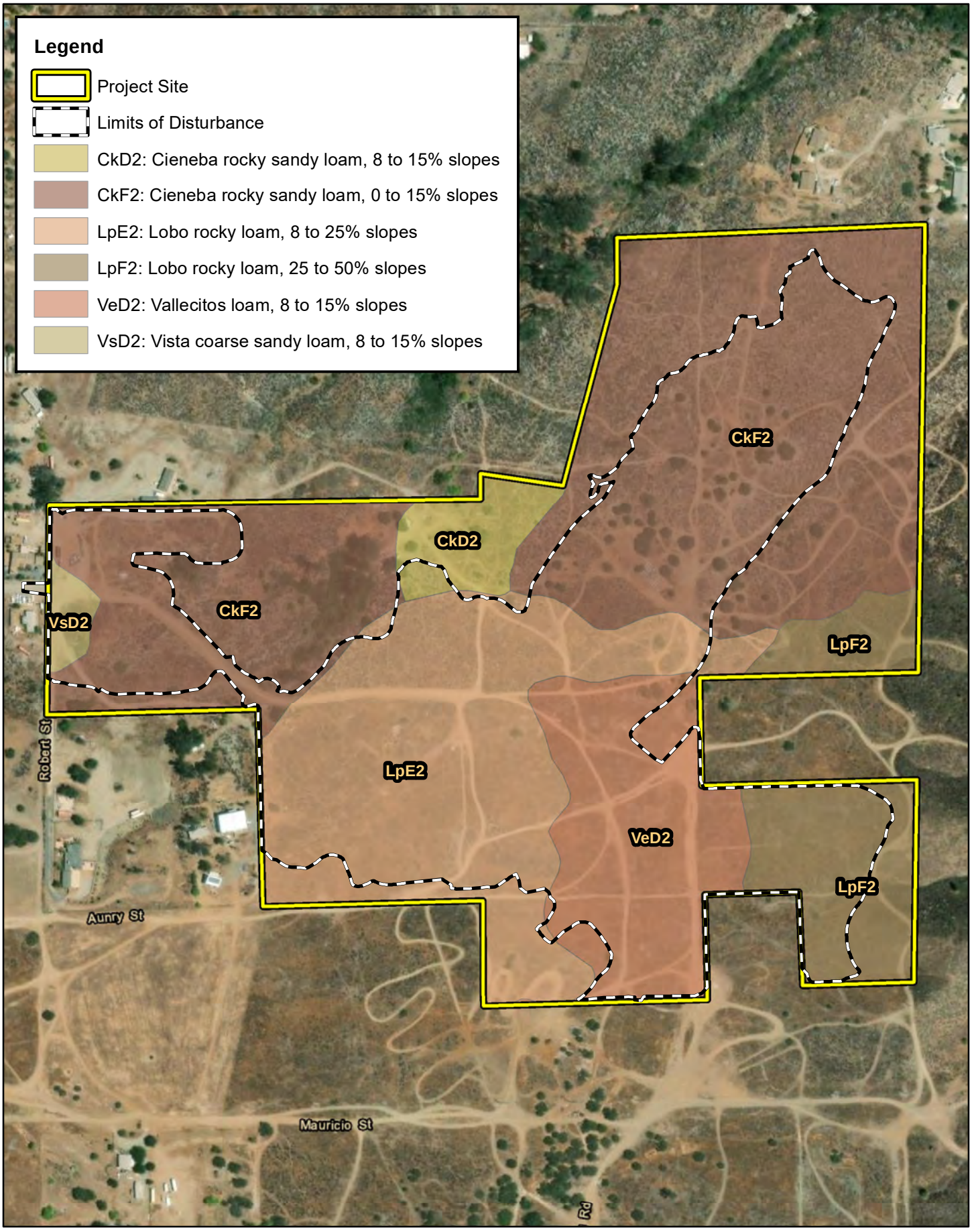
0 125 250 500 Feet

Source: ESRI Aerial Imagery, Riverside County

CRESCENT CEMETERY

Riparian/Riverine Habitat

Exhibit 5



ELMT CONSULTING

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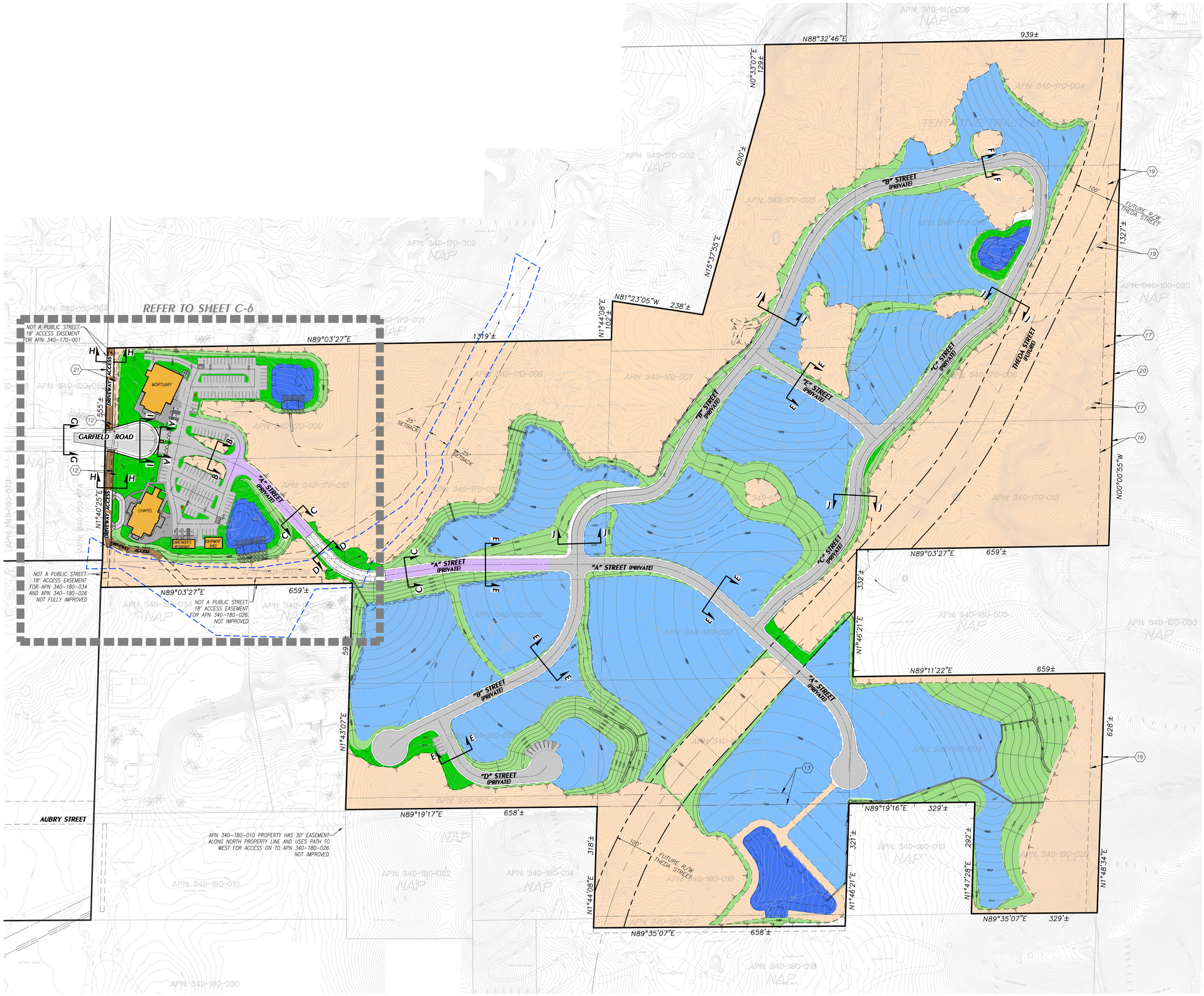
Source: ESRI Aerial Imagery, Soil Survey Geographic Database, Riverside County

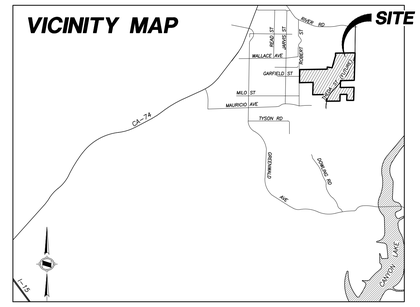
CRESCENT CEMETERY

Soils

Exhibit 6

Appendix B Site Plan





NOTES

1. REFER TO ENCUMBRANCE EXHIBIT, SHEETS C-2 AND C-3, FOR EASEMENT LOCATIONS.
2. REFER TO SHEET C-6 FOR STREET CROSS SECTIONS.
3. FOR GENERAL NOTES REFER TO SHEET C-1.

LEGEND

- PROJECT BOUNDARY LINE
- PROPOSED RIGHT OF WAY
- PROPOSED LOT LINE
- PROPOSED CURB
- EXISTING LOT LINE
- PROPOSED EASEMENT LINE
- PROPOSED CENTERLINE
- FENCE
- DAYLIGHT
- 4"W EXISTING WATER
- SD PROPOSED STORM DRAIN
- FLOOD PLAIN LIMITS (PER PRELIMINARY HYDROLOGY)
- JD STREAM BASED ON VCS ENVIRONMENTAL FIELD SURVEY
- WALL
- TOP OF SLOPE
- TOE OF SLOPE
- FIRE HYDRANT
- FIRE LANE (24' WIDTH)
- LANDSCAPE SLOPES 1:1 TO 4:1
- LANDSCAPE AREA
- OPEN SPACE AREA
- WATER QUALITY AND DETENTION BASINS
- BUILDING FOOTPRINT
- PERMEABLE PAVEMENT
- ASPHALT PAVEMENT
- CONCRETE PAVEMENT
- AGGREGATE BASE

Project Area: 84.99 Acres	
Open Space Summary	**Acres**
Grave Site	24.5
Natural Open Space	37.4
Slopes 1:1 to 4:1	9.3
Landscape Areas	1.9
Total	**73.0**
Detention Basins	**1.5 Acres**

* REFER TO PHASING PLAN

FEET
0 50 100 200
INCHES
0 1/2 1 2

APPLICANT:
MUSLIM MORTUARY & CEMETERY COMMITTEE
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GARDEN GROVE, CA 92843
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CRESCENT GARDENS CEMETERY, COUNTY OF RIVERSIDE

CONDITIONAL USE PERMIT - CUP230002

SITE PLAN - OVERALL

REVISION	
DATE	DESCRIPTION

DESIGNED BY: _____
DRAFTED BY: P.R.
CHECKED BY: _____
DATE: 11/29/23
CITY FILE NO.:
SHEET C-5

W.O.: 4427-2

DATE: Nov. 29, 2023 10:41:37 AM FILE: F:\1167\Planning\SA_CUP 230003\Exh_CUP\C05_SiteOverall_CUP 230002.dwg

Appendix C Habitat Assessment and Western Riverside County MSHCP Consistency Analysis

CRESCENT CEMETERY

CONDITIONAL USE PERMIT CUP230002

UNINCORPORATED RIVERSIDE COUNTY, CALIFORNIA

LAKE ELSINORE USGS 7.5-MINUTE TOPOGRAPHIC QUADRANGLE
SECTION 22, TOWNSHIP 5 SOUTH, RANGE 4 WEST
APNS: 3491-700-05, -06, -07, -08, -09, -10, -11, -12, AND -13; AND
3491-800-02, -04, -05, -06, -07, -08, -16, -17, -20, AND -35

Habitat Assessment and Western Riverside County Multiple Species Habitat Conservation Plan Consistency Analysis

---

Prepared For:

Muslim Mortuary and Cemetery Committee
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Prepared By:

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2201 N. Grand Avenue #10098
Santa Ana, California 92711
Contact: *Travis J. McGill*

July 2024

CRESCENT CEMETERY

UNINCORPORATED RIVERSIDE COUNTY, CALIFORNIA

Habitat Assessment and Western Riverside County Multiple Species Habitat Conservation Plan Consistency Analysis

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The undersigned certify that the statements furnished in this report and exhibits present data and information required for this biological evaluation, and the facts, statements, and information presented is a complete and accurate account of the findings and conclusions to the best of our knowledge and beliefs.



Travis J. McGill
Director/Biologist



Thomas J. McGill, Ph.D.
Managing Director

July 2024

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Appendix E Crotch Bumble Bee Survey

Section 1 Introduction

This report contains the findings of ELMT Consulting's (ELMT) Habitat Assessment and Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP) consistency analysis for the proposed Crescent Cemetery Project (project, site) located in unincorporated Riverside County, California. The report was prepared to document baseline conditions and assess the potential for special-status [1] plant and wildlife species to occur within the boundaries of the proposed project that could pose a constraint to project implementation. Special attention was given to the suitability of the on-site habitat to support special-status species identified by the California Department of Fish and Wildlife's (CDFW) California Natural Diversity Database (CNDDB) and other electronic databases as potentially occurring in the general vicinity of the project. Additionally, the report also addresses resources protected under the Migratory Bird Treaty Act (MBTA) and California Fish and Game Code (FGC), federal Clean Water Act (CWA) regulated by the United States Army Corps of Engineers (Corps) and Regional Water Quality Control Board (Regional Board) respectively, and Section 1602 of the FGC administered by CDFW.

The County of Riverside is a signatory to the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP). Since the County will be the lead agency for the proposed project, the project will need to be consistent with the rules and regulations set forth in the MSHCP. The Western Riverside County Regional Conservation Authority (RCA) MSHCP Information Map was queried to determine if the MSHCP identifies any potential survey requirements for the project. Further, the project site was reviewed against the MSHCP to determine if the site is located within any MSHCP areas including Criteria Cells (core habitat and wildlife movement corridors) or areas proposed for conservation. Based on the RCA MSHCP Information Map query and review of the MSHCP, it was determined that the project site is located within the Elsinore Area Plan of the MSHCP but is not located within any Criteria Cells or MSHCP Conserved Lands. In addition, the project site is only located within the designated survey area for burrowing owl (*Athene cunicularia*).

1.1 PROJECT LOCATION

The project site is generally located north and east of Interstate 15, south of State Route 74, and west of Interstate 215 in Riverside County, California (Exhibit 1, *Regional Vicinity*). The project site is depicted on the Lake Elsinore quadrangle of the United States Geological Survey's (USGS) 7.5-minute topographic map within Section 22 of Township 5 South, Range 4 West (refer to Exhibit 2, *Site Vicinity*, and Exhibit 3, *Project Site (Aerial View)*). Specifically, the proposed project site is located south of River Road, west of the San Jacinto River, north of Canyon Lake, and east of Jarvis Street within Assessor Parcel Numbers (APN) 349-170-003, -004, -005, -006, -007, -008, -009, -010, -011, -012, and -013; and 349-180-002, -004, -005, -006, -007, -008, -016, -017, -020, and -035.

[1] As used in this report, "special-status" refers to plant and wildlife species that are federally, State, and MSHCP listed, proposed, or candidates; plant species that have been designated with a California Native Plant Society Rare Plant Rank; wildlife species that are designated by the CDFW as fully protected, species of special concern, or watch list species; and specially protected natural vegetation communities as designated by the CDFW.

1.2 PROJECT DESCRIPTION

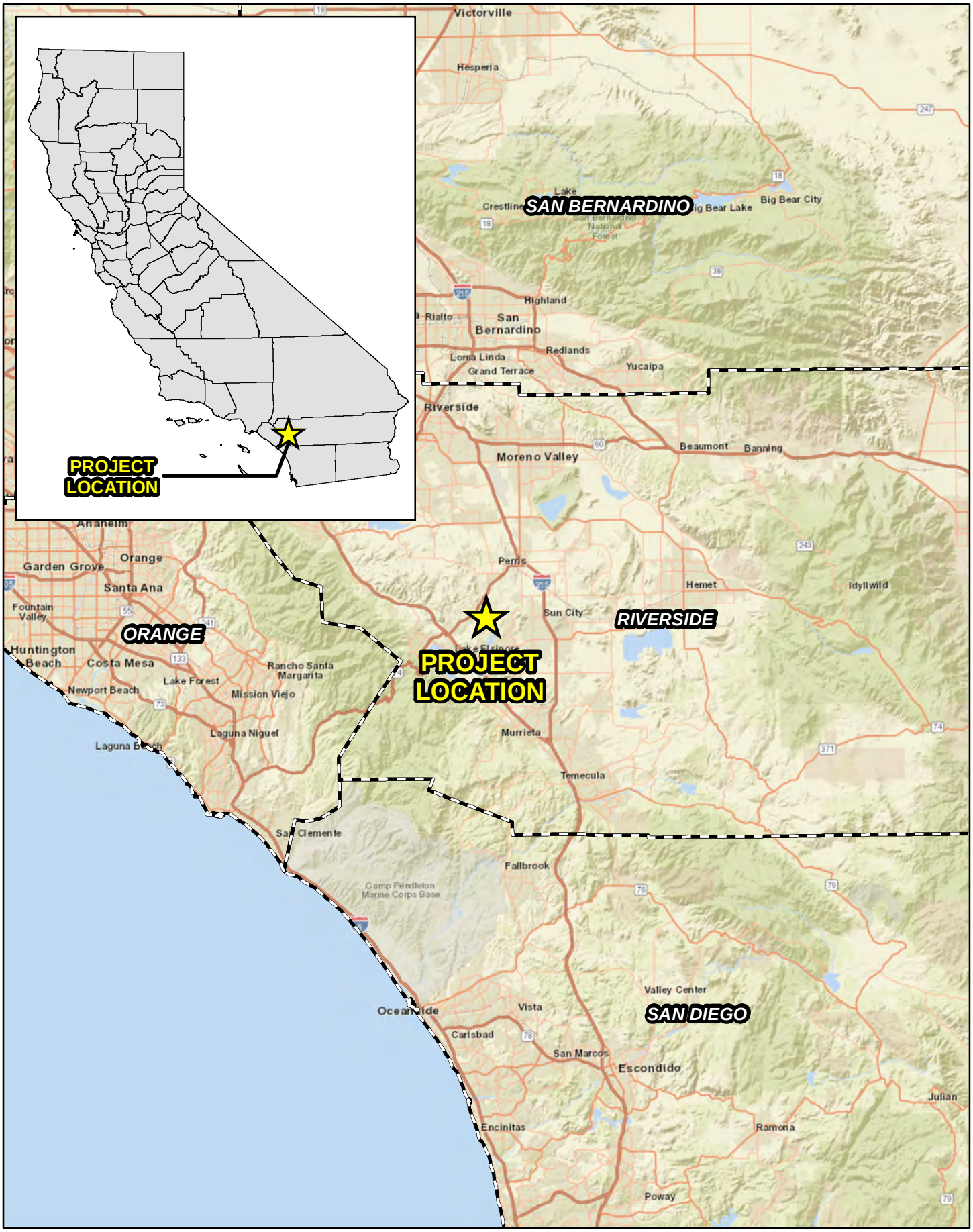
The project proposes to construct a cemetery and related support facilities designed for +/- 20,000 gravesites located in the unincorporated area of Riverside County in the community of Meadowbrook, north of Lake Elsinore (Exhibit 4: *Project Open Space Plan*). The cemetery would be developed over approximately 15 years. Facilities include the following:

- Mortuary - approximately 5,500 square feet (sf) with around 43 of 137 parking spaces (1,300 sf for assembly area). The intent of the mortuary is for burial preparations and small family-oriented gatherings as needed. It will provide offices to support making funeral and burial arrangements, including religious services ancillary to the mortuary, with family attendance.

- Chapel – approximately 9,700 sf with 2,400 sf of assembly area. Parking for each land use is planned to be shared on both sides of the main entry. 77 parking spaces for the chapel of the 152 parking spaces. Total parking provided for this campus area is 137 parking spaces.

- Equipment Shed –approximately 1,400 sf.

- Caretaker Residence. A caretaker residence, approximately 2,200 sf, is planned. It may be a modular design with its own septic tank. It is located near the main chapel area where the site manager can monitor and service the cemetery.



ELMT CONSULTING

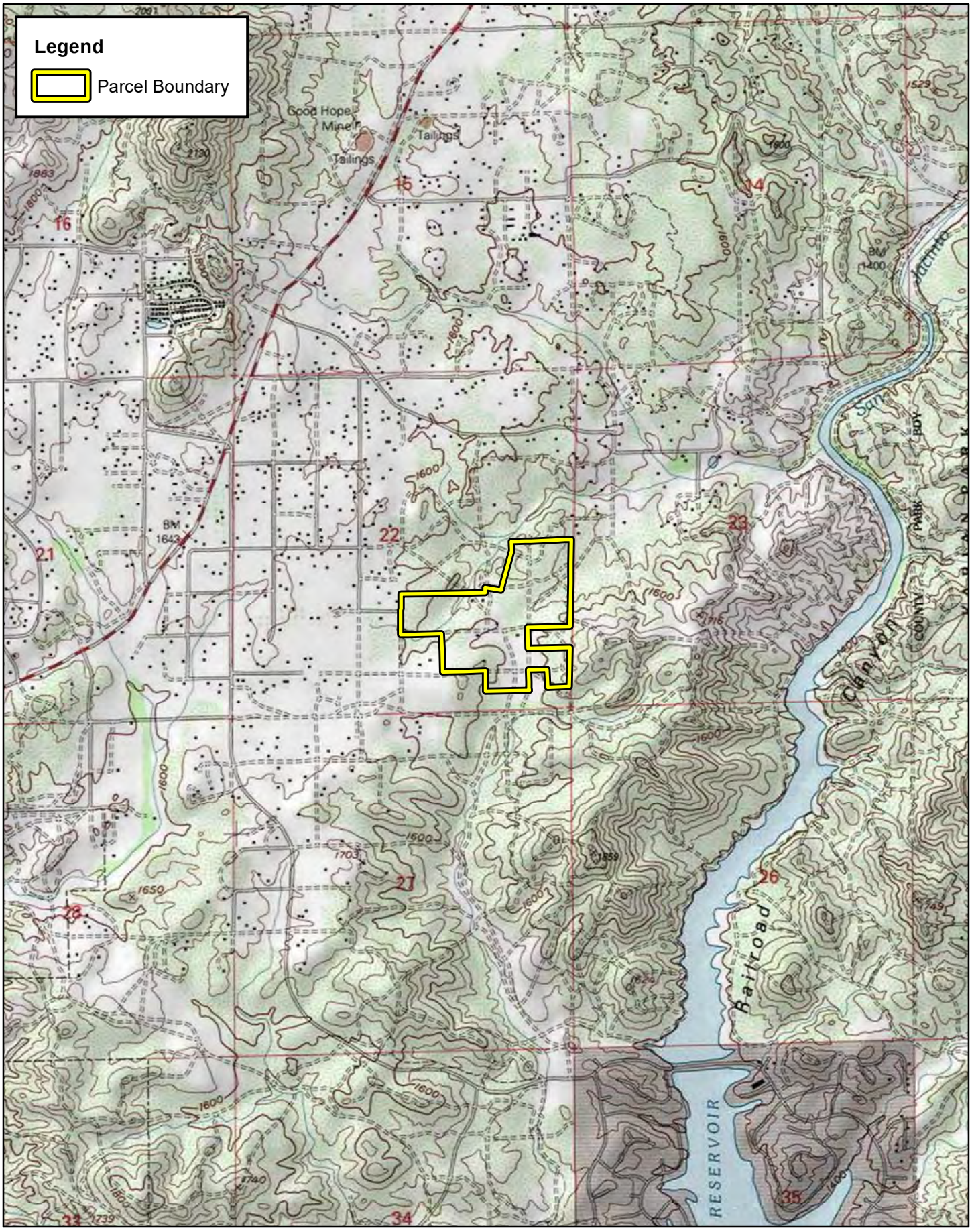
0 5 10 20 Miles

Source: World Street Map, Riverside County

CRESCENT CEMETERY

Regional Vicinity

Exhibit 1



ELMT CONSULTING

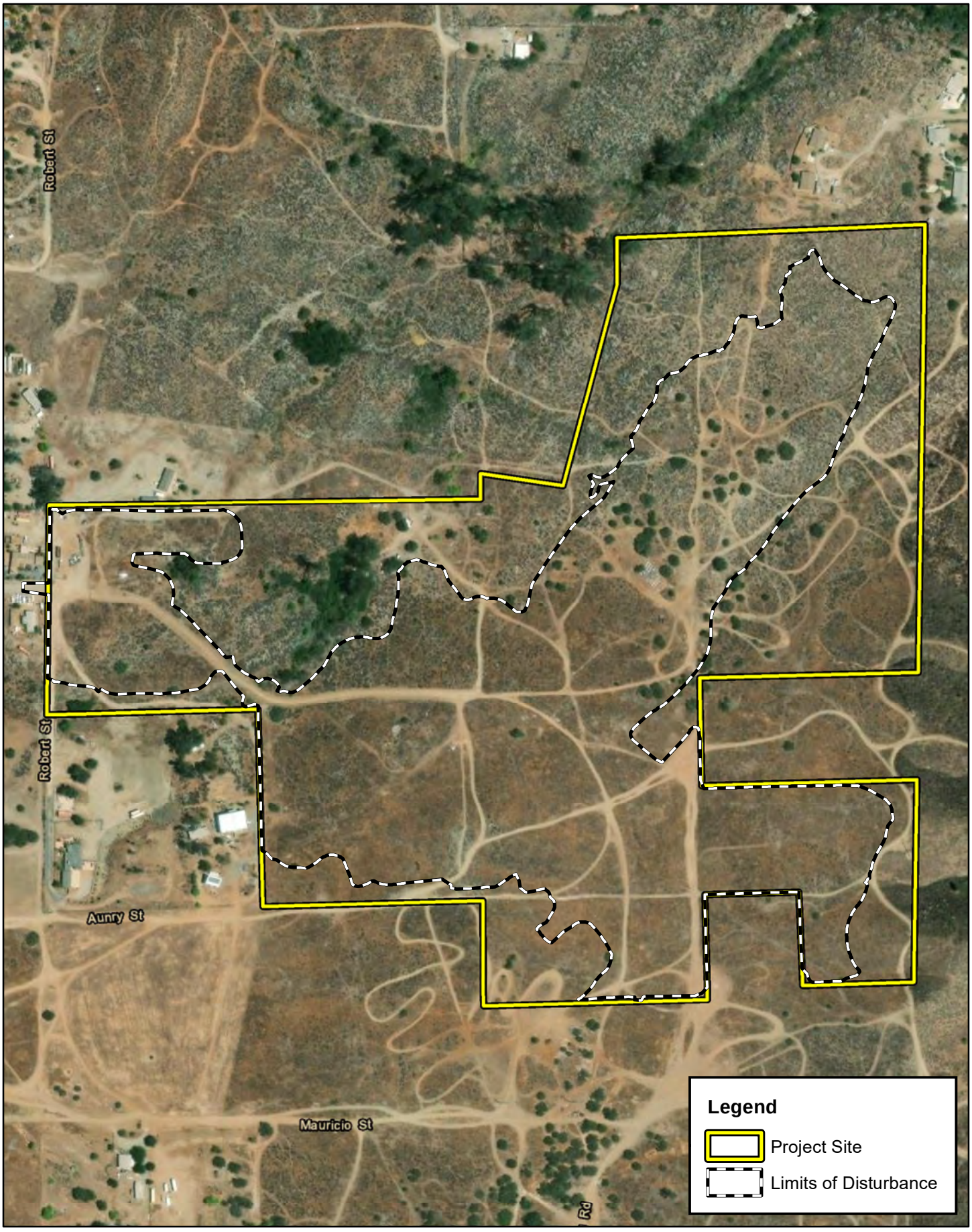
0 1,000 2,000 4,000 Feet

Source: USA Topographic Map, Riverside County

CRESCENT CEMETERY

Site Vicinity

Exhibit 2



ELMT CONSULTING

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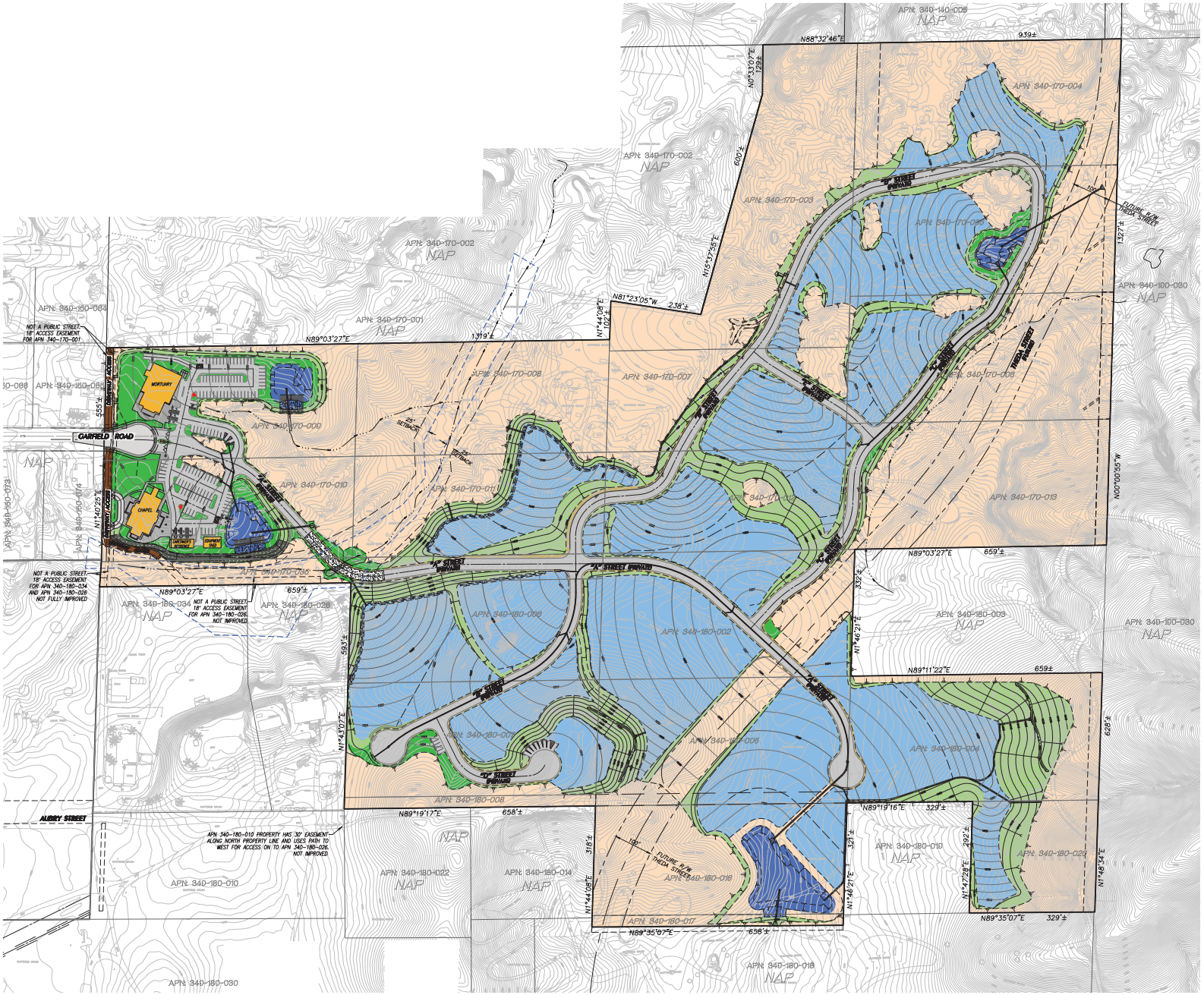
Source: ESRI Aerial Imagery, Riverside County

CRESCENT CEMETERY

Project Site

Exhibit 3


GARFIELD ROAD
ALBURY STREET
MORTUARY
CHAPEL
CEMETERY ACCESS
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Section 2 Methodology

A literature review and records search were conducted to determine which special-status biological resources have the potential to occur on or within the general vicinity of the project site. In addition to the literature review, a general habitat assessment or field investigation was conducted. The field investigation was conducted to document existing conditions within the project site to assess the potential for special-status biological resources to occur.

2.1 LITERATURE REVIEW

Prior to conducting the field investigation, species and habitat information was gathered from the reports related to the specific project and relevant databases for the *Lake Elsinore* and *Romoland* USGS quadrangles to determine which species and/or habitats could be expected to occur on-site. These sources include:

- California Native Plant Society Electronic Inventory (CNPSEI) database;
- California Natural Diversity Database (CNDDB) *Rarefind 5*;
- CNDDB Biogeographic Information and Observation System (BIOS);
- Environmental Protection Agency (EPA) Water Program "My Waters" data layers
- Google Earth Pro historic aerial imagery (1985-2023);
- Stephen's Kangaroo Rat Habitat Conservation Plan
- United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS), Soil Survey [2];
- United States Fish and Wildlife Service (USFWS) Critical Habitat designations for Threatened and Endangered Species;
- USFWS National Wetlands Inventory (NWI);
- Western Riverside County Regional Conservation Authority (RCA) MSHCP Information Map; and
- 2006 Burrowing Owl Survey Instructions for the Western Riverside Multiple Species Habitat Conservation Plan Area.

The literature review provided a baseline from which to inventory the biological resources potentially occurring on the project site. The CNDDB database was used, in conjunction with ArcGIS software, to locate the nearest recorded occurrences of special-status species and determine the distance from the project site.

[2] A soil series is defined as a group of soils with similar profiles developed from similar parent materials under comparable climatic and vegetation conditions. These profiles include major horizons with similar thickness, arrangement, and other important characteristics, which may promote favorable conditions for certain biological resources.

2.2 FIELD INVESTIGATION

Following the literature review, biologists Jacob H. Lloyd Davies and Megan E. Peukert inventoried and evaluated the condition of the habitat within the project site on November 13 and 16, 2023. Plant communities identified on aerial photographs during the literature review were verified by walking meandering transects through the plant communities and along boundaries between plant communities.

All plant and wildlife species observed, as well as dominant plant species within each plant community, were recorded. Plant species observed during the field survey were identified by visual characteristics and morphology in the field. Unusual and less familiar plant species were photographed during the field survey and identified in the laboratory using taxonomical guides. Wildlife detections were made through observation of scat, trails, tracks, burrows, nests, and/or visual and aural observation. In addition, site characteristics such as soil condition, topography, hydrology, anthropogenic disturbances, indicator species, condition of on-site plant communities, and presence of potential jurisdictional drainage and/or wetland features were noted.

Special attention was given to special-status habitats and/or undeveloped areas, which have higher potential to support special-status plant and wildlife species. Areas providing suitable habitat for burrowing owl were closely surveyed for signs of presence during the field survey. Methods to detect the presence of burrowing owls included direct observation, aural detection, and signs of presence including pellets, whitewash, feathers, or prey remains.

No limitations significantly affected the results and conclusions given herein. Surveys were conducted during the appropriate season to observe the target species, in good weather conditions, by a qualified biologist who followed all pertinent protocols.

2.3 SOILS SERIES ASSESSMENT

On-site and adjoining soils were researched prior to the field survey using the USDA NRCS Soil Survey for Western Riverside Area, California. In addition, a review of the local geological conditions and historical aerial photographs was conducted to assess the ecological changes that the project site has undergone.

2.4 PLANT COMMUNITIES

Plant communities were mapped using 7.5-minute USGS topographic base maps and aerial photography. The plant communities were delineated on an aerial photograph, classified in accordance with those described in the MSHCP, and then digitized into GIS Arcview. The Arcview application was used to compute the area of each plant community in acres.

2.5 PLANTS

Common plant species observed during the field survey were identified by visual characteristics and morphology in the field and recorded in a field notebook. Unusual and less-familiar plants were photographed in the field and identified in the laboratory using taxonomic guides. Taxonomic nomenclature

used in this study follows the 2012 Jepson Manual (Hickman 2012). In this report, scientific names are provided immediately following common names of plant species (first reference only).

2.6 WILDLIFE

Wildlife species detected during field surveys by sight, calls, tracks, scat, or other sign were recorded during surveys in a field notebook. Field guides were used to assist with identification of wildlife species during the survey included The Sibley Field Guide to the Birds of Western North America (Sibley 2003), A Field Guide to Western Reptiles and Amphibians (Stebbins 2003), and A Field Guide to Mammals of North America (Reid 2006). Although common names of wildlife species are well-standardized, scientific names are provided immediately following common names in this report (first reference only).

2.7 JURISDICTIONAL DRAINAGES AND WETLANDS

Aerial photography was reviewed prior to conducting a field investigation in order to locate and inspect any potential natural drainage features, ponded areas, or water bodies that may fall under the jurisdiction of the United States Army Corps of Engineers (Corps), Regional Water Quality Control Board (Regional Board), or CDFW. In general, surface drainage features indicated as blue-line streams on USGS maps that are observed or expected to exhibit evidence of flow are considered potential riparian/riverine habitat and are also subject to state and federal regulatory jurisdiction. In addition, ELMT reviewed jurisdictional waters information through examining historical aerial photographs to gain an understanding of the impact of land-use on natural drainage patterns in the area. The USFWS National Wetland Inventory (NWI) and Environmental Protection Agency (EPA) Water Program "My Waters" data layers were also reviewed to determine whether any hydrologic features and wetland areas have been documented on or within the vicinity of the project site.

Section 3 Existing Conditions

3.1 LOCAL CLIMATE

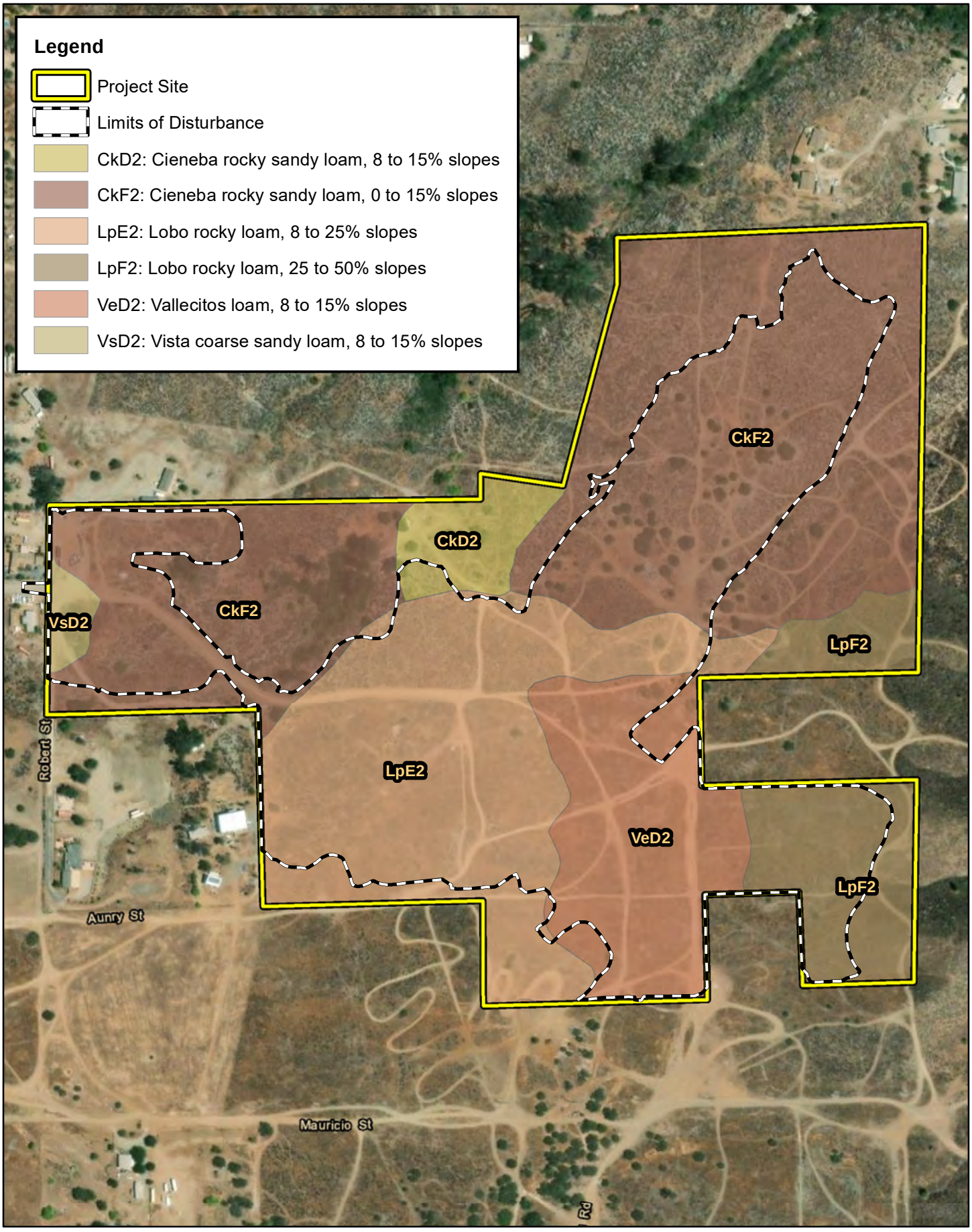
Western Riverside County features a somewhat cooler version of a Mediterranean climate, or semi-arid climate, with warm, sunny, dry summers and cool, rainy, mild winters. Relative to other areas in Southern California, winters are colder chilly to cold morning temperatures with frost common. Climatological data obtained for the nearby City of Lake Elsinore indicates the annual precipitation averages 11.65 inches per year. Almost all of the precipitation in the form of rain occurs in the months between October and April, with hardly any occurring between the months of June and September. The wettest months are January and February, with monthly average totals precipitation of 2.97 and 2.85 inches, respectively, and the driest months are June and August, with monthly average total precipitation of 0.07 and 0.06 inches, respectively. The average maximum and minimum temperatures are 80.2- and 51.8-degrees Fahrenheit (°F), respectively, with July and August (monthly average highs 96.5 and 97.8°F, respectively) being the hottest months and December and January (monthly average lows 40.3 and 41.9°F) being the coldest. The temperature during the site visit was in the mid-60s to mid-70s °F with lightly cloudy skies and calm winds.

3.2 TOPOGRAPHY AND SOILS

The project site is located at an approximate elevation of 1,540 to 1,670 feet above mean sea level and generally slopes from south to north with some areas bearing more defined sloping from southeast to northwest. The site occurs on the western periphery of the Temescal Mountains east of Railroad Canyon, resulting in hilly topography. Based on the NRCS USDA Web Soil Survey, the project site is historically underlain by Cieneba rocky sandy loam (8 to 15 percent slopes, eroded), Cieneba rocky sandy loam (15 to 50 percent slopes, eroded), Lodo rocky loam (8 to 25 percent slopes, eroded), Lodo rocky loam (25 to 50 percent slopes, eroded), Vallecitos loam (thick solum variant, 8 to 15 percent slopes, eroded), and Vista coarse sandy loam (8 to 15 percent slopes, eroded). Refer to Exhibit 5, *Soils*. Soils underlying the site are generally undisturbed with the exception of a network of access roads and recreational trails, areas surrounding remnant structures, and several areas on the western periphery of the site that have been utilized for storage and staging activities and road access for adjacent development.

3.3 SURROUNDING LAND USES

The project site is bounded to the east and south by undeveloped, vacant land supporting natural plant communities that extend into the adjacent hillside. The site is bounded to the northeast by undeveloped, vacant land with residential development beyond; and to the northeast and southwest by residential development.



ELMT CONSULTING

0 125 250 500 Feet

Source: ESRI Aerial Imagery, Soil Survey Geographic Database, Riverside County

CRESCENT CEMETERY

Soils

Exhibit 5

Section 4 Discussion

4.1 SITE CONDITIONS

The project site primarily supports undeveloped, vacant land with developed land occurring in the western limits of the site where adjacent development is encroaching into site boundaries. In addition, a remnant residential foundation is present in the middle of the eastern portion of the site. Undeveloped portions of the project site generally support natural plant communities, with the exception of a network of access roads and recreational trails that traverse the site. Historic aerials indicate that the site has supported some form of trails network since at least 1967, and on-site and adjacent development have been present since at least 1978. Refer to Appendix A, *Site Photographs*, for representative site photographs of the project site.

4.2 VEGETATION

Two (2) natural plant communities were documented on the project site: Riversidean Sage Scrub (RSS), and Mixed Riparian Scrub. In addition, the site supports one (1) land cover type that would be classified as disturbed. Refer to Exhibit 6, *Vegetation*. The plant community and land cover types are described in further detail below.

4.2.1 Riversidean Sage Scrub

The more topographically variable portions of the project site, namely the northern and southern portions and the southeast periphery, support a Riversidean sage scrub plant consistent with other natural areas in the surrounding area. The RSS supported on-site is dominated by a variety of woody perennials and supports a robust herbaceous layer. Vegetative cover in the RSS supported by the project site generally varies from moderate (>50%) to dense (>80%) with pockets of complete cover. Common native plant species observed in the RSS supported by the site include Deerweed (*Acmispon glaber*), fiddleneck (*Amsinckia sp.*), California sagebrush (*Artemisia californica*), golden stars (*Bloomeria crocea*), splendid mariposa-lily (*Calochortus splendens*), common sandaster (*Corethrogyne filaginifolia*), dove weed (*Croton setiger*), coyote melon (*Cucurbita palmata*), valley cholla (*Cylindropuntia bernardina*), sacred datura (*Datura wrightii*), fasciculated tarplant (*Deinandra fasciculata*), paniculate tarplant (*Deinandra paniculata*), bush sunflower (*Encelia californica*), brittlebush (*Encelia farinosa*), sapphire woollystar (*Eriastrum sapphirinum*), California buckwheat (*Eriogonum fasciculatum*), slender buckwheat (*Eriogonum gracile*), golden yarrow (*Eriophyllum confertiflorum*), rattlesnake sandmat (*Euphorbia albomarginata*), matchweed (*Gutierrezia california*), heliotrope (*Heliotropium curassavicum*), chaparral yucca (*Hesperoyucca whipplei*), Californica juniper (*Juniperus californica*), chaparral bush mallow (*Malacothamnus fasciculatus*), wishbone bush (*Mirabilis laevis*), showy penstemon (*Penstemon spectabilis*), holly leaf cherry (*Prunus ilicifolia*), perennial tobacco species (*Pseudognaphalium sp.*), spiny redberry (*Rhamnus crocea*), fragrant sumac (*Rhus aromatica*), white sage (*Salvia apiana*), chia sage (*Salvia columbariae*), blue elderberry (*Sambucus mexicana*), wire lettuce (*Stephanomeria exigua*), and vinegar weed (*Trichostema lanceolatum*). Common non-native plant species observed in the RSS supported on-site include giant reed (*Arundo donax*), broadleaf filaree (*Erodium botrys*), red-stemmed filaree (*Erodium*

cicutarum), mustard (*Hirschfeldia incana*), cheeseweed (*Malva parviflora*), horehound (*Marrubium vulgare*), Brazilian pepper (*Schinus terebinthifolius*), and milk thistle (*Silybum marianum*).

4.2.2 Mixed Riparian Scrub

The north western portion of the project site supports a mixed riparian scrub plant community on the banks of the on-site drainage feature Common native plant species observed in the plant community include, black willow (*Salix gooddingii*), baccharis (*Baccharis salicina*), pit seed goosefoot (*Chenopodium berlandieri*), coyote melon, sacred datura, giant wild rye (*Elysmus condensatus*), matchweed, heliotrope, wire rush (*Juncus balticus*), duck weed (*Lemna* sp.), chaparral bush mallow, arroyo willow (*Salix lasiolepsis*), rough hedge nettle (*Stachys rigida*), and stinging nettle (*Urtica dioica*). Common non-native plant species observed in this plant community include tree of heaven (*Ailanthus altissima*), red gum (*Eucalyptus camaldulensis*), horehound, tree tobacco (*Nicotiana glauca*), and London rocket (*Sisymbrium irio*).

It should be noted that several large red gum trees in this area appear to have been partially harvested, as several trunks remain intact while missing the majority of their mass above lateral chainsaw cuts. This portion of the site also appears to have supported some kind of horticultural or agricultural operation, as suggested by swathes of evenly spaced plants that are visible in some capacity from August 2019 to January 2023. The areas supporting growing operations were removed entirely during the recent grading.

4.2.3 Disturbed

Disturbed land generally encompasses areas where historic impacts or land uses have removed natural plant communities from an area and where routine disturbance prevents the re-establishment of a natural plant community. Within the boundaries of the project site, disturbed land is present throughout most of the southern portion of the site, in the western periphery of the site, and within and along a series of dirt trails and access roads that are routinely impacted by off-highway recreational vehicle access and other off-roading activities. Developed land supported on-site is generally barren and often supports dense monocultures of such species as dove weed, paniculate tarplant, brittlebush, vinegar weed, mustard, and stinknet (*Oncosiphon pilulifer*), and remnant stands of long-lived perennials that are adapted to routine disturbance such as California juniper. Other common native plant species observed in the disturbed land supported by the project site include deerweed, bush sunflower, California buckwheat, slender buckwheat, rattlesnake sandmat, matchweed, heliotrope, and Californica juniper. Other common non-native plant species observed include oats (*Avena* spp.), foxtail brome (*Bromus madritensis*), red brome (*Bromus rubens*), tocalote (*Centaurea melitensis*), yellow star thistle (*Centaurea solstitialis*), broadleaf filaree, red-stemmed filaree, red gum, cheeseweed, tree tobacco, Jerusalem thorn (Parkinsonia aculeata), Russian thistle (Salsola tragus), milk thistle, and London rocket.

4.3 WILDLIFE

Plant communities provide foraging habitat, nesting and denning sites for wildlife species, and shelter from adverse weather or predation. This section provides a discussion of wildlife species that were observed during the field survey or that are expected to occur within the project site. The discussion is to be used as a general reference and is limited by the season, time of day, and weather condition in which the field

survey was conducted. Wildlife detections were based on calls, songs, scat, tracks, burrows, and direct observation.

4.3.1 Fish

While the ponded area supported by the project site provides limited habitat for local fish species, it was created artificially for irrigation purposes and does not bear any connection to nearby aquatic habitats that support fish species. No fish were observed during the field investigation. The only fish species that may be expected to occur is mosquitofish (*Gambusia affinis*), a non-native/invasive species that is introduced to ponded areas and waterways in association with insect-borne disease vector control efforts.

4.3.2 Amphibians

The ponded area supported by the project site and adjacent mesic areas provide suitable habitat for local amphibian species adapted to small-scale agricultural projects and routine anthropogenic disturbance. The only amphibian species observed during the field investigation was Baja California tree frog (*Pseudacris hypochondriaca hypochondriaca*). Other common amphibian species that could be expected to occur on-site include California toad (*Anaxyrus boreas halophilus*), garden slender salamander (*Batrachoseps major major*), and black-bellied slender salamander (*Batrachoseps nigriventris*).

4.3.3 Reptiles

The project site and surrounding area provide suitable foraging and cover habitat for local reptile species. Reptilian species observed during the field investigation include orange-throated whiptail (*Aspidoscelis hyperythra*), granite spiny lizard (*Sceloporus orcutti*), and western side-blotched lizard (*Uta stansburiana elegans*). Other common reptilian species that could be expected to occur on-site include southern alligator lizard (*Elgaria multicarinata*), Great Basin fence lizard (*Sceloporus occidentalis longipes*), Southern Pacific rattlesnake (*Crotalus oreganus helleri*), California kingsnake (*Lampropeltis californiae*), and San Diego gophersnake (*Pituophis catenifer annectens*).

4.3.4 Birds

The project site and surrounding area provide suitable foraging and nesting habitat for local avian species. Avian species observed on-site during the field investigation include American pipit (*Anthus rubescens*), red-tailed hawk (*Buteo jamaicensis*), California quail (*Callipepla californica*), turkey vulture (*Cathartes aura*), northern flicker (*Colaptes auratus*), common raven (*Corvus corax*), nuttall's woodpecker (*Dryobates nuttallii*), greater roadrunner (*Geococcyx californianus*), house finch (*Haemorhous mexicanus*), loggerhead shrike (*Lanius ludovicianus*), California towhee (*Melozone crissalis*), California gnatcatcher (*Polioptila californica*), bushtit (*Psaltriparus minimus*), ruby-crowned kinglet (*Regulus calendula*), yellow-rumped warbler (*Setophaga coronata*), lesser goldfinch (*Spinus psaltria*), Eurasian collared dove (*Streptopelia decaocto*), cassin's kingbird (*Tyrannus vociferans*), mourning dove (*Zenaida macroura*), white-crowned sparrow (*Zonotrichia leucophrys*). In addition, several owl pellets were observed, indicating that great horned owl (*Bubo virginianus*) and/or barn owl (*Tyto alba*) are also present based on pellet size and local distributions of these species.

4.3.5 Mammals

The project site and surrounding area provide suitable foraging and cover habitat for local mammalian species. Mammalian species observed/detected during the field investigation include coyote (*Canis latrans*), California ground squirrel (*Otospermophilus beecheyi*), desert cottontail (*Sylvilagus audubonii*), and pocket gopher (*Thomomys bottae*). Other common mammalian species that could be expected to occur on-site include black-tailed jackrabbit (*Lepus californica*), and raccoon (*Procyon lotor*). Several large domestic dogs (*Canis familiaris*) were also observed freely roaming the northern portion of the site. In addition, the site and surrounding area provide suitable foraging habitat and roosting opportunities for a number of local bat species (i.e., family Vespertilionidae).

4.4 NESTING BIRDS

No active nests or birds displaying nesting behavior were observed during the field survey, which was conducted outside of the breeding season. The project site and surrounding area have the potential to provide nesting habitat for year-round and seasonal avian residents, as well as migrating songbirds that could occur in the area that area adapted to urban environments. Additionally, the disturbed portions of the sites have the potential to support birds that nest on the open ground such as killdeer (*Charadrius vociferus*).

Nesting birds are protected pursuant to the Migratory Bird Treaty Act (MBTA) and California Fish and Game Code (Sections 3503, 3503.5, 3511, and 3513 prohibit the take, possession, or destruction of birds, their nests or eggs). If construction occurs between February 1st and August 31st, a pre-construction clearance survey for nesting birds should be conducted prior to the start of any vegetation removal or ground disturbing activities to ensure that no nesting birds will be disturbed during construction.

4.5 WILDLIFE CORRIDORS AND LINKAGES

Habitat linkages provide links between larger undeveloped habitat areas that are separated by development. Wildlife corridors are similar to linkages but provide specific opportunities for animals to disperse or migrate between areas. A corridor can be defined as a linear landscape feature of sufficient width to allow animal movement between two comparatively undisturbed habitat fragments. Adequate cover is essential for a corridor to function as a wildlife movement area. It is possible for a habitat corridor to be adequate for one species yet inadequate for others. Wildlife corridors are significant features for dispersal, seasonal migration, breeding, and foraging. Additionally, open space can provide a buffer against both human disturbance and natural fluctuations in resources.

As mapped by the MSHCP, the project site has not been identified as occurring in a wildlife corridor or linkage. The site does occur adjacent to mapped MSHCP Conserved Public/Quasi-Public Land (PQP) within APN 3491-700-02 along the northern boundary; however, this parcel does not occur within any Criteria Cells and is not documented as contributing to nearby Linkages. The nearest mapped linkage occurs approximately 380 feet to the south within Proposed Linkage L-7. The site is separated from this linkage by undeveloped, vacant land and recreational trails.

The undeveloped land in the immediate vicinity of the project site provides local wildlife movement opportunities for wildlife species moving through the immediate area. The project site does not function as

a major wildlife movement corridor or linkage. As such, implementation of the proposed project is not expected to have a significant impact to wildlife movement opportunities or prevent local wildlife movement through the area since there is ample habitat adjacent to the project site to support wildlife movement opportunities.

4.6 STATE AND FEDERAL JURISDICTIONAL AREAS

There are three key agencies that regulate activities within inland streams, wetlands, and riparian areas in California. The Corps Regulatory Branch regulates discharge of dredge and/or fill materials into "waters of the United States" pursuant to Section 404 of the Federal Clean Water Act (CWA) and Section 10 of the Rivers and Harbors Act. Of the State agencies, the Regional Board regulates discharges into surface waters pursuant to Section 401 of the CWA and the California Porter-Cologne Water Quality Control Act and the CDFW regulates alterations to streambed and associated plant communities pursuant to Section 1602 of the California Fish and Game Code.

One (1) unnamed drainage feature (Drainage 1) was observed within the boundaries of the project site at the time of the investigation (refer to Exhibit 7, *On-site Drainage Features*). Drainage 1 extends from south to north within the northwest region of the project site. Drainage 1 conveys flows, primarily outside of the proposed limits of disturbance before terminating near the northwest corner of the site. Drainage 1 receives flows direct precipitation upstream and from the discharge waters of a well in the middle of the drainage, outside the proposed limits of disturbance, which was installed to provide water to on-site agricultural activities. The upstream portion of Drainage 1 appears to only support surface water immediately following storm events. Portions of Drainage 1 support a mixed riparian scrub plant community.

Based on the results of a Delineation of State and Federal Waters Report (ELMT, 2024) prepared under a separate cover, Drainage 1 is not relatively permanent, standing, or a continuously flowing body of water and, therefore, will not qualify as waters of the United States under the regulatory authority of the Corps (*Sackett v. EPA* (2022) 143 S. Ct. 1322, 1336). However, Drainage 1 will qualify as waters of the State and will fall under the regulatory authority of the Regional Board and CDFW. The project applicant will likely be required to obtain the following regulatory approvals prior to impacts occurring within the identified jurisdictional areas: Corps Approved Jurisdictional Determination/Waiver; Regional Board CWA Section 401 Water Quality Certification; and CDFW Section 1602 Streambed Alteration Agreement (SAA).

4.7 SPECIAL-STATUS BIOLOGICAL RESOURCES

A records search was conducted to determine reported locations of special-status plant and wildlife species as well as natural communities of special concern in the Lake Elsinore and Romoland USGS 7.5-minute quadrangles. These two quadrangles were used due to the proximity of the site to quadrangle boundaries and regional topography. Special-status plant and wildlife species were evaluated for their potential to occur within the project site based on habitat requirements, availability, and quality of suitable habitat, and known distributions. Twenty-five (25) specials status plant species, seventy-five (75) special-status wildlife species, and three (3) special-status plant communities have been recorded in the *Lake Elsinore and Romoland* USGS 7.5-minute quadrangles. Species determined to have the potential to occur within the general vicinity are provided in Appendix C, *Potentially Occurring Special-Status Biological Resources.*

4.7.1 Special-Status Plants

According to the CNDDB and CNPS, twenty-five (25) special-status plant species have been recorded in the Lake Elsinore and Romoland quadrangles (refer to Appendix C). One (1) special-status plant species was observed within the project site during the field investigation: paniculate tarplant (CNPS Rare Plant Rank 4.2). Based on habitat requirements for specific species and the availability and quality of on-site habitats, it was determined that the site has a low potential to support Payson's jewelflower (*Caulanthus simulans*, CRPR 4.2), Peninsular spineflower (*Chorizanthe leptotheca*, CRPR 4.2), southern California black walnut (*Juglans californica*, CRPR 4.2), Robinson's pepper-grass (*Lepidium virginicum* var. *robinsonii*, CRPR 4.3), and Coulter's matilija poppy (*Romneya coulteri*, CRPR 4.2). It was further determined that the site does not have potential to support any of the other special-status plant species known to occur in the vicinity of the site and all are presumed to be absent due to the lack of suitable habitat.

None of the aforementioned special-status plant species are federally nor state listed as threatened or endangered. They are designated as CNPS Rare Plant Rank 4.2 or 4.3 species. CNPS Rare Plant Rank 4 species are of limited distribution or infrequent throughout a broader area in California, with 4.3 species considered to not be very threatened and 4.2 species considered to be moderately threatened. In addition, Payson's jewelflower, Peninsular spineflower, southern California black walnut, and Coulter's matilija poppy are covered species under the MSHCP. The general suitability of the project site for these species is limited; however, due to the location of the site on the western periphery of a broad expanse of open space and the subsequent increased suitability of nearby habitats to the south, these species were determined to have a low potential to occur. Since the site provides only limited suitability habitat for these species and no direct observations of these species were made, it is unlikely that any Payson's jewelflower, Peninsular spineflower, southern California black walnut, or Coulter's matilija poppy supported on-site contribute meaningfully to the continued conservation of these species, if present. No mitigation obligations specific to these species are expected.

The project site supports populations of paniculate tarplant, which is scantly present throughout much of the RSS plant community and occurs in dense monocultures throughout the disturbed land in the middle portion of the site that is located outside of areas routinely impacted by off-highway recreational vehicle activities. This species is known to establish monocultures disturbed areas, especially in the absence of native plant communities.

4.7.2 Special-Status Wildlife

According to the CNDDB, seventy-five (75) special-status wildlife species have been reported in the Lake Elsinore and Romoland quadrangles (refer to Appendix C). Three special-status wildlife species were observed on-site during the field investigation: orange-throat whiptail (CDFW Watch List), loggerhead shrike (CDFW Species of Special Concern), and coastal California gnatcatcher (Federally Threatened, CDFW Species of Special Concern). Based on habitat requirements for specific species and the availability and quality of on-site habitats, it was determined that the project site has a high potential to support Cooper’s hawk (*Accipiter cooperii*), sharp-shinned hawk (*Accipiter striatus*), coastal whiptail (*Aspidoscelis tigris stejnegeri*), Costa’s hummingbird (*Calypte costae*), red-diamond rattlesnake (*Crotalus ruber*), California horned lark (*Eremophila alpestris actia*), San Diego desert woodrat (*Neotoma lepida intermedia*), coast horned lizard (*Phrynosoma blainvillii*), and coast patch-nosed snake (*Salvadora hexalepis virgultea*); and

a low potential to support Southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*), grasshopper sparrow (*Ammodramus savannarum*), California glossy snake (*Arizona elegans occidentalis*), Bell's sparrow (*Artemisiospiza belli belli*), burrowing owl (*Athene cunicularia*), Crotch bumblebee (*Bombus crotchii*), American bumble bee (*Bombus pensylvanicus*), Dulzura pocket mouse (*Chaetodipus californicus femoralis*), northwestern San Diego pocket mouse (*Chaetodipus fallax fallax*), San Bernardino ringneck snake (*Diadophis punctatus modestus*), western mastiff bat (*Eumops perotis californicus*), San Diego black-tailed jackrabbit (*Lepus californicus bennettii*), and pallid bobcat (*Lynx rufus pallescens*). It was further determined that the project sites do not have the potential to support any of the remaining special-status wildlife species known to occur in the vicinity and all are presumed to be absent.

Of the aforementioned species, coastal California gnatcatcher is federally listed as threatened and Crotch bumblebee is a candidate for state listing. None of the other aforementioned species are federally or state listed. In addition, orange-throat whiptail, loggerhead shrike, coastal California gnatcatcher, Cooper's hawk, sharp-shinned hawk, coastal whiptail, San Diego banded gecko, red-diamond rattlesnake, California horned lark, San Diego desert woodrat, coast horned lizard, southern California rufous-crowned sparrow, grasshopper sparrow, golden eagle, Bell's sparrow, burrowing owl, northwestern San Diego pocket mouse, San Diego black-tailed jackrabbit, and pallid bobcat are covered species under the MSHCP.

Of the aforementioned avian species, loggerhead shrike, coastal California gnatcatcher, Cooper's hawk, Costa's hummingbird, southern California rufous-crowned sparrow, grasshopper sparrow, and Bell's sparrow, have the potential to nest on-site. The remaining avian species are only expected to occur on-site while foraging due to the absence of suitable nesting/roosting opportunities and geographic disparities between the location of the project site and respective geographic nesting ranges. To ensure impacts to aforementioned avian species do not occur from implementation of the proposed project, a pre-construction nesting bird clearance survey shall be conducted prior to ground disturbance. With implementation of the pre-construction nesting bird clearance survey, impacts to the aforementioned species will be less than significant and no mitigation will be required.

Due to being a candidate for state listing as endangered, the potential occurrence of Crotch bumblebee is discussed in further detail below.

Crotch Bumblebee

The Crotch bumblebee is a candidate species for listing status by the CESA. It is a colonial species that lives almost exclusively from coastal California east towards the Sierra-Cascade Crest and can be found uncommonly in western Nevada and south through Baja California. The Crotch bumblebee inhabits grassland and scrub habitats in hotter and drier climates than most other bumblebee species and is only capable of tolerating a narrow range of climatic conditions. This species feeds on a variety of annual and perennial plant species, classifying it as a dietary generalist. It usually nests underground, often in abandoned rodent dens. Queens are active from March to May, with peak activity occurring in April; workers are active from April to August, with peak activity occurring between May and June; and males are active from May to September, with peak activity occurring in July.

The Riversidean sage scrub plant community supported on-site provides suitable foraging habitat and burrowing conditions for Crotch bumblebee. Further, the presence of fossorial mammals indicates that suitable nesting and overwintering opportunities are also available. According to the CNDDB, this species

is mapped as occurring near Quail Valley, approximately 0.84 miles to the east beyond the San Jacinto River. Therefore, the project site was determined to have a low potential to support Crotch bumblebee.

Crotch bumble bee was detected on the project site during the first survey during the 2024 flight season, with one remaining yet to be conducted as the date of this report, (Appendix F of this report is reserved for the final report). As of the date of this report, the population and impacts to crotch bumblebee are still being evaluated. If impacts to the species are determined, an Incidental Take Permit would likely be required from CDFW as this species is not covered by the MSHCP. .

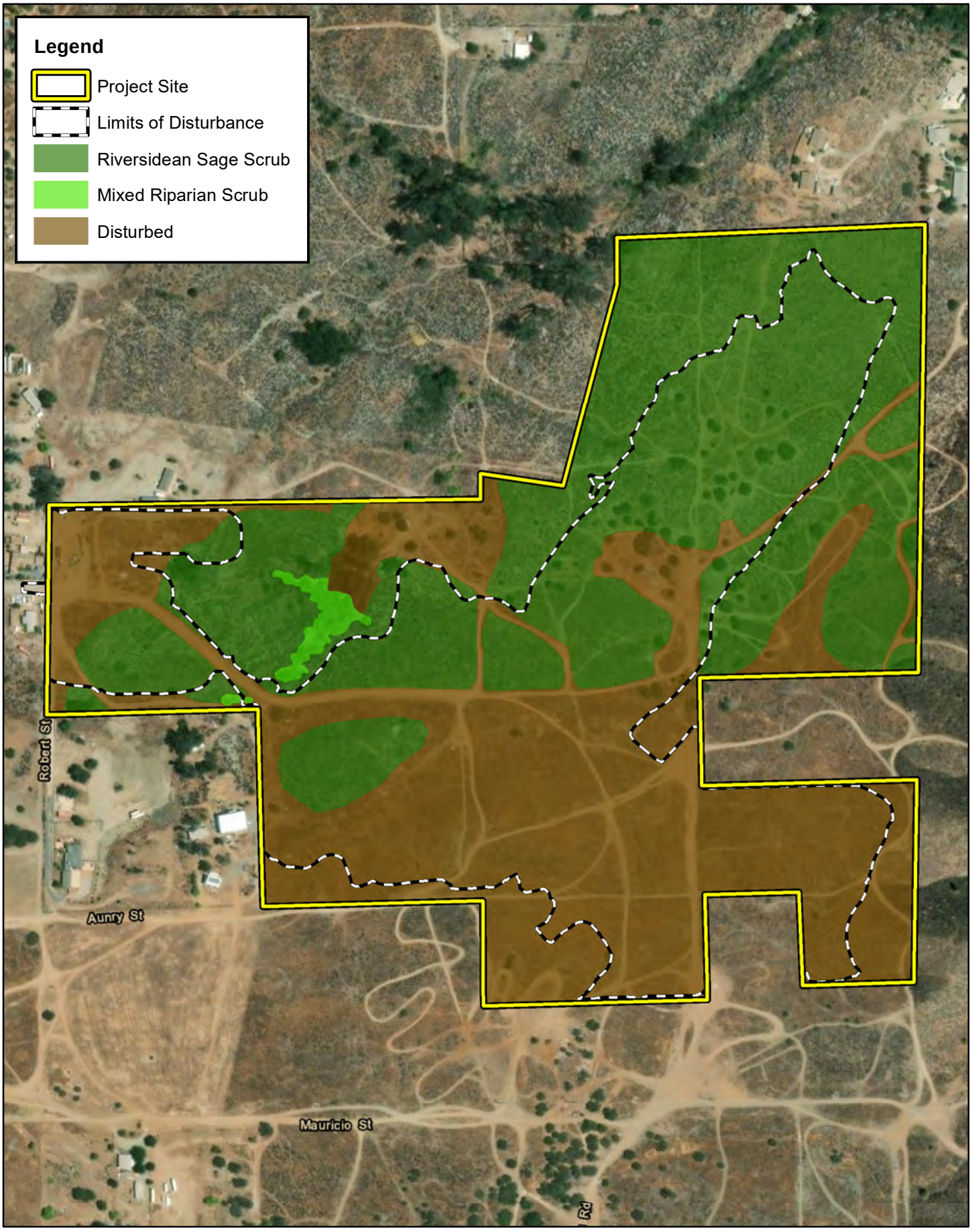
4.7.3 Special-Status Plant Communities

The CNDDB lists three (3) special-status habitats as being identified within the Lake Elsinore and Romoland quadrangles: Southern Coast Live Oak Riparian Forest, Southern Cottonwood Willow Riparian Forest, and Southern Sycamore Alder Riparian Woodland, which do not occur on the project site. No CDFW special-status plant communities occur within the boundaries of the project site.

4.8 CRITICAL HABITAT

Under the federal Endangered Species Act, "Critical Habitat" is designated at the time of listing of a species or within one year of listing. Critical Habitat refers to specific areas within the geographical range of a species at the time it is listed that include the physical or biological features that are essential to the survival and eventual recovery of that species. Maintenance of these physical and biological features requires special management considerations or protection, regardless of whether individuals or the species are present or not. All federal agencies are required to consult with the USFWS regarding activities they authorize, fund, or permit which may affect a federally listed species or its designated Critical Habitat. The purpose of the consultation is to ensure that projects will not jeopardize the continued existence of the listed species or adversely modify or destroy its designated Critical Habitat. The designation of Critical Habitat does not affect private landowners, unless a project they are proposing is on federal lands, uses federal funds, or requires federal authorization or permits (e.g., funding from the Federal Highways Administration or a CWA Permit from the Corps). If there is a federal nexus, then the federal agency that is responsible for providing the funding or permit would consult with the USFWS.

The project site is not located with federally designated Critical Habitat (Exhibit 8, *Critical Habitat*). The nearest designated Critical Habitat is located approximately 380 feet to the southeast for coastal California gnatcatcher. Therefore, the loss or adverse modification of Critical Habitat will not occur as a result of the proposed project and consultation with the USFWS will not be required for impacts to Critical Habitat.



ELMT CONSULTING

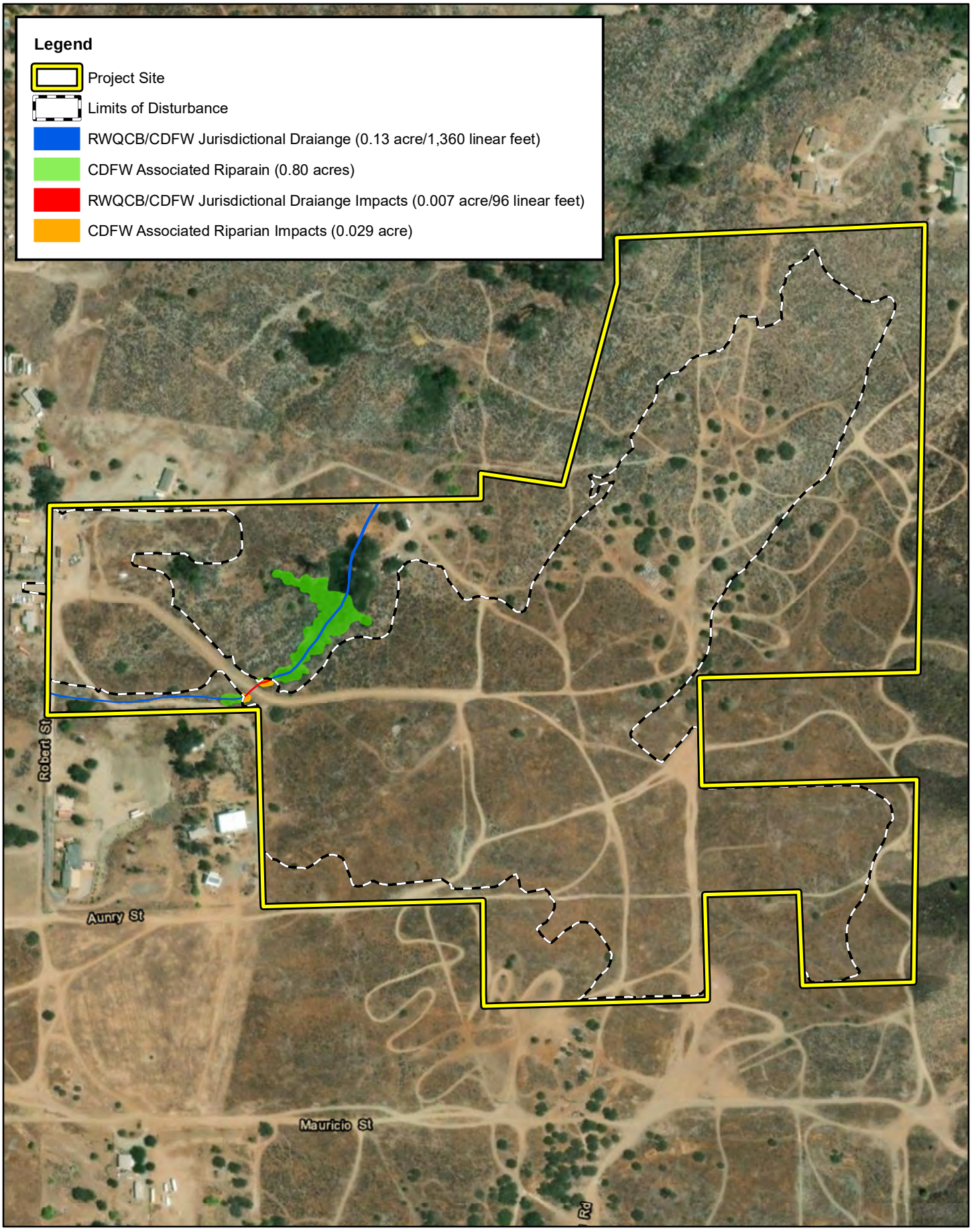
0 125 250 500 Feet

Source: ESRI Aerial Imagery, Riverside County

CRESCENT CEMETERY

Vegetation

Exhibit 6



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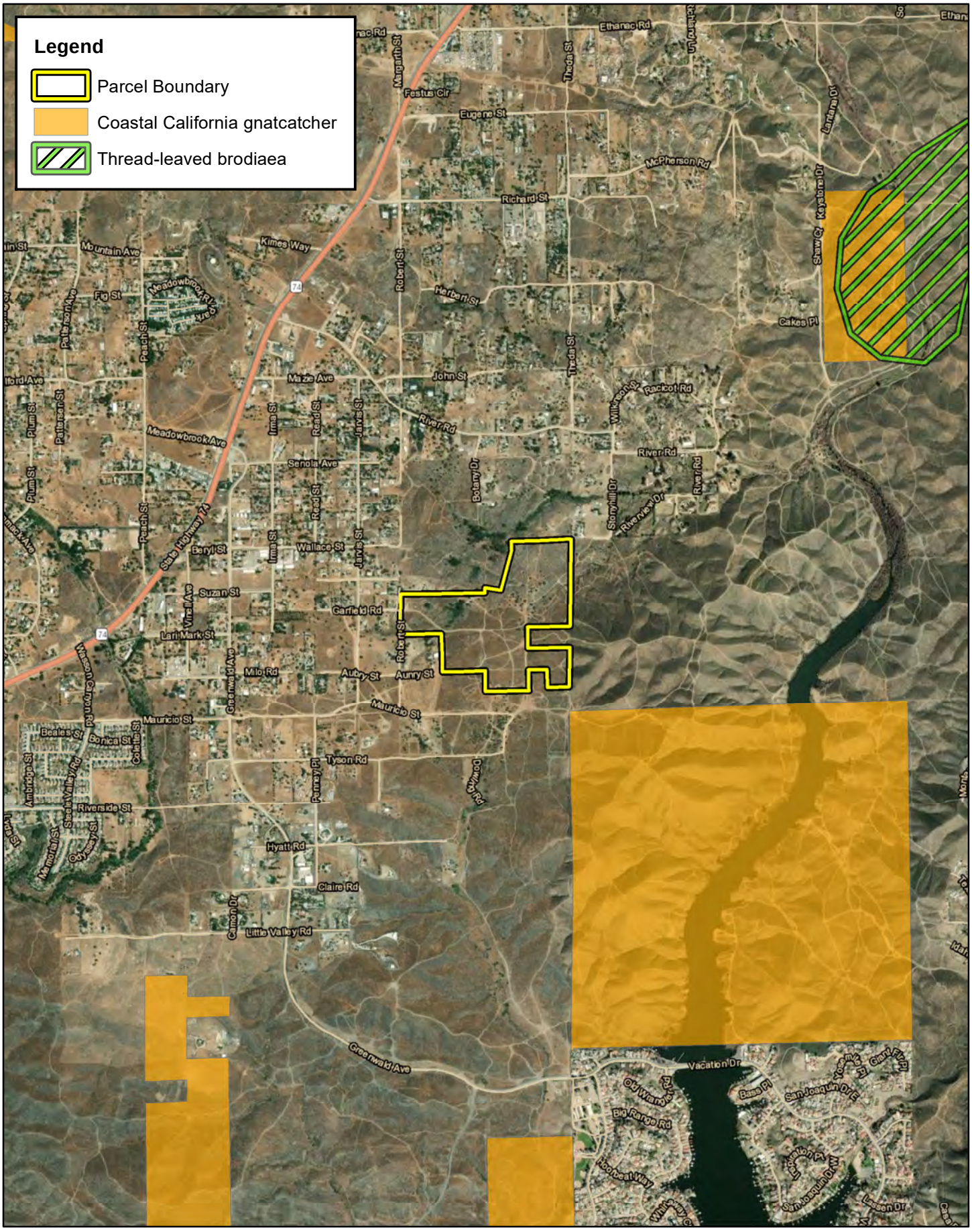
Source: ESRI Aerial Imagery, Riverside County

CRESCENT CEMETERY

Jurisdictional Areas

Exhibit 7



CRESCENT CEMETERY

Critical Habitat

Exhibit 8

Section 5 MSHCP Consistency Analysis

The project site is located in the Elsinore Area Plan, of the MSHCP but is not located within any Criteria Cells or designated conservation areas (Exhibit 9, *MSHCP Conservation Areas*). Additionally, the project site is located within the MSHCP designated survey area for burrowing owl (*Athene cunicularia*).

Since the County of Riverside is a permittee under the MSHCP and, while the project is not specifically identified as a Covered Activity under Section 7.1, *Covered Activities Outside Criteria Area and PQP Lands*, of the MSHCP, public and private development that are outside of Criteria Areas and Public/Quasi-Public (PQP)[3] Lands are permitted under the MSHCP, subject to consistency with MSHCP policies that apply to area outside of Criteria Areas. As such, to achieve coverage, the project must be consistent with the following policies of the MSHCP:

- The policies for the protection of species associated with Riparian/Riverine areas and vernal pools as set forth in Section 6.1.2 of the MSHCP;
- The policies for the protection of Narrow Endemic Plant Species as set forth in Section 6.1.3;
- The Urban/Wildlands Interface Guidelines as set forth in Section 6.1.4; and
- The requirements for conducting additional surveys as set forth in Section 6.3.2

5.1 RIPARIAN/RIVERINE AREAS AND VERNAL POOLS

5.1.1 Riparian/Riverine Areas

As defined under Section 6.1.2 of the MSHCP, *Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools,* riparian/riverine areas are areas dominated by trees, shrubs, persistent emergent plants, or emergent mosses and lichens which occur close to or are dependent upon nearby freshwater, or areas with freshwater flowing during all or a portion of the year. Conservation of these areas is intended to protect habitat that is essential to a number of listed or special-status water-dependent fish, amphibian, avian, and plant species. Any alteration or loss of riparian/riverine habitat from development of a Project will require the preparation of a Determination of Biologically Equivalent or Superior Preservation (DBESP) analysis to ensure the replacement of any lost functions and values of habitats in regard to the listed species. This assessment is independent from considerations given to waters of the United States and waters of the State under the CWA, the California Porter-Cologne Water Quality Control Act, and CDFW jurisdictional streambed under the California Fish and Game Code.

One (1) unnamed drainage feature (Drainage 1) was observed within the boundaries of the project site at the time of the investigation that will qualify as riparian/riverine habitat under the MSHCP (refer to Exhibit 7, *On-site Drainage Features*). Drainage 1 extends from west to east to northeast within the western region of the site. The majority of Drainage 1 supports similar upland vegetation observed in the Riversidean sage

[3] PQP Lands are a subset of MSHCP Conservation Area lands totaling approximately 347,000 acres of lands known to be in public/private ownership and expected to be managed for open space value and/or in a manner that contributes to the Conservation of Covered Species (including lands contained in existing reserves). The acreage of PQP Lands has been accounted for in the MSHCP tracking process for assembling the Conservation Area.

scrub plant community that dominates the site. In addition, a mixed riparian scrub plant community is supported in the middle and eastern portions of Drainage 1, surrounding a well that was installed to provide irrigation for a horticultural operation that occurred on-site from 2019 to 2023. Discharges from the well provide the perennial fresh water necessary to support the mixed riparian scrub and the well was observed holding surface water during all visits to the site.

The limits of disturbance for the project were purposefully designed to avoid impacts to Drainage 1 and associated riparian habitats to the greatest extent possible; however, a small portion of Drainage 1 will be impacted from project implementation as a result of installation of a road culvert in the drainage to facilitate a site access road. Project activities will result in permanent impacts to 0.036 acre (96 linear feet) to the riverine habitat associated with Drainage 1. In accordance with Section 6.1.2 of the MSHCP, a Determination of Biologically Equivalent or Superior Preservation (DBESP) has been prepared for the project (submitted to the County as a separate document), that proposes to mitigate impacts to riverine habitat through the purchase of mitigation credits through either the Riverpark Mitigation Bank or Skunk Hollow Mitigation Bank and/or other approved bank, or combination thereof at a 1:1 ratio, or on a ratio otherwise agreed upon by the regulatory agencies. The applicant will be responsible for the purchase of mitigation credits to compensate for impacts to riparian/riverine habitat prior to the start of construction.

The purchase of mitigation credits would result in a net increase in the function and ecological value of riparian/riverine habitat within the region by preserving/enhancing high quality habitat along the San Jacinto River within the Riverpark Mitigation Bank, or at the Skunk Hollow Mitigation Bank.

Riparian Obligate Avian Species

The mixed riparian scrub associated with Drainage 1 provides low quality habitat for the State- and federally-listed as endangered least Bell's Vireo (*Vireo bellii pusillus* [LBVI]), outside of the proposed limits of disturbance, and is not expected to provide suitable habitat for the other riparian obligate species listed under the MSHCP that may occur within the regional vicinity, including southwestern willow flycatcher (*Empidonax traillii extimus*), or yellow-billed cuckoo (*Coccyzus americanus*).

The composition of the mixed riparian scrub supported on-site has been degraded by invasive plant species, namely tree of heaven, and previous agricultural activities. The mixed riparian scrub, located outside of the proposed limits of disturbance does not have a contiguous willow canopy, and does not provide the dense, multi-storied canopy for southwestern willow flycatcher and yellow-billed cuckoo. Due to incomplete canopy, limited acreage, and lack of riparian plant species diversity of the mixed riparian scrub supported on-site, the habitat associated with the on-site drainage feature was determined not to provide suitable habitat for southwestern willow flycatcher and yellow-billed cuckoo.

However, the mixed riparian scrub plant community has the potential to provide low quality habitat for LBVI. LBVI do not require the dense multi-storied riparian canopy that southwestern willow flycatcher and yellow-billed cuckoo need. The mixed riparian scrub has a degraded and inconsistent canopy throughout the length of the drainage and generally provides limited nesting opportunities by LBVI. However, the area of Project impacts do not provide nesting opportunities due to the extreme degradation inconsistency of the canopy and presence significant invasive species that are not favored by LBVI.

Therefore, the project would not impact riparian species, including LBVI, due to the fact that riparian vegetation does not exist in the direct impact area of the project's road culvert. The degraded and inconsistent canopy does exist within several feet of the proposed road culvert improvements, but construction is not required in these areas to construct the road culvert. Further, a pre-construction nesting bird clearance survey is required, which would further ensure that there would be no impacts to bird species associated with riparian plant communities. Because of the poor quality of the habitat adjacent to the planned culvert, and that no riparian vegetation exists directly within the planned construction limits, no focused surveys are deemed necessary.

The portion of Drainage 1 that will be impacted is considered riverine.

5.1.2 Vernal Pools

Vernal pools are seasonally inundated, ponded areas that only form in regions where specialized soil and climatic conditions exist. During fall and winter rains typical of Mediterranean climates, water collects in shallow depressions where downward percolation of water is prevented by the presence of a hard pan or clay pan layer (duripan) below the soil surface. Later in the spring when rains decrease and the weather warms, the water evaporates, and the pools generally disappear by May. The shallow depressions remain relatively dry until late fall and early winter with the advent of greater precipitation and cooler temperatures. Vernal pools provide unusual "flood and drought" habitat conditions to which certain plant and wildlife species have specifically adapted as well as invertebrate species such as fairy shrimp.

One of the factors for determining the suitability of the habitat for fairy shrimp would be demonstrable evidence of seasonal ponding in an area of topographic depression that is not subject to flowing waters. These astatic pools are typically characterized as vernal pools. More specifically, vernal pools are seasonal wetlands that occur in depression areas without a continual source of water. They have wetland indicators of all 3 parameters (soils, vegetation, and hydrology) during the wetter portion of the growing season but normally lack wetland indicators of hydrology and/or vegetation during the drier portion of the growing season. Obligate hydrophytes and facultative wetlands plant species are normally dominant during the wetter portion of the growing season. The determination that an area exhibits vernal pool characteristics and the definition of the watershed supporting vernal pool hydrology is made on a case-by-case basis. Such determinations should consider the length of time the area exhibits upland and wetland characteristics and the manner in which the area fits into the overall ecological system as a wetland. The seasonal hydrology of vernal pools provides for a unique environment, which supports plants and invertebrates specifically adapted to a regime of winter inundation, followed by an extended period when the pool soils are dry.

The MSHCP lists two general classes of soils known to be associated with special-status plant species; clay soils and Traver-Domino Willow association soils. The specific clay soils known to be associated with special-status species within the MSHCP plan area include Bosanko, Auld, Altamont, and Porterville series soils, whereas Traver-Domino Willows association includes saline-alkali soils largely located along floodplain areas of the San Jacinto River and Salt Creek. Without the appropriate soils to create the impermeable restrictive layer, none of the special-status species associated with vernal pools can occur on the project site. None of these soils have been documented within the project site.

The site contains 38 road rut/small depressional areas that pond seasonally. Although these features exhibit hydrology, the features are compacted and lack hydric soils, and the features do not support any vegetation. As a result, these features are not MSHCP vernal pools because they lack two of the parameters needed to be considered as a depressional wetland.

Fairy Shrimp

There are three species of fairy shrimp with the potential to occur on-site: vernal pool fairy shrimp (*Branchinecta lynchi*), Riverside fairy shrimp (*Streptocephalus woottoni*), and versatile fairy shrimp (*Branchinecta lindahli*). Vernal pool (*lynchi*) fairy shrimp are federally listed as threatened, and Riverside fairy shrimp (*woottoni*) are federally listed as endangered, whereas the versatile fairy shrimp (*lindahli*) is relatively common and is not listed or considered sensitive. Vernal pool fairy shrimp (*lynchi*) have the widest geographic range of the federally listed vernal pool crustaceans and occur from southern Oregon to northern and central California, generally west of the Sierra Nevada, to southern California. The species' range extends south to Orange and Los Angeles counties and east to western Riverside County but is generally absent from San Diego County. Vernal pool fairy shrimp are found in vernal pools and other vernal pool-like habitats such as ephemeral ponds or features that can be formed from anthropogenic events such as tire ruts. Riverside fairy shrimp can be found in Riverside, Orange, and San Diego counties and occur in vernal pools and other ephemeral features with long inundation times. The versatile fairy shrimp (*lindahli*) is common in pools throughout California and can co-occur with vernal pool (*lynchi*) and Riverside fairy shrimp (*woottoni*).

To determine if the vernal pools on site support the three species of fairy shrimp, Fairy Shrimp surveys were conducted in the dry season of 2023, the wet season of 23-24 and the dry season of 2024 (Helix 2023 and 2024).

All survey events combined sampled a total of 38 features within the project site during the Based on the information gathered from all surveys and factoring the nearest known location for vernal pool fairy shrimp (*B. lynchi)* it is presumed that the federally listed vernal pool fairy shrimp (*B. lynchi)* is absent from the site. Both results for wet and dry season surveys did not indicate presence of Riverside fairy shrimp (S. *woottoni*). As a result, Riverside fairy shrimp (S. *woottoni*) is also presumed absent from the project site. According to the survey reports, the only species present on site is the non-listed versatile fairy shrimp (*B. lindahli*).

5.2 NARROW ENDEMIC PLANT SPECIES

Section 6.1.3 of the MSHCP, *Protection of Narrow Endemic Plant Species*, states that the MSHCP database does not provide sufficient detail to determine the extent of the presence/distribution of Narrow Endemic Plant Species within the MSHCP Plan Area. Additional surveys may be needed to gather information to determine the presence/absence of these species to ensure that appropriate conservation of these species occurs. Based on the RCA MSHCP Information Map query and review of the MSHCP, it was determined that the project site is not located within the designated survey area for Narrow Endemic Plant Species. Through the field investigation, it was determined that the project site does not provide suitable habitat for any of the Narrow Endemic Plant Species listed under Section 6.1.3 of the MSHCP, and, therefore, the project is consistent with Section 6.1.3 of the MSHCP. No additional surveys or analysis are required.

5.3 URBAN/WILDLANDS INTERFACE GUIDELINES

Section 6.1.4 of the MSHCP, *Guidelines Pertaining to Urban/Wildlands Interface*, is intended to address indirect effects associated with development in proximity to MSHCP Conservation Areas. The Urban/Wildlife Interface Guidelines are intended to ensure that indirect project-related impacts to the MSHCP Conservation Area, including drainage, toxics, lighting, noise, invasive plant species, barriers, and grading/land development, are avoided or minimized.

The project site is not located within any Criteria Cells or designated conservation areas. However, the northern portion of the site does occur adjacent to mapped MSHCP Conserved Public/Quasi-Public Land (PQP) within APN 3491-700-02 (refer to Exhibit 9);, this parcel does not occur within any Criteria Cells and is not documented as contributing to nearby Linkages.

The limits of disturbance for the proposed project were purposefully designed to avoid impacts to adjacent PQP Conserved Land and no impacts to PQP Conserved Land will occur due to project implementation. However, due to the proximity of the project site to the adjacent PQP Conserved Land, the project will need to comply with the Urban/Wildlands Interface Guidelines.

The Urban/Wildlife Interface Guidelines, as discussed below, will be incorporated into the project to ensure that Project-related impacts, including drainage, toxics, lighting, noise, invasive plant species, barriers, and grading/land development, are avoided or minimized to the fullest extent possible.

Drainage

The project's stormwater will be directed to three stormwater basins on-site, away from the PQP Conservation Lands. The basin will be designed in accordance with all federal, state, regional, and local standards and regulations concerning water quality. These measures will assure that the project stormwater discharges are no greater in volume and velocity than current conditions and that the water leaving the site complies with all applicable water quality standards.

Toxics

According to the MSHCP, measures will be incorporated to ensure that application of chemicals does not result in discharge to the PQP Conservation Lands. During the construction of the project, construction activities have the potential to cause release of toxics that could indirectly impact the PQP Conservation Lands. To address these potential short-term impacts, the project is required to stage construction operations as far away from the MSHCP Conservation Area to the maximum extent feasible.

Lighting

The proposed project is not anticipated to significantly increase lighting and glare. However, light sources will be designed with to direct the lighting towards the ground and the developed areas and have a zero-side angle cut off to the horizon.

Noise

The grave sites will be separated from the adjacent PQP Conservation Lands by natural open space (refer to Exhibits 4 and 9). The natural open space buffer along with the passive nature of the cemetery activities

would lessen noise exposure to any MSHCP-covered species. Construction-related noise will be mitigated to be consistent with the County's Noise Ordinances by limiting construction activities to daytime hours and requiring construction equipment to be tuned and equipped with mufflers. Under the MSHCP, wildlife within the PQP Conservation Lands should not be subject to noise that would exceed residential noise standards. Due to the passive nature of the cemetery activities, noise would not exceed residential noise standards.

Invasive Plant Species

Plant species acceptable for the Project's landscaping must not be considered an invasive species pursuant to Table 6-2 of the MSHCP. To ensure this, the final landscape plans will be reviewed and verified by the County for consistency with the plant species list in Table 6-2 of the MSHCP. Allowable use of invasive species on a project site is based on the proximity of the plantings to the PQP Conservation Lands, the sensitivity of resources in the PQP Conservation Lands to invasion, and barriers to plant and seed dispersal. If the site is sufficiently contained such that invasive plantings would not be able to spread outside of the developed Project footprint, invasive plantings may be allowed on the site. However, the County will make the final decision on the suitability of this species for the Project's landscape plan.

Barriers

Barriers would restrict direct access to the PQP Conservation Lands from the project site by unauthorized public access or domestic animals. Under the MSHCP, suitable barriers include native landscaping, rocks/boulders, fencing, walls, signage, and/or other appropriate mechanisms. The barriers would and should be placed within the boundaries of the development and will be outside of the confines of the PQP Conservation Lands.

Grading/Land Development

Manufactured slopes associated with proposed site development will not extend into the PQP Conservation Lands. No manufactured slopes are anticipated to be constructed within the PQP Conservation Lands. Should manufactured slopes be necessary, they will be kept within the boundaries of the development footprint and not encroach into the PQP Conservation Lands.

5.4 ADDITIONAL MSHCP CONSIDERATIONS

In accordance with Section 6.3.2 of the MSHCP, *Additional Survey Needs and Procedures*, additional surveys may be needed for certain species in order to achieve coverage for these species. The query of the RCA MSHCP Information Map and review of the MSHCP determined that the project site is located within the designated survey area for burrowing owl as depicted in Figure 6-4 within Section 6.3.2 of the MSHCP. No other special-status wildlife species surveys were identified.

Burrowing Owl

Burrowing owl is currently designated as a California Species of Special Concern. The burrowing owl is a grassland specialist distributed throughout western North America where it occupies open areas with short vegetation and bare ground within shrub, desert, and grassland environments. Burrowing owls use a wide variety of arid and semi-arid environments with level to gently-sloping areas characterized by open

vegetation and bare ground. The western burrowing owl (*A.c. hypugaea*), which occurs throughout the western United States including California, rarely digs its own burrows and is instead dependent upon the presence of burrowing mammals (i.e., California ground squirrels, coyotes, and badgers) whose burrows are often used for roosting and nesting. The presence or absence of colonial mammal burrows is often a major factor that limits the presence or absence of burrowing owls. Where mammal burrows are scarce, burrowing owls have been found occupying man-made cavities, such as buried and non-functioning drain pipes, stand-pipes, and dry culverts. They also require low growth or open vegetation allowing line-of-sight observation of the surrounding habitat to forage and watch for predators. In California, the burrowing owl breeding season extends from the beginning of February through the end of August.

Under the MSHCP burrowing owl is considered an adequately conserved covered species that may still require focused surveys in certain areas as designated in Figure 6-4 of the MSHCP. The project site is located within a MSHCP designated burrowing owl survey area. In accordance with the MSHCP Burrowing Owl Survey Instructions (2006), survey protocol consists of two steps, Step I – Habitat Assessment and Step II – Locating Burrows and Burrowing Owls. The following section describes the methodology followed during the burrowing owl habitat assessment conducted for this project.

- Step I – Habitat Assessment: Step 1 of the MSHCP habitat assessment for burrowing owl consists of a walking survey to determine if suitable habitat is present on-site. The habitat assessment was conducted on November 13 and 16, 2022. Upon arrival at the project site, and prior to initiating the assessment survey, binoculars were used to scan all suitable habitats on and adjacent to the property, including perch locations, to establish owl presence.

  All suitable areas of the project site were surveyed on foot by walking slowly and methodically while recording/mapping areas that may represent suitable owl habitat on-site. Primary indicators of suitable burrowing owl habitat in western Riverside County include, but are not limited to, native and non-native grassland, interstitial grassland within shrub lands, shrub lands with low density shrub cover, golf courses, drainage ditches, earthen berms, unpaved airfields, pastureland, dairies, fallow fields, and agricultural use areas. Burrowing owls typically use burrows made by fossorial mammals, but they often utilize man-made structures, such as earthen berms, cement culverts, cement, asphalt, rock, wood debris piles, openings beneath cement or asphalt pavement. Burrowing owls are often found within, under, or in close proximity to man-made structures.

  According to the MSHCP guidelines, if suitable habitat is present, the biologist should also walk the perimeter of the property, which consists of a 150-meter (approximately 500 feet) buffer zone around the project site boundary. If permission to access the buffer area cannot be obtained, the biologist shall not trespass, but visually inspect adjacent habitats with binoculars. In addition to surveying the entire Project Site all bordering natural habitats located immediately adjacent to the Project Site were assessed. Results from the habitat assessment indicate that suitable resources (i.e., low growing vegetation that provides line of site opportunities) for burrowing owl are present throughout the project site. Accordingly, if suitable habitat is documented on-site or within adjacent habitats, both Step II, focused burrow surveys and the 30-day preconstruction surveys are required in order to comply with the MSHCP guidelines.

- Step II – Locating Burrows and Burrowing Owls: Concurrent with the initial habitat assessment, a detailed focused burrow survey was conducted and included documentation of appropriately sized natural burrows or suitable man-made structures that may be utilized by burrowing owl – as part of the MSHCP protocol, which is described below under Part A, Focused Burrow Survey. The MSHCP protocol indicates that no more than 100 acres should be surveyed per day/per biologist.

    - Part A – Focused Burrow Survey: A systematic survey for burrows, including burrowing owl sign, was conducted by walking across all suitable habitats mapped within the project site on November 13 and 16, 2023. Pedestrian survey transects were spaced to allow 100% visual coverage of the ground surface. The distances between transect centerlines were no more than 30 meters (approximately 100 feet) apart, and owing to the terrain, often much smaller. Transect routes were also adjusted to account for topography and in general ground surface visibility. Areas providing potential habitat for burrowing owls were surveyed for suitable burrows, consisting of natural and non-natural substrates in areas with low, open vegetation. All burrows encountered were examined for shape, scat, pellets, white-wash, feathers, tracks, and prey remains. Suitable burrows/sites, including rock piles and non-natural substrates, were thoroughly examined for signs of presence.

    - Part B – Focused Burrow Survey: Due to surrounding development to the west, a zone of influence was not able to be surveyed; however, these areas do not support suitable habitat for burrowing owls. Some areas to the north and east of the project site within 500 feet, support dense vegetation and were determined not to provide suitable habitat. Survey transects on the project site were oriented north to west and were conducted at a maximum of 30-meter (approximately 100 feet) intervals to ensure 100% visual coverage of all areas in suitable habitat on the project site, and within the survey area. The focused burrowing owl surveys were conducted during the recognized timeframe (the breeding season is typically March through August) in the morning one hour before sunrise to two hours after sunrise.

      Suitable burrows/sites, including rock piles and non-natural substrates, were thoroughly examined for signs of presence. All burrows encountered were examined for shape, scat, pellets, white-wash, feathers, tracks, and prey remains. The location of all suitable burrowing owl habitat, potential owl burrows, burrowing owl sign, and any owls observed were recorded and mapped, with a hand-held GPS unit, if observed. Methods to detect presence of burrowing owls included direct observation, aural detection, and signs of presence. Binoculars were used to observe distant birds and their activity around potential nesting habitat. The survey area was assessed on foot by qualified biologists Travis J McGill, Rachael A. Lyons, and Megan E. Peukert, who are knowledgeable in the habitats and behavior of burrowing owls.

      Four focused burrowing owl surveys were conducted on May 10 and 31 and June 14 and 28, 2024. All surveys were completed between 0630 and 1030. The surveys were conducted to document the presence/absence of burrowing owl on the project site. Refer to Table 1, *Survey Data*, for a summary of the survey dates and times, personnel, weather conditions, and general findings.

Table 1: Burrowing Owl Survey Data

Survey No.	Survey Date	Surveyor	Time	Temperature (˚F)	Cloud Cover	Wind Speed (mph)	Burrowing Owl Detected On-Site
1	5/10/24	Travis J. McGill, Rachael Lyons & Megan E. Peukert	0630-1000	66-73	10%	0-5	No
2	5/31/24	Megan E. Peukert & Rachael Lyons	0700-1030	65-68	30%	0-5	No
3	6/14/24	Travis J. McGill, Rachael Lyons & Megan E. Peukert	0630-1030	65-69	30%	0-5	No
4	6/28/24	Megan E. Peukert & Rachael Lyons	0700-1030	67-74	0%	0-5	No

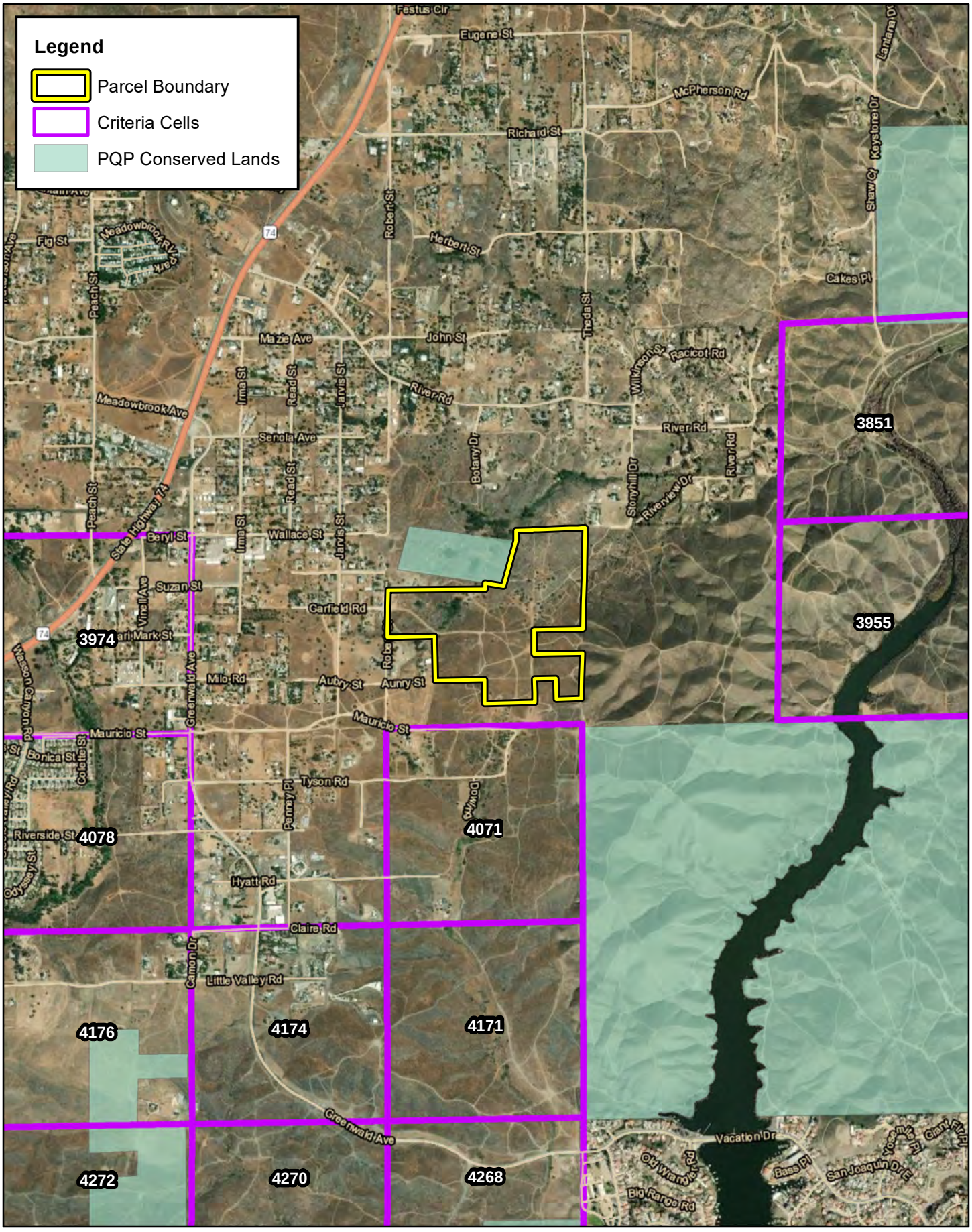
Based on the results of the 2024 burrowing owl focused surveys, no burrowing owls or evidence of recent or historic use by burrowing owls were observed on the project site. As a result, burrowing owls are presumed to be absent from the project site.

To ensure burrowing owl remain absent from the project site, it is recommended that a 30-day burrowing owl pre-construction clearance survey be conducted in accordance with the *Burrowing Owl Survey Instructions for the Western Riverside Multiple Species Habitat Conservation Plan Area* prior to any ground disturbing activities. If burrowing owls and/or birds displaying nesting behaviors are observed within the project site during future construction, further review may be needed to ensure compliance with the MSHCP, MBTA and Fish and Game Code.

5.5 FUELS MANAGEMENT

In accordance with Section 6.4 of the MSHCP, *Fuels Management*, fuels management focuses on hazard reduction for humans and their property. Fuels management for human hazard reduction involves reducing fuel loads in areas where fire may threaten human safety or property, suppressing fires once they have started, and providing access for fire suppression equipment and personnel.

Per the MSHCP, new Development (i.e., what this project is proposing), that is planned adjacent to a PQP Conservation Lands or other undeveloped areas, brush management shall be incorporated in the project footprint boundaries and shall not encroach into the PQP Conservation Lands.



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MSHCP Criteria Area

Exhibit 9

Section 7 Stephen's Kangaroo Rat Habitat Conservation Plan

Separate from the consistency review against the policies of the MSHCP, Riverside County established a boundary in 1996 for protecting the Stephens' kangaroo rat (*Dipodomys stephensi*), a federally endangered and state threatened species. The Stephens' kangaroo rat is protected under the Stephens' Kangaroo Rat Habitat Conservation Plan (County Ordinance No. 663.10; SKR HCP). As described in the MSHCP Implementation Agreement, a Section 10(a) Permit, and California Fish and Game Code Section 2081 Management Authorization were issued to the Riverside County Habitat Conservation Agency (RCHCA) for the Long-Term SKR HCP and was approved by the USFWS and CDFW in August 1990 (RCHCA 1996). Relevant terms of the SKR HCP have been incorporated into the MSHCP and its Implementation Agreement. The SKR HCP will continue to be implemented as a separate HCP; however, to provide the greatest conservation for the largest number of Covered Species, the Core Reserves established by the SKR HCP are managed as part of the MSHCP Conservation Area consistent with the SKR HCP. Actions shall not be taken as part of the implementation of the SKR HCP that will significantly affect other Covered Species. Take of Stephens' kangaroo rat outside of the boundaries but within the MSHCP area is authorized under the MSHCP and the associated permits.

The project site is located within the Mitigation Fee Area of the SKR HCP but is not located within or adjacent to any of the Core Reserve Areas. Since the project site is not located within or adjacent to any of the Core Reserve Areas, no focused SKR surveys or on-site mitigation would be required. On-site mitigation is only recommended in Ordinance 663.10 when a site is located within or adjacent to a Core Reserve Area. As a result, the applicant will only be required to pay the SKR HCP Mitigation Fee prior to development of the project site.

Section 8 Conclusion and Recommendations

The discussion below provides a summary of survey results; avoidance and minimization efforts; direct, indirect, and cumulative project impacts; and compensatory mitigation measures for each biological resource area required to be analyzed according to CEQA, based on Appendix G (Environmental Checklist Form) of the CEQA Guidelines:

***CEQA Threshold**: Would the proposed Project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or the U.S. Fish and Wildlife Service?*

Special-Status Plant Species

One (1) special-status plant species, paniculate tarplant, was observed during the field investigation. Further, based on habitat requirements for identified special-status species, known species distributions, and the quality and availability of habitats present, it was determined that the project site has a low potential to support Payson's jewelflower, Peninsular spineflower, southern California black walnut, Robinson's pepper-grass, and Coulter's Matilija poppy.

The general suitability of the project site for these species is limited; however, due to the location of the site on the northern periphery of the Sedco Hills and the subsequent increased suitability of nearby habitats to the south, these species were determined to have a low potential to occur. Since the site provides only limited suitability habitat for these species and no direct observations of these species were made, it is unlikely that any paniculate tarplant, Robinson's pepper-grass, or Coulter's Matilija poppy supported on-site contribute meaningfully to the continued conservation of these species, if present. No mitigation obligations specific to these species are expected and no additional surveys are recommended.

Special-Status Wildlife Species

Three (3) special-status wildlife species, orange-throat whiptail, loggerhead shrike, and coastal California gnatcatcher, were observed during the field investigation. Further, based on habitat requirements for the identified special-status species, known species distributions, and the quality and availability of habitats present, it was determined that the project site has a high potential to support Cooper's hawk, sharp-shinned hawk, coastal whiptail, Costa's hummingbird, San Diego banded gecko, red-diamond rattlesnake, California horned lark, San Diego desert woodrat, coast horned lizard, and coast patch-nosed snake; and a low potential to support southern California rufous-crowned sparrow, grasshopper sparrow, golden eagle, California glossy snake, Bell's sparrow, burrowing owl, Crotch bumblebee, American bumble bee, Dulzura pocket mouse, northwestern San Diego pocket mouse, San Bernardino ringneck snake, western mastiff bat, San Diego black-tailed jackrabbit, and pallid bobcat. Of the aforementioned species, only coastal California gnatcatcher is federally listed as threatened and Crotch bumblebee is a candidate for state listing. In addition, orange-throat whiptail, loggerhead shrike, coastal California gnatcatcher, Cooper's hawk, sharp-shinned hawk, coastal whiptail, San Diego banded gecko, red-diamond rattlesnake, California horned lark, San Diego desert woodrat, coast horned lizard, southern California rufous-crowned sparrow, grasshopper

sparrow, golden eagle, Bell's sparrow, burrowing owl, northwestern San Diego pocket mouse, San Diego black-tailed jackrabbit, and pallid bobcat are covered species under the MSHCP.

Since coastal California gnatcatcher is a fully covered species under the MSHCP, no focused surveys for this species are required. To ensure impacts to aforementioned avian species do not occur from implementation of the proposed project, a pre-construction nesting bird clearance survey shall be conducted prior to ground disturbance. With implementation of the pre-construction nesting bird clearance survey, impacts to the aforementioned species will be less than significant and no mitigation will be required.

Recommendations for avoidance and minimization:

1. Nesting birds are protected pursuant to the Migratory Bird Treaty Act (MBTA) and California Fish and Game Code (Sections 3503, 3503.3, 3511, and 3513 of the California Fish and Game Code prohibit the take, possession, or destruction of birds, their nests or eggs). In order to protect migratory bird species, a nesting bird clearance survey should be conducted prior to any ground disturbance or vegetation removal activities that may disrupt the birds during the nesting season. Consequently, if avian nesting behaviors are disrupted, such as nest abandonment and/or loss of reproductive effort, it is considered "take" and is potentially punishable by fines and/or imprisonment.

   If construction occurs between February 1st and August 31st, a pre-construction clearance survey for nesting birds should be conducted within three (3) days of the start of any vegetation removal or ground disturbing activities to ensure that no nesting birds will be disturbed during construction. The biologist conducting the clearance survey should document a negative survey with a brief letter report indicating that no impacts to active avian nests will occur. If an active avian nest is discovered during the pre-construction clearance survey, construction activities should stay outside of a no-disturbance buffer. The size of the no-disturbance buffer will be determined by the wildlife biologist and will depend on the level of noise and/or surrounding anthropogenic disturbances, line of sight between the nest and the construction activity, type and duration of construction activity, ambient noise, species habituation, and topographical barriers. These factors will be evaluated on a case-by-case basis when developing buffer distances. Limits of construction to avoid an active nest will be established in the field with flagging, fencing, or other appropriate barriers; and construction personnel will be instructed on the sensitivity of nest areas. A biological monitor should be present to delineate the boundaries of the buffer area and to monitor the active nest to ensure that nesting behavior is not adversely affected by the construction activity. Once the young have fledged and left the nest, or the nest otherwise becomes inactive under natural conditions, construction activities within the buffer area can occur.

2. Crotch bumble bee, a candidate for listing under the California Endangered Species Act, was detected on the project site during the 2024 flight season during the first survey, with two surveys pending (Appendix F is reserved for the final report). If impacts to the Crotch bumblebee, , cannot be avoided, an Incidental Take Permit would be required from the CDFW as it is not an MSCHP-covered species.

CEQA Threshold: *Would the proposed Project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?*

Riparian Habitat and Special-Status Natural Communities

One (1) unnamed drainage feature (Drainage 1) was observed within the boundaries of the project site at the time of the investigation. The on-site ephemeral drainage feature is not relatively permanent, standing, or a continuously flowing body of water and, therefore, will not qualify as waters of the United States under the regulatory authority of the Corps (*Sackett v. EPA* (2022) 143 S. Ct. 1322, 1336). However, the on-site drainage feature will qualify was waters of the State and fall under the regulatory authority of the Regional Board and CDFW.

The project applicant will likely be required to obtain the following regulatory approvals prior to impacts occurring within the identified jurisdictional areas: Corps Approved Jurisdictional Determination/Waiver; Regional Board CWA Section 401 Water Quality Certification; and CDFW Section 1602 SAA.

No sensitive habitats were identified within the Project site. Thus, no sensitive natural communities will be impacted from Project implementation.

CEQA Threshold: *Would the proposed Project have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?*

Federally Protected Wetlands

No inundated areas, wetland features, or wetland plant species that would be considered wetlands as defined by Section 404 of the Clean Water Act occur within the proposed Project footprint. As a result, implementation of the proposed Project would not result in any impacts or have substantial adverse effect on federally protected wetlands.

CEQA Threshold: *Would the proposed Project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?*

Wildlife Corridors

As mapped by the MSHCP, the project site has not been identified as occurring in a wildlife corridor or linkage. The proposed project has been designed in such a way that the majority of high-quality habitat supported within site boundaries will not be significantly impacted. In addition, the location of the site on the western periphery of the open space within the Temescal Mountains and the presence of residential developments and State Route 74 to the north and west of the site generally precludes the site from functioning as a major wildlife movement corridor or linkage.

The undeveloped land in the immediate vicinity of the project site provides local wildlife movement opportunities for wildlife species moving through the immediate area. The project site does not function as a major wildlife movement corridor or linkage. As such, implementation of the proposed project is not

expected to have a significant impact to wildlife movement opportunities or prevent local wildlife movement through the area since there is ample habitat adjacent to the project site to support wildlife movement opportunities.

CEQA Threshold: *Would the proposed Project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?*

Local Policies or Ordinances

There are no local policies or ordinances that pertain to the proposed project. Therefore, impacts on local polices or ordinances are not expected to occur from development of the proposed project, and mitigation is not required.

CEQA Threshold: *Would the proposed Project conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state Habitat Conservation Plan?*

Local, Regional, and State Plans

The project site is located in the Elsinore Area Plan, of the MSHCP but is not located within any Criteria Cells or designated conservation areas. Based on the analysis provided in this report and with completion of recommendations in this report and payment of the MSHCP Local Development Mitigation Fee, development of the project site will be fully consistent with the MSHCP. Additionally, the project site is also located within the fee area for the SKR HCP. With payment of the Stephen's kangaroo rat mitigation fee, development of the project will be consistent with the SKR HCP.

Recommendations for avoidance and minimization:

3. In order to comply with the conservation goals of the MSCHP, a 30-day burrowing owl pre-construction clearance survey be conducted in accordance with the *Burrowing Owl Survey Instructions for the Western Riverside Multiple Species Habitat Conservation Plan Area* prior to any ground disturbing activities. If burrowing owls and/or birds displaying nesting behaviors are observed within the project site and off-site improvement areas during future construction, further review may be needed to ensure compliance with the MSHCP, MBTA and Fish and Game Code.

Section 9 References

California Burrowing Owl Consortium, 1993. *Burrowing Owl Survey Protocol and Mitigation Guidelines.* Accessed on the internet at: www.dfg.ca.gov/wildlife/nongame/docs/boconsortium.pdf

California Department of Fish and Wildlife (CDFW), 2012. *Staff Report on Burrowing Owl Mitigation*.

California Department of Fish and Wildlife. 2010. List of Vegetation Alliances and Associations (Natural Communities List). Available online at http://www.dfg.ca.gov/biogeodata/vegcamp/natural_comm_list.asp.

California Department of Fish and Wildlife. 2024. RareFind 5, California Natural Diversity Data Base, California. Data Base report on threatened, endangered, rare or otherwise sensitive species and communities for the *Lake Elsinore and Romoland* 7.5-minute USGS quadrangles.

California Native Plant Society. 2024. Inventory of Rare and Endangered Plants of California. Rare Plant Scientific Advisory Committee, David P. Tibor, Convening Editor. California Native Plant Society. Sacramento, California. Available at: http://www.cnps.org/inventory.

Google, Inc. 2021. Google Earth Pro version 7.3.3.7786, build date 07/21/2020. Historical aerial imagery from 1994 to 2023.

Helix Environmental Planning, 2024. 2023 Dry Season and West Season Reports for the Meadowbrook-Crescent Garden Project.

Hickman, J.C., ed. 2012. *The Jepson Manual: Higher Plants of California*. University of California Press.

Holland, R. F. 1986. Preliminary descriptions of the Terrestrial Natural Communities of California. Calif. Dept. of Fish and Game, Sacramento, CA.

Munz, P.A. 1974. *A Flora of Southern California*. University of California Press, Berkeley, California.

Nationwide Environmental Title Research, LLC, 1999. Historic Aerials Viewers. Available online at https://www.historicaerials.com/viewer.

Riverside County. 2003 (June). Final Western Riverside County Multiple Species Habitat Conservation Plan. http://rctlma.org/

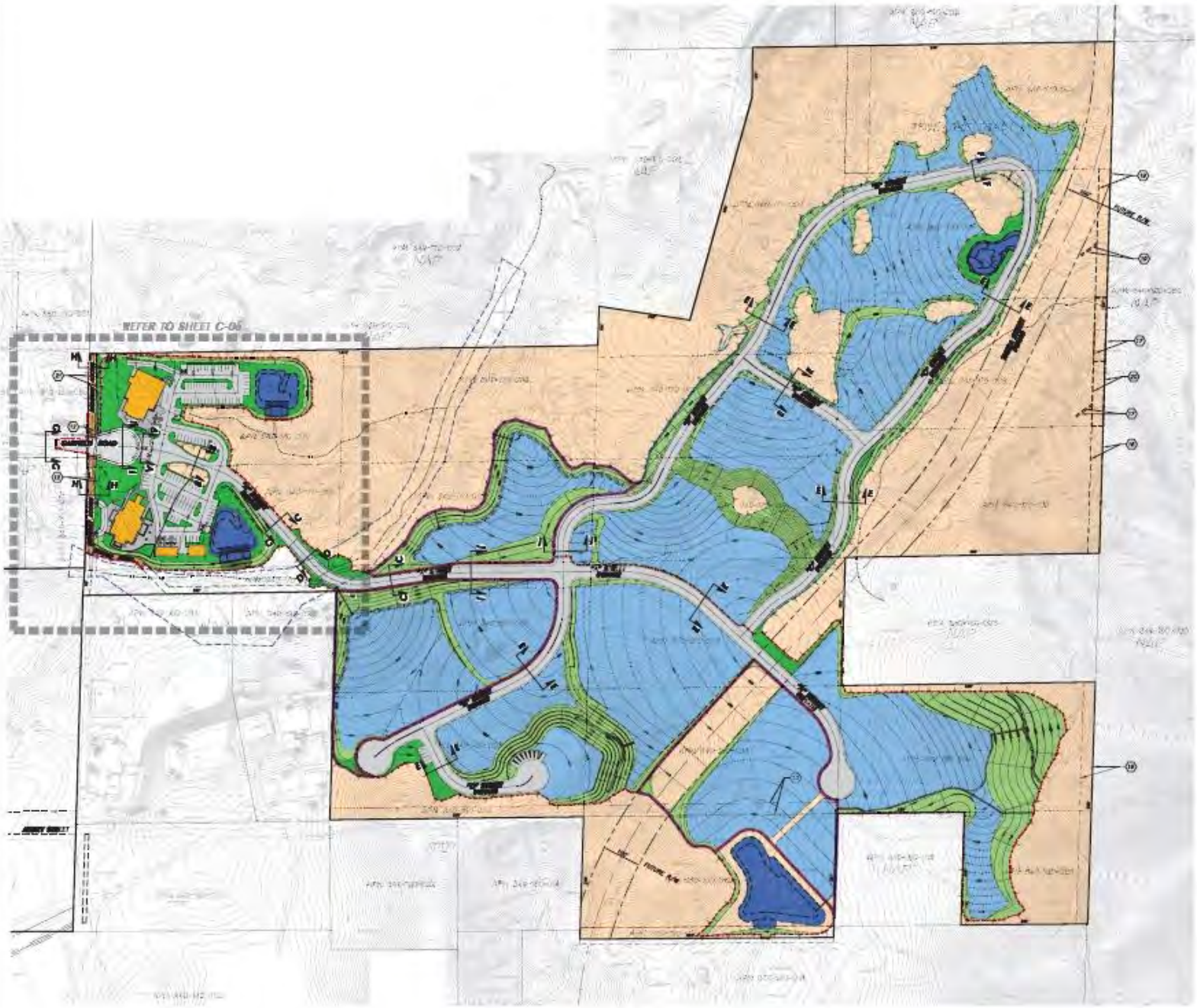
Riverside County. 2006. Burrowing Owl Survey Instructions for the Western Riverside Mulitple Species Habitat Conservation Plan Area. Available online at http://rctlma.org/Portals/1/EPD/consultant/burrowing_owl_survey_instructions.pdf.

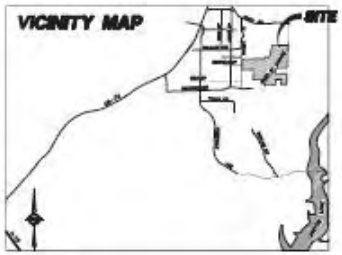
Sibley, D.A. 2014. The Sibley Guide to Birds, Second Edition. Alfred A. Knopf, Inc., New York, New York.

Stebbins, R.C. 2003. A Field Guide to Western Reptiles and Amphibians, Third Edition. Houghton Mifflin Company, New York, New York.

U.S. Department of Agriculture, Natural Resources Conservation Service. 2018. *Web Soil Survey*. Online at http://websoilsurvey.nrcs.usda.gov/app/.

Appendix A Site Plan





NOTES

1. REFER TO GROUNDWORK SHEET, SHEETS C-2 AND C-3, FOR EASEMENT LOCATIONS.
2. REFER TO SHEET C-8 FOR STREET CROSS SECTIONS.
3. FOR GENERAL NOTES REFER TO SHEET C-1.

LEGEND

- PROJECT BOUNDARY LINE
- PROPOSED RIGHT OF WAY
- PROPOSED LOT LINE
- PROPOSED CURB
- EXISTING LOT LINE
- EASEMENT LINE
- PROPOSED CENTERLINE
- EXISTING WATER
- PROPOSED STORM DRAIN
- FLOOD PLAIN LIMITS
- FLOWLINE
- WALL
- DAYLIGHT
- TOP OF SLOPE
- TOE OF SLOPE

- GRADE SITE
- NATURAL OPEN SPACE
- SLOPES 3:1 TO 4:1
- LANDSCAPE AREAS
- STRUCTURE/BUILDING
- WATER QUALITY AND DETENTION BASIN

PHASES

- PHASE 01
- PHASE 02
- PHASE 03



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HUNTINGTON BEACH, CA 92648
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CONTACT: CHARLES CHRISTIAN, COUNTY OF RIVERSIDE

PREPARED BY:
[illegible] ASSOCIATES
[illegible]

CONDITIONAL USE PERMIT - CUP230002

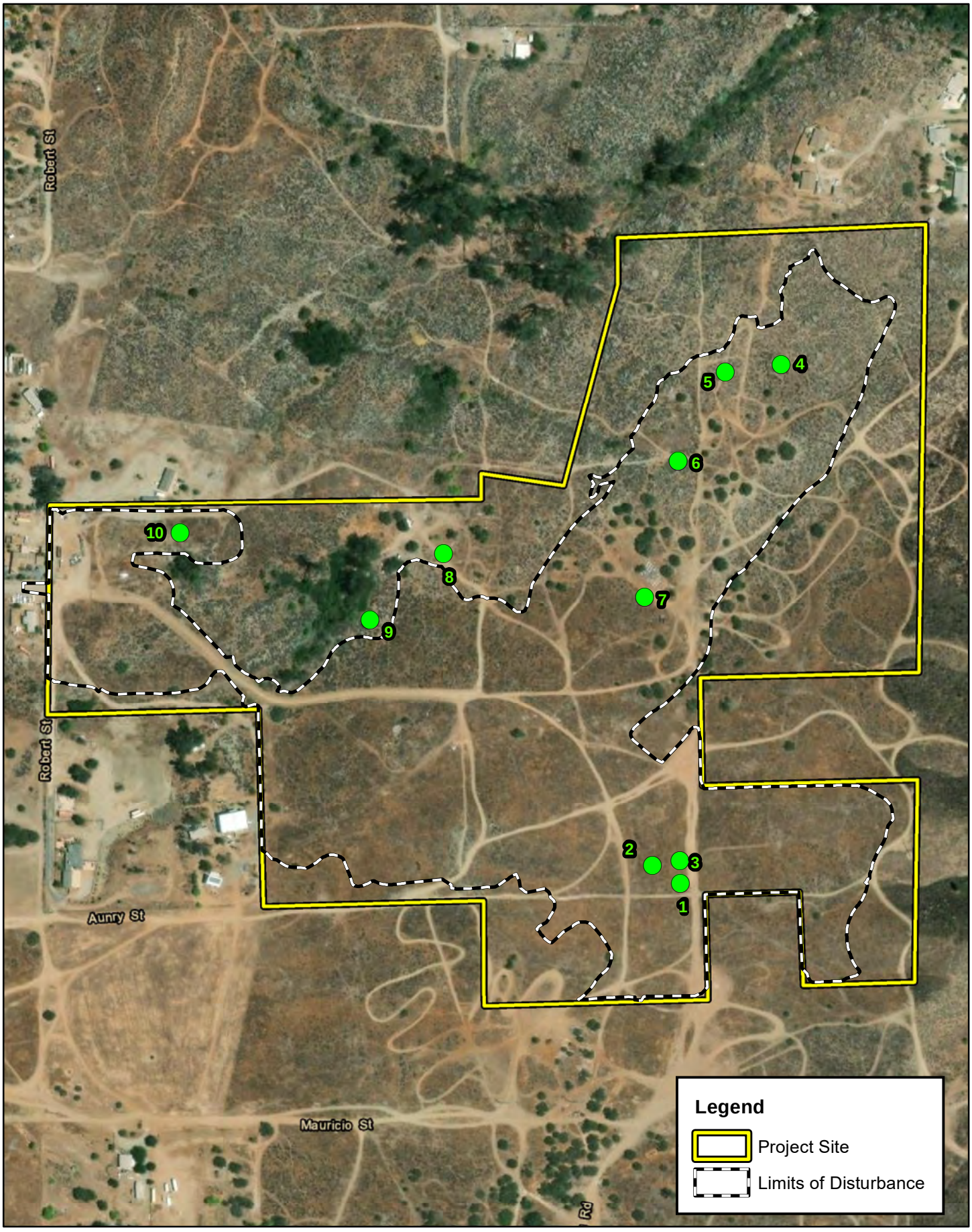
SITE PLAN - OVERALL

DESIGNED BY	DATE	CITY FILE NO.	SHEET
DRAWN BY: P.R.			C-5
CHECKED BY:			

REVISIONS	
DATE	DESCRIPTION

DATE: Nov. 02, 2023 12:11:36 File: P:\1187\Planning\SA_CUP 230002\dwg_CUP\C05_SitePlanOverall_CUP 230002.dwg

Appendix B Site Photographs



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0 125 250 500 Feet

Source: ESRI Aerial Imagery, Riverside County

CRESCENT CEMETERY

Photo Index

Exhibit 1



Photograph 1: From the southeast corner of the project site, looking west along the southern boundary.



Photograph 2: From the southeast corner of the project site, looking northwest through undeveloped land.



Photograph 3: From the southeast corner of the project site, looking north along the eastern boundary.



Photograph 4: From the northeast portion of the project site looking west through undeveloped land onsite.



Photograph 5: From the northeast portion of the project site, looking southwest through undeveloped land.



Photograph 6: From the northeast portion of the project site, looking south through undeveloped land.



Photograph 7: From the middle of the project site, looking west through an area which supports an apiary onsite.



Photograph 8: From the northwest region of the project site, looking south through an area of the site which historically supported a well and pump system.



Photograph 9: From the southwest region of the project site, looking east through existing vegetation surrounding the onsite drainage feature.



Photograph 10: From the southwest region of the project site, looking northeast through undeveloped land onsite.

Appendix C Potentially Occurring Special-Status Biological Resources

Table C-1: Potentially Occurring Special-Status Biological Resources

Scientific Name Common Name	**Status**	**Habitat**	**Covered by MSHCP**	**Observed On-site**	**Potential to Occur**
WILDLIFE SPECIES					
Accipiter cooperii Cooper's hawk	Fed: None CA: WL	Generally found in forested areas up to 3,000 feet in elevation, especially near edges and rivers. Prefers hardwood stands and mature forests but can be found in urban and suburban areas where there are tall trees for nesting. Common in open areas during nesting season.	Yes	No	**High** Suitable foraging habitat and nesting opportunities are present within and surrounding the project site.
Accipiter striatus sharp-shinned hawk	Fed: None CA: WL	Found in pine, fir and aspen forests. They can be found hunting in forest interior and edges from sea level to near alpine areas. Can also be found in rural, suburban and agricultural areas, where they often hunt at bird feeders. Typically found in southern California in the winter months.	Yes	No	**High** Suitable foraging habitat is present within and surrounding the project site. This species does not nest in the region.
Agelaius tricolor tricolored blackbird	Fed: None CA: **THR**; SSC	Range is limited to the coastal areas of the Pacific coast of North America, from Northern California to upper Baja California. Can be found in a wide variety of habitat including annual grasslands, wet and dry vernal pools and other seasonal wetlands, agricultural fields, cattle feedlots, and dairies. Occasionally forage in riparian scrub habitats along marsh borders. Basic habitat requirements for breeding include open accessible water, protected nesting substrate (freshwater marsh dominated by cattails, willows, and bulrushes [*Schoenoplectus* sp.]), and either flooded or thorny or spiny vegetation and suitable foraging space providing adequate insect prey.	Yes	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Aimophila ruficeps canescens southern California rufous-crowned sparrow	Fed: None CA: WL	Typically found between 3,000 and 6,000 feet in elevation. Breed in sparsely vegetated scrubland on hillsides and canyons. Prefers coastal sage scrub dominated by California sagebrush (*Artemisia californica*), but they can also be found breeding in coastal bluff scrub, low-growing serpentine chaparral, and along the edges of tall chaparral habitats.	Yes	No	**Low** Limited foraging and nesting habitat are present within and to the south of the project site. More suitable habitat is present to the east and south.

Scientific Name Common Name	**Status**	**Habitat**	**Covered by MSHCP**	**Observed On-site**	**Potential to Occur**
Ammodramus savannarum grasshopper sparrow	Fed: None CA: SSC	Occurs in grassland, upland meadow, pasture, hayfield, and old field habitats. Optimal habitat contains short- to medium-height bunch grasses interspersed with patches of bare ground, a shallow litter layer, scattered forbs, and few shrubs. May inhabit thickets, weedy lawns, vegetated landfills, fence rows, open fields, or grasslands.	Yes (e)	No	**Low** Limited foraging and nesting habitat are present within and to the south of the project site.
Anaxyrus californicus arroyo toad	Fed: **END** CA: SSC	Occurs in washes and intermittent streams with a mixture of gravel and sandy substrate. Requires a moderate cover of willows, cottonwoods, mulefat, and sycamore to provide shade over the water, and oaks in the upland area to forage for ants.	Yes (a)	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Aquila chrysaetos golden eagle	Fed: None CA: FP; WL	Occupies nearly all terrestrial habitats of the western states except densely forested areas. Favors secluded cliffs with overhanging ledges and large trees for nesting and cover. Hilly or mountainous country where takeoff and soaring are supported by updrafts is generally preferred to flat habitats. Deeply cut canyons rising to open mountain slopes and crags are ideal habitat.	Yes	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Ardea alba great egret	Fed: None CA: None	Yearlong resident throughout California, except for the high mountains and deserts. Feeds and rests in fresh, and saline emergent wetlands, along the margins of estuaries, lakes, and slow-moving streams, on mudflats and salt ponds, and in irrigated croplands and pastures.	No	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Ardea herodias great blue heron	Fed: None CA: None	Forages along streams, marshes, lakes, and meadows. Nests colonially in tall trees (typically Eucalyptus sp.), on cliffsides, or in isolated spots in marshes.	Yes	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Arizona elegans occidentalis California glossy snake	Fed: None CA: SSC	Inhabits arid scrub, rocky washes, grasslands, and chaparral habitats.	No	No	**Low** Suitable foraging and cover habitat are present within and surrounding the project site.
Artemisiospiza belli belli Bell's sparrow	Fed: None CA: WL	Generally prefers semi-open habitats with evenly spaced shrubs 1 – 2 meters in height. Dry chaparral and coastal sage scrub. Less common in tall dense, old chaparral.	Yes	No	**Low** Suitable foraging and nesting habitat are present within and surrounding the project site.

Scientific Name Common Name	**Status**	**Habitat**	**Covered by MSHCP**	**Observed On-site**	**Potential to Occur**
Aspidoscelis hyperythra Orange-throat whiptail	Fed: None CA: WL	Semi-arid brushy areas typically with loose soil and rocks, including washes, streamsides, rocky hillsides, and coastal chaparral.	Yes	Yes	**Present** Suitable foraging and cover habitat are present within and adjacent to the project site.
Aspidoscelis tigris stejnegeri coastal whiptail	Fed: None CA: SSC	Found in a variety of ecosystems, primarily hot and dry open areas with sparse foliage - chaparral, woodland, and riparian areas.	Yes	No	**High** Suitable foraging and cover habitat are present within and to the south of the project site.
Athene cunicularia burrowing owl	Fed: None CA: SSC	Occurs in open, annual or perennial grasslands, deserts, and scrublands characterized by low-growing vegetation. Dependent upon fossorial mammals for burrows, most notable ground squirrels.	Yes (c)	No	**Low** Portions of the project site provide line-of-sight opportunities favored by burrowing owls. Several suitable burrows for roosting and nesting were observed in heavily vegetated areas.
Aythya valisineria canvasback	Fed: None CA: None	Breeds in small lakes, deep-water marshes, bays, and ponds. Occurs more commonly in waters with a border of dense vegetation, which they use to construct their nests.	No	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Bombus crotchii Crotch bumblebee	Fed: None CA: CE	Colonial species that lives almost exclusively from coastal California east towards the Sierra-Cascade Crest and can be found uncommonly in western Nevada and south through Baja California. Inhabits grassland and scrub habitats in hotter and drier climates than most other bumblebee species and is only capable of tolerating a narrow range of climatic conditions. Feeds on a variety of annual and perennial plant species, classifying it as a dietary generalist. This species usually nests underground, often in abandoned rodent dens.	No	Yes	**Present** Observed onsite during the first of three focused presence/absence surveys during the 2024 flight season.
Bombus pensylvanicus American bumble bee	Fed: None CA: None	Prefers farmlands, meadows, grasslands, and open fields. Nests below grass or underground. Feeds on pollen of a wide variety of flowering plants including vetches, clovers, goldenrods, and many crop species.	No	No	**Low** Limited habitat is present within and surrounding the project site.

Scientific Name Common Name	**Status**	**Habitat**	**Covered by MSHCP**	**Observed On-site**	**Potential to Occur**
Botaurus lentiginosus American bittern	Fed: None CA: None	Often breed in shallow wetlands dominated by tall emergent vegetation, including cattail marshes, wet meadows, bogs, and shrubby marshes and occasionally hayfields.	Yes (a)	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Buteo regalis ferruginous hawk	Fed: None CA: WL	Occurs primarily in open grasslands and fields, but may be found in sagebrush flats, desert scrub, low foothills, or along the edges of pinyon-juniper woodland. Feeds primarily on small mammals and typically found in agricultural or open fields.	Yes	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Buteo swainsoni Swainson's hawk	Fed: None CA: **THR**	Typical habitat is open desert, grassland, or cropland containing scattered, large trees or small groves. Breeds in stands with few trees in juniper-sage flats, riparian areas, and in oak savannah in the Central Valley. Forages in adjacent grassland or suitable grain or alfalfa fields or livestock pastures.	Yes	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Calypte costae Costa's hummingbird	Fed: None CA: None	Desert and semi-desert, arid brushy foothills and chaparral. A desert hummingbird that breeds in the Sonoran and Mojave Deserts. Departs desert heat moving into chaparral, scrub, and woodland habitats.	No	No	**High** Suitable foraging and nesting habitat are present within and surrounding the project site.
Campylorhynchus brunneicapillus sandiegensis coastal cactus wren	Fed: None CA: SSC	Found in arid and semi-arid habitats with a high occurrence of cactus and spiny trees. Nests almost exclusively in prickly pear and cholla cactus.	Yes	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Chaetodipus californicus femoralis Dulzura pocket mouse	Fed: None CA: SSC	Occurs in desert and coastal habitats in southern California, Mexico, and northern Baja California, from sea level to at least 1,400 meters. Found in a variety of temperate habitats ranging from chaparral and grasslands to scrub forests and deserts. Requires low growing vegetation or rocky outcroppings, as well as sandy soils for burrowing.	No	No	**Low** Limited foraging and burrowing habitat are present within and surrounding the project site.
Chaetodipus fallax fallax northwestern San Diego pocket mouse	Fed: None CA: SSC	Occurs in desert and coastal habitats in southern California, Mexico, and northern Baja California, from sea level to at least 1,400 meters. Found in a variety of temperate habitats ranging from chaparral and grasslands to scrub forests and deserts. Requires low growing vegetation or rocky outcroppings, as well as sandy soils for burrowing.	Yes	No	**Low** Limited foraging and burrowing habitat are present within and surrounding the project site.

Scientific Name Common Name	**Status**	**Habitat**	**Covered by MSHCP**	**Observed On-site**	**Potential to Occur**
Chaetura vauxi Vaux's swift	Fed: None CA: SSC	Prefers redwood and Douglas-fir habitats with nest-sites in large hollow trees and snags, especially tall, burned-out snags. Fairly common migrant throughout most of the state in April and May, and August and September.	No	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Charadrius montanus mountain plover	Fed: None CA: SSC	Found in short grasslands, freshly-plowed fields, newly-sprouting grain fields, and sometimes in sod farms. Prefers short vegetation or bare ground with flat topography, particularly grazed areas or areas with fossorial rodents.	Yes	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Charadrius nivosus nivosus western snowy plover	Fed: **THR** CA: SSC	Occurs on sandy beaches, salt pond levees and along the shores of large alkali lakes. Requires sandy or gravelly substrate for nesting.	No	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Chlidonias niger black tern	Fed: None CA: SSC	Found at freshwater marshes and lakes and found along coastal waters in migration. For nesting favors fresh waters with extensive marsh vegetation and open water, also sometimes in smaller marshes and wet meadows. In migration found on larger lakes and along coast. Winters in tropical coastal regions, mostly just offshore or around salt lagoons and estuaries.	No	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Cicindela senilis frosti senile tiger beetle	Fed: None CA: None	Found in coastal salt marshes and interior alkali mud flats. Adults overwinter in shallow underground galleries beneath flat rocks.	No	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Circus hudsonius northern harrier	Fed: None CA: SSC	Frequents meadows, grasslands, open rangelands, desert sinks, fresh and saltwater emergent wetlands; seldom found in wooded areas. Mostly found in flat, or hummocky, open areas of tall, dense grasses, moist or dry shrubs, and edges for nesting, cover, and feeding.	Yes	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Cistothorus palustris clarkae Clark's marsh wren	Fed: None CA: SSC	Restricted to freshwater and brackish marshes dominated by bulrushes or cattails. Has a narrow distribution along the coast of southern California from Los Angeles basin south to the Mexican border.	No	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.

Scientific Name Common Name	**Status**	**Habitat**	**Covered by MSHCP**	**Observed On-site**	**Potential to Occur**
Coleonyx variegatus abbotti San Diego banded gecko	Fed: None CA: SSC	Occurs in coastal and cismontane southern California from interior Ventura County south, although it is absent from the extreme outer coast. It is uncommon in coastal scrub and chaparral, most often occurring in granite or rocky outcrops in these habitats.	Yes	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Crotalus ruber red-diamond rattlesnake	Fed: None CA: SSC	It can be found from the desert, through dense chaparral in the foothills (it avoids the mountains above around 4,000 feet), to warm inland mesas and valleys, all the way to the cool ocean shore. It is most commonly associated with heavy brush with large rocks or boulders. Dense chaparral in the foothills, cactus or boulder associated coastal sage scrub, oak and pine woodlands, and desert slope scrub associations are known to carry populations of the northern red-diamond rattlesnake; however, chamise and red shank associations may offer better structural habitat for refuges and food resources for this species than other habitats.	Yes	No	**High** Suitable foraging and cover habitat are present within and to the south of the project site. Local records indicate this species occurs nearby.
Cypseloides niger black swift	Fed: None CA: SSC	Aerial feeder, forages over forests and open areas. Nests behind or adjacent to waterfalls and wet cliffs, on sea cliffs and caves, and occasionally limestone caves.	Yes	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Diadophis punctatus modestus San Bernardino ringneck snake	Fed: None CA: None	Found near water under cover of bark, logs, stones, or boards, although it is not an active burrower. Common in open, relatively rocky areas within woodland, chaparral, forest, and grassland habitats. Also found on farms and in gardens. Restricted to springs and watercourses in arid regions.	No	No	**Low** Isolated suitable habitat is present within the project site. Local records indicate this species occurs nearby.
Dipodomys merriami parvus San Bernardino kangaroo rat	Fed: **END** CA: CE; SSC	Primarily found in Riversidian alluvial fan sage scrub and sandy loam soils, alluvial fans and flood plains, and along washes with nearby sage scrub. May occur at lower densities in Riversidian upland sage scrub, chaparral and grassland in uplands and tributaries in proximity to Riversidian alluvial fan sage scrub habitats. Tend to avoid rocky substrates and prefer sandy loam substrates for digging of shallow burrows.	Yes (c)	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.

Scientific Name Common Name	**Status**	**Habitat**	**Covered by MSHCP**	**Observed On-site**	**Potential to Occur**
Dipodomys simulans Dulzura kangaroo rat	Fed: None CA: None	Relatively common in chaparral, coastal sage scrub, Riversidean alluvial fan sage scrub, and peninsular juniper woodland habitats.	Yes	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Dipodomys stephensi Stephens' kangaroo rat	Fed: **THR** CA: **THR**	Occur in arid and semi-arid habitats with some grass or brush. Prefer open habitats with less than 50% protective cover. Require soft, well-drained substrate for building burrows and are typically found in areas with sandy soil.	Yes	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Egretta thula snowy egret	Fed: None CA: None	Widespread in California along shores of coastal estuaries, fresh and saline emergent wetlands, ponds, slow-moving rivers, irrigation ditches, and wet fields. In southern California, common yearlong in the Imperial Valley and along the Colorado River.	No	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Elanus leucurus white-tailed kite	Fed: None CA: FP	Occurs in low elevation, open grasslands, savannah-like habitats, agricultural areas, wetlands, and oak woodlands. Uses trees with dense canopies for cover.	Yes	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Empidonax traillii willow flycatcher	Fed: None CA: **END**	A rare to locally uncommon, summer resident in wet meadow and montane riparian habitats (2,000 to 8,000 ft) in the Sierra Nevada and Cascade Range. Most often occurs in broad, open river valleys or large mountain meadows with lush growth of shrubby willows.	No	No	**Presumed Absent** There is no suitable habitat present within the limits of disturbance for the proposed project.
Empidonax traillii extimus southwestern willow flycatcher	Fed: **END** CA: **END**	Occurs in riparian woodlands in southern California. Typically requires large areas of willow thickets in broad valleys, canyon bottoms, or around ponds and lakes. These areas typically have standing or running water, or are at least moist.	Yes (a)	No	**Presumed Absent** There is no suitable habitat present within the limits of disturbance for the proposed project.
Emys marmorata western pond turtle	Fed: None CA: SSC	Found in ponds, lakes, rivers, streams, creeks, marshes, and irrigation ditches, with abundant vegetation, either rocky or muddy bottoms, in woodland, forest, and grassland. In streams, prefers pools to shallower areas. Logs, rocks, cattail mats, and exposed banks are required for basking. May enter brackish water and even seawater. Found at elevations from sea level to over 5,900 feet (1,800 m).	Yes	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.

Scientific Name Common Name	**Status**	**Habitat**	**Covered by MSHCP**	**Observed On-site**	**Potential to Occur**
Eremophila alpestris actia California horned lark	Fed: None CA: WL	Generally found in shortgrass prairies, grasslands, disturbed fields, or similar habitat types along the coast or in deserts. Trees are shrubs are usually scarce or absent. Generally rare in montane, coniferous, or chaparral habitats. Forms large flocks outside of the breeding season.	Yes	No	**High** Suitable foraging and cover habitat are present within and to the south of the project site. Local records indicate this species occurs nearby.
Eumops perotis californicus western mastiff bat	Fed: None CA: SSC	Primarily a cliff-dwelling species, roost generally under exfoliating rock slabs. Roosts are generally high above the ground, usually allowing a clear vertical drop of at least 3 meters below the entrance for flight. In California, it is most frequently encountered in broad open areas. Its foraging habitat includes dry desert washes, flood plains, chaparral, oak woodland, open ponderosa pine forest, grassland, and agricultural areas.	No	No	**Low** Suitable foraging habitat and roosting opportunities are present within and surrounding the project site.
Euphydryas editha quino Quino checkerspot butterfly	Fed: **END** CA: None	Range is now limited to a few populations in Riverside and San Diego counties. Common in meadows and upland sage scrub/chapparal habitat.	Yes	No	**Presumed Absent** The project site does not occur in proximity to known populations.
Falco columbarius merlin	Fed: None CA: WL	Nest in forested openings, edges, and along rivers across northern North America. Found in open forests, grasslands, and especially coastal areas with flocks of small songbirds or shorebirds.	Yes	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Falco mexicanus prairie falcon	Fed: None CA: WL	Commonly occur in arid and semiarid shrubland and grassland community types. Also occasionally found in open parklands within coniferous forests. During the breeding season, they are found commonly in foothills and mountains which provide cliffs and escarpments suitable for nest sites.	Yes	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Falco peregrinus anatum American peregrine falcon	Fed: DL CA: DL; FP	Uncommon winter resident of the inland region of southern California. Active nesting sites are known along the coast north of Santa Barbara, in the Sierra Nevada, and in other mountains of northern California. Breeds mostly in woodland, forest, and coastal habitats. Riparian areas and coastal and inland wetlands are important habitats yearlong, especially in nonbreeding seasons.	Yes	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.

Scientific Name Common Name	**Status**	**Habitat**	**Covered by MSHCP**	**Observed On-site**	**Potential to Occur**
Hydroprogne caspia Caspian tern	Fed: None CA: None	Occurs near large lakes, coastal waters, beaches, and bays. Found on both fresh and salt water, favoring protected waters such as bays and lagoons, rivers, not usually foraging over open sea. Nests on open ground on islands, coasts.	No	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Icteria virens yellow-breasted chat	Fed: None CA: SSC	Primarily found in tall, dense, relatively wide riparian woodlands and thickets of willows, vine tangles, and dense brush with well-developed understories. Nesting areas are associated with streams, swampy ground, and the borders of small ponds. Breeding habitat must be dense to provide shade and concealment. It winters south the Central America.	Yes	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Lanius ludovicianus loggerhead shrike	Fed: None CA: SSC	Often found in broken woodlands, shrublands, and other habitats. Prefers open country with scattered perches for hunting and fairly dense brush for nesting.	Yes	Yes	**Present** Suitable foraging and nesting habitat is present within and surrounding the project site.
Larus californicus California gull	Fed: None CA: WL	Require isolated islands in rivers, reservoirs and natural lakes for nesting, where predations pressures from terrestrial mammals are diminished. Uses both fresh and saline aquatic habitats at variable elevations and degrees of aridity for nesting and for opportunistic foraging.	No	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Lasiurus xanthinus western yellow bat	Fed: None CA: SSC	Roosts in palm trees in foothill riparian, desert wash, and palm oasis habitats with access to water for foraging.	No	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Lepus californicus bennettii San Diego black-tailed jackrabbit	Fed: None CA: None	Occurs in diverse habitats, but primarily is found in arid regions supporting shortgrass habitats. Openness of open scrub habitat is preferred over dense chaparral.	Yes	No	**Low** Suitable foraging and cover habitat are present within and to the south of the project site. This species is known to occupy Sedco Hills.

Scientific Name Common Name	**Status**	**Habitat**	**Covered by MSHCP**	**Observed On-site**	**Potential to Occur**
Lynx rufus pallescens pallid bobcat	Fed: None CA: None	Found on the western edge of the great basin habitat in extreme northeast California. Live in a variety of habitats including forests, deserts, mountains, swamps and farmland.	Yes	No	**Low** Suitable foraging and cover habitat are present within and surrounding the project site. Free-roaming domestic dogs likely preclude this species from establishing on-site.
Nannopterum auritum double-crested cormorant	Fed: None CA: WL	Common yearlong resident in southern California. Occurs widely in freshwater and marine habitats along coastlines. Require open water where they can forage for schooling fish.	Yes	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Neotoma lepida intermedia San Diego desert woodrat	Fed: None CA: SSC	Occurs in coastal scrub communities between San Luis Obispo and San Diego Counties. Prefers moderate to dense canopies, and especially rocky outcrops.	Yes	No	**High** Suitable foraging and cover habitat are present within and to the south of the project site.
Numenius americanus long-billed curlew	Fed: None CA: WL	Preferred winter habitats include large coastal estuaries, upland herbaceous areas, and croplands. On estuaries, feeding occurs mostly on intertidal mudflats.	No	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Nycticorax nycticorax black-crowned night heron	Fed: None CA: None	Fairly common, yearlong resident in lowlands and foothills throughout most of California, including the Salton Sea and Colorado River areas, and very common locally in large nesting colonies. Feeds along the margins of lacustrine, large riverine, and fresh and saline emergent habitats and rarely, on kelp beds in marine sub tidal habitats. Nests and roosts in dense-foliaged trees and dense emergent wetlands.	Yes	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Onychomys torridus ramona southern grasshopper mouse	Fed: None CA: SSC	Inhabits alkali desert scrub and other desert scrub habitats, and to a lesser extent succulent shrubs, desert washes, desert riparian, coastal scrub, mixed chaparral, and sagebrush habitats. Generally rare in valley foothill and montane riparian habitats. Prefers low to moderate shrub cover and requires friable soils.	No	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.

Scientific Name Common Name	**Status**	**Habitat**	**Covered by MSHCP**	**Observed On-site**	**Potential to Occur**
Pandion haliaetus osprey	Fed: None CA: WL	Remain close to still or slow-moving bodies of water including oceans, rivers, lakes, mangroves, coastal wetlands, lagoons, reefs, estuaries and marshes. Generally nest in high places, such as trees, power poles, or cliffs.	Yes	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Pelecanus erythrorhynchos American white pelican	Fed: None CA: SSC	Locally common winter resident of southern California. Typically forage in shallow inland waters, such as open areas in marshes and along lake or river edges. Also occur in shallow coastal marine habitats.	No	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Perognathus longimembris brevinasus Los Angeles pocket mouse	Fed: None CA: SSC	Occurs in lower elevation grasslands and coastal sage scrub communities in and around the Los Angeles Basin. Prefers open ground with fine sandy soils. May not dig extensive burrows, but instead will seek refuge under weeds and dead leaves instead.	Yes (c)	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Phrynosoma blainvillii coast horned lizard	Fed: None CA: SSC	Occurs in a wide variety of vegetation types including coastal sage scrub, annual grassland, chaparral, oak woodland, riparian woodland and coniferous forest. In inland areas, this species is restricted to areas with pockets of open microhabitat, created by disturbance (i.e. fire, floods, roads, grazing, fire breaks). The key elements of such habitats are loose, fine soils with a high sand fraction; an abundance of native ants or other insects; and open areas with limited overstory for basking and low, but relatively dense shrubs for refuge.	Yes	No	**High** Suitable foraging and burrowing habitat are present within and to the south of the project site. Local records indicate this species occurs nearby.
Plegadis chihi white-faced ibis	Fed: None CA: WL	Prefers to feed in fresh emergent wetland, shallow lacustrine waters, muddy ground of wet meadows, and irrigated or flooded partures and croplands. Nests in dense, fresh emergent wetland.	Yes	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Polioptila californica californica coastal California gnatcatcher	Fed: **THR** CA: SSC	Obligate resident of sage scrub habitats that are dominated by California sagebrush (*Artemisia californica*). This species generally occurs below 750 feet elevation in coastal regions and below 1,500 feet inland. Ranges from the Ventura County, south to San Diego County and northern Baja California and it is less common in sage scrub with a high percentage of tall shrubs. Prefers habitat with more low-growing vegetation.	Yes	Yes	**Present** Suitable foraging and nesting habitat are present within and to the south of the project site.

Scientific Name Common Name	**Status**	**Habitat**	**Covered by MSHCP**	**Observed On-site**	**Potential to Occur**
Progne subis purple martin	Fed: None CA: SSC	Summer resident in a variety of wooded, low-elevation habitats throughout the state. Uses valley foothill and montane hardwood, valley foothill and montane hardwood-conifer, and riparian habitats. Also occurs in coniferous habitats, including closed-cone pine-cypress, ponderosa pine, Douglas-fir, and redwood.	Yes	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Salvadora hexalepis virgultea coast patch-nosed snake	Fed: None CA: SSC	Found in brushy or shrubby vegetation along the coast and requires small mammal burrows for refuge and overwintering.	No	No	**High** Suitable foraging and cover habitat are present within and to the south of the project site. Local records indicate this species occurs nearby.
Setophaga petechia yellow warbler	Fed: None CA: SSC	Nests over all of California except the Central Valley, the Mojave Desert region, and high altitudes and the eastern side of the Sierra Nevada. Winters along the Colorado River and in parts of Imperial and Riverside Counties. Nests in riparian areas dominated by willows, cottonwoods, sycamores, or alders or in mature chaparral. May also use oaks, conifers, and urban areas near stream courses.	No	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Spea hammondii western spadefoot	Fed: None CA: SSC	Prefers open areas with sandy or gravelly soils, in a variety of habitats including mixed woodlands, grasslands, coastal sage scrub, chaparral, sandy washed, lowlands, river floodplains, alluvial fans, playas, alkali flats, foothills, and mountains. Rainpools which do not contain bullfrogs, fish, or crayfish are necessary for breeding.	Yes	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Spinus lawrencei Lawrence's goldfinch	Fed: None CA: None	Open woodlands, chaparral, and weedy fields. Closely associated with oaks. Nests in open oak or other arid woodland and chaparral near water.	No	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Streptocephalus woottoni Riverside fairy shrimp	Fed: **END** CA: None	Freshwater crustacean that is found in vernal pools in the coastal California area.	Yes (a)	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.

Scientific Name Common Name	**Status**	**Habitat**	**Covered by MSHCP**	**Observed On-site**	**Potential to Occur**
Taxidea taxus American badger	Fed: None CA: SSC	Primarily occupy grasslands, parklands, farms, tallgrass and shortgrass prairies, meadows, shrub-steppe communities and other treeless areas with sandy loam soils where it can dig more easily for its prey. Occasionally found in open chaparral (with less than 50% plant cover) and riparian zones.	No	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Thamnophis hammondii two-striped garter snake	Fed: None CA: SSC	Occurs in or near permanent fresh water, often along streams with rocky beds and riparian growth up to 7,000 feet in elevation.	No	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Vireo bellii pusillus least Bell's vireo	Fed: **END** CA: **END**	Primarily occupy Riverine riparian habitat that typically feature dense cover within 1 -2 meters of the ground and a dense, stratified canopy. Typically it is associated with southern willow scrub, cottonwood-willow forest, mule fat scrub, sycamore alluvial woodlands, coast live oak riparian forest, arroyo willow riparian forest, or mesquite in desert localities. It uses habitat which is limited to the immediate vicinity of water courses, 2,000 feet elevation in the interior.	Yes (a)	No	**Low** Riparian habitats supported on-site provide limited foraging and nesting habitat; however, the limits of disturbance for the proposed project do not support suitable nesting habitat.
PLANT SPECIES					
Allium munzii Munz's onion	Fed: **END** CA: **THR** CNPS: 1B.1	Grows within vernally moist, heavy clay soils within chaparral, cismontane woodland, coastal scrub, pinyon and juniper woodland, valley and foothill grassland. Found at elevations ranging from 974 to 3,510 feet. Blooming period is from March to May.	Yes (b)	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Ambrosia pumila San Diego ambrosia	Fed: **END** CA: None CNPS: 1B.1	Occurs in open habitats in coarse substrates near drainages, and in upland areas on clay slopes or on the dry margins of vernal pools. This species occurs in a variety of associations that are dominated by sparse grasslands or marginal wetland habitats such as river terraces, pools, and alkali playas. Found at elevations ranging from 65 to 1,360 feet. Blooming period is from April to October.	No	No	**Presumed Absent** The project site occurs outside of the known elevation range for this species.
Atriplex coronata* var. *notatior San Jacinto Valley crownscale	Fed: **END** CA: None CNPS: 1B.1	Grows in alkaline conditions within playas, mesic valley and foothill grasslands, and vernal pools. Found at elevations ranging from 456 to 1,640 feet. Blooming period is from April to August.	Yes (d)	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.

Scientific Name Common Name	**Status**	**Habitat**	**Covered by MSHCP**	**Observed On-site**	**Potential to Occur**
Brodiaea filifolia thread-leaved brodiaea	Fed: **THR** CA: **END** CNPS: 1B.1	Grows in clay soils within chaparral openings, cismontane woodland, coastal scrub, playas, valley and foothill grassland, and vernal pools. Found at elevations ranging from 82 to 3,675 feet. Blooming period is from March to June.	Yes (d)	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Carex buxbaumii Buxbaum's sedge	Fed: None CA: None CNPS: 4.2	Grows within bogs and fens, meadows and seeps (mesic) and marshes and swamps. Found at elevations ranging from 10 to 10,825 feet. Blooming period is from March to August.	No	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Caulanthus simulans Payson's jewelflower	Fed: None CA: None CNPS: 4.2	Occurs on granitic, sandy soils in chaparral and coastal scrub habitats. Found at elevations ranging from 295 to 7,218 feet. Blooming period is from February to June.	Yes	No	**Low** Limited habitat is present within the project site.
Centromadia pungens ssp. laevis smooth tarplant	Fed: None CA: None CNPS: 1B.1	Found in alkaline soils within chenopod scrub, meadows and seeps, playas, riparian woodland, valley and foothill grassland habitats. Found at elevations ranging from 0 to 2,100 feet. Blooming period is from April to September.	Yes (d)	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Chorizanthe leptotheca Peninsular spineflower	Fed: None CA: None CNPS: 4.2	Found in granitic soils within chaparral, coast scrub, and lower montane coniferous forest habitats. Found at elevations ranging from 984 to 6,234 feet. Blooming period is from May to August.	Yes (e)	No	**Low** Limited habitat is present within the project site.
Chorizanthe parryi* var. *parryi Parry's spineflower	Fed: None CA: None CNPS: 1B.1	Occurs on openings in sandy and/or rocky soils in chaparral, coastal sage scrub, and sandy openings within alluvial washes and margins. Found at elevations ranging from 900 to 4,005 feet. Blooming period is from April to June.	Yes (e)	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Chorizanthe polygonoides var. longispina long-spined spineflower	Fed: None CA: None CNPS: 1B.2	Typically found on clay lenses which are largely devoid of shrubs. Can be found on the periphery of vernal pool habitat and even on the periphery of montane meadows near vernal seeps. Found at elevations ranging from 98 to 5,020 feet. Blooming period is from April to July.	Yes	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Convolvulus simulans small-flowered morning-glory	Fed: None CA: None CNPS: 4.2	Grows in clay soils within serpentinite seeps, chaparral, coastal scrub, valley and foothill grassland habitats. Found at elevations ranging from 98 to 2,297 feet. Blooming period is from March to July.	Yes	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.

Scientific Name Common Name	**Status**	**Habitat**	**Covered by MSHCP**	**Observed On-site**	**Potential to Occur**
Deinandra paniculata paniculate tarplant	Fed: None CA: None CNPS: 4.2	Typically found in vernally mesic, sometimes sandy soils in coastal scrub, valley and foothill grasslands, and vernal pools. Found at elevations ranging from 8 to 3,085 feet. Blooming period is from April to November.	No	Yes	**Present** Suitable habitat is present throughout the project site. This species is well-adapted to growing in disturbed settings.
Dodecahema leptoceras slender-horned spineflower	Fed: **END** CA: **END** CNPS: 1B.1	Flood deposited terraces and washes in chaparral, coastal scrub (alluvial fan sage scrub). Found at elevations ranging from 655 to 2,495 feet. Blooming period is from April to June.	Yes (b)	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Dudleya multicaulis many-stemmed dudleya	Fed: None CA: None CNPS: 1B.2	Often occurs on clay soils and around granitic outcrops in chaparral, coastal sage scrub, and grasslands. Found at elevations ranging from 50 to 2,590 feet. Blooming period is from April to July.	Yes (b)	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Harpagonella palmeri Palmer's grapplinghook	Fed: None CA: None CNPS: 4.2	Occurs on clay soils in chaparral, coastal scrub, and valley and foothill grasslands. Found at elevations ranging from 66 to 3,133 feet. Blooming period is from March to May.	Yes	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Hordeum intercedens vernal barley	Fed: None CA: None CNPS: 3.2	Found in coastal dunes, coastal scrub, vernal pools, and valley and foothill grassland habitats. Found at elevations ranging from 16 to 3,281 feet. Blooming period is from March to June.	Yes	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Juglans californica southern California black walnut	Fed: None CA: None CNPS: 4.2	Occurs in alluvial soils in chaparral, cismontane woodland, coastal scrub, and riparian woodlands. From 15 to 5,875 feet in elevation. Blooming period is from May to June.	Yes	No	**Low** Suitable habitat is present within the project site. This highly conspicuous species was not observed during the field investigation.
Lasthenia glabrata* ssp. *coulteri Coulter's goldfields	Fed: None CA: None CNPS: 1B.1	Prefers playas, vernal pools, and coastal salt marshes and swamps. Found at elevations ranging from 3 to 4,003 feet. Blooming period is from February to June.	Yes (d)	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.

Scientific Name Common Name	**Status**	**Habitat**	**Covered by MSHCP**	**Observed On-site**	**Potential to Occur**
Lepidium virginicum var. robinsonii Robinson's pepper-grass	Fed: None CA: None CNPS: 4.3	Dry soils on chaparral and coastal sage scrub. Found at elevations ranging from 3 to 2,904 feet. Blooming period is from January to July.	No	No	**Low** Limited habitat is present within the project site. More suitable habitat is present to the east and south.
Microseris douglasii* ssp. *platycarpha small-flowered microseris	Fed: None CA: None CNPS: 4.2	Occurs in clay soils in cismontane woodland, coastal scrub, valley and foothill grasslands, and around vernal pools. Found at elevations ranging from 49 to 3,510 feet. Blooming period is from March to May.	No	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Myosurus minimus ssp. apus little mousetail	Fed: None CA: None CNPS: 3.1	Occurs in alkaline soils in valley and foothill grassland and vernal pools. Found at elevations ranging from 66 to 2,100 feet. Blooming period is from March to June.	Yes (d)	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Navarretia fossalis spreading navarretia	Fed: **THR** CA: None CNPS: 1B.1	Grows in chenopod scrub, assorted shallow freshwater marshes and swamps, playas, and vernal pools. Found at elevations ranging from 98 to 2,149 feet. Blooming period is from April to June.	Yes (b)	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Orcuttia californica California Orcutt grass	Fed: **END** CA: **END** CNPS: 1B.1	Primarily restricted to the southern basaltic claypan vernal pools at the Santa Rosa Plateau, and alkali vernal pools at Skunk Hollow, and at Salt Creek. Grows in elevations ranging from 45 to 2,165 feet above msl. Blooming period is from April to August.	Yes (b)	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
Romneya coulteri Coulter's matilija poppy	Fed: None CA: None CNPS: 4.2	Found in recently burned areas within chaparral and coastal scrub habitats. Found at elevations ranging from 66 to 3,937 feet. Blooming period is from March to July.	Yes (e)	No	**Low** Limited habitat is present within the project site.
Viguiera laciniata San Diego County viguiera	Fed: None CA: None CNPS: 4.3	Grows within chaparral and coastal scrub habitats. Found at elevations ranging from 200 to 2,460 feet. Blooming period is typically from February to June and can extend through August.	No	No	**Presumed Absent** There is no suitable habitat present within or adjacent to the project site.
CDFW SENSITIVE HABITATS					

Scientific Name Common Name	**Status**	**Habitat**	**Covered by MSHCP**	**Observed On-site**	**Potential to Occur**
Southern Coast Live Oak Riparian Forest	CDFW Sensitive Habitat	Open to locally dense evergreen riparian woodlands dominated by *Quercus agrifolia*. This type appears to be richer in herbs and poorer in understory shrubs than other riparian communities. Bottomlands and outer floodplains along larger streams, on fine-grained, rich alluvium. Canyons and valleys of coastal southern California.	NA	No	**Absent**
Southern Cottonwood Willow Riparian Forest	CDFW Sensitive Habitat	Dominated by cottonwood (*Populus* sp.) and willow (*Salix* sp.) trees and shrubs. Considered to be an early successional stage as both species are known to germinate almost exclusively on recently deposited or exposed alluvial soils.	NA	No	**Absent**
Southern Sycamore Alder Riparian Woodland	CDFW Sensitive Habitat	Occurs below 2,000 meters in elevation, sycamore and alder often occur along seasonally-flooded banks; cottonwoods and willows are also often present. Poison oak, mugwort, elderberry and wild raspberry may be present in understory.	NA	No	**Absent**

U.S. Fish and Wildlife Service (Fed) - Federal
END- Federal Endangered
THR- Federal Threatened

California Department of Fish and Wildlife (CA) - California
END- California Endangered
THR- California Threatened
Candidate- Candidate for listing under the California Endangered Species Act
FP- California Fully Protected
SSC- Species of Special Concern
WL- Watch List

California Native Plant Society (CNPS)
California Rare Plant Rank
1B Plants Rare, Threatened, or Endangered in California and Elsewhere
2B Plants Rare, Threatened, or Endangered in California, But More Common Elsewhere
3 Plants About Which More Information is Needed – A Review List
4 Plants of Limited Distribution – A Watch List

CNPS Threat Ranks
0.1- Seriously threatened in California
0.2- Moderately threatened in California
0.3- Not very threatened in California

Western Riverside County MSHCP
Yes- Fully covered
No- Not covered
Yes (a)- May require surveys under MSHCP Section 6.1.2
Yes (b)- May require surveys under MSHCP Section 6.1.3
Yes (c)- May require surveys under MSHCP Section 6.3.2
Yes (d)- May require surveys under MSHCP Section 6.3.2
Yes (e)- Conditionally covered pending the achievement of species-specific conservation measures

Appendix D Regulations

Special status species are native species that have been afforded special legal or management protection because of concern for their continued existence. There are several categories of protection at both federal and state levels, depending on the magnitude of threat to continued existence and existing knowledge of population levels.

Federal Regulations

Endangered Species Act of 1973

Federally listed threatened and endangered species and their habitats are protected under provisions of the Federal Endangered Species Act (ESA). Section 9 of the ESA prohibits "take" of threatened or endangered species. "Take" under the ESA is defined as to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any of the specifically enumerated conduct." The presence of any federally threatened or endangered species that are in a project area generally imposes severe constraints on development, particularly if development would result in "take" of the species or its habitat. Under the regulations of the ESA, the United States Fish and Wildlife Service (USFWS) may authorize "take" when it is incidental to, but not the purpose of, an otherwise lawful act.

Critical Habitat is designated for the survival and recovery of species listed as threatened or endangered under the ESA. Critical Habitat includes those areas occupied by the species, in which are found physical and biological features that are essential to the conservation of an ESA listed species and which may require special management considerations or protection. Critical Habitat may also include unoccupied habitat if it is determined that the unoccupied habitat is essential for the conservation of the species.

Whenever federal agencies authorize, fund, or carry out actions that may adversely modify or destroy Critical Habitat, they must consult with USFWS under Section 7 of the ESA. The designation of Critical Habitat does not affect private landowners, unless a project they are proposing uses federal funds, or requires federal authorization or permits (e.g., funding from the Federal Highway Administration or a permit from the U.S. Army Corps of Engineers (Corps)).

If USFWS determines that Critical Habitat will be adversely modified or destroyed from a proposed action, the USFWS will develop reasonable and prudent alternatives in cooperation with the federal institution to ensure the purpose of the proposed action can be achieved without loss of Critical Habitat. If the action is not likely to adversely modify or destroy Critical Habitat, USFWS will include a statement in its biological opinion concerning any incidental take that may be authorized and specify terms and conditions to ensure the agency is in compliance with the opinion.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) (16 U.S. Government Code [USC] 703) makes it unlawful to pursue, capture, kill, possess, or attempt to do the same to any migratory bird or part, nest, or egg of any such bird listed in wildlife protection treaties between the United States, Great Britain, Mexico, Japan, and the countries of the former Soviet Union, and authorizes the U.S. Secretary of the Interior to protect and regulate the taking of migratory birds. It establishes seasons and bag limits for hunted species and protects migratory birds, their occupied nests, and their eggs (16 USC 703; 50 CFR 10, 21).

The MBTA covers the taking of any nests or eggs of migratory birds, except as allowed by permit pursuant to 50 CFR, Part 21. Disturbances causing nest abandonment and/or loss of reproductive effort (i.e., killing or abandonment of eggs or young) may also be considered "take." This regulation seeks to protect migratory birds and active nests.

In 1972, the MBTA was amended to include protection for migratory birds of prey (e.g., raptors). Six families of raptors occurring in North America were included in the amendment: Accipitridae (kites, hawks, and eagles); Cathartidae (New World vultures); Falconidae (falcons and caracaras); Pandionidae (ospreys); Strigidae (typical owls); and Tytonidae (barn owls). The provisions of the 1972 amendment to the MBTA protects all species and subspecies of the families listed above. The MBTA protects over 800 species including geese, ducks, shorebirds, raptors, songbirds and many relatively common species.

State Regulations

California Environmental Quality Act (CEQA)

The California Environmental Quality Act (CEQA) provides for the protection of the environment within the State of California by establishing State policy to prevent significant, avoidable damage to the environment through the use of alternatives or mitigation measures for projects. It applies to actions directly undertaken, financed, or permitted by State lead agencies. If a project is determined to be subject to CEQA, the lead agency will be required to conduct an Initial Study (IS); if the IS determines that the project may have significant impacts on the environment, the lead agency will subsequently be required to write an Environmental Impact Report (EIR). A finding of non-significant effects will require either a Negative Declaration or a Mitigated Negative Declaration instead of an EIR. Section 15380 of the CEQA Guidelines independently defines "endangered" and "rare" species separately from the definitions of the California Endangered Species Act (CESA). Under CEQA, "endangered" species of plants or animals are defined as those whose survival and reproduction in the wild are in immediate jeopardy, while "rare" species are defined as those who are in such low numbers that they could become endangered if their environment worsens.

California Endangered Species Act (CESA)

In addition to federal laws, the state of California implements the CESA which is enforced by CDFW. The CESA program maintains a separate listing of species beyond the FESA, although the provisions of each act are similar.

State-listed threatened and endangered species are protected under provisions of the CESA. Activities that may result in "take" of individuals (defined in CESA as; "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill") are regulated by CDFW. Habitat degradation or modification is not included in the definition of "take" under CESA. Nonetheless, CDFW has interpreted "take" to include the destruction of nesting, denning, or foraging habitat necessary to maintain a viable breeding population of protected species.

The State of California considers an endangered species as one whose prospects of survival and reproduction are in immediate jeopardy. A threatened species is considered as one present in such small numbers throughout its range that it is likely to become an endangered species in the near future in the

absence of special protection or management. A rare species is one that is considered present in such small numbers throughout its range that it may become endangered if its present environment worsens. State threatened and endangered species are fully protected against take, as defined above.

The CDFW has also produced a species of special concern list to serve as a species watch list. Species on this list are either of limited distribution or their habitats have been reduced substantially, such that a threat to their populations may be imminent. Species of special concern may receive special attention during environmental review, but they do not have formal statutory protection. At the federal level, USFWS also uses the label species of concern, as an informal term that refers to species which might be in need of concentrated conservation actions. As the Species of Concern designated by USFWS do not receive formal legal protection, the use of the term does not necessarily ensure that the species will be proposed for listing as a threatened or endangered species.

Fish and Game Code

Fish and Game Code Sections 3503, 3503.5, 3511, and 3513 are applicable to natural resource management. For example, Section 3503 of the Code makes it unlawful to destroy any birds' nest or any birds' eggs that are protected under the MBTA. Further, any birds in the orders Falconiformes or Strigiformes (Birds of Prey, such as hawks, eagles, and owls) are protected under Section 3503.5 of the Fish and Game Code which makes it unlawful to take, possess, or destroy their nest or eggs. A consultation with CDFW may be required prior to the removal of any bird of prey nest that may occur on a project site. Section 3511 of the Fish and Game Code lists fully protected bird species, where the CDFW is unable to authorize the issuance of permits or licenses to take these species. Pertinent species that are State fully protected by the State include golden eagle (*Aquila chrysaetos*) and white-tailed kite (*Elanus leucurus*). Section 3513 of the Fish and Game Code makes it unlawful to take or possess any migratory nongame bird as designated in the MBTA or any part of such migratory nongame bird except as provided by rules and regulations adopted by the Secretary of the Interior under provisions of the MBTA.

Native Plant Protection Act

Sections 1900–1913 of the Fish and Game Code were developed to preserve, protect, and enhance Rare and Endangered plants in the state of California. The act requires all state agencies to use their authority to carry out programs to conserve Endangered and Rare native plants. Provisions of the Native Plant Protection Act prohibit the taking of listed plants from the wild and require notification of the CDFW at least ten days in advance of any change in land use which would adversely impact listed plants. This allows the CDFW to salvage listed plant species that would otherwise be destroyed.

California Native Plant Society Rare and Endangered Plant Species

Vascular plants listed as rare or endangered by the CNPS, but which have no designated status under FESA or CESA are defined as follows:

California Rare Plant Rank

1A- Plants Presumed Extirpated in California and either Rare or Extinct Elsewhere

1B- Plants Rare, Threatened, or Endangered in California and Elsewhere

2A- Plants Presumed Extirpated in California, But More Common Elsewhere

2B- Plants Rare, Threatened, or Endangered in California, But More Common Elsewhere

3- Plants about Which More Information is Needed - A Review List

4- Plants of Limited Distribution - A Watch List

Threat Ranks

.1- Seriously threatened in California (over 80% of occurrences threatened / high degree and immediacy of threat)

.2- Moderately threatened in California (20-80% occurrences threatened / moderate degree and immediacy of threat)

.3- Not very threatened in California (<20% of occurrences threatened / low degree and immediacy of threat or no current threats known).

Local Policies

Western Riverside County MSHCP

The MSHCP is a comprehensive, multi-jurisdictional HCP focusing on conservation of species and their associated habitats in western Riverside County. The goal of the MSHCP is to maintain biological and ecological diversity within a rapidly urbanizing region.

The approval of the MSHCP and execution of the Implementing Agreement (IA) by the wildlife agencies allows signatories of the IA to issue "take" authorizations for all species covered by the MSHCP, including state- and federal-listed species as well as other identified sensitive species and/or their habitats. Each city or local jurisdiction will impose a Development Mitigation Fee for projects within their jurisdiction. With payment of the mitigation fee to the County and compliance with the survey requirements of the MSHCP where required, full mitigation in compliance with the California Environmental Quality Act (CEQA), National Environmental Policy Act (NEPA), CESA, and FESA will be granted. The Development Mitigation Fee varies according to project size and project description. The fee for industrial development is $7,382 per acre (County Ordinance 810.2). Payment of the mitigation fee and compliance with the requirements of Section 6.0 of the MSHCP are intended to provide full mitigation under CEQA, NEPA, CESA, and FESA for impacts to the species and habitats covered by the MSHCP pursuant to agreements with the USFWS, the CDFW, and/or any other appropriate participating regulatory agencies and as set forth in the IA for the MSHCP.

There are three key agencies that regulate activities within inland streams, wetlands, and riparian areas in California. The Corps Regulatory Branch regulates activities pursuant to Section 404 of the Federal Clean Water Act (CWA) and Section 10 of the Rivers and Harbors Act. Of the State agencies, the CDFG regulates activities under the Fish and Game Code Section 1600-1616, and the Regional Board regulates activities pursuant to Section 401 of the CWA and the California Porter-Cologne Water Quality Control Act.

Federal Regulations

Section 404 of the Clean Water Act

In accordance with the Revised Definition of "Waters of the United States"; Conforming (September 8, 2023), "waters of the United Sates" are defined as follows:

(a) ***Waters of the United States*** means:

(1) Waters which are:
(i) Currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
(ii) The territorial seas; or
(iii) Interstate waters;

(2) Impoundments of waters otherwise defined as waters of the United States under this definition, other than impoundments of waters identified under paragraph (a)(5) of this section;

(3) Tributaries of waters identified in paragraph (a)(1) or (2) of this section that are relatively permanent, standing or continuously flowing bodies of water;

(4) Wetlands adjacent to the following waters:
(i) Waters identified in paragraph (a)(1) of this section; or
(ii) Relatively permanent, standing or continuously flowing bodies of water identified in paragraph (a)(2) or (a)(3) of this section and with a continuous surface connection to those waters;

(5) Intrastate lakes and ponds not identified in paragraphs (a)(1) through (4) of this section that are relatively permanent, standing or continuously flowing bodies of water with a continuous surface connection to the waters identified in paragraph (a)(1) or (a)(3) of this section

(b) The following are not "waters of the United States" even where they otherwise meet the terms of paragraphs (a)(2) through (5) of this section:

(1) Waste treatment systems, including treatment ponds or lagoons, designed to meet the requirements of the Clean Water Act;

(2) Prior converted cropland designated by the Secretary of Agriculture. The exclusion would cease upon a change of use, which means that the area is no longer available for the production of agricultural commodities. Notwithstanding the determination of an area's status as prior converted

cropland by any other Federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with EPA;

(3) Ditches (including roadside ditches) excavated wholly in and draining only dry land and that do not carry a relatively permanent flow of water;

(4) Artificially irrigated areas that would revert to dry land if the irrigation ceased;
(5) Artificial lakes or ponds created by excavating or diking dry land to collect and retain water and which are used exclusively for such purposes as stock watering, irrigation, settling basins, or rice growing;
(6) Artificial reflecting or swimming pools or other small ornamental bodies of water created by excavating or diking dry land to retain water for primarily aesthetic reasons;

(7) Waterfilled depressions created in dry land incidental to construction activity and pits excavated in dry land for the purpose of obtaining fill, sand, or gravel unless and until the construction or excavation operation is abandoned and the resulting body of water meets the definition of waters of the United States; and

(8) Swales and erosional features (*e.g.*, gullies, small washes) characterized by low volume, infrequent, or short duration flow.

(c) In this section, the following definitions apply:

(1) ***Wetlands*** means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

(2) ***Adjacent*** means having a continuous surface connection

(3) ***High tide line*** means the line of intersection of the land with the water's surface at the maximum height reached by a rising tide. The high tide line may be determined, in the absence of actual data, by a line of oil or scum along shore objects, a more or less continuous deposit of fine shell or debris on the foreshore or berm, other physical markings or characteristics, vegetation lines, tidal gages, or other suitable means that delineate the general height reached by a rising tide. The line encompasses spring high tides and other high tides that occur with periodic frequency but does not include storm surges in which there is a departure from the normal or predicted reach of the tide due to the piling up of water against a coast by strong winds such as those accompanying a hurricane or other intense storm.

(4) ***Ordinary high water mark*** means that line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.

(5) ***Tidal waters*** means those waters that rise and fall in a predictable and measurable rhythm or cycle due to the gravitational pulls of the moon and sun. Tidal waters end where the rise and fall of the water surface can no longer be practically measured in a predictable rhythm due to masking by hydrologic, wind, or other effects.

Section 401 of the Clean Water Act

Pursuant to Section 401 of the CWA, any applicant for a federal license or permit to conduct any activity which may result in any discharge to waters of the United States must provide certification from the State or Indian tribe in which the discharge originates. This certification provides for the protection of the physical, chemical, and biological integrity of waters, addresses impacts to water quality that may result from issuance of federal permits, and helps insure that federal actions will not violate water quality standards of the State or Indian tribe. In California, there are nine Regional Water Quality Control Boards (Regional Board) that issue or deny certification for discharges to waters of the United States and waters of the State, including wetlands, within their geographical jurisdiction. The State Water Resources Control Board assumed this responsibility when a project has the potential to result in the discharge to waters within multiple Regional Boards.

State Regulations

Fish and Game Code

Fish and Game Code Sections 1600 et. seq. establishes a fee-based process to ensure that projects conducted in and around lakes, rivers, or streams do not adversely impact fish and wildlife resources, or, when adverse impacts cannot be avoided, ensures that adequate mitigation and/or compensation is provided.

Fish and Game Code Section 1602 requires any person, state, or local governmental agency or public utility to notify the CDFW before beginning any activity that will do one or more of the following:

(1) substantially obstruct or divert the natural flow of a river, stream, or lake;
(2) substantially change or use any material from the bed, channel, or bank of a river, stream, or lake; or
(3) deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it can pass into a river, stream, or lake.

Fish and Game Code Section 1602 applies to all perennial, intermittent, and ephemeral rivers, streams, and lakes in the State. CDFW's regulatory authority extends to include riparian habitat (including wetlands) supported by a river, stream, or lake regardless of the presence or absence of hydric soils and saturated soil conditions. Generally, the CDFW takes jurisdiction to the top of bank of the stream or to the outer limit of the adjacent riparian vegetation (outer drip line), whichever is greater. Notification is generally required for any project that will take place in or in the vicinity of a river, stream, lake, or their tributaries. This includes rivers or streams that flow at least periodically or permanently through a bed or channel with banks that support fish or other aquatic life and watercourses having a surface or subsurface flow that support or have supported riparian vegetation. A Section 1602 Streambed Alteration Agreement would be required if impacts to identified CDFW jurisdictional areas occur.

Porter Cologne Act

The California *Porter-Cologne Water Quality Control Act* gives the State very broad authority to regulate waters of the State, which are defined as any surface water or groundwater, including saline waters. The Porter-Cologne Act has become an important tool in the post SWANCC and Rapanos regulatory environment, with respect to the state's authority over isolated and insignificant waters. Generally, any person proposing to discharge waste into a water body that could affect its water quality must file a Report of Waste Discharge in the event that there is no Section 404/401 nexus. Although "waste" is partially defined as any waste substance associated with human habitation, the Regional Board also interprets this to include fill discharged into water bodies.

Appendix E Crotch Bumble Bee Survey

Appendix D Delineation of State and Federal Jurisdictional Waters

CRESCENT CEMETERY

CONDITIONAL USE PERMIT CUP230002

UNINCORPORATED RIVERSIDE COUNTY, CALIFORNIA

DELINEATION OF STATE AND FEDERAL JURISDICTIONAL WATERS

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March 2024

CRESCENT CEMETERY

UNINCORPORATED RIVERSIDE COUNTY, CALIFORNIA

DELINEATION OF STATE AND FEDERAL JURISDICTIONAL WATERS

The undersigned certify that the statements furnished in this report and exhibits present data and information required for this biological evaluation, and the facts, statements, and information presented is a complete and accurate account of the findings and conclusions to the best of our knowledge and beliefs.



Travis J. McGill
Director



Thomas J. McGill, Ph.D.
Managing Director

March 2024

Executive Summary

ELMT Consulting (ELMT) has prepared this Delineation of State and Federal Jurisdictional report for the Crescent Cemetery project located in unincorporated Riverside County, California. The jurisdictional delineation documents the regulatory authority of the U.S. Army Corps of Engineers (Corps), the Regional Water Quality Control Board (Regional Board), and the California Department of Fish and Wildlife (CDFW) pursuant to Section 401 and 404 of the Federal Clean Water Act (CWA), the California Porter-Cologne Water Quality Control Act, and Sections 1600 *et. seq.* of the California Fish and Game Code.[1]

One (1) unnamed drainage feature (Drainage 1) was observed within the boundaries of the project site at the time of the investigation. Drainage 1 extends from south to north within the northwest region of the project site. Drainage 1 conveys flows, primarily outside of the proposed limits of disturbance before terminating near the northwest corner of the site. Drainage 1 receives flows direct precipitation upstream and from the discharge waters of a well in the middle of the drainage, outside the proposed limits of disturbance, which was installed to provide water to onsite agricultural activities. The upstream portion of Drainage 1 appears to only support surface water immediately following storm events. Portions of Drainage 1 support a mixed riparian scrub plant community.

The onsite ephemeral drainage feature is not relatively permanent, standing, or a continuously flowing body of water and, therefore, will not qualify as waters of the United States under the regulatory authority of the Corps (*Sackett v. EPA* (2022) 143 S. Ct. 1322, 1336). However, the onsite drainage feature will qualify was waters of the State and fall under the regulatory authority of the Regional Board and CDFW. Table ES-1 identifies the on-site jurisdictional including the total acreage of jurisdiction and anticipated impacts for each regulatory agency within the boundaries of the project site.

Table ES-1: Jurisdictional Area and Impact Analysis

Jurisdictional Feature	Corps/Regional Board Jurisdiction		CDFW Jurisdictional Streambed	
	On-Site Jurisdiction Acreage (Linear Feet)	**Jurisdictional Impacts** Acreage (Linear Feet)	**On-Site Jurisdiction** Acreage (Linear Feet)	**Jurisdictional Impacts** Acreage (Linear Feet)
Drainage 1	0.13 (1,360)	0.007 (96)	0.93 (1,360)	0.036 (96)
TOTAL	**0.13 (1,360)**	**0.007 (96)**	**0.93 (1,360)**	**0.036 (96)**

The project applicant will likely be required to obtain the following regulatory approvals prior to impacts occurring within the identified jurisdictional areas: Corps Approved Jurisdictional Determination/Waiver; Regional Board CWA Section Report of Waste Discharge; and CDFW Section 1602 Streambed Alteration

[1] The field survey for this jurisdictional delineation was conducted on November 13 and 16, 2023 pursuant to the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region, Version 2.0* (Corps 2008); and *Minimum Standards for Acceptance of Aquatic Resources Delineation Reports* (Corps 2017); *The MESA Field Guide: Mapping Episodic Stream Activity* (CDFW 2014); and a *Review of Stream Processes and Forms in Dryland Watersheds* (CDFW 2010).

Agreement (SAA). Refer to Sections 1-7 for a detailed analysis of site conditions and regulatory requirements.

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Section 1 Introduction

This delineation has been prepared for the proposed Crescent Cemetery Project in order to document the jurisdictional authority of the U.S. Army Corps of Engineers' (Corps), the Regional Water Quality Control Board (Regional Board), and the California Department of Fish and Wildlife (CDFW) pursuant to Section 401 and 404 of the Federal Clean Water Act (CWA), the California Porter-Cologne Water Quality Control Act, and Sections 1600 *et seq.* of the California Fish and Game Code. The analysis presented in this report is supported by a field survey of site conditions conducted on November 13 and 16, 2023.

This jurisdictional delineation explains the methodology undertaken by ELMT Consulting (ELMT) to define the regulatory authority of the aforementioned regulatory agencies and documents the findings made by ELMT. This report presents our best effort at documenting the jurisdictional boundaries using the most up-to-date regulations, written policy, and guidance from the regulatory agencies. Ultimately the regulatory agencies make the final determination of jurisdictional boundaries.

1.1 PROJECT LOCATION

The project site is generally located north and east of Interstate 15, south of State Route 74, and west of Interstate 215 in Riverside County, California (Exhibit 1, *Regional Vicinity*). The project site is depicted on the Lake Elsinore quadrangle of the United States Geological Survey's (USGS) 7.5-minute topographic map within Section 22 of Township 5 South, Range 4 West (refer to Exhibit 2, *Site Vicinity,* and Exhibit 3, *Project Site (Aerial View)*). Specifically, the proposed project site is located south of River Road, west of the San Jacinto River, north of Canyon Lake, and east of Jarvis Street within Assessor Parcel Numbers (APN) 349-170-003, -004, -005, -006, -007, -008, -009, -010, -011, -012, and -013; and 349-180-002, -004, -005, -006, -007, -008, -016, -017, -020, and -035.

1.2 PROJECT DESCRIPTION

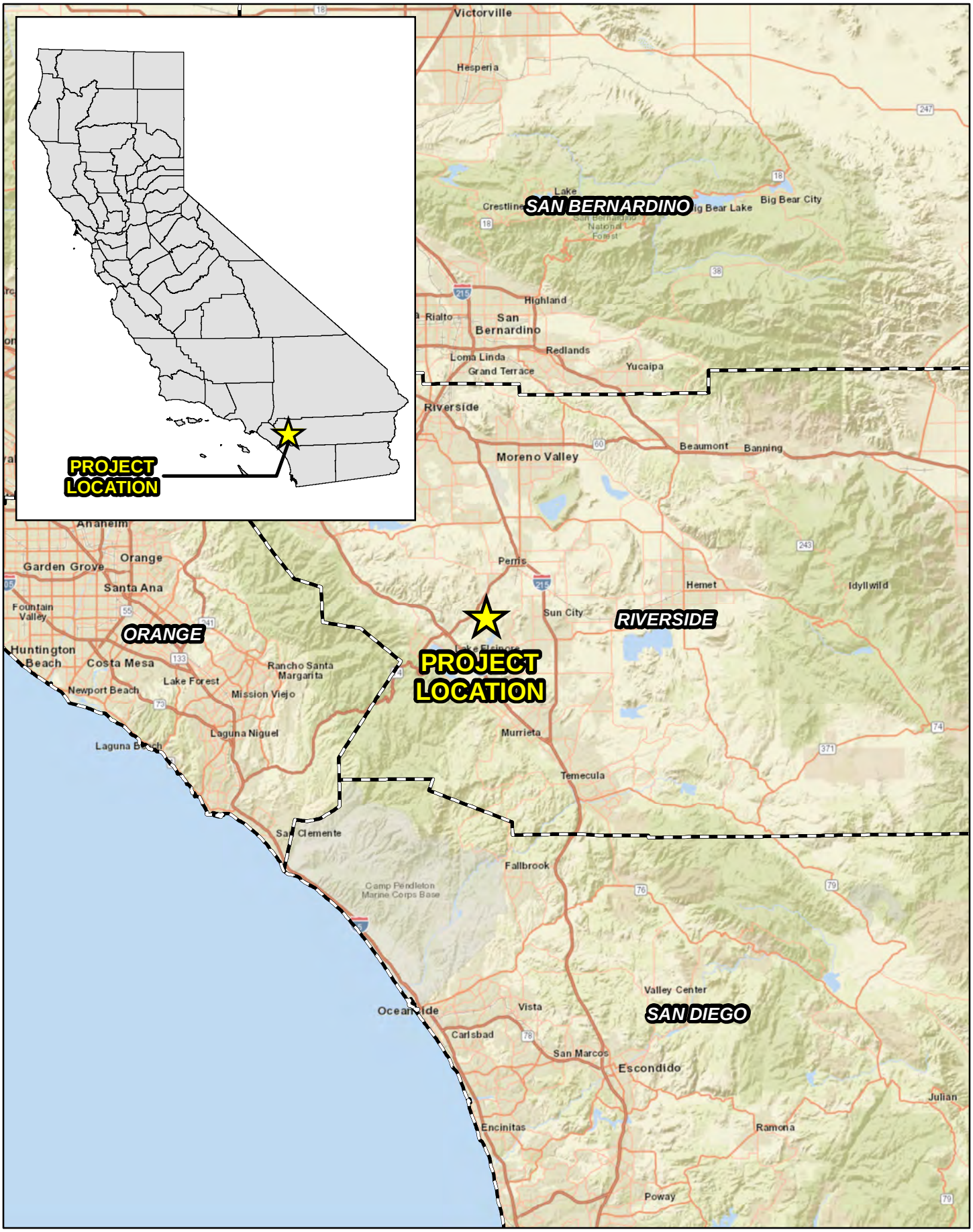
The project proposes to construct a cemetery and related support facilities designed for +/- 20,000 gravesites located in the unincorporated area of Riverside County in the community of Meadowbrook, north of Lake Elsinore (Exhibit 4: *Project Open Space Plan*). The cemetery would be developed over approximately 15 years. Facilities include the following:

- Mortuary - approximately 5,500 square feet (sf) with around 43 of 137 parking spaces (1,300 sf for assembly area). The intent of the mortuary is for burial preparations and small family-oriented gatherings as needed. It will provide offices to support making funeral and burial arrangements, including religious services ancillary to the mortuary, with family attendance.

- Chapel – approximately 9,700 sf with 2,400 sf of assembly area. Parking for each land use is planned to be shared on both sides of the main entry. 77 parking spaces for the chapel of the 152 parking spaces. Total parking provided for this campus area is 137 parking spaces.

- Equipment Shed –approximately 1,400 sf.

Caretaker Residence. A caretaker residence, approximately 2,200 sf, is planned. It may be a modular design with its own septic tank. It is located near the main chapel area where the site manager can monitor and service the cemetery.



ELMT CONSULTING

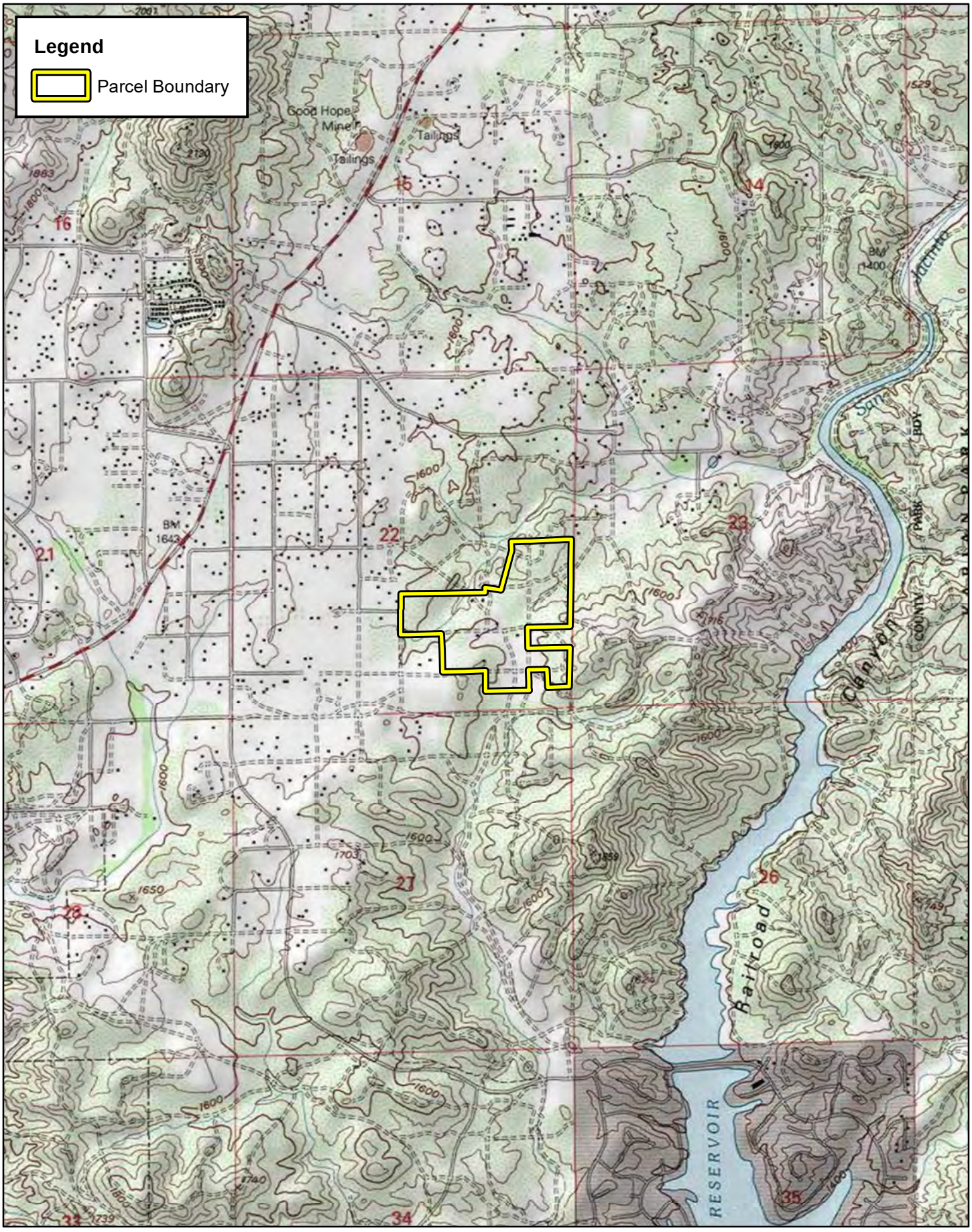
0 5 10 20 Miles

Source: World Street Map, Riverside County

CRESCENT CEMETERY

Regional Vicinity

Exhibit 1



ELMT CONSULTING

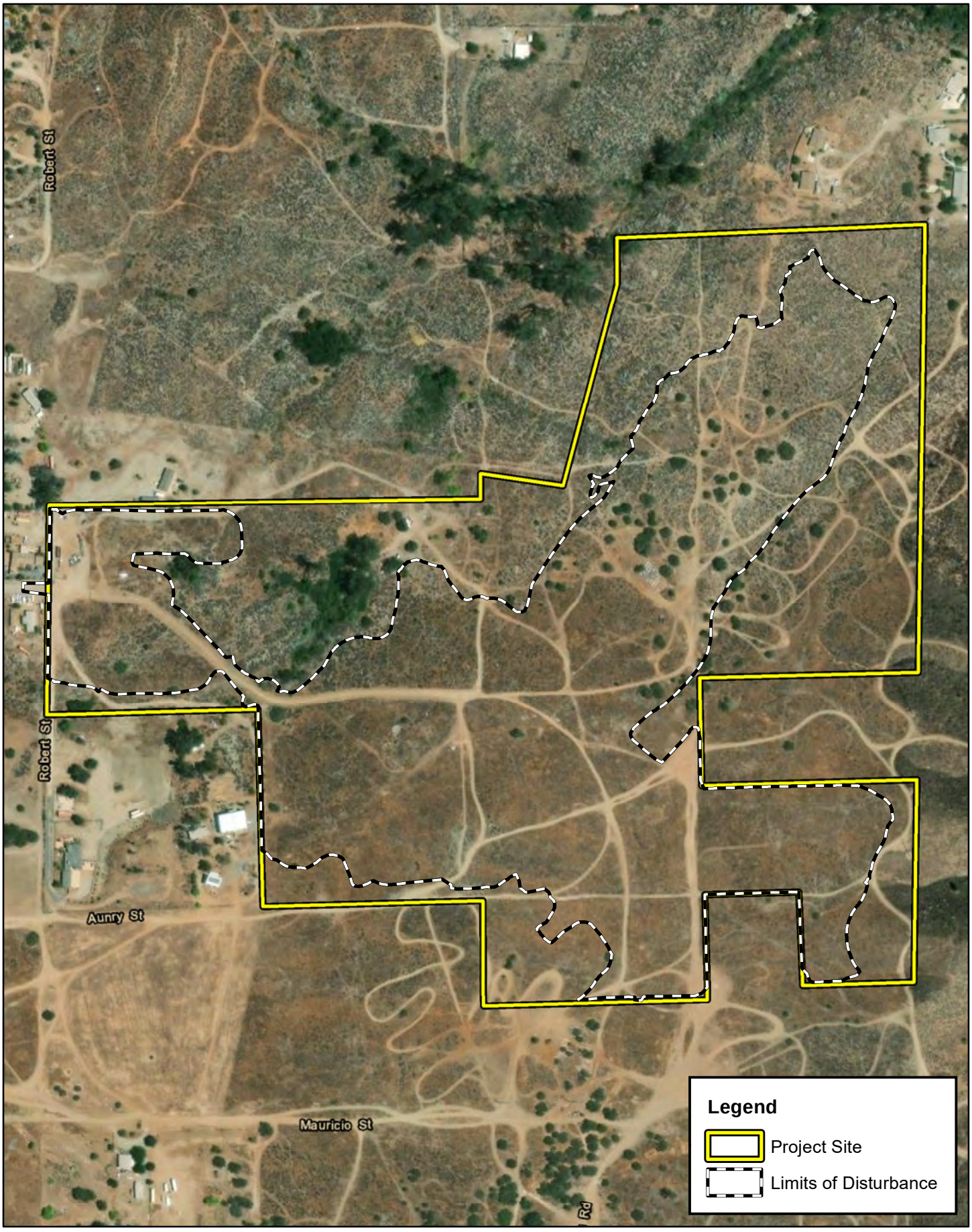
0 1,000 2,000 4,000 Feet

Source: USA Topographic Map, Riverside County

CRESCENT CEMETERY

Site Vicinity

Exhibit 2



ELMT CONSULTING

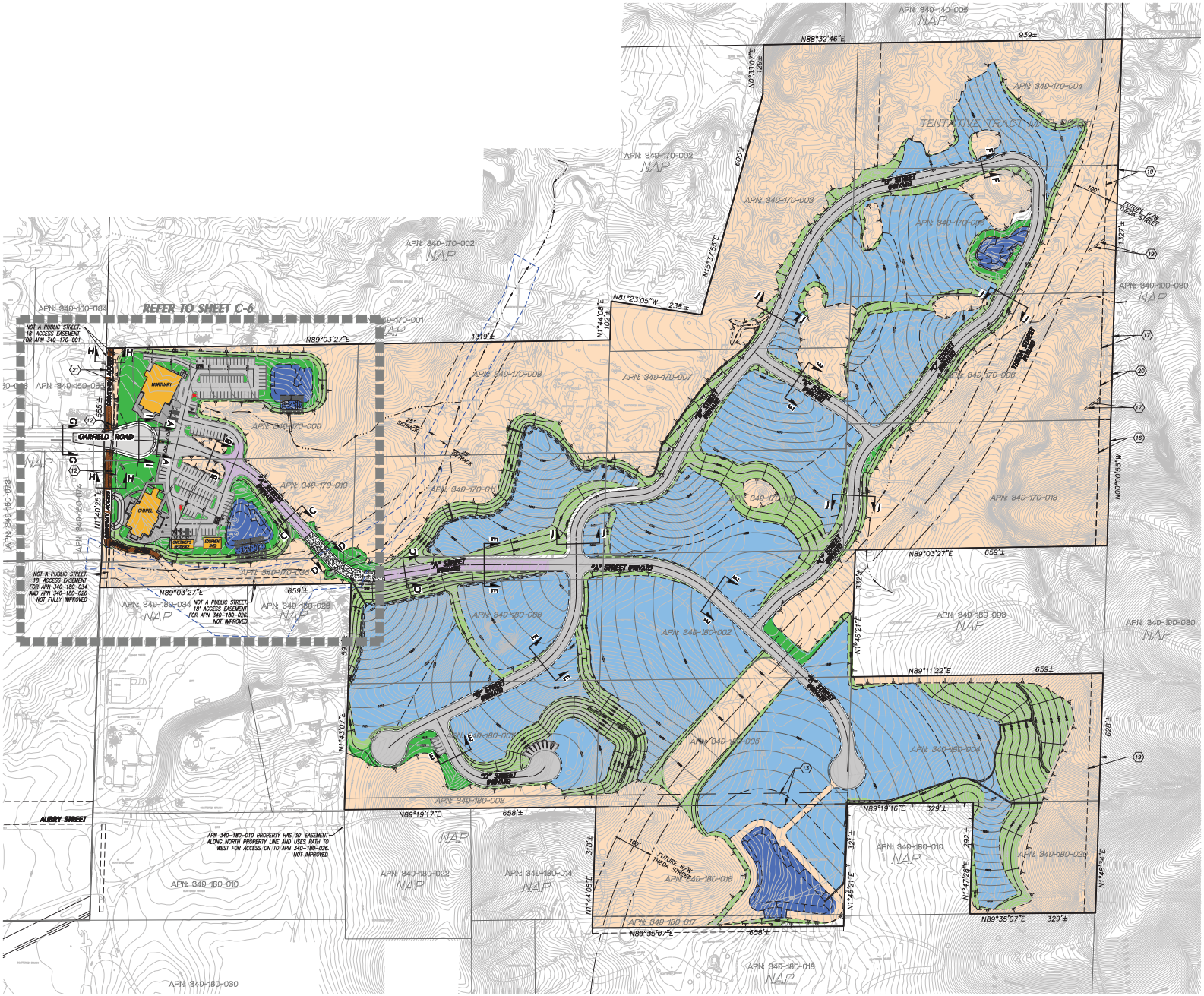
0 125 250 500 Feet

Source: ESRI Aerial Imagery, Riverside County

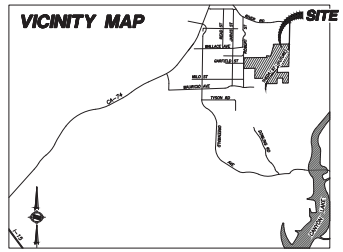
CRESCENT CEMETERY

Project Site

Exhibit 3



VICINITY MAP


SITE
GARFIELD ROAD
TYSON ST
ALBERY ST
CRESCENT AVE
BRIGHT AVE
CHAPEL AVE
CHAPEL ST
BRIGHT ST
CRESCENT AVE
SUNSET AVE
CHAPEL AVE
CR-14
TYSON ST
PASADENA
ALBERY ST
SUNSET AVE
CRESCENT AVE
SUNSET AVE
SUNSET AVE
SUNSET

Section 2 Regulations

There are three key agencies that regulate activities within inland streams, wetlands, and riparian areas in California. The Corps Regulatory Division regulates activities pursuant to Section 404 of the CWA, Section 10 of the Rivers and Harbors Act, and Section 103 of the Marine Protection, Research, and Sanctuaries Act. The Regional Board regulates activities pursuant to Section 401 of the CWA and the California Porter-Cologne Water Quality Control Act and the CDFW regulates activities under Sections 1600 *et seq*. of the California Fish and Game Code.

2.1 U.S. ARMY CORPS OF ENGINEERS

Since 1972, the Corps and U.S. Environmental Protection Agency (EPA) have jointly regulated the discharge of dredged or fill material into waters of the United States, including wetlands, pursuant to Section 404 of the CWA. The Corps and EPA define "fill material" to include any "material placed in waters of the United States where the material has the effect of: (i) replacing any portion of a water of the United States with dry land; or (ii) changing the bottom elevation of any portion of the waters of the United States." Examples include, but are not limited to, sand, rock, clay, construction debris, wood chips, and "materials used to create any structure or infrastructure in the waters of the United States." The terms *waters of the United States* and *wetlands* are defined under CWA Regulations 33 Code of Federal Regulations (CFR) §328.3 (a) through (b).

2.2 REGIONAL WATER QUALITY CONTROL BOARD

Pursuant to Section 401 of the CWA, any applicant for a federal license or permit to conduct any activity which may result in any discharge to waters of the United States must provide certification from the State or Indian tribe in which the discharge originates. This certification provides for the protection of the physical, chemical, and biological integrity of waters, addresses impacts to water quality that may result from issuance of federal permits and helps ensure that federal actions will not violate water quality standards of the State or Indian tribe. In California, there are nine Regional Boards that issue or deny certification for discharges to waters of the United States and waters of the State, including wetlands, within their geographical jurisdiction. The State Water Resources Control Board (SWRCB) assumes this responsibility when a project has the potential to result in the discharge to waters within multiple Regional Boards.

Additionally, the California Porter-Cologne Water Quality Control Act gives the State very broad authority to regulate waters of the State, which are defined as any surface water or groundwater, including saline waters. The Porter-Cologne Water Quality Control Act has become an important tool post *Solid Waste Agency of Northern Cook County vs. United States Corps of Engineers*[2] (SWANCC) and *Rapanos v. United States*[3] (Rapanos) court cases with respect to the State's regulatory authority over isolated and insignificant waters. Generally, any applicant proposing to discharge waste into a water body must file a Report of Waste Discharge in the event that there is no Section 404/401 nexus. Although "waste" is partially defined as any

[2] Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers, 531 U.S. 159 (2001)
[3] Rapanos v. United States, 547 U.S. 715 (2006)

waste substance associated with human habitation, the Regional Board also interprets this to include discharge of dredged and fill material into water bodies.

Under the State Water Resources Control Board Sate Wetland Definition, an area is a wetland if, under normal circumstances, (1) the area has continuous or recurrent saturation of the upper substrate caused by groundwater, or shallow surface water, or both; (2) the duration of such saturation is sufficient to cause anaerobic conditions in the upper substrate; and (3) the area's vegetation is dominated by hydrophytes or the area lacks vegetation.

2.3 CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

Sections 1600 *et seq.* of the California Fish and Game Code establishes a fee-based process to ensure that projects conducted in and around lakes, rivers, or streams do not substantially adversely impact fish and wildlife resources, or, when adverse impacts cannot be avoided, ensures that adequate mitigation and/or compensation is provided. Pursuant to Section 1602 of the California Fish and Game Code, a notification must be submitted to the CDFW for any activity that will divert or obstruct the natural flow or alter the bed, channel, or bank (which may include associated biological resources) of a river or stream or use material from a streambed. One CDFW guidance document, although not a formally adopted rule or policy, requires notification for activities taking place within rivers or streams that flow perennially or episodically and that are defined by the area in which surface water currently flows, or has flowed, over a given course during the historic hydrologic regime, and where the width of its course can reasonably be identified by physical and biological indicators. If the project will not "substantially adversely affect an existing fish or wildlife resource," following notification to CDFW, the project may commence without an agreement with CDFW. (Fish & G. Code, § 1602(a)(4)(A)(i).)

Section 3 Methodology

The analysis presented in this report is supported by field surveys and verification of site conditions conducted August 22, 2023. ELMT conducted a field delineation to determine the jurisdictional limits of "waters of the State" and jurisdictional streambed (including potential wetlands), located within the boundaries of the project site. While in the field, jurisdictional features were recorded on an aerial base map at a scale of 1" = 50' using topographic contours and visible landmarks as guidelines. Data points were obtained with a Garmin Map62 Global Positioning System to record and identify specific widths for ordinary high-water mark (OHWM) indicators and the locations of photographs, soil pits, and other pertinent jurisdictional features, if present. This data was then transferred as a .shp file and added to the Project's jurisdictional exhibits. The jurisdictional exhibits were prepared using ESRI ArcInfo Version 10 software.

3.1 WATERS OF THE UNITED STATES

In the absence of adjacent wetlands, the limits of the Corps jurisdiction in non-tidal waters extend to the OHWM, which is defined as " . . . *that line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.*"3F3F[4] Indicators of an OHWM are defined in *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (Corps 2008). In addition to characteristics listed above, wracking; vegetation matted down, bent, or absent; sediment sorting; leaf litter disturbed or washed away; scour; deposition; multiple observed flow events; bed and banks; water staining; and/or change in plant community.

In accordance with the Revised Definition of "Waters of the United States"; Conforming (September 8, 2023), "waters of the United Sates" are defined as follows:

(a) ***Waters of the United States*** means:
- (1) Waters which are:
  - (i) Currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
  - (ii) The territorial seas; or
  - (iii) Interstate waters;
- (2) Impoundments of waters otherwise defined as waters of the United States under this definition, other than impoundments of waters identified under paragraph (a)(5) of this section;
- (3) Tributaries of waters identified in paragraph (a)(1) or (2) of this section that are relatively permanent, standing or continuously flowing bodies of water;
- (4) Wetlands adjacent to the following waters:
  - (i) Waters identified in paragraph (a)(1) of this section; or

[4] CWA regulations 33 CFR §328.3(e).

(ii) Relatively permanent, standing or continuously flowing bodies of water identified in paragraph (a)(2) or (a)(3) of this section and with a continuous surface connection to those waters;

(5) Intrastate lakes and ponds not identified in paragraphs (a)(1) through (4) of this section that are relatively permanent, standing or continuously flowing bodies of water with a continuous surface connection to the waters identified in paragraph (a)(1) or (a)(3) of this section

(b) The following are not "waters of the United States" even where they otherwise meet the terms of paragraphs (a)(2) through (5) of this section:

(1) Waste treatment systems, including treatment ponds or lagoons, designed to meet the requirements of the Clean Water Act;

(2) Prior converted cropland designated by the Secretary of Agriculture. The exclusion would cease upon a change of use, which means that the area is no longer available for the production of agricultural commodities. Notwithstanding the determination of an area's status as prior converted cropland by any other Federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with EPA;

(3) Ditches (including roadside ditches) excavated wholly in and draining only dry land and that do not carry a relatively permanent flow of water;

(4) Artificially irrigated areas that would revert to dry land if the irrigation ceased;

(5) Artificial lakes or ponds created by excavating or diking dry land to collect and retain water and which are used exclusively for such purposes as stock watering, irrigation, settling basins, or rice growing;

(6) Artificial reflecting or swimming pools or other small ornamental bodies of water created by excavating or diking dry land to retain water for primarily aesthetic reasons;

(7) Waterfilled depressions created in dry land incidental to construction activity and pits excavated in dry land for the purpose of obtaining fill, sand, or gravel unless and until the construction or excavation operation is abandoned and the resulting body of water meets the definition of waters of the United States; and

(8) Swales and erosional features (*e.g.*, gullies, small washes) characterized by low volume, infrequent, or short duration flow.

(c) In this section, the following definitions apply:

(1) ***Wetlands*** means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

(2) ***Adjacent*** means having a continuous surface connection

(3) ***High tide line*** means the line of intersection of the land with the water's surface at the maximum height reached by a rising tide. The high tide line may be determined, in the absence of actual data, by a line of oil or scum along shore objects, a more or less continuous deposit of fine shell or debris on the foreshore or berm, other physical markings or characteristics, vegetation lines, tidal gages, or other suitable means that delineate the general height reached by a rising tide. The line encompasses spring high tides and other high tides that occur with periodic frequency but does not include storm surges in which there is a departure from the normal or predicted reach of the tide due to the piling up of water against a coast by strong winds such as those accompanying a hurricane or other intense storm.

(4) ***Ordinary high water mark*** means that line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.

(5) ***Tidal waters*** means those waters that rise and fall in a predictable and measurable rhythm or cycle due to the gravitational pulls of the moon and sun. Tidal waters end where the rise and fall of the water surface can no longer be practically measured in a predictable rhythm due to masking by hydrologic, wind, or other effects.

Pursuant to the Corps Wetland Delineation Manual (Corps 1987), the identification of wetlands is based on a three-parameter approach involving indicators of hydrophytic vegetation, hydric soils, and wetland hydrology. In order to qualify as a wetland, a feature must exhibit at least minimal characteristics within each of these three parameters. It should also be noted that both the Regional Board and CDFW follow the methods utilized by the Corps to identify wetlands. For this Project , Corps jurisdictional wetlands are delineated using the methods outlined in the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region, Version 2.0* (Corps 2008).

3.2 WATERS OF THE STATE

3.2.1 REGIONAL WATER QUALITY CONTROL BOARD

The California *Porter-Cologne Water Quality Control Act* gives the Regional Board very broad authority to regulate waters of the State, which are defined as any surface water or groundwater, including saline waters. The Regional Board shares the Corps' methodology for delineating the limits of jurisdiction based on the identification of OHWM indicators and utilizing the three parameter approach for wetlands. The Regional Board shares the Corps' jurisdictional methodology, unless SWANCC or Rapanos conditions are present. In the latter case, the Regional Board considers such drainage features to be jurisdictional waters of the State.

3.2.2 CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

Sections 1600 *et seq*. of the California Fish and Game Code applies to all perennial, intermittent, and ephemeral rivers, streams, and lakes in the State. Generally, the CDFW's jurisdictional limit is not defined by a specific flow event, nor by the presence of OHWM indicators or the path of surface water as this path might vary seasonally. Instead, CDFW's jurisdictional limit is based on the topography or elevation of land that confines surface water to a definite course when the surface water rises to its highest point. Further, the CDFW's jurisdictional limit extends to include any habitat (e.g. riparian), including wetlands and vernal pools, supported by a river, stream, or lake regardless of the presence or absence of hydric soils and saturated soil conditions. For this project location, CDFW jurisdictional limits were delineated using the methods outlined in the *MESA Field Guide* (Brady, III and Vyverberg 2013) and *A Review of Stream Processes and Forms in Dryland Watersheds* (Vyverberg 2010), which were developed to provide guidance on the methods utilized to describe and delineate episodic streams within the inland deserts region of southern California.

Section 4 Literature Review

ELMT conducted a thorough review of relevant literature and materials to preliminarily identify areas that may fall under the jurisdiction of the regulatory agencies. In addition, refer to Section 8 for a complete list of references used throughout the course of this delineation.

4.1 WATERSHED REVIEW

The project site is located within the Perris hydrologic area in the Lower San Jacinto River Watershed, which is a subset of the larger San Jacinto River Watershed (HUS 18070202). The San Jacinto flows approximately 0.64 miles east of the project site. The San Jacinto River conveys flows south in to Canyon Lake, then further southwest where it terminates at Lake Elsinore.

The Lower San Jacinto Watershed encompasses approximately 765 square miles in western Riverside County. This watershed is bounded by several mountain ranges, including the Badlands Mountain Range to the north, San Jacinto Mountains to the east, the Santa Ana Mountains to the west, and the Santa Margarita Mountains to the south. Currently, this watershed is primarily undeveloped. With natural open spaces at the headwaters areas and mostly agricultural and urban development in the middle and downstream areas.

The San Jacinto River Watershed consists of a single major drainage, the San Jacinto River, which is comprised of several smaller tributaries. The San Jacinto River begins in the San Jacinto Mountains and veers northwest to follow the lower elevations of the San Jacinto Valley. The mainstem begins at the confluence of South Fork San Jacinto River and North Fork San Jacinto River. The San Jacinto River is approximately 42 miles long, supports the majority of existing agricultural land in the San Jacinto Valley, and discharges into Canyon Lake, the overflow from which discharges into Lake Elsinore, which qualifies as a traditional navigable water (TNW). Discharges from Lake Elsinore drain into Walker Canyon, which is a tributary to Temescal Wash, and Temescal Wash is a tributary to the Santa Ana River, which ultimately conveys flows to the Pacific Ocean, a TNW.

4.2 LOCAL CLIMATE

The City of Perris features a somewhat cooler version of a Mediterranean climate, or semi-arid climate, with warm, sunny, dry summers and cool, rainy, mild winters. Relative to other areas in Southern California, winters are colder chilly to cold morning temperatures with frost common. Climatological data obtained for the City of Riverside indicates the annual precipitation averages 11.11 inches per year. Almost all of the precipitation in the form of rain occurs in the months between December and April, with hardly any occurring between the months of May and September. The wettest months are January and February, with monthly average totals precipitation of 2.24 and 3.29 inches, respectively, and the driest months are June and July, both with monthly average total precipitation of 0.04 inches. The average maximum and minimum temperatures are 86- and 46-degrees Fahrenheit (°F), respectively, with July and August (monthly average high 100°F) being the hottest months and December and January (monthly average lows 34 and 35°F) being the coldest. The temperature during the site visit was in the low-70s°F with overcast skies and calm winds.

4.3 USGS TOPOGRAPHIC QUADRANGLE

The USGS 7.5 Minute Series Topographic Quadrangle maps show geological formations and their characteristics, describing the physical setting of an area through contour lines and major surface features including lakes, rivers, streams, buildings, landmarks, and other factors that may fall under an agency's jurisdiction. Additionally, the maps depict topography through color and contour lines, which are helpful in determining elevations and latitude and longitude within a project site.

The proposed project site is depicted on the Lake Elsinore quadrangle of the United States Geological Survey's (USGS) 7.5-minute topographic map series within Sections 18 and 19 of Township 4 South, Range 3 West. The project site ranges in elevation from 1,540 to 1,670 feet above mean sea level and slopes generally from south to north. On-site topography is variable with topographic relief present along the eastern boundaries. Depressions within the site occur in association with access roads, and ponding which has occurred in recent years as a result of well installation and well water extraction.

4.4 AERIAL PHOTOGRAPH

Prior to conducting the field delineation, ELMT reviewed current and historical aerial photographs (1985-2023) of the project as available from Google Earth Pro Imaging. Aerial photographs can be useful during the delineation process, as they often indicate the presence of drainage features and riverine habitat within the boundaries of the project site, if any.

The project site occurs in an area formerly dominated by agricultural land uses that has been becoming urbanized in recent decades. Present land uses in the vicinity include tract neighborhoods, anchor retail centers, and assorted commercial, industrial, and institutional developments, with scattered undeveloped parcels supporting former agricultural land. The site is bounded to the north by Val Verde Elementary School and undeveloped, vacant land; to the northeast, east, and south by commercial and industrial developments with tract neighborhoods beyond; and to the west by Interstate 215.

The project site primarily supports undeveloped land with some developed areas. The entirety of the site has been subject to several decades of anthropogenic disturbances associated with historic agricultural land uses, grading activities, flood control infrastructure, weed abatement, and other on-site and surrounding development. Historic aerials show these activities have been ongoing since at least 1959. A more detailed historical timeline is provided below:

1967 - 1978: The project site and surrounding areas support primarily undeveloped, vacant land. Disturbances onsite include unpaved roadways. Scattered residential development occurs to the north and west. Robert Street is present to the west.

1978 - 1985: Additional residential development is present to the west, south, and southeast of the project site. Increased disturbance within the project site includes additional unpaved roadways. State Route 74 is constructed to the northwest.

1985 - 1994: Residential development continues to expand to the west and north of the project site. Bee boxes are installed in the northwest region of the site.

1994 - 2006: Minor development occurs within the boundaries of the project site concentrated in the northwest region. This development appears to be preliminary and is restricted to concrete footings for several small structures.

2006 - 2009: A well is installed in the northwest corner of the project site, near the northern boundary.

2009 - 2018: Minor disturbances continue onsite in association with the expansion of unpaved roadways, and intermittent stockpiling.

2018 - 2019: Onsite stockpiling increases. Storage containers are present near the northern boundary. Crops are visible to the southwest of the well.

2019 - 2021: More crops are visible to the west, north, east, and south southeast of the well.

2021 - Present: Trees have been cleared near the well and surrounding areas. Crops are no longer present.

4.5 SOILS

On-site and adjoining soils were researched prior to the field visits using the U.S. Department of Agriculture National Resources Conservation Service and Soil Survey for Western Riverside Area, California. Soil surveys furnish soil maps and interpretations originally needed in providing technical assistance to farmers and ranchers; in guiding other decisions about soil selection, use and management; and in planning, research and disseminating the results of the research. In addition, soil surveys are now heavily utilized in order to obtain soil information with respect to potential wetland environments and jurisdictional areas (i.e., soil characteristics, drainage, and color). Based on the NRCS USDA Web Soil Survey, the project site is underlain by Cieneba rocky sandy loam (8 to 15 percent slopes, eroded), Cieneba rocky sandy loam (15 to 50 percent slopes, eroded), Lodo rocky loam (8 to 25 percent slopes, eroded), Lodo rocky loam (25 to 50 percent slopes, eroded), Vallecitos loam (thick solum variant, 8 to 15 percent slopes, eroded), and Vista coarse sandy loam (8 to 15 percent slopes, eroded). Refer to Exhibit 4, *Soils*. Soils underlying the site are generally undisturbed with the exception of a network of access roads and recreational trails, areas surrounding remnant structures, and several areas on the western periphery of the site that have been utilized for storage and staging activities and road access for adjacent development.

4.6 HYDRIC SOILS LIST OF CALIFORNIA

ELMT reviewed the USDA NRCS Hydric Soils List of California in an effort to verify whether on-site soils are considered to be hydric[5]. It should be noted that lists of hydric soils along with soil survey maps provide off-site ancillary tools to assist in wetland determinations, but they are not a substitute for field investigations. The presence of hydric soils is initially investigated by comparing the mapped soil series for the site to the County list of hydric soils. According to the hydric soils list, none of the soils mapped as occurring within the project site are listed as hydric in Western Riverside County.

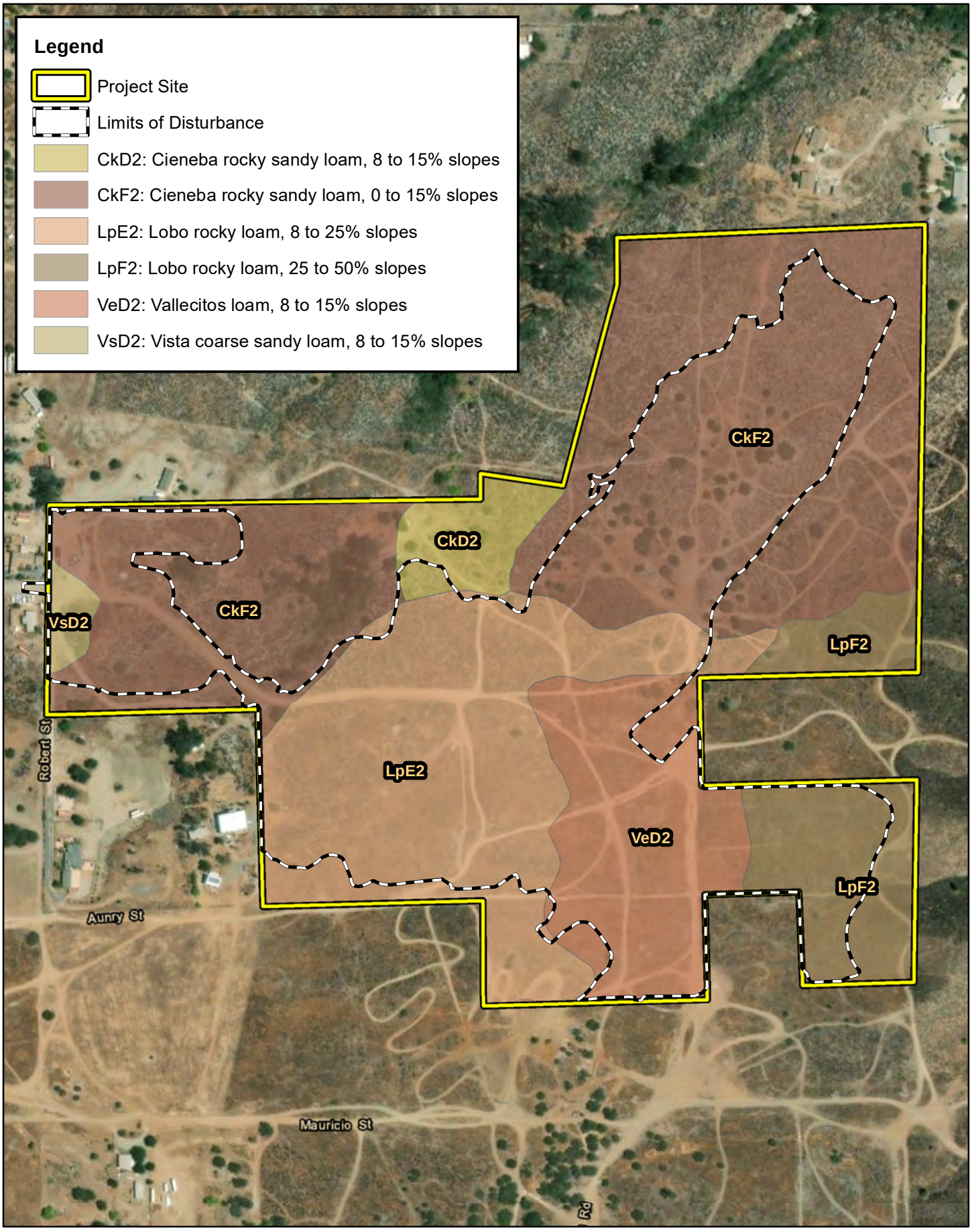
[5] A hydric soil is a soil that formed under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions in the upper part.

4.7 NATIONAL WETLANDS INVENTORY

The USFWS NWI and the USGS National Hydrography Dataset were reviewed to determine if any blueline streams or riverine resources have been documented within or immediate surrounding the project site. Based on this review, one riverine feature is mapped as occurring within the boundaries of the project site. This feature is classified as an intermittent streambed by the NWI. Drainage 1 observed within the project site, correspond to the mapped blueline stream. Refer to Appendix B, *Documentation*.

4.8 FLOOD ZONE

The Federal Emergency Management Act (FEMA) website was searched for flood data for the project site. Based on Flood Insurance Rate Map Nos. 06065C2033G and -034G, the project site is located within Zone X – area of minimal flood hazard.



ELMT CONSULTING

0 125 250 500 Feet

Source: ESRI Aerial Imagery, Soil Survey Geographic Database, Riverside County

CRESCENT CEMETERY

Soils

Exhibit 5

Section 5 Site Conditions

ELMT biologists Travis J. McGill, Jacob H. Lloyd Davies, and Rachael A. Lyons conducted a field delineation on November 13 and 16, 2023, to verify existing site conditions and document the extent of potential jurisdictional areas within the boundaries of the project site. ELMT field staff encountered no limitations during the field delineation. Refer to Appendix C for representative photographs taken throughout the project site.

5.1 JURISDICTIONAL FEATURES

5.1.1 DRAINAGE FEATURES

ELMT carefully assessed the site for depressions, inundation, presence of hydrophytic vegetation, staining, cracked soil, ponding, and indicators of active surface flow and corresponding physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris. Suspected jurisdictional areas were checked for the presence of definable channels, soils, and hydrology. One (1) unnamed drainage (Drainage 1) was documented within the project site during the time of the investigation.

Drainage 1

One (1) unnamed drainage feature (Drainage 1) was observed within the boundaries of the project site at the time of the investigation. Drainage 1 extends from south to north within the northwest region of the project site. Drainage 1 conveys flows, primarily outside of the proposed limits of disturbance before terminating near the northwest corner of the site. Drainage 1 receives flows direct precipitation upstream and from the discharge waters of a well in the middle of the drainage, outside the proposed limits of disturbance, which was installed to provide water to onsite agricultural activities. The upstream portion of Drainage 1 appears to only support surface water immediately following storm events. Portions of Drainage 1 support a mixed riparian scrub plant community.

Evidence of an OHWM was observed via scour, changes in substrate, shelving, and lack of vegetation. The OWHM ranged from 3 to 6 feet in width throughout the length of the drainage within site boundaries.

5.1.2 WETLAND FEATURES

In order to qualify as a wetland, a feature must exhibit all three wetland parameters (i.e., vegetation, soils, and hydrology) described in the Corps Arid West Regional Supplement. No riparian vegetation or wetland obligate plant species were observed within the drainage described above. Drainage 1 conveys flows during and following storm events and does not hold water for long enough to create anaerobic conditions or form hydric soils. Therefore, Drainage 1 does not meet wetland requirements.

Section 6 Findings

This report presents the extent of jurisdictional features using the most up-to-date regulations, written policy, and guidance from the regulatory agencies. Please refer to the following sections for a summary of jurisdictional areas within the Project site.

6.1 U.S. ARMY CORPS OF ENGINEERS DETERMINATION

6.1.1 WATERS OF THE UNITED STATES DETERMINATION

The onsite ephemeral drainage feature is not relatively permanent, standing, or continuously flowing body of water and, therefore, will not qualify as waters of the United States under the regulatory authority of the Corps (*Sackett v. EPA* (2022) 143 S. Ct. 1322, 1336).

6.1.2 WETLAND DETERMINATION

An area must exhibit all three wetland parameters described in the Corps Arid West Regional Supplement to be considered a jurisdictional wetland. Based on the results of the field delineation, it was determined that no areas within the Project site met all three wetland parameters. Therefore, no jurisdictional wetland features exist within the Project site.

6.2 REGIONAL WATER QUALITY CONTROL BOARD

Drainage 1 exhibits characteristics consistent with the Regional Board's methodology and would likely be considered jurisdictional waters of the State. Approximately 0.13 acre (1,360 linear feet) of Regional Board jurisdiction is located within the boundaries of the project site. Based on the proposed project footprint, approximately 0.007 acre (96 linear feet) of Regional Board waters of the State will be impacted from project implementation. Refer to Table 1 for a summary of on-site jurisdictional areas, and Exhibit 5, *Jurisdictional Areas*, for an illustration of on-site Regional Board jurisdictional areas and anticipated impacts.

Table 1: Regional Board Jurisdictional Waters

Jurisdictional Feature	Regional Board Jurisdiction	
	On-Site Jurisdiction Acreage (Linear Feet)	**Jurisdictional Impacts** Acreage (Linear Feet)
Drainage 1	0.13 (1,360)	0.007 (96)
TOTAL	**0.13 (1,360)**	**0.007 (96)**

6.3 CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

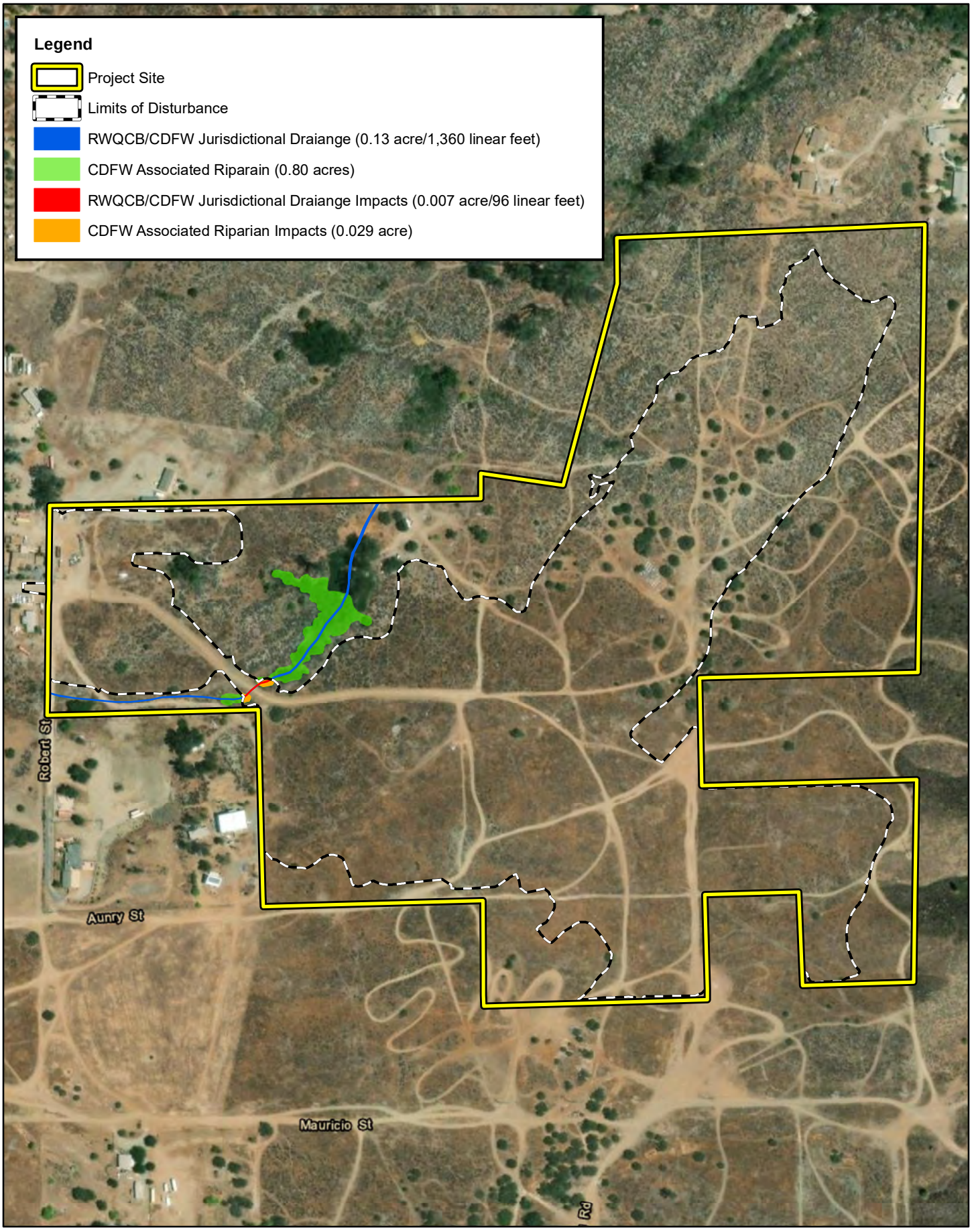
Drainages 1 exhibits characteristics consistent with CDFW's methodology and would likely be considered CDFW streambed/riparian. Approximately 0.96 acre (1,360 linear feet) of CDFW jurisdictional areas, consisting of 0.13 acre of jurisdictional streambed, and 0.80 acre of associated riparian vegetation occur

within boundaries of the project site. CDFW jurisdiction within Drainage 1 extends beyond the OHWM or streambed to the outer canopy of the riparian vegetation (mixed riparian scrub).

Based on the proposed project footprint, approximately 0.036 acre (96 linear feet) of CDFW jurisdictional streambed/riparian habitat will be impacted from project implementation. Refer to Table 2 for a summary of on-site jurisdictional areas, and Exhibit 5, for an illustration of on-site CDFW jurisdictional areas and anticipated impacts.

Table 2: CDFW Jurisdictional Waters

Jurisdictional Feature	**CDFW Jurisdiction**	
	On-Site Jurisdiction Acreage (Linear Feet)	**Jurisdictional Impacts** Acreage (Linear Feet)
Drainage 1	0.93 (1,360)	0.036 (96)
TOTAL	**0.96 (1,360)**	**0.036 (96)**



ELMT CONSULTING

0 125 250 500 Feet

Source: ESRI Aerial Imagery, Riverside County

CRESCENT CEMETERY

Jurisdictional Areas

Exhibit 5

Section 7 Regulatory Approval Process

The following is a summary of the various permits, certifications, and agreements that may be necessary prior to construction and/or alteration within jurisdictional areas. Ultimately the regulatory agencies make the final determination of jurisdictional boundaries and permitting requirements.

7.1 U.S. ARMY CORPS OF ENGINEERS

The Corps regulates discharges of dredged or fill materials into waters of the United States and wetlands pursuant to Section 404 of the CWA. No Corps jurisdictional areas were identified within the project site and a CWA Section 404 permit would not be required for the proposed project.

7.2 REGIONAL WATER QUALITY CONTROL BOARD

The Regional Board regulates discharges to surface waters pursuant to Section 401 of the CWA and the California Porter-Cologne Water Quality Control Act. Any impacts to on-site jurisdictional areas will require a Report of Waste Discharge prior to project implementation. Therefore, it will be necessary for the applicant to acquire a Report of Waste Discharge prior to impacts occurring within Regional Board jurisdictional areas. The Regional Board also requires that California Environmental Quality Act (CEQA) compliance be obtained prior to obtaining the 401 Certification. A Regional Board Application fee is required with the application package and is calculated based on the acreage and linear feet of jurisdictional impacts.

7.3 CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

Pursuant to Section 1602 of the California Fish and Game Code, the CDFW regulates any activity that will divert or obstruct the natural flow or alter the bed, channel, or bank (which may include associated biological resources) of a river or stream. Therefore, impacts to the on-site jurisdictional areas will require a Section 1602 Streambed Alteration Agreement from the CDFW prior to project implementation. The notification will require a processing fee which is based on the term and cost of the proposed Project. It should also be noted that the CDFW requires that the payment of the process fee be paid and CEQA compliance be obtained prior to the issuance of the final Section 1602 Streambed Alteration Agreement.

7.4 RECOMMENDATIONS

It is recommended that this delineation be forwarded to the regulatory agencies for their review and concurrence. The concurrence/receipt would solidify findings noted within this report.

Section 8 References

Brady, III, Roland H. and Kris Vyverberg. 2013. *Methods to Describe and Delineate Episodic Stream Processes on Arid Landscapes for Permitting Utility-Scale Solar Power Plants.* California Energy Commission, Publication Number: CEC-500-2014-013.

California Department of Fish and Wildlife, *Lake and Streambed Alteration Program*. (https://www.wildlife.ca.gov/Conservation/LSA)

Environmental Laboratory. 1987. *Corps of Engineers Wetland Delineation Manual*. Technical Report Y-87-1. Vicksburg, MS: U.S. Army Engineer Waterways Experiment Station, 1987.

Faber, Phyllis M., *Common Riparian Plants of California*, Pickleweed Press 1996.

Faber, Phyllis M., *Common Wetland Plants of Coastal California*, Pickleweed Press 1996.

Google, Inc. 2013. Google Earth Pro version 7.3.4.8248, build date 07/16/2021. Historical aerial imagery from 1985 to 2020.

Munsell. 2009. *Soil Color Charts*, Year Revised/2009 Production. Lichvar, R.W., M. Butterwick, N.C. Melvin, and W.N. Kirchner. 2014.

U.S. Army Corps of Engineers (Corps). 2006. *Distribution of Ordinary High Water Mark Indicators and their Reliability in Identifying the Limits of "Waters of the United States" in the Arid Southwestern Channels*. February 2006.

Corps. 2008. *A Field Guide to the Identification of the Ordinary High Water Mark in the Arid West Region of the Western United States*. August 2008.

Corps. 2008. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)*, ed. J.S. Wakeley, R. W. Lichvar, and C. V. Nobel. ERDC/EL TR-08-28. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

Corps. 2016. *Regulatory Guidance Letter No. 16-01: Jurisdictional Determinations*. October 2016.

Corps. 2016. *Arid West 2016 Regional Wetland Plant List*. 2016 NWPL v3.3. Accessed online at http://wetland-plants.usace.army.mil/nwpl_static/index.html.

Corps. 2016. *Updated Map and Drawing Standards for the South Pacific Regulatory Division Regulatory Program*. February 2016.

Corps. 2017. *Los Angeles District Regulatory Program* (www.spl.usace.army.mil/).

Corps. 2017. *Minimum Standards for Acceptance of Aquatic Resources Delineation Reports*. March 2017.

Corps. 2017. *Reissuance of the Nationwide Permits and Issuance of Final Regional Conditions for the Los Angeles District.* March 2017.

U.S. Department of Agriculture, Natural Resources Conservation Service (USDA NRCS). *List of Hydric Soils*. Accessed online at https://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/use/hydric/.

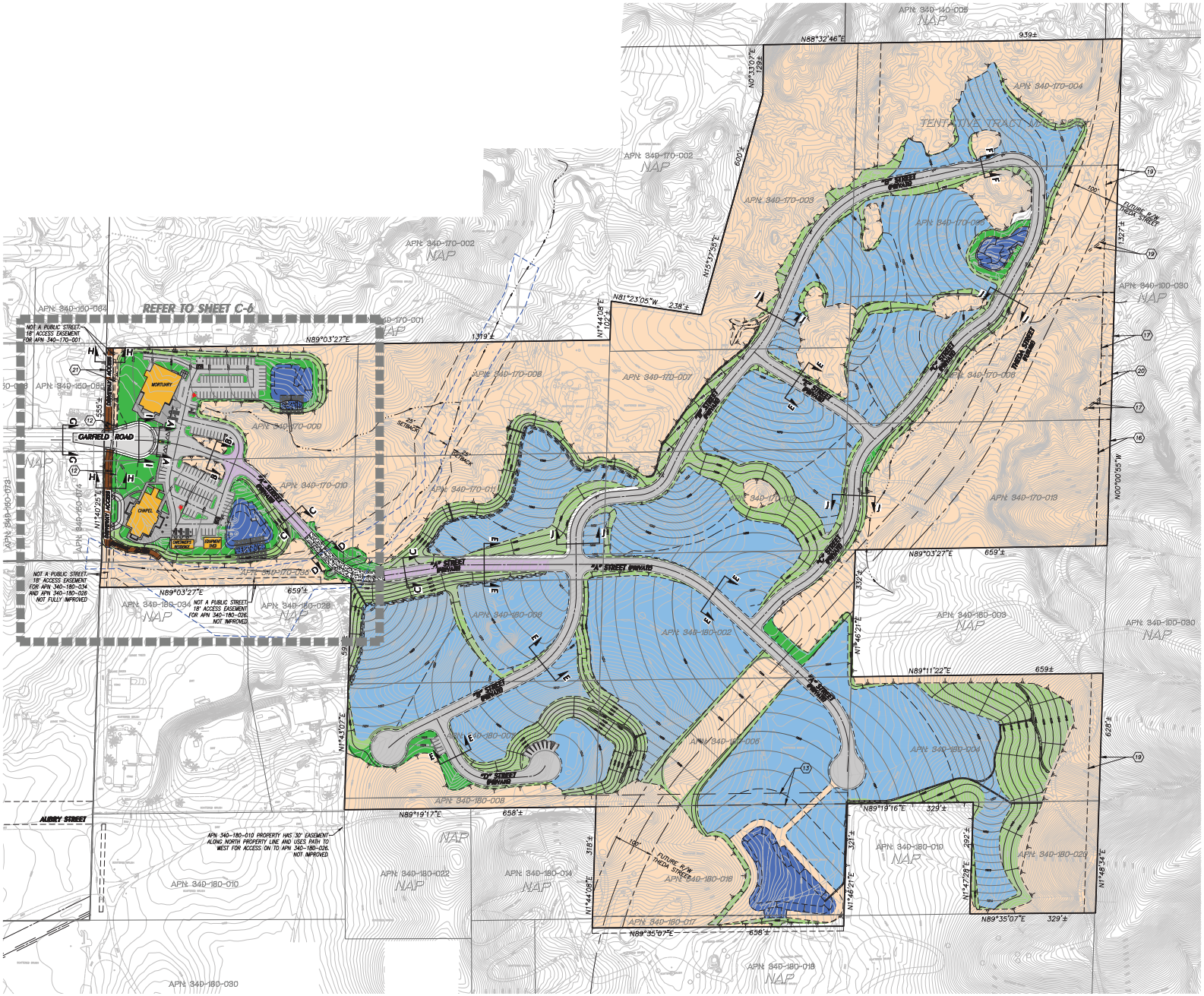
USDA NRCS. 2017. *Field Indicators of Hydric Soils in the United States: A Guide to Identifying and Delineating Hydric Soils, Version 8.1*. 2017.

U.S. Department of Homeland Security, Federal Emergency Management Agency, National Flood Insurance Program, *Flood Insurance Rate Map Nos. 06065C2715G and 06065C2720G*

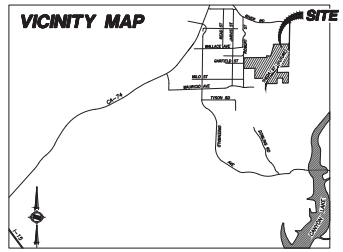
U.S. Fish and Wildlife Service, Department of Habitat and Resource Conservation. 2017. *Wetland Geodatabase*. Accessed online at http://wetlandsfws.er.usgs.gov/NWI/index.html.

Vyverberg, Kris. 2010. *A Review of Stream Processes and Forms in Dryland Watersheds*. California Department of Fish and Game. December 2010.

Appendix A Site Plan



VICINITY MAP

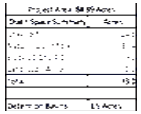


NOTES

1. REFER TO ENCUMBRANCE EXHIBIT, SHEETS C-2 AND C-3, FOR EASEMENT LOCATIONS.
2. REFER TO SHEET C-6 FOR STREET CROSS SECTIONS.
3. FOR GENERAL NOTES REFER TO SHEET C-1.

LEGEND

- PROJECT BOUNDARY LINE
- PROPOSED RIGHT OF WAY
- PROPOSED LOT LINE
- PROPOSED CURB
- EXISTING LOT LINE
- PROPOSED EASEMENT LINE
- PROPOSED CENTERLINE
- FENCE
- DAYLIGHT
- EXISTING WATER
- PROPOSED STORM DRAIN
- FLOOD PLAIN LIMITS (PER PRELIMINARY HYDROLOGY)
- JD STREAM BASED ON VCS ENVIRONMENTAL FIELD SURVEY
- WALL
- TOP OF SLOPE
- TOE OF SLOPE
- FIRE HYDRANT
- FIRE LANE (24' WIDTH)
- LANDSCAPE SLOPES 1:1 TO 4:1
- LANDSCAPE AREA
- OPEN SPACE AREA
- WATER QUALITY AND DETENTION BASINS
- BUILDING FOOTPRINT
- PERMEABLE PAVEMENT
- ASPHALT PAVEMENT
- CONCRETE PAVEMENT
- AGGREGATE BASE



* REFER TO PHASING PLAN

FEET 0 50 100 200
INCHES 0 1/2 1 2

APPLICANT:
MUSLIM MORTUARY & CEMETERY COMMITTEE
13121 BROOKHURST STREET, SUITE C
GARDEN GROVE, CA 92843
TEL: (310)-619-0082

PREPARED BY:
HUNSAKER & ASSOCIATES IRVINE, INC.
PLANNING • ENGINEERING • SURVEYING
Irvine, CA 92618 • 714.869.2650 • Fax 714.869.2694

CRESCENT GARDENS CEMETERY, COUNTY OF RIVERSIDE

CONDITIONAL USE PERMIT - CUP230002

SITE PLAN - OVERALL

REVISION	
DATE	DESCRIPTION

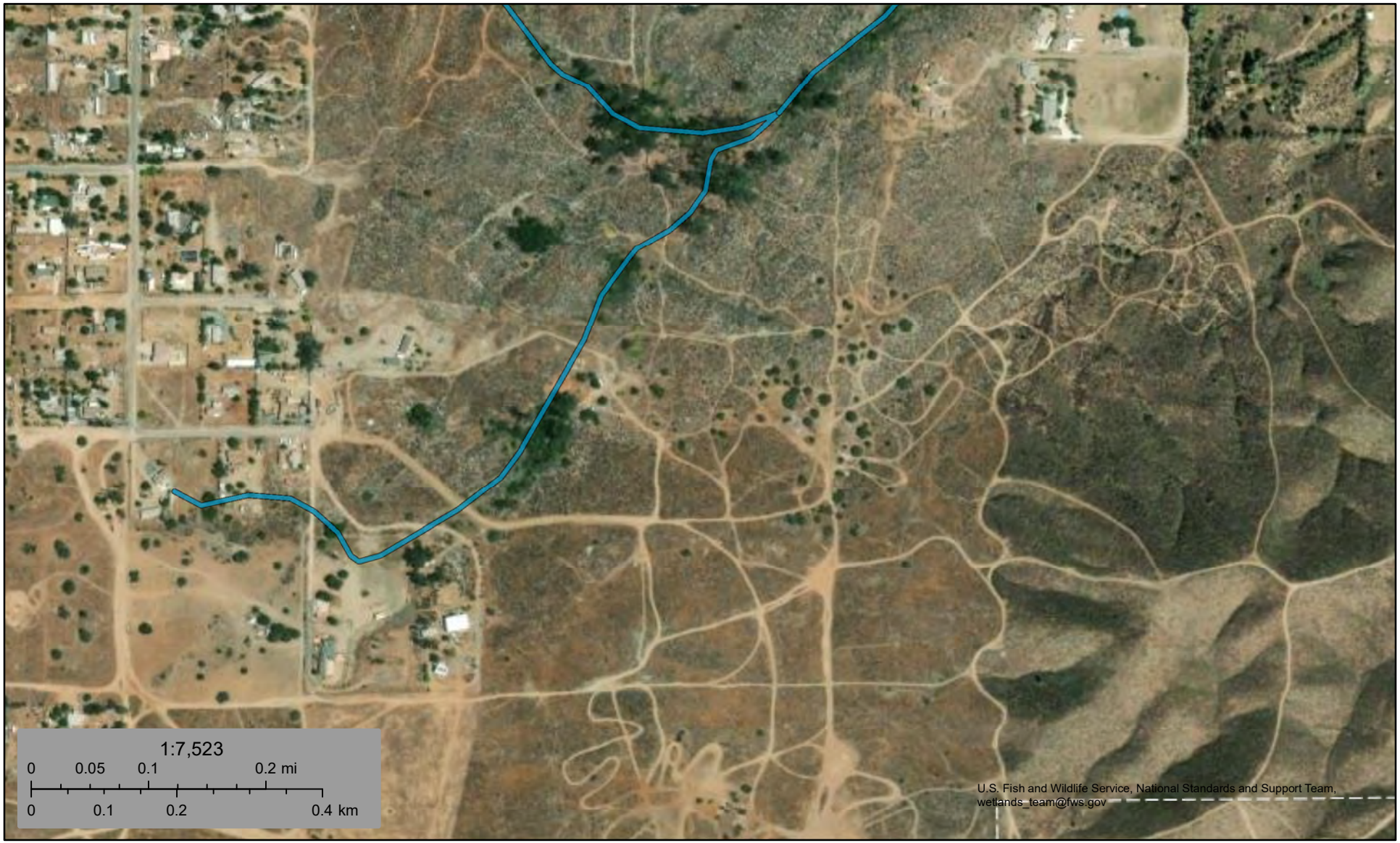
DESIGNED BY: ____
DRAFTED BY: P.R.
CHECKED BY: ____
DATE: 11/29/23
CITY FILE NO.:
SHEET C-5
W.O. 4427-2

DATE: Nov. 29, 2023 10:41:37 AM FILE: F:\1167\Planning\SA_CUP 230003\Exh_CUP\C05_SiteOverall_CUP 230002.dwg

Appendix B Documentation

U.S. Fish and Wildlife Service
National Wetlands Inventory

Crescent Cemetery



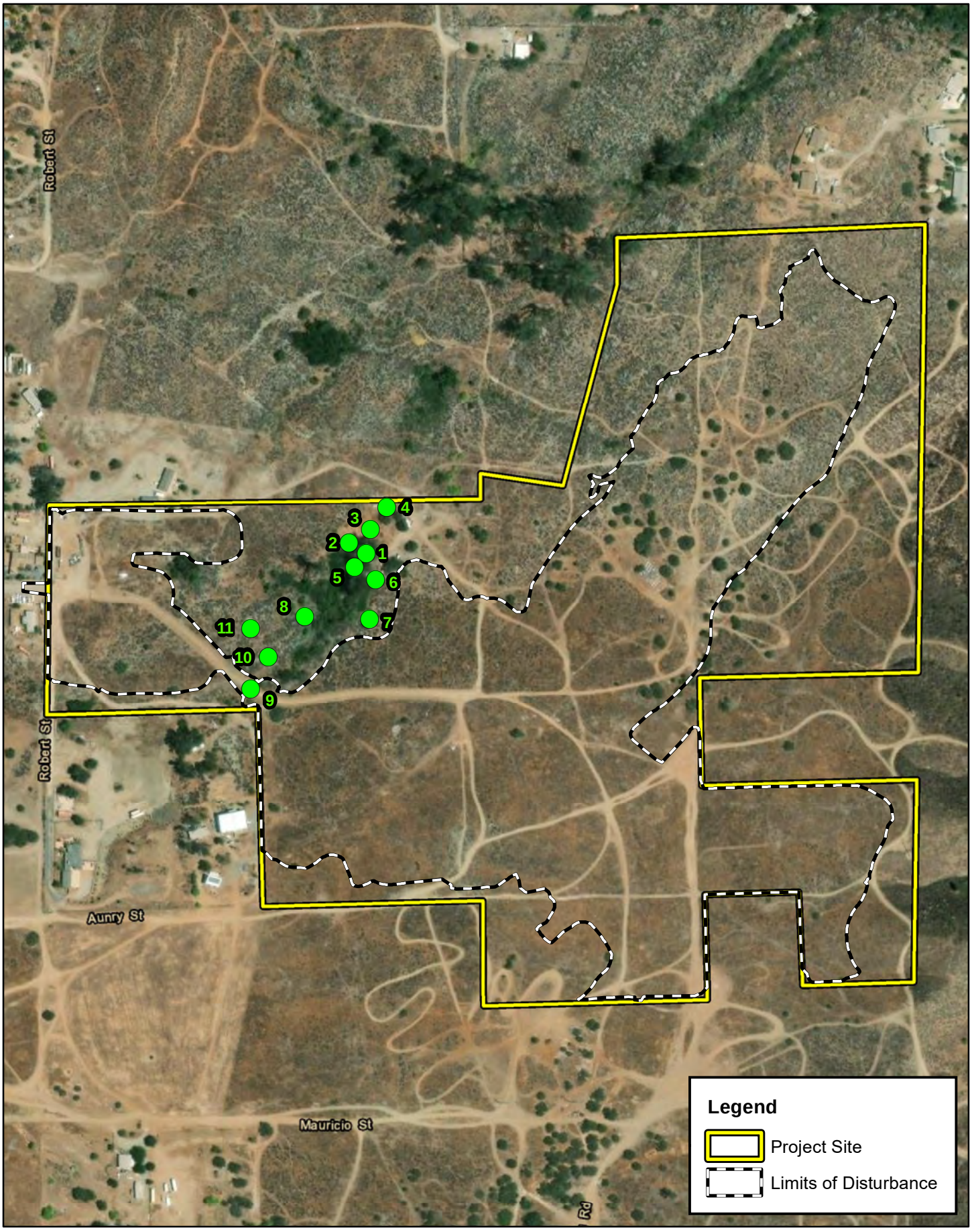
February 22, 2024

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

Appendix C Site Photographs



ELMT CONSULTING

0 125 250 500 Feet

Source: ESRI Aerial Imagery, Riverside County

CRESCENT CEMETERY

Photo Index

Exhibit 1



Photograph 1: View of a well observed within the project site.



Photograph 2: View at the start of Drainage 1 at the base of the well, looking northwest.



Photograph 3: From middle of Drainage 1 looking north through existing debris and vegetation, outside of the limits of disturbance.



Photograph 4: From the middle of Drainage 1, looking northeast at the point of termination outside of the limits of disturbance.



Photograph 5: View of the standing water within the mixed riparian scrub plant community that was created from damming of the drainage and irrigation.



Photograph 6: Depicting a second well found within the ponded area within the project site.



Photograph 7: From the northwest portion of the mixed riparian plant community, looking southeast through associated vegetation.



Photograph 8: From the southwest portion of the mixed riparian plant community, looking northeast through associated vegetation.



Photograph 9: Looking east along the dirt access road that crosses the onsite drainage feature.



Photograph 10: View of the southern end of the onsite drainage feature, north of the dirt road.



Photograph 11: From the dirt road looking north at the southern portion of the onsite drainage feature.

Appendix D Methodology

WATERS OF THE UNITED STATES

Section 404 of the Clean Water Act

In accordance with the Revised Definition of "Waters of the United States"; Conforming (September 8, 2023), "waters of the United Sates" are defined as follows:

(a) ***Waters of the United States*** means:

(1) Waters which are:
(i) Currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
(ii) The territorial seas; or
(iii) Interstate waters;

(2) Impoundments of waters otherwise defined as waters of the United States under this definition, other than impoundments of waters identified under paragraph (a)(5) of this section;

(3) Tributaries of waters identified in paragraph (a)(1) or (2) of this section that are relatively permanent, standing or continuously flowing bodies of water;

(4) Wetlands adjacent to the following waters:
(i) Waters identified in paragraph (a)(1) of this section; or
(ii) Relatively permanent, standing or continuously flowing bodies of water identified in paragraph (a)(2) or (a)(3) of this section and with a continuous surface connection to those waters;

(5) Intrastate lakes and ponds not identified in paragraphs (a)(1) through (4) of this section that are relatively permanent, standing or continuously flowing bodies of water with a continuous surface connection to the waters identified in paragraph (a)(1) or (a)(3) of this section

(b) The following are not "waters of the United States" even where they otherwise meet the terms of paragraphs (a)(2) through (5) of this section:

(1) Waste treatment systems, including treatment ponds or lagoons, designed to meet the requirements of the Clean Water Act;

(2) Prior converted cropland designated by the Secretary of Agriculture. The exclusion would cease upon a change of use, which means that the area is no longer available for the production of agricultural commodities. Notwithstanding the determination of an area's status as prior converted cropland by any other Federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with EPA;

(3) Ditches (including roadside ditches) excavated wholly in and draining only dry land and that do not carry a relatively permanent flow of water;

(4) Artificially irrigated areas that would revert to dry land if the irrigation ceased;
(5) Artificial lakes or ponds created by excavating or diking dry land to collect and retain water and which are used exclusively for such purposes as stock watering, irrigation, settling basins, or rice growing;
(6) Artificial reflecting or swimming pools or other small ornamental bodies of water created by excavating or diking dry land to retain water for primarily aesthetic reasons;

(7) Waterfilled depressions created in dry land incidental to construction activity and pits excavated in dry land for the purpose of obtaining fill, sand, or gravel unless and until the construction or excavation operation is abandoned and the resulting body of water meets the definition of waters of the United States; and

(8) Swales and erosional features (*e.g.*, gullies, small washes) characterized by low volume, infrequent, or short duration flow.

(c) In this section, the following definitions apply:

(1) ***Wetlands*** means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

(2) ***Adjacent*** means having a continuous surface connection

(3) ***High tide line*** means the line of intersection of the land with the water's surface at the maximum height reached by a rising tide. The high tide line may be determined, in the absence of actual data, by a line of oil or scum along shore objects, a more or less continuous deposit of fine shell or debris on the foreshore or berm, other physical markings or characteristics, vegetation lines, tidal gages, or other suitable means that delineate the general height reached by a rising tide. The line encompasses spring high tides and other high tides that occur with periodic frequency but does not include storm surges in which there is a departure from the normal or predicted reach of the tide due to the piling up of water against a coast by strong winds such as those accompanying a hurricane or other intense storm.

(4) ***Ordinary high water mark*** means that line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.

(5) ***Tidal waters*** means those waters that rise and fall in a predictable and measurable rhythm or cycle due to the gravitational pulls of the moon and sun. Tidal waters end where the rise and fall of the water surface can no longer be practically measured in a predictable rhythm due to masking by hydrologic, wind, or other effects.

WETLANDS

For this project location, Corps jurisdictional wetlands are delineated using the methods outlined in the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region, Version 2.0* (Corps 2008). This document is one of a series of Regional Supplements to the Corps Wetland Delineation Manual (Corps 1987). The identification of wetlands is based on a three-parameter approach involving indicators of hydrophytic vegetation, hydric soil, and wetland hydrology. In order to be considered a wetland, an area must exhibit at least minimal characteristics within these three (3) parameters. The Regional Supplement presents wetland indicators, delineation guidance, and other information that is specific to the Arid West Region. In the field, vegetation, soils, and evidence of hydrology are examined using the methodology listed below and documented on Corps wetland data sheets, when applicable. It should be noted that both the Regional Board and the CDFW jurisdictional wetlands encompass those of the Corps.

Vegetation

Nearly 5,000 plant types in the United States may occur in wetlands. These plants, often referred to as hydrophytic vegetation, are listed in regional publications by the U.S. Fish and Wildlife Service (USFWS). In general, hydrophytic vegetation is present when the plant community is dominated by species that can tolerate prolonged inundation or soil saturation during growing season. Hydrophytic vegetation decisions are based on the assemblage of plant species growing on a site, rather than the presence or absence of particular indicator species. Vegetation strata are sampled separately when evaluating indicators of hydrophytic vegetation. A stratum for sampling purposes is defined as having 5 percent or more total plant cover. The following vegetation strata are recommended for use across the Arid West:

- *Tree Stratum:* Consists of woody plants 3 inches or more in diameter at breast height (DBH), regardless of height;
- *Sapling/shrub stratum:* Consists of woody plants less than 3 inches DBH, regardless of height;
- *Herb stratum:* Consists of all herbaceous (non-woody) plants, including herbaceous vines, regardless of size; and,
- *Woody vines:* Consists of all woody vines, regardless of size.

The following indicator is applied per the test method below.[1] Hydrophytic vegetation is present if any of the indicators are satisfied.

[1] Although the Dominance Test is utilized in the majority of wetland delineations, other indicator tests may be employed. If one indicator of hydric soil and one primary or two secondary indicators of wetland hydrology are present, then the Prevalence Test (Indicator 2) may be performed. If the plant community satisfies the Prevalence Test, then the vegetation is hydric. If the Prevalence Test fails, then the Morphological Adaptation Test may be performed, where the delineator analyzes the vegetation for potential morphological features.

Indicator 1 – Dominance Test

Cover of vegetation is estimated and is ranked according to their dominance. Species that contribute to a cumulative total of 50% of the total dominant coverage, plus any species that comprise at least 20% (also known as the "50/20 rule") of the total dominant coverage, are recorded on a wetland data sheet. Wetland indicator status in California (Region 0) is assigned to each species using the *National Wetland Plant List, version 2.4.0* (Corps 2012). If greater than 50% of the dominant species from all strata were Obligate, Facultative-wetland, or Facultative species, the criteria for wetland vegetation is considered to be met. Plant indicator status categories are described below:

- *Obligate Wetland (OBL):* Plants that almost always occur in wetlands;
- *Facultative Wetland (FACW):* Plants that usually occur in wetlands, but may occur in non-wetlands;
- *Facultative (FAC):* Plants that occur in wetlands and non-wetlands;
- *Facultative Upland (FACU):* Plants that usually occur in non-wetlands, but may occur in wetlands; and,
- *Obligate Upland (UPL):* Plants that almost never occur in wetlands.
- No Indicator (*NI):* Plant not listed on the Corps Wetland Plant List for the Arid West.

Hydrology

Wetland hydrology indicators are presented in four (4) groups, which include:

Group A – Observation of Surface Water or Saturated Soils

Group A is based on the direct observation of surface water or groundwater during the site visit.

Group B – Evidence of Recent Inundation

Group B consists of evidence that the site is subject to flooding or ponding, although it may not be inundated currently. These indicators include water marks, drift deposits, sediment deposits, and similar features.

Group C – Evidence of Recent Soil Saturation

Group C consists of indirect evidence that the soil was saturated recently. Some of these indicators, such as oxidized rhizospheres surrounding living roots and the presence of reduced iron or sulfur in the soil profile, indicate that the soil has been saturated for an extended period.

Group D – Evidence from Other Site Conditions or Data

Group D consists of vegetation and soil features that indicate contemporary rather than historical wet conditions, and include shallow aquitard and the FAC-neutral test.

If wetland vegetation criteria is met, the presence of wetland hydrology is evaluated at each transect by recording the extent of observed surface flows, depth of inundation, depth to saturated soils, and depth to free water in the soil test pits. The lateral extent of the hydrology indicators are used as a guide for locating soil pits for evaluation of hydric soils and jurisdictional areas. In portions of the stream where the flow is divided by multiple channels with intermediate sand bars, the entire area between the channels is considered within the OHWM and the wetland hydrology indicator is considered met for the entire area.

Soils

A hydric soil is a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper 16-20 inches.[2] The concept of hydric soils includes soils developed under sufficiently wet conditions to support the growth and regeneration of hydrophytic vegetation. Soils that are sufficiently wet because of artificial measures are included in the concept of hydric soils. It should also be noted that the limits of wetland hydrology indicators are used as a guide for locating soil pits. If any hydric soil features are located, progressive pits are dug moving laterally away from the active channel until hydric features are no longer present within the top 20 inches of the soil profile.

Once in the field, soil characteristics are verified by digging soil pits along each transect to an excavation depth of 20 inches; in areas of high sediment deposition, soil pit depth may be increased. Soil pit locations are usually placed within the drainage invert or within adjoining vegetation. At each soil pit, the soil texture and color are recorded by comparison with standard plates within a *Munsell Soil Chart* (2009). Munsell Soil Charts aid in designating color labels to soils, based by degrees of three simple variables – hue, value, and chroma. Any indicators of hydric soils, such as organic accumulation, iron reduction, translocation, and accumulation, and sulfate reduction, are also recorded.

Hydric soil indicators are present in three groups, which include:

All Soils

"All soils" refers to soils with any United States Department of Agriculture (USDA) soil texture. Hydric soil indicators within this group include histosol, histic epipedon, black histic, hydrogen sulfide, stratified layers, 1 cm muck, depleted below dark surface, and thick dark surface.

[2] According to the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region, Version 2.0 (Corps 2008), growing season dates are determined through on-site observations of the following indicators of biological activity in a given year: (1) above-ground growth and development of vascular plants, and/or (2) soil temperature.

Sandy Soils

"Sandy soils" refers to soil materials with a USDA soil texture of loamy fine sand and coarser. Hydric soil indicators within this group include sandy mucky mineral, sandy gleyed matrix, sandy redox, and stripped matrix.

Loamy and Clayey Soils

"Loamy and clayey soils" refers to soil materials with a USDA soil texture of loamy very fine sand and finer. Hydric soil indicators within this group include loamy mucky mineral, loamy gleyed matrix, depleted matrix, redox dark surface, depleted dark surface, redox depressions, and vernal pools.

SWANCC WATERS

The term "isolated waters" is generally applied to waters/wetlands that are not connected by surface water to a river, lake, ocean, or other body of water. In the presence of isolated conditions, the Regional Board and CDFW take jurisdiction through the application of the OHWM/streambed and/or the 3 parameter wetland methodology utilized by the Corps.

Appendix E Fairy Shrimp Survey Reports

HELIX Environmental Planning, Inc.
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July 3, 2024 04940.00003.001

Ms. Stacey Love
U.S. Fish and Wildlife Service
2177 Salk Avenue, Suite 250
Carlsbad, CA 92008

Subject: 2024 Dry Season Survey Report for the Meadowbrook-Crescent Garden Project

Dear Ms. Love:

This report presents the findings of the 2024 dry season fairy shrimp sampling conducted by HELIX Environmental Planning, Inc. (HELIX) for the Meadowbrook-Crescent Garden Project (project). This report presents the findings of features not sampled during the 2023 dry season survey (HELIX 2024a) but present during the 2023/2024 wet season survey (HELIX 2024b). The 2024 dry season survey was conducted for six features within the proposed project footprint. The combined number of features discussed in this report and the previous dry season report total thirty-eight, which represents the number of features sampled during the 2023/2024 wet season survey.

PROJECT LOCATION

The project site is in the City of Lake Elsinore in Riverside County (Figure 1, *Regional Location*). The project site is located southeast of Highway 74, within Section 33 of Township 5 South, Range 4 West on the Lake Elsinore U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle (Figure 2, *USGS Topography*). The project is north of Mauricio Street, south and west of Stonyhill Drive, and east of Robert Street within Assessor's Parcel Numbers (APNs) 349-170-003, 349-170-004, 349-170-005, 349-170-006, 349-170-007, 349-170-008, 349-170-009, 349-170-010, 349-170-011, 349-170-012, 349-170-013, 349-180-002, 349-180-004, 349-180-005, 349-180-006, 349-180-007, 349-180-016, 349-180-017, 349-180-020, and 349-180-035 (Figure 3, *Aerial Photograph*).

SPECIES INFORMATION

There are three species of fairy shrimp with the potential to occur on-site: vernal pool fairy shrimp (*Branchinecta lynchi*), Riverside fairy shrimp (*Streptocephalus woottoni*), and versatile fairy shrimp (*Branchinecta lindahli*) (Erikson and Belk 1999; California Natural Diversity Database 2024). Vernal pool fairy shrimp are federally listed as threatened, and Riverside fairy shrimp are federally listed as endangered, whereas the versatile fairy shrimp is relatively common and is not listed or considered sensitive. Vernal pool fairy shrimp have the widest geographic range of the federally listed vernal pool crustaceans and occur from southern Oregon to northern and central California, generally west of the Sierra Nevada, to southern California. The species' range extends south to Orange and Los Angeles counties and east to western Riverside County but is generally absent from San Diego County. Vernal

pool fairy shrimp are found in vernal pools and other vernal pool-like habitats such as ephemeral ponds or features that can be formed from anthropogenic events such as tire ruts. Riverside fairy shrimp can be found in Riverside, Orange, and San Diego counties and occur in vernal pools and other ephemeral features with long inundation times. The versatile fairy shrimp is common in pools throughout California and can co-occur with vernal pool and Riverside fairy shrimp.

Fairy shrimp are adapted for variable and uncertain rainfall patterns. When fertilized by males of their species, female fairy shrimp produce "resting eggs," which are dormant embryos surrounded by hard-shelled membranes capable of remaining viable in the soil for long periods. Dry season fairy shrimp surveys are designed to detect, collect, and identify eggs present in the soil. The surface characteristics of these eggs can be used to differentiate the genus and, potentially, the species of fairy shrimp. Certain fairy shrimp, such as *B. lindahli* and *B. lynchi*, cannot be identifiable to the species level by examination of the eggs alone. For these species, a wet season fairy shrimp survey or authorized hatching would be required to identify individuals to the species level.

METHODS

HELIX permitted biologist Jason Kurnow (Permit ES-778195-15) assisted by HELIX biologist Amanda Mathews (supervised individual), conducted the 2024 dry season survey in accordance with U.S. Fish and Wildlife Service (USFWS) protocol (USFWS 2017). Ms. Mathews collected soil on May 23, 2024. Following soil collection, the samples were transferred to the HELIX laboratory for processing by Mr. Kurnow and Ms. Mathews (under supervision). The soil samples were prepared by dissolving them in water and sequentially sieving the material through 710- and 75 µm pore size screens. The small size of these screens ensures that eggs from the target fairy shrimp species are retained. The portion of each sample retained in the screen was dispersed in a brine solution to separate the organic material from the inorganic material. Mr. Kurnow decanted, dried, and examined the organic fraction under a microscope. Eggs were identified to genus level based on surface characteristics. Multiple species of the *Branchinecta* genus can occur in Riverside County but cannot be identified past genus level based on egg characteristics.

Eggs of each genus were counted within each soil sample; egg abundance was estimated for each feature and is provided in the Results Section, according to the guidelines provided in the USFWS Survey Guidelines: none (no eggs found in sample), low abundance (estimate of 1 to 10 eggs/100 milliliters [mL] soil), medium abundance (estimate of 11 to 50 eggs/100 mL soil), and high abundance (estimate of more than 50 eggs/100 mL of soil). The data sheets are included as Appendix A, *USFWS Data Sheet for Dry Season Sampling for Large Branchiopods.*

RESULTS

Branchinecta sp. eggs were observed in one of the six features sampled in 2024 (Table 1, *2024 Dry Season Results*; Figure 4, *2024 Dry Season Survey Results*). No *Streptocephalus* sp. eggs were observed in the sampled features. The USFWS Data Sheet for Dry Season Sample Analysis for Listed Large Branchiopods is included as Appendix A.

Table 1
2024 DRY SEASON RESULTS

Feature	*Branchinecta* sp. Present	Abundance*	*Streptocephalus* sp. Present	Abundance*
34	Yes	Low	No	None
35	No	None	No	None
36	No	None	No	None
37	No	None	No	None
38	No	None	No	None
39	No	None	No	None

* Based on abundance categories found within the 2017 U.S. Fish and Wildlife Service Survey Guidelines for the Listed Large Branchiopods.

DISCUSSION

Between the 2023 dry season survey and 2024 dry season survey fifteen of the thirty-eight features were positive for *Branchinecta* sp. cysts (Table 2). The wet season survey identified *Branchinecta lindahli* in six features (Table 2). Based on a review of the dry season and wet season results there are instances where cysts were identified in the dry season, but no shrimp were identified during the wet season. This can happen especially when features do not inundate long enough to support the *Branchinecta* life cycle. There are also a few instances of shrimp being identified in the wet season but not in the dry season. This is expected since there is always the potential for variability between wet season and dry season surveys. That is why a complete fairy shrimp effort has both a dry season and wet season component.

Based on the information gathered from all surveys and factoring the nearest known location for *B. lynchi* it is presumed that *B. lynchi* is absent from the site. Both results for wet and dry season surveys did not indicate presence of *S. woottoni*. As a result, this species is also presumed absent from the project site. Taking this into consideration, the only species present on site is the non-listed *B. lindahli*.

Feature	Dry Season Results		Wet Season Results	
	***Branchinecta* sp. Present**	**Abundance***	***Branchinecta lindahli* Present**	**Order of Magnitude**
1	Yes	high	No	N/A
2	Yes	high	Yes	1000's
3	Yes	high	Yes	1000's
4	Yes	low	No	N/A
5	Yes	low	No	N/A
6	Yes	medium	No	N/A
7	Yes	high	No	N/A
8	Yes	low	Yes	100's
9	Yes	high	No	100's
10	No	none	Yes	1000's
11	Yes	high	No	N/A
12	No	none	No	N/A
13	No	none	No	N/A
14	Yes	low	No	N/A
15	No	none	No	N/A
16	No	none	No	N/A
17	No	none	No	N/A
18	No	none	No	N/A
19	No	none	No	N/A
20	No	none	No	N/A
21	No	none	No	N/A
22	No	none	No	N/A
23	No	none	No	N/A
24	No	none	No	N/A
25	No	none	No	N/A
26	No	none	No	N/A
27	No	none	No	N/A
28	No	none	Yes	N/A
29	No	none	No	N/A
30	Yes	low	No	N/A
31	Yes	medium	No	N/A
32	Yes	high	No	N/A
33	No	none	Yes	100's
34	Yes	Low	No	N/A
35	No	None	No	N/A
36	No	None	No	N/A
37	No	None	No	N/A
38	No	None	No	N/A
39	No	None	No	N/A

CERTIFICATION

I certify that the information in this survey report and attached exhibits fully and accurately represents my work.



Jason Kurnow
Senior Scientist; ES-778195-15



Amanda Mathews
Biologist
Supervised Individual; ES-778195-15

Enclosures:

Figure 1: Regional Location
Figure 2: USGS Topography
Figure 3: Aerial Photograph
Figure 4: 2024 Dry Season Survey Results
Appendix A: USFWS Data Sheet for Dry Season Sampling for Large Branchiopods

REFERENCES

California Department of Fish and Wildlife (CDFW), California Natural Diversity Database (CNDDB). 2024. RareFind Database Program.

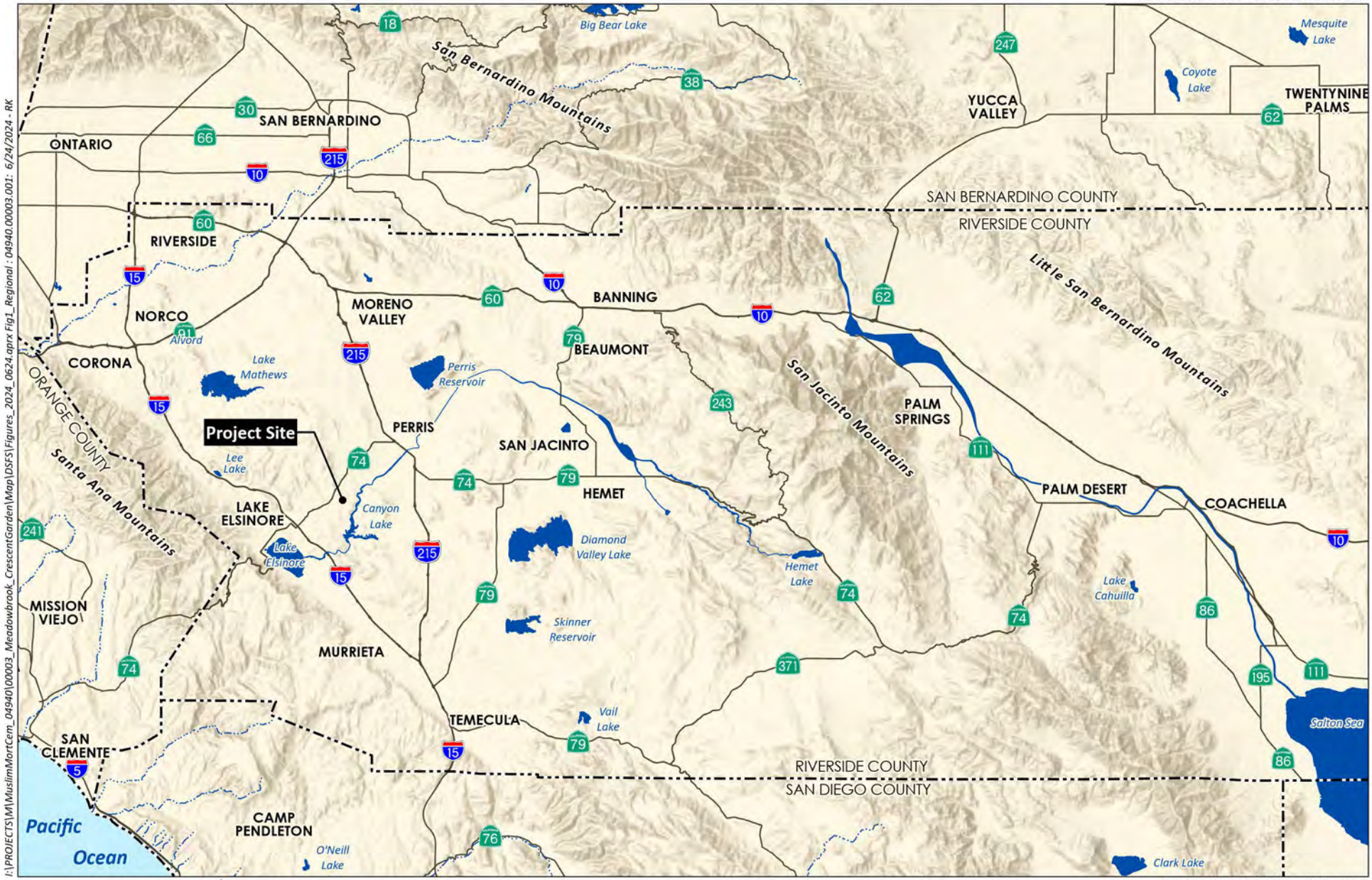
Erikson, C.H. and D. Belk. 1999. Fairy Shrimps of California's Puddles, Pools, and Playas. Mad River Press. Eureka, California. 196 pp.

HELIX Environmental Planning, Inc. 2024a. 2023 Dry Season Survey Report for the Meadowbrook-Crescent Garden Project

2024b. 2023-2024 Wet Season Fairy Shrimp Survey Report for the Meadowbrook – Crescent Garden Project. May 14.

U.S. Fish and Wildlife Service (USFWS). 2017. Survey Guidelines for the Listed Large Branchiopods. Revised November 13.

Meadowbrook - Crescent Garden



I:\PROJECTS\M\MuslimMortCem_04940\00003_Meadowbrook_CrescentGarden\Map\DSFS\Figures_2024_0624.aprx Fig1_Regional : 04940.00003.001: 6/24/2024 - RK

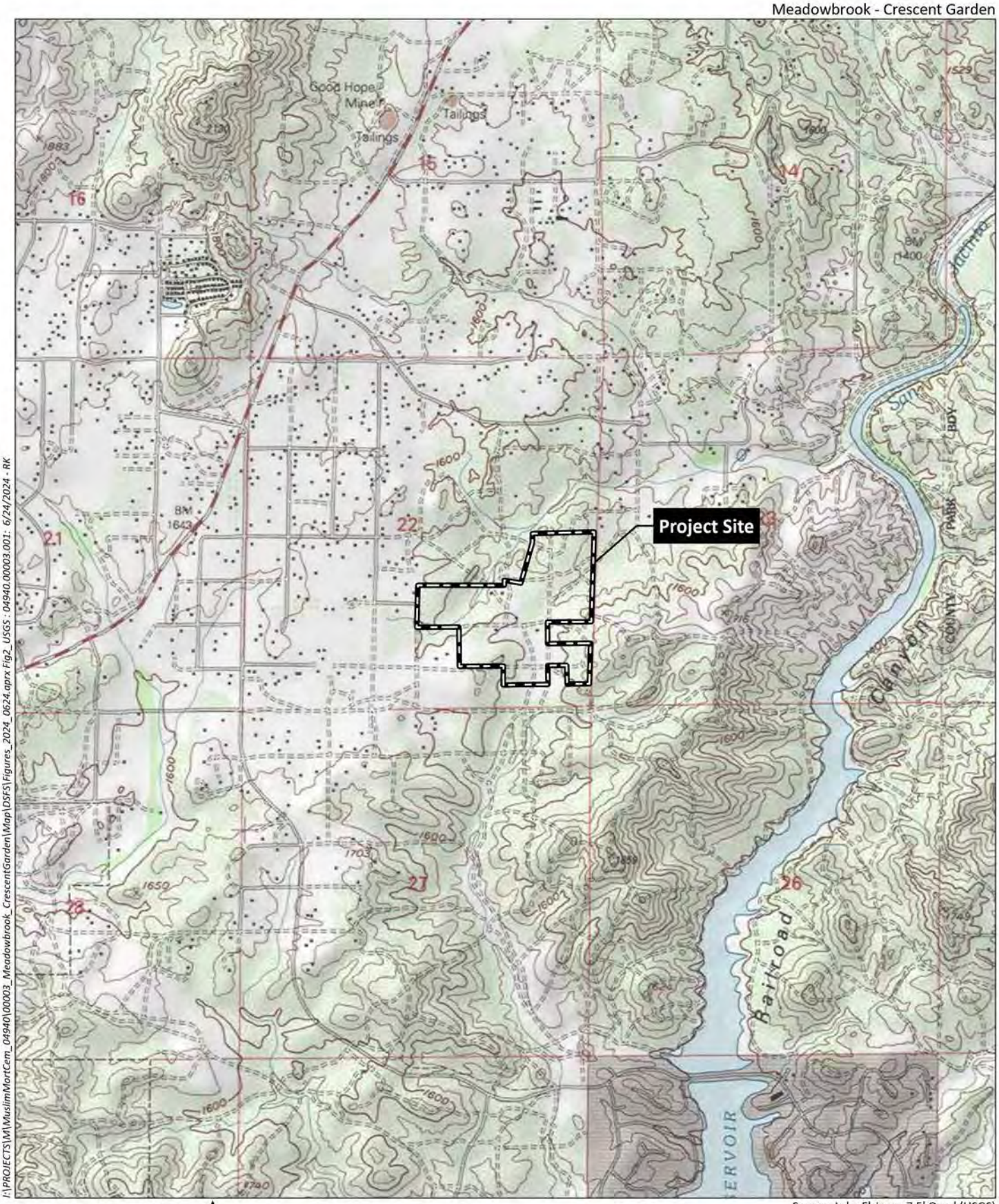
0 10 Miles

Source: Base Map Layers (ESRI, 2013)

HELIX Environmental Planning

Regional Location

Figure 1

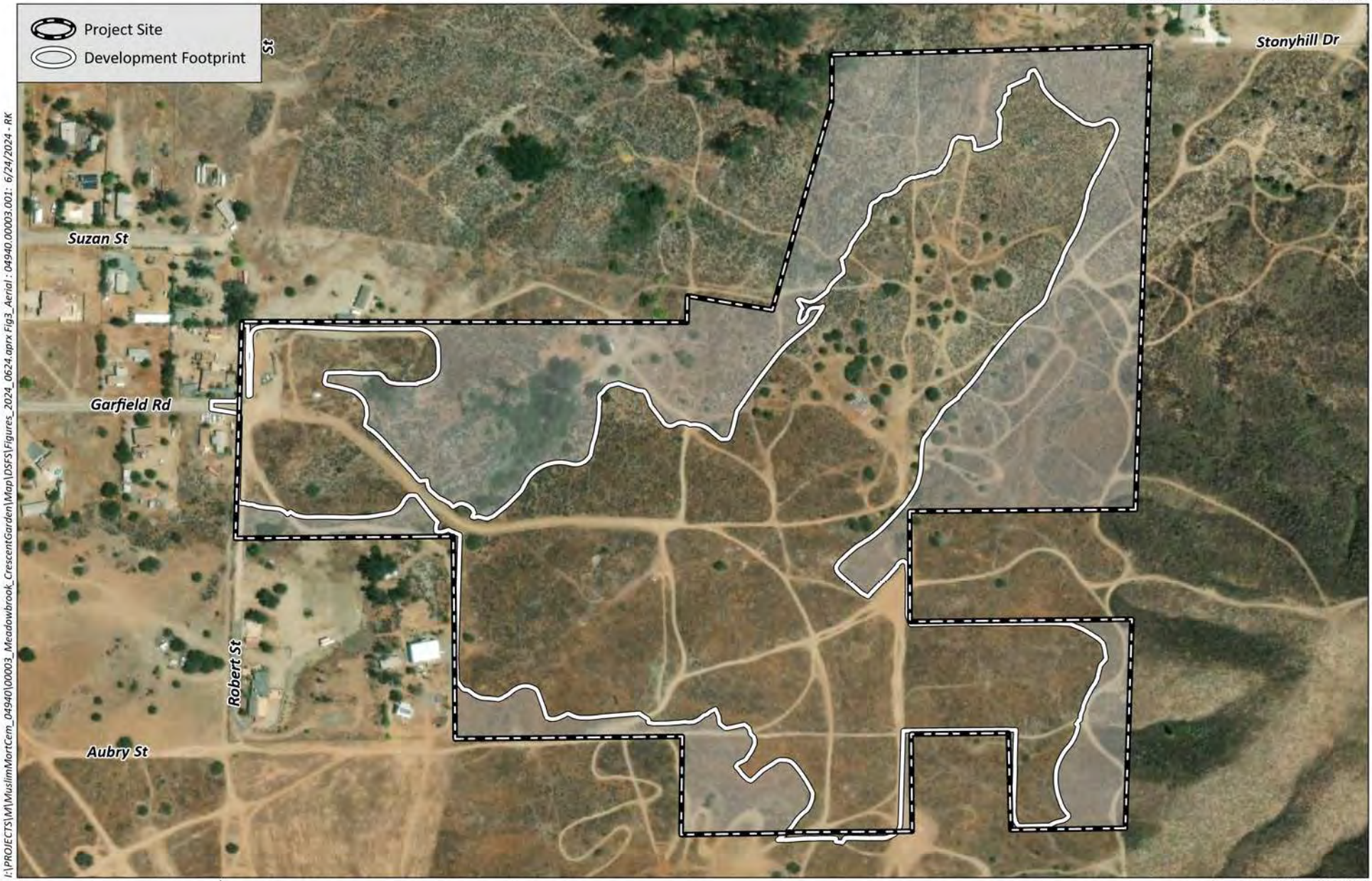


I:\PROJECTS\M\MuslimMortCem_04940\00003_Meadowbrook_CrescentGarden\Map\DSFS\Figures_2024_0624.aprx Fig2_ USGS : 04940.00003.001: 6/24/2024 - RK

HELIX Environmental Planning

USGS Topography

Figure 2



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Source: Aerial (SanGIS 2023)

HELIX Environmental Planning

Aerial Photograph

Figure 3

Meadowbrook - Crescent Garden

Project Site

Development Footprint

1 Feature Number

Feature Results

Feature with Fairy Shrimp (*Branchinecta* sp.) Eggs

Feature without Fairy Shrimp

Robert St

Stonyhill Dr

Suzan St

Garfield Rd

Jarvis St

Aubry St

Robert St

38

37

36

39

35

34

I:\PROJECTS\M\MuslimMortCem_04940\00003_Meadowbrook_CrescentGarden\Map\DSFS\Figures_2024.aprx Fig4_DSFS_Results : 04940.00003.001: 6/24/2024 - RK

0 300 Feet

Source: Aerial (Esri 2021)

HELIX Environmental Planning

2024 Dry Season Survey Results

Figure 4

Appendix A

USFWS Data Sheet for Dry Season Sampling for Large Branchiopods

APPENDIX A. U.S. Fish and Wildlife Service – Data Sheet for Dry Season Sample Analysis for Listed Large Branchiopods

Project Information		Biologist Information
Project Name: Meadowbrook-Crescent Garden	Quad: Lake Elsinore	Name of Person(s) Who Conducted the Following Tasks and Permit #'s
USFWS Project Number:	Township: 5 south	Soil Collection: Mandy Mathews (ES-778195-15)
County: Riverside	Range: 4 west	Soil Processing: Jason Kurnow and Mandy Mathews (supervised; ES-778195-15 for wet season)
Lat: 33.716008°	Section: 33	Soil Analysis/Cyst ID: Jason Kurnow (ES-778195-15)
Long: -117.279951°	Soil Collection Date: 5/23/24	

	Invertebrates Present (X)															
						Number of Large Branchiopod Cysts										
Pool/Habitat/ Basin	Insect Exo-Skeletons	Micro-Turbellaria Cysts	Cladocera Ephippia	Ostracods Live/Cysts/ Carapaces	Copepod Live/Cysts	*Branchinecta* sp.	*Lepidurus packardi*	*Streptocephalus wootoni*	*Linderiella occidentalis*	*Lynceus brachyurus*	*Cyzicus californicus*	Hydracanna Live	Nematoda	Collembola	Other Species	Comments
34	---	---	---	---	---	81	---	---	---	---	---	---	---	---	---	---
35	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
36	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
37	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
38	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
39	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

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May 14, 2024 04940.00003.001

Ms. Stacey Love
U.S. Fish and Wildlife Service
2177 Salk Avenue, Suite 250
Carlsbad, CA 92008

Subject: **2023-2024 Wet Season Fairy Shrimp Survey Report for the Meadowbrook – Crescent Garden Project**

Dear Ms. Love:

This letter presents the results of the 2023-2024 U.S. Fish and Wildlife Service (USFWS) protocol presence/absence wet season survey for the listed large branchiopods (i.e., fairy shrimp) conducted by HELIX Environmental Planning, Inc. (HELIX) for the Meadowbrook – Crescent Garden Project (project). This report describes the methods used to perform the survey and the results. It is being submitted to the USFWS as a condition of HELIX's Threatened and Endangered Species Permit ES-778195-15. A total of 38 features were mapped and surveyed during the survey effort. Feature conditions were suitable for conducting surveys during the 2023-2024 wet season.

PROJECT LOCATION

The Project site is approximately 84.99 acres of undeveloped land, located in the unincorporated area of Riverside County in the community of Meadowbrook, north of Lake Elsinore (Figure 1, *Regional Location*). It is situated within Section 33 of Township 5 South, Range 4 West of the Lake Elsinore U.S. Geological Survey (USGS) 7.5-minute quadrangle map (Figure 2, *USGS Topography*). Specifically, the project site is generally located northeast of the City of Lake Elsinore, west of Canyon Lake, and east of State Route 74 (Figure 3, *Aerial Photograph*). It encompasses Assessor's Parcel Numbers (APNs) 349-170-003, -004, -005, -006, -007, -008, -009, -010, -011, -012, -013 and 349-180-002, -004, -005, -006, -007, -008, -016, -020, and -035. The project site is not located within the USFWS-designated critical habitat for fairy shrimp species.

SPECIES INFORMATION

There are three species of fairy shrimp with the potential to occur on site: vernal pool fairy shrimp (*Branchinecta lynchi*), Riverside fairy shrimp (*Streptocephalus woottoni*), and versatile fairy shrimp (*Branchinecta lindahli*). Vernal pool fairy shrimp are federally listed as threatened and Riverside fairy shrimp are federally listed as endangered, whereas the versatile fairy shrimp is relatively common and is not listed or considered sensitive. Vernal pool fairy shrimp have the widest geographic range of the federally listed vernal pool crustaceans occurring from southern Oregon to northern and central California, generally west of the Sierra Nevada, to southern California. The species' range extends south

to Orange and Los Angeles counties and east to western Riverside County but is generally absent from San Diego County. Vernal pool fairy shrimp are found in vernal pools and other vernal pool-like habitats such as ephemeral ponds or basins that can be formed from anthropogenic events such as tire ruts. Riverside fairy shrimp can be found in Riverside, Orange, and San Diego counties and occur in vernal pools and other ephemeral basins with long inundation times. The versatile fairy shrimp is common in pools throughout California and can co-occur with both vernal pool and Riverside fairy shrimp.

METHODS

HELIX permitted biologists Mandy Mathews and Amy Mattson (Permit ES-778195-15) conducted the 2023-2024 wet season survey in accordance with current USFWS protocol[1]. The survey consisted of 17 survey visits, conducted between January 3 and April 24, 2024 (Table 1, *2023-2024 Meadowbrook – Crescent Garden Project Wet Season Fairy Shrimp Survey Results*). The first substantial rainfall of the season occurred on December 20-22, 2024 (0.66 inch; NOAA 2023[2]) with the initial survey occurring on January 3, 2024. Each feature was sampled at approximately seven-day intervals until dry, and sampling was reinitiated within seven days of the feature becoming re-inundated. All features were observed to be dry on April 24, 2023. As such, April 24, 2024, was the last survey visit for the 2023-2024 wet season covered by this report.

The features were sampled using fine mesh aquarium nets swept through the water and examined for invertebrates. If fairy shrimp were present, an attempt to identify netted fairy shrimp to species occurred in the field. Following identification, individuals identified in the field were immediately returned to their pool of origin. Fairy shrimp unable to be identified to species in the field were collected and identified using the key in Eriksen and Belk,[3] with the aid of a dissecting scope. Because multiple similar branchiopod species may occupy the same features, when "take" of fairy shrimp occurred, no more than 30 specimens of each species from each feature, or less than 50 percent of the estimated subpopulation for each feature, were collected (whichever was the lesser amount). Care was taken to ensure that nets were cleaned after each feature was sampled.

USFWS vernal pool data sheets were completed during each site visit and included the collection of the following data at each feature, as applicable: average and maximum water depth, air and water temperature, feature length and width, habitat condition, a population estimate of any fairy shrimp present, and observations of any other feature-dwelling species. The USFWS vernal pool data sheets are included in Attachment A, *USFWS Vernal Pool Data Sheets*. Representative site photos are included in Attachment B, *Representative Site Photos*.

---

1 U.S. Fish and Wildlife Service (USFWS). 2017. Survey Guidelines for the Listed Large Branchiopods. November 13. Available at: https://www.fws.gov/sites/default/files/documents/survey-guidelines-for-large-branchiopods.pdf.

2 NOAA. 2023. Elsinore RTP Station. Available from: https://www.wrh.noaa.gov/sgx/obs/rtp/rtp_ELS_23

3 Eriksen, C.H. and D. Belk. 1999. Fairy Shrimps of California's Puddles, Pools, and Playas. Mad River Press. Eureka, California. 196pp.

RESULTS

Fairy Shrimp

A total of 38 features were surveyed within the project site during the 2023-2024 wet season survey effort (Figure 4, *2023-2024 Wet Season Fairy Shrimp Survey Results*). They include all 33 features identified in the 2023 dry season survey (HELIX 2024[4]) as well as 6 new features identified during the wet season survey. Two of the dry season features combined into a single feature during the wet season, which is why the total feature count during the wet season survey is 38 and not 39. All features sampled lack vernal pool vegetation and are not considered vernal pools. The non-listed versatile fairy shrimp was detected within 6 of the 38 features; specifically, Features 2, 3, 8, 10, 28, and 33 (Table 1). In addition to these 6 features, there were an additional 11 features where *Branchinecta* eggs were present during the 2023 dry season survey, but survey results were negative during the wet season survey. This discrepancy is primarily due to the features not inundating long enough to support the *Branchinecta* life cycle. Associated features where this is the case consist of Features 1, 4-7, 9, 11, 14, 29, 31, and 32 (Table 1). Federally listed species were not observed in any features during the 2023-2024 wet season survey effort. All features sampled lack vernal pool vegetation and are not considered vernal pools.

[4] HELIX Environmental Planning, Inc. (HELIX). 2024. 2023 Dry Season Survey Report for the Meadowbrook-Crescent Garden Project

Table 1
2023-2024 MEADOWBROOK – CRESCENT GARDEN PROJECT WET SEASON SURVEY RESULTS

Feature	UTM	Survey Results																
		2024																
		1/3	1/10	1/17	1/24	1/31	2/7	2/14	2/21	2/29	3/6	3/13	3/20	3/27	4/3	4/10	4/17	4/24
1*	11S 474284.25 E 3730673.36 N	---	Dry	Dry	---	Dry	---	---	---	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
2*	11S 474265.76 E 3730731.81 N	---	Dry	Dry	---	Dry	---	BRLI	---	---	Dry	BRLI	Dry	Dry	---	Dry	Dry	Dry
3*	11S 474279.58 E 3730655.17 N	---	Dry	Dry	---	BRLI	BRLI	BRLI	BRLI	BRLI	BRLI	BRLI	---	---	---	---	---	Dry
4*	11S 474282.52 E 3730618.17 N	Dry	Dry	Dry	Dry	Dry	---	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
5*	11S 474285.29 E 3730602.14 N	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
6*	11S 474279.10 E 3730576.16 N	---	Dry	Dry	Dry	Dry	---	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
7*	11S 474279.16 E 3730562.72 N	---	Dry	Dry	---	Dry	---	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry

Feature	UTM	Survey Results																
		2024																
		1/3	1/10	1/17	1/24	1/31	2/7	2/14	2/21	2/29	3/6	3/13	3/20	3/27	4/3	4/10	4/17	4/24
8*	11S 474281.68 E 3730696.59 N	Dry	Dry	Dry	---	BRLI	BRLI	BRLI	---	BRLI	BRLI	BRLI	Dry	Dry	---	---	Dry	Dry
9*	11S 474239.96 E 3730720.47 N	---	Dry	Dry	Dry	Dry	---	Dry	---	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
10	11S 474276.30 E 3730692.36 N	BRLI	BRLI	BRLI	---	Dry	BRLI	BRLI	---	Dry	BRLI	BRLI	---	Dry	---	Dry	Dry	Dry
11*	11S 474225.41 E 3730712.55 N	---	Dry	Dry	---	Dry	---	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
12	11S 474200.21 E 3730722.29 N	Dry	Dry	Dry	Dry	Dry	Dry	Dry	---	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
13	11S 474200.21 E 3730722.29 N	Dry	Dry	Dry	Dry	Dry	Dry	---	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
14*	11S 474288.09 E 3730766.58 N	Dry	Dry	Dry	Dry	Dry	---	Dry	---	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
15	11S 474285.09 E 3730911.97 N	---	Dry	Dry	---	Dry	---	Dry	---	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry

Feature	UTM	Survey Results																
		2024																
		1/3	1/10	1/17	1/24	1/31	2/7	2/14	2/21	2/29	3/6	3/13	3/20	3/27	4/3	4/10	4/17	4/24
16	11S 474259.55 E 3731028.23 N	---	Dry	Dry	---	Dry	---	Dry	---	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
17	11S 474258.99 E 3731024.22 N	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
18	11S 474289.47 E 3731071.92 N	Dry	Dry	Dry	Dry	Dry	Dry	---	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
19	11S 473950.77 E 3730809.87 N	---	Dry	Dry	Dry	Dry	Dry	Dry	---	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
20	11S 474282.32 E 3730633.32 N	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
21	11S 474062.93 E 3730658.96 N	Dry	Dry	Dry	Dry	Dry	---	Dry	---	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
22	11S 474062.81 E 3730633.32 N	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
23	11S 474060.27 E 3730665.53 N	Dry	Dry	Dry	Dry	Dry	Dry	---	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry

Feature	UTM	Survey Results																
		2024																
		1/3	1/10	1/17	1/24	1/31	2/7	2/14	2/21	2/29	3/6	3/13	3/20	3/27	4/3	4/10	4/17	4/24
24	11S 474062.04 E 3730673.52 N	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
25	11S 474114.91 E 3730806.44 N	Dry	Dry	Dry	---	Dry	---	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
26	11S 474054.01 E 3730658.96 N	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
27	11S 474062.38 E 3730641.79 N	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
28	11S 474249.58 E 3730824.83 N	Dry	Dry	Dry	---	Dry	---	BRLI	---	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
29*†	11S 474224.04 E 3730682.24 N	Dry	Dry	Dry	Dry	Dry	---	Dry	---	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
31*	11S 474095.08 E 3730881.42 N	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
32*	11S 474217.54 E 3730568.99 N	Dry	Dry	Dry	---	Dry	---	---	---	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry

Feature	UTM	Survey Results																
		2024																
		1/3	1/10	1/17	1/24	1/31	2/7	2/14	2/21	2/29	3/6	3/13	3/20	3/27	4/3	4/10	4/17	4/24
33	11S 474401.49 E 3730619.14 N	BRLI	BRLI	BRLI	---	BRLI	BRLI	BRLI	---	BRLI	BRLI	BRLI	Dry	Dry	---	Dry	Dry	Dry
34	11S 474282.05 E 3730838.24 N	Dry	Dry	Dry	---	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
35	11S 474291.68 E 3731038.88 N	---	Dry	Dry	---	---	---	---	---	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
36	11S 474333.75 E 3731107.10 N	---	Dry	Dry	Dry	Dry	---	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
37	11S 474214.76 E 3730710.31 N	---	Dry	Dry	---	Dry	---	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
38	11S 474304.72 E 3731082.61 N	---	Dry	Dry	---	Dry	---	Dry	---	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
39	11S 474284.74 E 3730687.95 N	---	Dry	Dry	---	Dry	---	---	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry

*Features were positive for *Branchinecta* sp. eggs during the 2023 dry season survey
†Feature 29 and 30 combined during the wet season. This is now a single feature, identified as Feature 29.
--- : Feature sampled, but no fairy shrimp observed
Dry: Feature not ponded, and not sampled.
BRLI: Versatile Fairy Shrimp (*Branchinecta lindahli*).

Rainfall

The year-to-date precipitation total (as of April 29, 2024) for the Lake Elsinore area, as reported by the Riverside County Flood Control and Water District is 13.56 inches.[5] The average annual precipitation in this area is 11 inches.[5]

The Palmer Drought Severity Index categorizes precipitation into ranges that fall either above or below what is classified as average precipitation. The index classified the region where the survey occurred as moderately moist in October 2023, mid-range November 2023 – February 2024, and moderately moist in March 2024.[6]

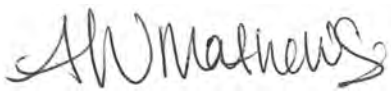
Pursuant to the 2017 USFWS protocol, a wet season survey may be considered unreliable if moderate to extreme drought conditions persist through the wet season as determined by this index. Wet season surveys for the project were conducted during a period categorized as mid-range to moderately moist. Therefore, based on the higher-than-average rainfall year and moist conditions, the surveys meet the requirements of a reliable survey.

CONCLUSION

There were no federally listed fairy shrimp species identified during the protocol 2023-2024 wet season fairy shrimp survey. However, the non-listed versatile fairy shrimp was found in 6 of the 38 on-site features. A second dry season survey covering the six features not identified during the 2023 dry season survey (Features 34 – 39) will occur later in 2024, once the soil has completely dried out.

CERTIFICATION

I certify that the information in this survey report and attached exhibits fully and accurately represent my work.



Mandy Mathews
Biologist
ES-778195-15



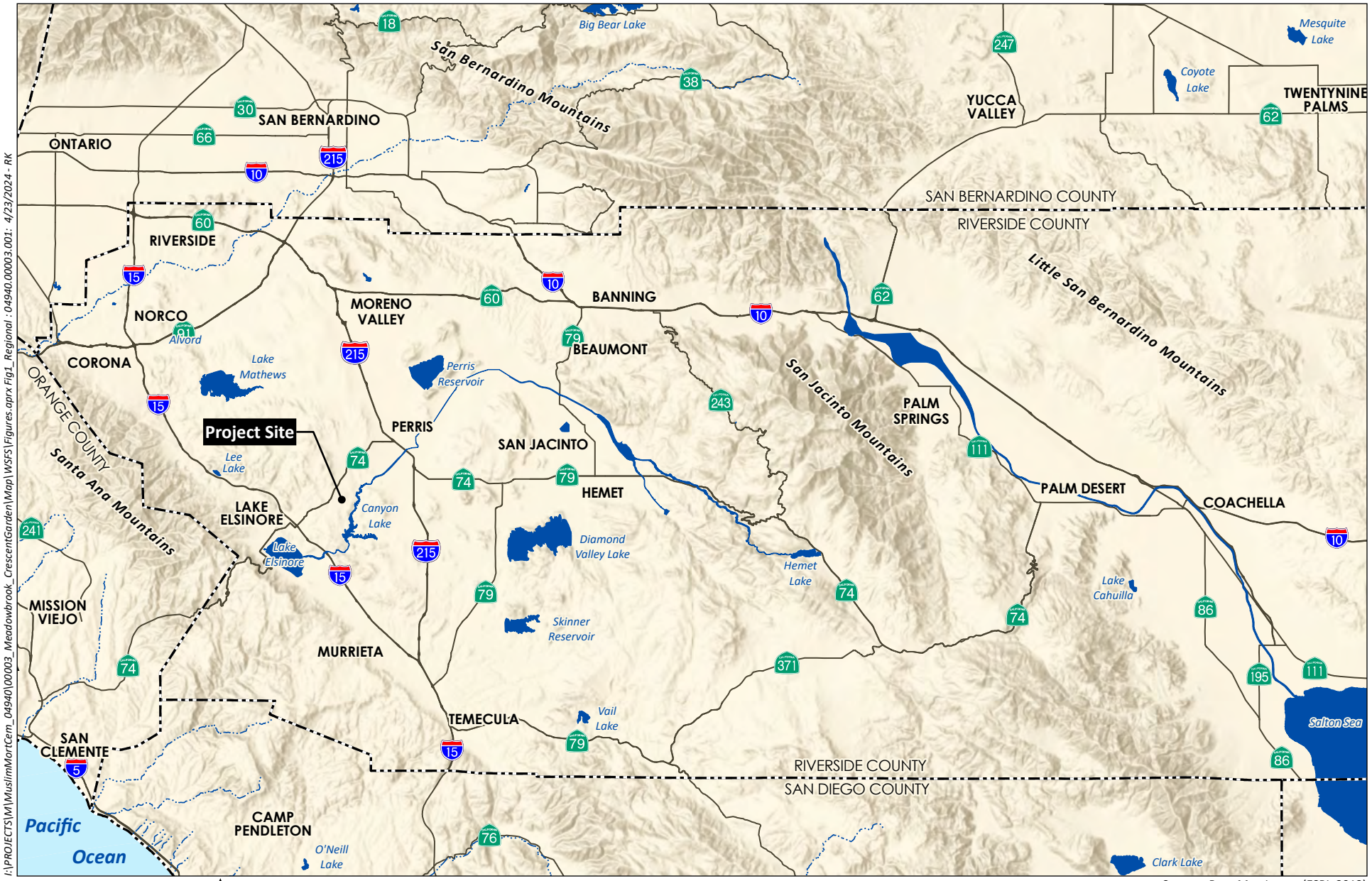
Amy Mattson
Senior Scientist I
ES-778195-15

[5] Riverside County Flood Control and Water Conservation District. 2024. Available from: https://content.rcflood.org/RainfallMap/data/rainfall_summary_report.pdf.

[6] NOAA. 2024. Historical Palmer Drought Indices. Available from: https://www.ncei.noaa.gov/access/monitoring/historical-palmers/maps/psi/202301-202304.

Attachments:

Figure 1: Regional Location
Figure 2: USGS Topography
Figure 3: Aerial Photograph
Figure 4: 2023-2024 Wet Season Fairy Shrimp Survey Results
Attachment A: USFWS Vernal Pool Data Sheets
Attachment B: Representative Site Photos



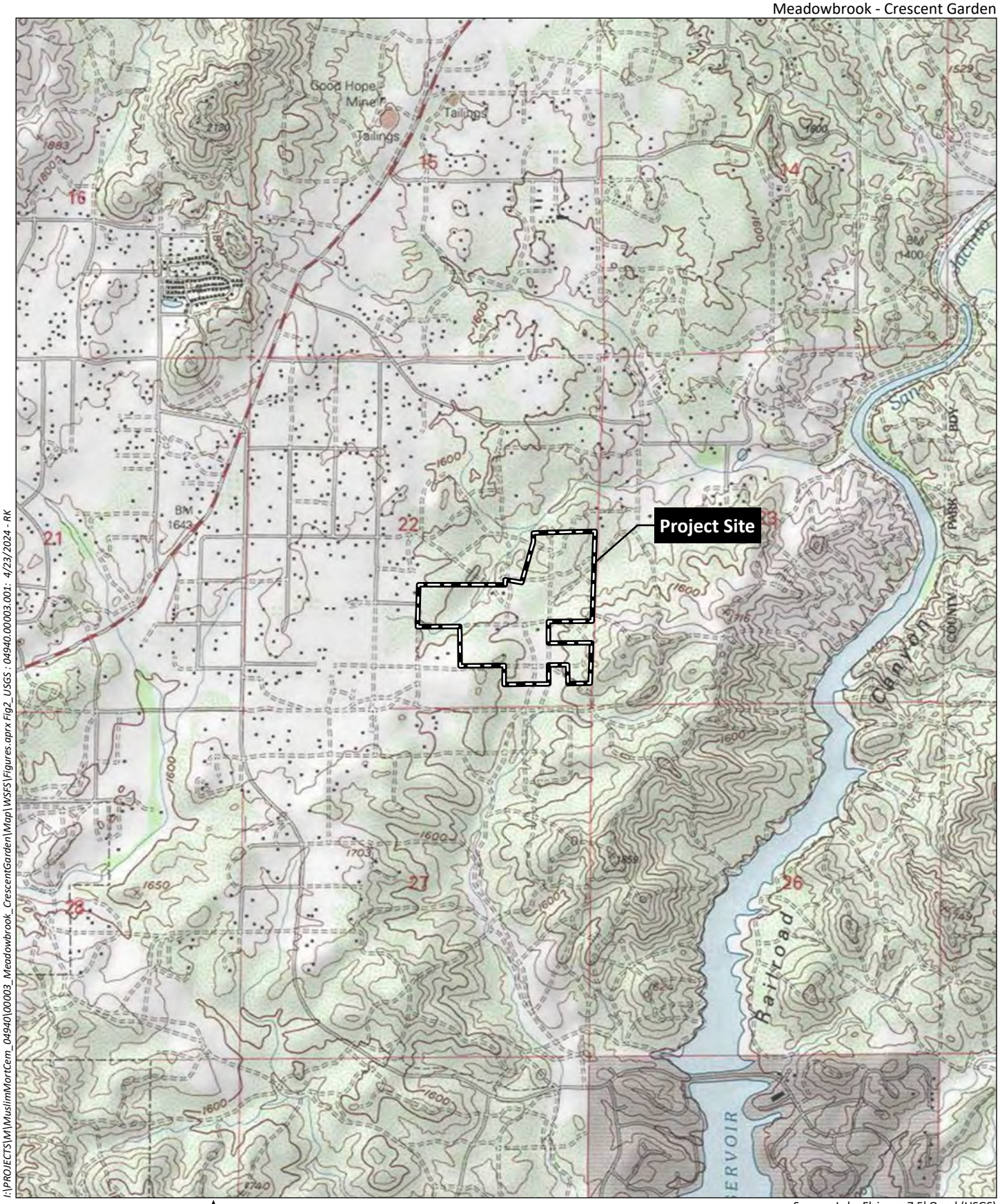
I:\PROJECTS\M\MuslimMortCem_04940\00003_Meadowbrook_CrescentGarden\Map\WSFS\Figures.aprx Fig1_Regional : 04940.00003.001: 4/23/2024 - RK

Source: Base Map Layers (ESRI, 2013)

HELIX Environmental Planning

Regional Location

Figure 1



I:\PROJECTS\M\MuslimMortCem_04940\00003_Meadowbrook_CrescentGarden\Map\WSFS\Figures.aprx Fig2_USGS : 04940.00003.001: 4/23/2024 - RK

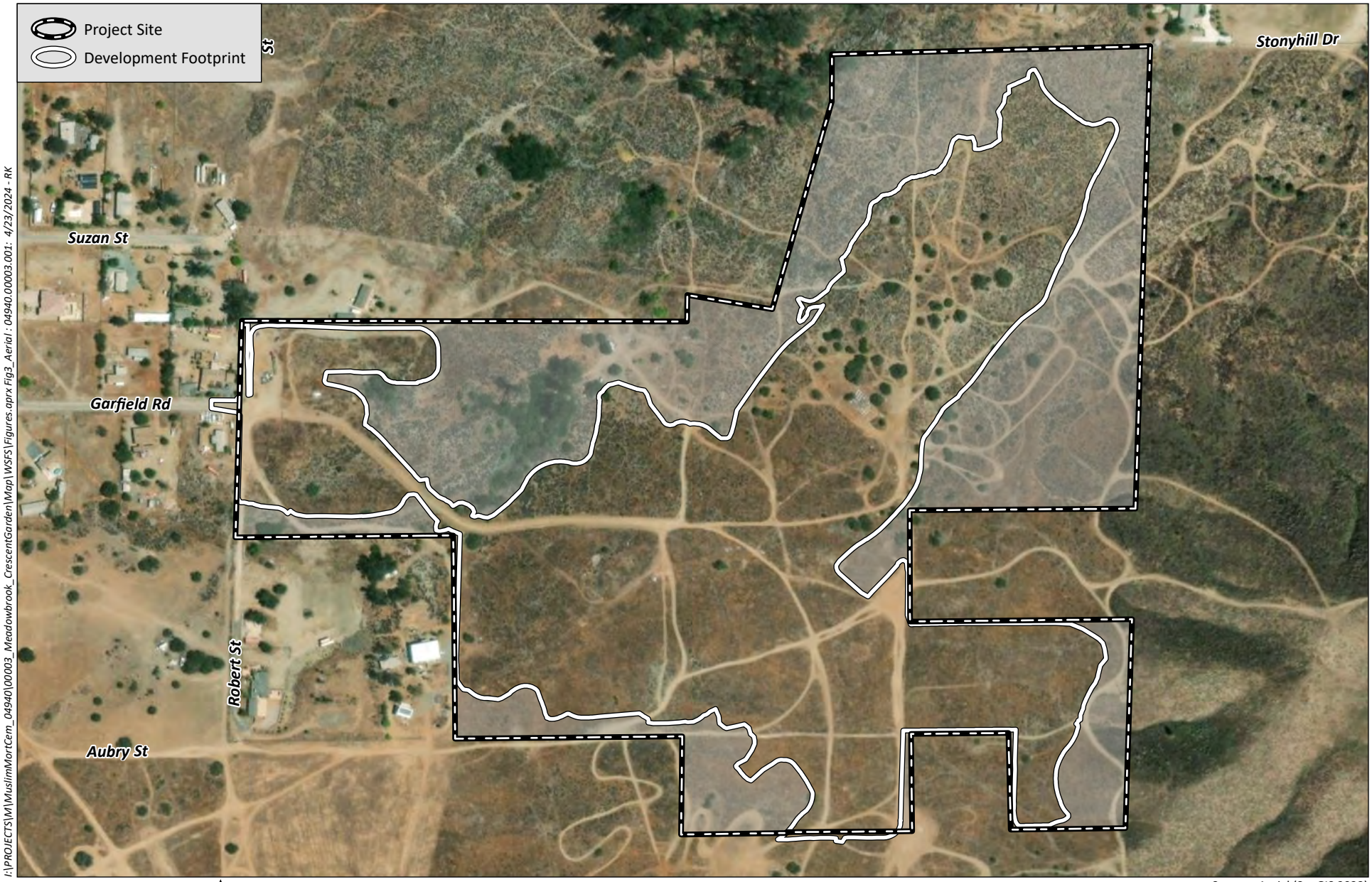
0 2,000 Feet

Source: Lake Elsinore 7.5' Quad (USGS)

HELIX Environmental Planning

USGS Topography

Figure 2



I:\PROJECTS\M\MuslimMortCem_04940\00003_Meadowbrook_CrescentGarden\Map\WSFS\Figures.aprx Fig3_Aerial : 04940.00003.001: 4/23/2024 - RK

Source: Aerial (SanGIS 2023)

HELIX Environmental Planning

Aerial Photograph

Figure 3

Meadowbrook - Crescent Garden

Project Site

Development Footprint

1 Feature Number

Basin Results

Branchinecta sp. Eggs (No Fairy Shrimp Observed During 2024 Wet Season Surveys)

Versatile Fairy Shirmp (*Branchinecta lindahli*)

No Fairy Shrimp Observed

Suzan St

Garfield Rd

Jarvis St

Robert St

Aubry St

Stonyhill Dr

36 38 16 35 15 27 17 18 34 28 19 26 25 14 12 13 2 9 11 37 8 10 39 24 21 29 1 22 20 3 23 33 4 5 31 32 6 7

I:\PROJECTS\M\MuslimMortCem_04940\00003_Meadowbrook_CrescentGarden\Map\WSFS\Figures.aprx Fig4_WSFS_Results : 04940.00003.001: 5/6/2024 - RK

0 300 Feet

Source: Aerial (Esri 2021)

HELIX Environmental Planning

2024 Wet Season Survey Results

Figure 4

Attachment A

USFWS Vernal Pool Data Sheets

Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Crescent Garden | County: Riverside | Quad: San Bernardino Princpial Meridian | Township: 5 South | Range: 4 West | Section: 22

Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 1/3/2024 | Time: 08:00 | Weather Conditions: | Temp (°C): 8 | Wind (mph): 2-4 | Cloud Cover: 100% + Rain

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
1	11S 474284.25 E 3730673.36 N	8	11.2	3	5	5x1	5x1	---	---	---	---	---	---	---	---	---	---	D, TT	
2	11S 474265.76 E 3730731.81 N	8	9.8	6	8	4.5x2	4.5x2	---	---	---	---	---	---	---	---	---	---	D, TT	
3	11S 474279.58 E 3730655.17 N	8	12.3	3	5	5x2	5x2	---	---	---	---	---	---	---	---	---	---	D, TT	
4	11S 474282.52 E 3730618.17 N	8	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
5	11S 474285.29 E 3730602.14 N	8	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
6	11S 474279.10 E 3730576.16 N	8	N/A	1	2	2x2	2x2	Not Sampled			---	---	---	---	---	---	---	D, TT	
7	11S 474279.16 E 3730562.72 N	8	12.1	5	8	4x1	4x1	---	---	---	---	---	---	---	---	---	---	D, TT	
8	11S 474281.68 E 3730696.59 N	8	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
9	11S 474239.96 E 3730720.47 N	8	11.8	8	11	6x2.5	6x2.5	---	---	---	---	---	---	---	X	---	---	D, TT	
10	11S 474276.30 E 3730692.36 N	8	9.4	3	5	2.5x1	2.5x1	BRLI	---	---	---	---	---	---	---	---	---	D, TT	Vouchered, BRLI 100s
11	11S 474225.41 E 3730712.55 N	8	9.4	5	8	2.5x1.5	2.5x1.5	---	---	---	---	---	---	---	---	---	---	D, TT	
12	11S 474230.46 E 3730715.23 N	8	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
13	11S 474200.21 E 3730722.29 N	8	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
14	11S 474288.09 E 3730766.58 N	8	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.

(Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Crescent Garden County: Riverside Quad: San Bernardino Princpial Meridian Township: 5 South Range: 4 West Section: 22

Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 1/3/2024 Time: 08:00 Weather Conditions: Temp (°C): 8 Wind (mph): 2-4 Cloud Cover: 100% + Rain

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
15	11S 474285.09 E 3730911.97 N	8	10.4	5	7	2.5x1.5	2.5x1.5	---	---	---	---	---	---	---	---	---	---	D, TT	
16	11S 474259.55 E 3731028.23 N	8	9.7	4	6	2x2	7x4	---	---	---	---	---	---	---	---	---	---	D, TT	
17	11S 474258.99 E 3731024.22 N	8	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
18	11S 474289.47 E 3731071.92 N	8	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
19	11S 473950.77 E 3730809.87 N	8	9.8	4	6	1x0.5	1x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
20	11S 474282.32 E 3730633.32 N	8	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
21	11S 474062.93 E 3730658.96 N	8	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
22	11S 474062.81 E 3730633.32 N	8	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
23	11S 474060.27 E 3730665.53 N	8	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
24	11S 474062.04 E 3730673.52 N	8	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
25	11S 474114.91 E 3730806.44 N	8	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
26	11S 474054.01 E 3730658.96 N	8	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
27	11S 474062.38 E 3730641.79 N	8	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
28	11S 474224.04 E 3730682.24 N	8	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.

(Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Crescent Garden County: Riverside Quad: San Bernardino Princpial Meridian Township: 5 South Range: 4 West Section: 22

Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 1/3/2024 Time: 08:00 Weather Conditions: Temp (°C): 8 Wind (mph): 2-4 Cloud Cover: 100% + Rain

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
29/30	11S 474249.58 E 3730824.83 N	8	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
31	11S 474095.08 E 3730881.42 N	8	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
32	11S 474217.54 E 3730568.99 N	8	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
33	11S 474401.49 E 3730619.14 N	8	10.4	12	15	5x3	5x3	BRLI	---	---	---	---	---	---	---	---	---	D, TT	Vouchered, BRLI 100s
34	11S 474282.05 E 3730838.24 N	8	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
35	11S 474291.68 E 3731038.88 N	8	9.9	5	9	2x2	2x2	---	---	X	---	---	---	---	---	---	---	D, TT	
36	11S 474333.75 E 3731107.10 N	8	9.9	6	9	4x1.5	4x1.5	---	---	---	---	---	---	---	---	---	---	D, TT	
37	11S 474214.76 E 3730710.31 N	8	9.8	6	9	5x2	5x2	---	---	---	---	---	---	---	---	---	---	D, TT	
38	11S 474304.72 E 3731082.61 N	8	9.8	3	6	3x2	3x2	---	---	---	---	---	---	---	---	---	---	D, TT	
39	11S 474284.74 E 3730687.95 N	8	9.8	5	10	6x3	6x3	---	---	---	---	---	---	---	---	---	---	D, TT	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.

(Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Crescent Garden | County: Riverside | Quad: San Bernardino Princpial Meridian | Township: 5 South | Range: 4 West | Section: 22

Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 1/10/2024 | Time: 10:00 | Weather Conditions: | Temp (°C): 9 | Wind (mph): 1-3 | Cloud Cover: 50%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
1	11S 474284.25 E 3730673.36 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
2	11S 474265.76 E 3730731.81 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
3	11S 474279.58 E 3730655.17 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
4	11S 474282.52 E 3730618.17 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
5	11S 474285.29 E 3730602.14 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
6	11S 474279.10 E 3730576.16 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
7	11S 474279.16 E 3730562.72 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
8	11S 474281.68 E 3730696.59 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
9	11S 474239.96 E 3730720.47 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
10	11S 474276.30 E 3730692.36 N	9	8.8	4	7	4x2.5	8x3	BRLI	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/10/24, BRLI 100s
11	11S 474225.41 E 3730712.55 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
12	11S 474230.46 E 3730715.23 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
13	11S 474200.21 E 3730722.29 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
14	11S 474288.09 E 3730766.58 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.

(Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Crescent Garden County: Riverside Quad: San Bernardino Princpial Meridian Township: 5 South Range: 4 West Section: 22

Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 1/10/2024 Time: 10:00 Weather Conditions: Temp (°C): 9 Wind (mph): 1-3 Cloud Cover: 50%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
15	11S 474285.09 E 3730911.97 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
16	11S 474259.55 E 3731028.23 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
17	11S 474258.99 E 3731024.22 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
18	11S 474289.47 E 3731071.92 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
19	11S 473950.77 E 3730809.87 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
20	11S 474282.32 E 3730633.32 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
21	11S 474062.93 E 3730658.96 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
22	11S 474062.81 E 3730633.32 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
23	11S 474060.27 E 3730665.53 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
24	11S 474062.04 E 3730673.52 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
25	11S 474114.91 E 3730806.44 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
26	11S 474054.01 E 3730658.96 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
27	11S 474062.38 E 3730641.79 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
28	11S 474224.04 E 3730682.24 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.

(Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Crescent Garden | County: Riverside | Quad: | San Bernardino Princpial Meridian | Township: 5 South | Range: 4 West | Section: 22

Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 1/10/2024 | Time: 10:00 | Weather Conditions: | Temp (°C): 9 | Wind (mph): 1-3 | Cloud Cover: 50%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
29/30	11S 474249.58 E 3730824.83 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
31	11S 474095.08 E 3730881.42 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
32	11S 474217.54 E 3730568.99 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
33	11S 474401.49 E 3730619.14 N	9	7.1	5	8	6x2.5	6x3	BRLI	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/10/24, BRLI 100s
34	11S 474282.05 E 3730838.24 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
35	11S 474291.68 E 3731038.88 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
36	11S 474333.75 E 3731107.10 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
37	11S 474214.76 E 3730710.31 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
38	11S 474304.72 E 3731082.61 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
39	11S 474284.74 E 3730687.95 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.

(Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Crescent Garden | County: Riverside | Quad: San Bernardino Princpial Meridian | Township: 5 South | Range: 4 West | Section: 22

Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 1/17/2024 | Time: 08:00 | Weather Conditions: | Temp (°C): 10 | Wind (mph): 2-5 | Cloud Cover: 80%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
1	11S 474284.25 E 3730673.36 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
2	11S 474265.76 E 3730731.81 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
3	11S 474279.58 E 3730655.17 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
4	11S 474282.52 E 3730618.17 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
5	11S 474285.29 E 3730602.14 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
6	11S 474279.10 E 3730576.16 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
7	11S 474279.16 E 3730562.72 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
8	11S 474281.68 E 3730696.59 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
9	11S 474239.96 E 3730720.47 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
10	11S 474276.30 E 3730692.36 N	10	9	1	2	2x0.4	8x3	BRLI	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/17/24, BRLI 1000s
11	11S 474225.41 E 3730712.55 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
12	11S 474230.46 E 3730715.23 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
13	11S 474200.21 E 3730722.29 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
14	11S 474288.09 E 3730766.58 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

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Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Crescent Garden County: Riverside Quad: San Bernardino Princpial Meridian Township: 5 South Range: 4 West Section: 22

Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 1/17/2024 Time: 08:00 Weather Conditions: Temp (°C): 10 Wind (mph): 2-5 Cloud Cover: 80%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
15	11S 474285.09 E 3730911.97 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
16	11S 474259.55 E 3731028.23 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
17	11S 474258.99 E 3731024.22 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
18	11S 474289.47 E 3731071.92 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
19	11S 473950.77 E 3730809.87 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
20	11S 474282.32 E 3730633.32 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
21	11S 474062.93 E 3730658.96 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
22	11S 474062.81 E 3730633.32 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
23	11S 474060.27 E 3730665.53 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
24	11S 474062.04 E 3730673.52 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
25	11S 474114.91 E 3730806.44 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
26	11S 474054.01 E 3730658.96 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
27	11S 474062.38 E 3730641.79 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
28	11S 474224.04 E 3730682.24 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	

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Date: 1/17/2024 | Time: 08:00 | Weather Conditions: | Temp (°C): 10 | Wind (mph): 2-5 | Cloud Cover: 80%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
29/30	11S 474249.58 E 3730824.83 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
31	11S 474095.08 E 3730881.42 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
32	11S 474217.54 E 3730568.99 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
33	11S 474401.49 E 3730619.14 N	9	8.6	4	8	6x3	6x3	BRLI	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/17/24, BRLI 100s
34	11S 474282.05 E 3730838.24 N	10	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
35	11S 474291.68 E 3731038.88 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
36	11S 474333.75 E 3731107.10 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
37	11S 474214.76 E 3730710.31 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
38	11S 474304.72 E 3731082.61 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
39	11S 474284.74 E 3730687.95 N	9	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

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Date: 1/24/2024 | Time: 08:00 | Weather Conditions: | Temp (°C): 10 | Wind (mph): 1-3 | Cloud Cover: 100%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
1	11S 474284.25 E 3730673.36 N	10	14.6	3	5	4x1	4x1	---	---	---	---	---	---	---	---	---	---	D, TT	
2	11S 474265.76 E 3730731.81 N	10	12.2	6	10	4x2	4x2	---	---	---	---	---	---	---	---	---	---	D, TT	
3	11S 474279.58 E 3730655.17 N	10	13.3	10	15	13x3	13x3	---	---	---	---	---	---	---	---	---	---	D, TT	
4	11S 474282.52 E 3730618.17 N	10	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
5	11S 474285.29 E 3730602.14 N	10	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
6	11S 474279.10 E 3730576.16 N	10	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
7	11S 474279.16 E 3730562.72 N	10	13	8	15	6x2	6x2	---	---	---	---	---	---	---	---	---	---	D, TT	
8	11S 474281.68 E 3730696.59 N	10	14.1	8	11	7x2	7x2	---	---	---	---	---	---	---	---	---	---	D, TT	
9	11S 474239.96 E 3730720.47 N	10	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
10	11S 474276.30 E 3730692.36 N	10	13.7	12	25	10x2	10x3	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/17/24, BRLI
11	11S 474225.41 E 3730712.55 N	10	13	4	5	3.5x1.2	3.5x1.2	---	---	---	---	---	---	---	---	---	---	D, TT	
12	11S 474230.46 E 3730715.23 N	10	12.6	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
13	11S 474200.21 E 3730722.29 N	10	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
14	11S 474288.09 E 3730766.58 N	10	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

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Site or Project Name: Crescent Garden County: Riverside Quad: San Bernardino Princpial Meridian Township: 5 South Range: 4 West Section: 22

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Date: 1/24/2024 Time: 08:00 Weather Conditions: Temp (°C): 10 Wind (mph): 1-3 Cloud Cover: 100%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
15	11S 474285.09 E 3730911.97 N	10	10.2	5	9	5.5x2.7	5.2x2.7	---	---	---	---	---	---	---	---	---	---	D, TT	
16	11S 474259.55 E 3731028.23 N	10	11.5	3	6	2.2x2	2.2x2	---	---	---	---	---	---	---	---	---	---	D, TT	
17	11S 474258.99 E 3731024.22 N	10	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
18	11S 474289.47 E 3731071.92 N	10	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
19	11S 473950.77 E 3730809.87 N	10	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
20	11S 474282.32 E 3730633.32 N	10	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
21	11S 474062.93 E 3730658.96 N	10	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
22	11S 474062.81 E 3730633.32 N	10	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
23	11S 474060.27 E 3730665.53 N	10	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
24	11S 474062.04 E 3730673.52 N	10	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
25	11S 474114.91 E 3730806.44 N	10	10.1	3	4	1.2x1	1.5x1.5	---	---	---	---	---	---	---	---	---	---	D, TT	
26	11S 474054.01 E 3730658.96 N	10	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
27	11S 474062.38 E 3730641.79 N	10	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
28	11S 474224.04 E 3730682.24 N	10	12.6	5	7	3x2	3x2	---	---	---	---	---	---	---	---	---	---	D, TT	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.

(Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Crescent Garden | County: Riverside | Quad: San Bernardino Princpial Meridian | Township: 5 South | Range: 4 West | Section: 22

Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 1/24/2024 | Time: 08:00 | Weather Conditions: | Temp (°C): 10 | Wind (mph): 1-3 | Cloud Cover: 100%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
29/30	11S 474249.58 E 3730824.83 N	10	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
31	11S 474095.08 E 3730881.42 N	10	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
32	11S 474217.54 E 3730568.99 N	10	13.1	7	10	9x2	9x2	---	---	---	---	---	---	---	---	---	---	D, TT	
33	11S 474401.49 E 3730619.14 N	10	10.2	10	18	8x3.5	8x3.5	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/17/24, BRLI
34	11S 474282.05 E 3730838.24 N	10	11.2	1	3	1x1	6x3	---	---	---	---	---	---	---	---	---	---	D, TT	
35	11S 474291.68 E 3731038.88 N	10	11.2	7	10	4x2.2	4x2.2	---	---	---	---	---	---	---	---	---	---	D, TT	
36	11S 474333.75 E 3731107.10 N	10	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
37	11S 474214.76 E 3730710.31 N	10	12.7	4	6	4.5x2.5	4.5x2.5	---	---	---	---	---	---	---	---	---	---	D, TT	
38	11S 474304.72 E 3731082.61 N	10	10.9	6	9	1.3x1.2	1.3x1.2	---	---	---	---	---	---	---	---	---	---	D, TT	
39	11S 474284.74 E 3730687.95 N	10	12.9	5	7	1.5x1.5	1.5x1.5	---	---	---	---	---	---	---	---	---	---	D, TT	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.

(Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Crescent Garden | County: Riverside | Quad: San Bernardino Princpial Meridian | Township: 5 South | Range: 4 West | Section: 22

Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 1/31/2024 | Time: 07:30 | Weather Conditions: | Temp (°C): 11 | Wind (mph): 2-4 | Cloud Cover: 100%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
1	11S 474284.25 E 3730673.36 N	11	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
2	11S 474265.76 E 3730731.81 N	11	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
3	11S 474279.58 E 3730655.17 N	11	12.6	8	15	9x2	13x3	BRLI	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/31/2024, BRLI 1,000s
4	11S 474282.52 E 3730618.17 N	11	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
5	11S 474285.29 E 3730602.14 N	11	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
6	11S 474279.10 E 3730576.16 N	11	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
7	11S 474279.16 E 3730562.72 N	11	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
8	11S 474281.68 E 3730696.59 N	11	12.4	6	10	3.5x2	7x2	BRLI	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/31/2024, BRLI 100s
9	11S 474239.96 E 3730720.47 N	11	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
10	11S 474276.30 E 3730692.36 N	11	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/17/24, BRLI
11	11S 474225.41 E 3730712.55 N	11	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
12	11S 474230.46 E 3730715.23 N	11	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
13	11S 474200.21 E 3730722.29 N	11	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
14	11S 474288.09 E 3730766.58 N	11	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.

(Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Crescent Garden County: Riverside Quad: San Bernardino Princpial Meridian Township: 5 South Range: 4 West Section: 22

Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 1/31/2024 Time: 07:30 Weather Conditions: Temp (°C): 11 Wind (mph): 2-4 Cloud Cover: 100%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
15	11S 474285.09 E 3730911.97 N	11	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
16	11S 474259.55 E 3731028.23 N	11	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
17	11S 474258.99 E 3731024.22 N	11	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
18	11S 474289.47 E 3731071.92 N	11	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
19	11S 473950.77 E 3730809.87 N	11	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
20	11S 474282.32 E 3730633.32 N	11	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
21	11S 474062.93 E 3730658.96 N	11	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
22	11S 474062.81 E 3730633.32 N	11	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
23	11S 474060.27 E 3730665.53 N	11	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
24	11S 474062.04 E 3730673.52 N	11	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
25	11S 474114.91 E 3730806.44 N	11	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
26	11S 474054.01 E 3730658.96 N	11	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
27	11S 474062.38 E 3730641.79 N	11	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
28	11S 474224.04 E 3730682.24 N	11	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

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Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Crescent Garden County: Riverside Quad: San Bernardino Princpial Meridian Township: 5 South Range: 4 West Section: 22

Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 1/31/2024 Time: 07:30 Weather Conditions: Temp (°C): 11 Wind (mph): 2-4 Cloud Cover: 100%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
29/30	11S 474249.58 E 3730824.83 N	11	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
31	11S 474095.08 E 3730881.42 N	11	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
32	11S 474217.54 E 3730568.99 N	11	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
33	11S 474401.49 E 3730619.14 N	11	9.2	7	12	6x2	8x3.5	BRLI	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/31/24, BRLI 100s
34	11S 474282.05 E 3730838.24 N	11	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
35	11S 474291.68 E 3731038.88 N	11	10.1	2	3	2.5x0.7	4x2.2	---	---	---	---	---	---	---	---	---	---	D, TT	
36	11S 474333.75 E 3731107.10 N	11	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
37	11S 474214.76 E 3730710.31 N	11	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
38	11S 474304.72 E 3731082.61 N	11	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
39	11S 474284.74 E 3730687.95 N	11	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

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(Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Crescent Garden | County: Riverside | Quad: San Bernardino Princpial Meridian | Township: 5 South | Range: 4 West | Section: 22

Surveyor/Permit Number: Amy Mattson; ES778195-15

Date: 2/7/2024 | Time: 11:00 | Weather Conditions: | Temp (°C): 8 | Wind (mph): 0-10 | Cloud Cover: 100%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
1	11S 474284.25 E 3730673.36 N	8	15.4	5	---	7.5x2	7.5x2	---	---	---	---	---	---	---	---	---	---	D, TT	
2	11S 474265.76 E 3730731.81 N	8	11.9	10	---	9x4	9x4	---	---	---	---	---	---	---	---	---	---	D, TT	
3	11S 474279.58 E 3730655.17 N	8	14.7	25	---	31x7	13x4	BRLI	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/31/2024, BRLI 1,000s
4	11S 474282.52 E 3730618.17 N	8	17.5	2	---	6x5	6x5	---	---	---	---	---	---	---	---	---	---	D, TT	
5	11S 474285.29 E 3730602.14 N	8	14.3	19	---	4x2	6x5	---	---	---	---	---	---	---	---	---	---	D, TT	
6	11S 474279.10 E 3730576.16 N	8	15	8	---	7x1	7x1	---	---	---	---	---	---	---	---	---	---	D, TT	
7	11S 474279.16 E 3730562.72 N	8	14.3	19	---	18x4	18x4	---	---	---	---	---	---	---	---	---	---	D, TT	
8	11S 474281.68 E 3730696.59 N	8	14.6	14	---	3.5x2	7x2	BRLI	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/31/2024, BRLI 100s
9	11S 474239.96 E 3730720.47 N	8	12.6	9	---	9x2	9x2	---	---	---	---	---	---	---	---	---	---	D, TT	
10	11S 474276.30 E 3730692.36 N	8	12.7	20	---	22x4	22x4	BRLI	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/17/24, BRLI 1,000s
11	11S 474225.41 E 3730712.55 N	8	11.4	13	---	8x2.5	8x2.5	---	---	---	---	---	---	---	---	---	---	D, TT	
12	11S 474230.46 E 3730715.23 N	8	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
13	11S 474200.21 E 3730722.29 N	8	13.5	2	---	4x0.5	4x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
14	11S 474288.09 E 3730766.58 N	8	12	9	---	10x4	10x4	---	---	---	---	---	---	---	---	---	---	D, TT	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

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(Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Crescent Garden County: Riverside Quad: San Bernardino Princpial Meridian Township: 5 South Range: 4 West Section: 22

Surveyor/Permit Number: Amy Mattson; ES778195-15

Date: 2/7/2024 Time: 11:00 Weather Conditions: Temp (°C): 8 Wind (mph): 0-10 Cloud Cover: 100%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
15	11S 474285.09 E 3730911.97 N	8	14.3	5	---	4x2	4x2	---	---	---	---	---	---	---	---	---	---	D, TT	
16	11S 474259.55 E 3731028.23 N	8	13.3	11	---	8x6	8x6	---	---	---	---	---	---	---	---	---	---	D, TT	
17	11S 474258.99 E 3731024.22 N	8	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
18	11S 474289.47 E 3731071.92 N	8	12.3	10	---	2.5x1.5	---	---	---	---	---	---	---	---	---	---	---	D, TT	
19	11S 473950.77 E 3730809.87 N	8	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
20	11S 474282.32 E 3730633.32 N	8	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
21	11S 474062.93 E 3730658.96 N	8	14.1	13	---	19x8	19x8	---	---	---	---	---	---	---	---	---	---	D, TT	
22	11S 474062.81 E 3730633.32 N	8	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
23	11S 474060.27 E 3730665.53 N	8	14.7	5	---	7x1	---	---	---	---	---	---	---	---	---	---	---	D, TT	
24	11S 474062.04 E 3730673.52 N	8	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
25	11S 474114.91 E 3730806.44 N	8	13	5	---	2x2	2x2	---	---	---	---	---	---	---	---	---	---	D, TT	
26	11S 474054.01 E 3730658.96 N	8	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
27	11S 474062.38 E 3730641.79 N	8	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
28	11S 474224.04 E 3730682.24 N	8	17.2	4	---	4x1	4x1	---	---	---	---	---	---	---	---	---	---	D, TT	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.

(Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Crescent Garden County: Riverside Quad: San Bernardino Princpial Meridian Township: 5 South Range: 4 West Section: 22

Surveyor/Permit Number: Amy Mattson; ES778195-15

Date: 2/7/2024 Time: 11:00 Weather Conditions: Temp (°C): 8 Wind (mph): 0-10 Cloud Cover: 100%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
29/30	11S 474249.58 E 3730824.83 N	8	16.1	6	---	6x4.5	6x4.5	---	---	---	---	---	---	---	---	---	---	D, TT	
31	11S 474095.08 E 3730881.42 N	8	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
32	11S 474217.54 E 3730568.99 N	8	15.3	9	---	17x3.5	17x3.5	---	---	---	---	---	---	---	---	---	---	D, TT	
33	11S 474401.49 E 3730619.14 N	8	12.1	15		8x3.5	8x3.5	BRLI	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/31/24, BRLI 10s
34	11S 474282.05 E 3730838.24 N	8	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
35	11S 474291.68 E 3731038.88 N	8	13.6	9	---	4x3	4x3	---	---	---	---	---	---	---	---	---	---	D, TT	
36	11S 474333.75 E 3731107.10 N	8	15.4	2	---	3x1.5	3x1.5	---	---	---	---	---	---	---	---	---	---	D, TT	
37	11S 474214.76 E 3730710.31 N	8	12	9	---	9x5	9x5	---	---	---	---	---	---	---	---	---	---	D, TT	
38	11S 474304.72 E 3731082.61 N	8	13.4	11	---	3x2.5	3x2.5	---	---	---	---	---	---	---	---	---	---	D, TT	
39	11S 474284.74 E 3730687.95 N	8	15.1	7	---	3x3	3x3	---	---	---	---	---	---	---	---	---	---	D, TT	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.

(Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Crescent Garden | County: Riverside | Quad: San Bernardino Princpial Meridian | Township: 5 South | Range: 4 West | Section: 22

Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 2/14/2024 | Time: 08:30 | Weather Conditions: | Temp (°C): 10 | Wind (mph): 1-3 | Cloud Cover: 100%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
1	11S 474284.25 E 3730673.36 N	10	17.5	1	2	1x0.2	7.5x2	---	---	---	---	---	---	---	---	---	---	D, TT	
2	11S 474265.76 E 3730731.81 N	10	12.9	4	5	2x1.5	3x2	BRLI	---	---	---	---	X	---	X	---	---	D, TT	Vouchered 2/14/2024, BRLI 10s
3	11S 474279.58 E 3730655.17 N	10	13.4	10	15	11x2.5	13x4	BRLI	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/31/2024, BRLI 1,000s
4	11S 474282.52 E 3730618.17 N	10	N/A	Dry	---	---	6x5	---	---	---	---	---	---	---	---	---	---	D, TT	
5	11S 474285.29 E 3730602.14 N	10	N/A	Dry	---	---	6x5	---	---	---	---	---	---	---	---	---	---	D, TT	
6	11S 474279.10 E 3730576.16 N	10	N/A	Dry	---	---	7x1	---	---	---	---	---	---	---	---	---	---	D, TT	
7	11S 474279.16 E 3730562.72 N	10	N/A	Dry	---	---	18x4	---	---	---	---	---	---	---	---	---	---	D, TT	
8	11S 474281.68 E 3730696.59 N	10	13.7	10	15	4x2	7x2	BRLI	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 2/14/2024, BRLI 100s
9	11S 474239.96 E 3730720.47 N	10	N/A	Dry	---	---	9x2	---	---	---	---	---	---	---	---	---	---	D, TT	
10	11S 474276.30 E 3730692.36 N	10	11.7	8	12	5x2	22x4	BRLI	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 2/14/24, BRLI 1000s
11	11S 474225.41 E 3730712.55 N	10	N/A	Dry	---	---	8x2.5	---	---	---	---	---	---	---	---	---	---	D, TT	
12	11S 474230.46 E 3730715.23 N	10	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
13	11S 474200.21 E 3730722.29 N	10	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
14	11S 474288.09 E 3730766.58 N	10	N/A	Dry	---	---	10x4	---	---	---	---	---	---	---	---	---	---	D, TT	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.

(Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Crescent Garden County: Riverside Quad: San Bernardino Princpial Meridian Township: 5 South Range: 4 West Section: 22

Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 2/14/2024 Time: 08:30 Weather Conditions: Temp (°C): 10 Wind (mph): 1-3 Cloud Cover: 100%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
15	11S 474285.09 E 3730911.97 N	10	N/A	Dry	---	---	4x2	---	---	---	---	---	---	---	---	---	---	D, TT	
16	11S 474259.55 E 3731028.23 N	10	N/A	Dry	---	---	8x6	---	---	---	---	---	---	---	---	---	---	D, TT	
17	11S 474258.99 E 3731024.22 N	10	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
18	11S 474289.47 E 3731071.92 N	10	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
19	11S 473950.77 E 3730809.87 N	10	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
20	11S 474282.32 E 3730633.32 N	10	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
21	11S 474062.93 E 3730658.96 N	10	N/A	Dry	---	---	19x8	---	---	---	---	---	---	---	---	---	---	D, TT	
22	11S 474062.81 E 3730633.32 N	10	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
23	11S 474060.27 E 3730665.53 N	10	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
24	11S 474062.04 E 3730673.52 N	10	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
25	11S 474114.91 E 3730806.44 N	10	N/A	Dry	---	---	2x2	---	---	---	---	---	---	---	---	---	---	D, TT	
26	11S 474054.01 E 3730658.96 N	10	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
27	11S 474062.38 E 3730641.79 N	10	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
28	11S 474224.04 E 3730682.24 N	10	18.7	2	4	1.5x0.5	6x4.5	BRLI	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 2/14/24, BRLI 100s

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.

(Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Crescent Garden | County: Riverside | Quad: San Bernardino Princpial Meridian | Township: 5 South | Range: 4 West | Section: 22

Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 2/14/2024 | Time: 08:30 | Weather Conditions: | Temp (°C): 10 | Wind (mph): 1-3 | Cloud Cover: 100%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
29/30	11S 474249.58 E 3730824.83 N	10	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
31	11S 474095.08 E 3730881.42 N	10	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
32	11S 474217.54 E 3730568.99 N	10	17.9	6	8	6x2	8x3	---	---	---	---	---	---	---	---	---	---	D, TT	
33	11S 474401.49 E 3730619.14 N	10	11.3	7	12	6x3	9x3	BRLI	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/31/24, BRLI 10s
34	11S 474282.05 E 3730838.24 N	10	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
35	11S 474291.68 E 3731038.88 N	10	11.2	4	7	5x2	5x2	---	---	---	---	---	---	---	---	---	---	D, TT	
36	11S 474333.75 E 3731107.10 N	10	N/A	Dry	---	---	3x1.5	---	---	---	---	---	---	---	---	---	---	D, TT	
37	11S 474214.76 E 3730710.31 N	10	N/A	Dry	---	---	9x5	---	---	---	---	---	---	---	---	---	---	D, TT	
38	11S 474304.72 E 3731082.61 N	10	N/A	Dry	---	---	3x2.5	---	---	---	---	---	---	---	---	---	---	D, TT	
39	11S 474284.74 E 3730687.95 N	10	18.5	1	2	1x0.5	3x3	---	---	---	---	---	---	---	---	---	---	D, TT	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.

(Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Crescent Garden | County: Riverside | Quad: San Bernardino Princpial Meridian | Township: 5 South | Range: 4 West | Section: 22

Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 2/21/2024 | Time: 08:00 | Weather Conditions: | Temp (°C): 10 | Wind (mph): 1-3 | Cloud Cover: 90%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
1	11S 474284.25 E 3730673.36 N	10	15	4	8	3x1	7.5x2	---	---	---	---	---	---	---	---	---	---	D, TT	
2	11S 474265.76 E 3730731.81 N	10	15	8	12	4x2	4x2	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 2/14/2024, BRLI
3	11S 474279.58 E 3730655.17 N	10	14.9	14	20	13x4	13x4	BRLI	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/31/2024, BRLI 100s
4	11S 474282.52 E 3730618.17 N	10	N/A	Dry	---	---	6x5	---	---	---	---	---	---	---	---	---	---	D, TT	
5	11S 474285.29 E 3730602.14 N	10	N/A	Dry	---	---	6x5	---	---	---	---	---	---	---	---	---	---	D, TT	
6	11S 474279.10 E 3730576.16 N	10	N/A	Dry	---	---	7x1	---	---	---	---	---	---	---	---	---	---	D, TT	
7	11S 474279.16 E 3730562.72 N	10	N/A	Dry	---	---	18x4	---	---	---	---	---	---	---	---	---	---	D, TT	
8	11S 474281.68 E 3730696.59 N	10	13.9	8	15	7x2	7x2	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/31/2024, BRLI
9	11S 474239.96 E 3730720.47 N	10	14.5	5	9	4x1	9x2	---	---	---	---	---	---	---	---	---	---	D, TT	
10	11S 474276.30 E 3730692.36 N	10	13.9	15	23	6x2	22x4	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 2/14/24, BRLI
11	11S 474225.41 E 3730712.55 N	10	14.9	10	15	5x1.5	8x2.5	---	---	---	---	---	---	---	---	---	---	D, TT	
12	11S 474230.46 E 3730715.23 N	10	14.7	2	2	2x0.5	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
13	11S 474200.21 E 3730722.29 N	10	N/A	Dry	2	2x0.5	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
14	11S 474288.09 E 3730766.58 N	10	15.6	5	10	4x1	10x4	---	---	---	---	---	---	---	---	---	---	D, TT	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.

(Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Crescent Garden County: Riverside Quad: San Bernardino Princpial Meridian Township: 5 South Range: 4 West Section: 22

Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 2/21/2024 Time: 08:00 Weather Conditions: Temp (°C): 10 Wind (mph): 1-3 Cloud Cover: 90%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
15	11S 474285.09 E 3730911.97 N	10	N/A	Dry	---	---	4x2	---	---	---	---	---	---	---	---	---	---	D, TT	
16	11S 474259.55 E 3731028.23 N	10	15.6	3	6	6x2	8x6	---	---	---	---	---	---	---	---	---	---	D, TT	
17	11S 474258.99 E 3731024.22 N	10	N/A	Dry	2	2x0.5	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
18	11S 474289.47 E 3731071.92 N	10	N/A	Dry	2	2x0.5	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
19	11S 473950.77 E 3730809.87 N	10	14.6	4	7	4x3	4x3	---	---	---	---	---	---	---	---	---	---	D, TT	
20	11S 474282.32 E 3730633.32 N	10	N/A	Dry	2	2x0.5	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
21	11S 474062.93 E 3730658.96 N	10	14.3	3	5	4x0.7	4x1	---	---	---	---	---	---	---	---	---	---	D, TT	
22	11S 474062.81 E 3730633.32 N	10	N/A	Dry	2	2x0.5	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
23	11S 474060.27 E 3730665.53 N	10	N/A	Dry	2	2x0.5	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
24	11S 474062.04 E 3730673.52 N	10	N/A	Dry	2	2x0.5	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
25	11S 474114.91 E 3730806.44 N	10	N/A	Dry	---	---	2x2	---	---	---	---	---	---	---	---	---	---	D, TT	
26	11S 474054.01 E 3730658.96 N	10	N/A	Dry	2	2x0.5	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
27	11S 474062.38 E 3730641.79 N	10	N/A	Dry	2	2x0.5	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
28	11S 474224.04 E 3730682.24 N	10	15.9	5	10	9x2	4x1	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 2/14/24, BRLI

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.

(Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Crescent Garden County: Riverside Quad: San Bernardino Princpial Meridian Township: 5 South Range: 4 West Section: 22

Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 2/21/2024 Time: 08:00 Weather Conditions: Temp (°C): 10 Wind (mph): 1-3 Cloud Cover: 90%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
29/30	11S 474249.58 E 3730824.83 N	10	18.7	4	9	2x1	6x4.5	---	---	---	---	---	---	---	---	---	---	D, TT	
31	11S 474095.08 E 3730881.42 N	10	N/A	Dry	2	2x0.5	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
32	11S 474217.54 E 3730568.99 N	10	15.9	5	10	9x2	9x3	---	---	---	---	---	---	---	---	---	---	D, TT	
33	11S 474401.49 E 3730619.14 N	10	15.4	7	16	4x2	9x3	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/31/24, BRLI
34	11S 474282.05 E 3730838.24 N	10	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
35	11S 474291.68 E 3731038.88 N	10	15.8	5	9	2x1	5x2	---	---	---	---	---	---	---	---	---	---	D, TT	
36	11S 474333.75 E 3731107.10 N	10	N/A	Dry	---	---	3x1.5	---	---	---	---	---	---	---	---	---	---	D, TT	
37	11S 474214.76 E 3730710.31 N	10	N/A	Dry	---	---	9x5	---	---	---	---	---	---	---	---	---	---	D, TT	
38	11S 474304.72 E 3731082.61 N	10	14.8	7	16	6x2	6x2	---	---	---	---	---	---	---	---	---	---	D, TT	
39	11S 474284.74 E 3730687.95 N	10	N/A	Dry	---	---	3x3	---	---	---	---	---	---	---	---	---	---	D, TT	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.

(Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Crescent Garden | County: Riverside | Quad: San Bernardino Princpial Meridian | Township: 5 South | Range: 4 West | Section: 22

Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 2/29/2024 | Time: 13:30 | Weather Conditions: | Temp (°C): 16 | Wind (mph): 1-3 | Cloud Cover: 80%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
1	11S 474284.25 E 3730673.36 N	16	N/A	Dry	---	---	7.5x2	---	---	---	---	---	---	---	---	---	---	D, TT	
2	11S 474265.76 E 3730731.81 N	16	21.3	3	5	4x1	6x2	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 2/14/2024, BRLI
3	11S 474279.58 E 3730655.17 N	16	19	10	15	23x4	23x4	BRLI	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/31/2024, BRLI 100s
4	11S 474282.52 E 3730618.17 N	16	N/A	Dry	---	---	6x5	---	---	---	---	---	---	---	---	---	---	D, TT	
5	11S 474285.29 E 3730602.14 N	16	N/A	Dry	---	---	6x5	---	---	---	---	---	---	---	---	---	---	D, TT	
6	11S 474279.10 E 3730576.16 N	16	N/A	Dry	---	---	7x1	---	---	---	---	---	---	---	---	---	---	D, TT	
7	11S 474279.16 E 3730562.72 N	16	N/A	Dry	---	---	18x4	---	---	---	---	---	---	---	---	---	---	D, TT	
8	11S 474281.68 E 3730696.59 N	16	19.5	12	17	5x2	9x3	BRLI	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/31/2024, BRLI 100s
9	11S 474239.96 E 3730720.47 N	16	N/A	Dry	---	---	9x2	---	---	---	---	---	---	---	---	---	---	D, TT	
10	11S 474276.30 E 3730692.36 N	16	N/A	Dry	---	---	22x4	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 2/14/24, BRLI
11	11S 474225.41 E 3730712.55 N	16	N/A	Dry	---	---	8x2.5	---	---	---	---	---	---	---	---	---	---	D, TT	
12	11S 474230.46 E 3730715.23 N	16	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
13	11S 474200.21 E 3730722.29 N	16	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
14	11S 474288.09 E 3730766.58 N	16	N/A	Dry	---	---	10x4	---	---	---	---	---	---	---	---	---	---	D, TT	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

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(Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Crescent Garden County: Riverside Quad: San Bernardino Princpial Meridian Township: 5 South Range: 4 West Section: 22

Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 2/29/2024 Time: 13:30 Weather Conditions: Temp (°C): 16 Wind (mph): 1-3 Cloud Cover: 80%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
15	11S 474285.09 E 3730911.97 N	16	N/A	Dry	---	---	4x2	---	---	---	---	---	---	---	---	---	---	D, TT	
16	11S 474259.55 E 3731028.23 N	16	N/A	Dry	---	---	8x6	---	---	---	---	---	---	---	---	---	---	D, TT	
17	11S 474258.99 E 3731024.22 N	16	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
18	11S 474289.47 E 3731071.92 N	16	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
19	11S 473950.77 E 3730809.87 N	16	N/A	Dry	---	---	4x3	---	---	---	---	---	---	---	---	---	---	D, TT	
20	11S 474282.32 E 3730633.32 N	16	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
21	11S 474062.93 E 3730658.96 N	16	N/A	Dry	---	---	4x1	---	---	---	---	---	---	---	---	---	---	D, TT	
22	11S 474062.81 E 3730633.32 N	16	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
23	11S 474060.27 E 3730665.53 N	16	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
24	11S 474062.04 E 3730673.52 N	16	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
25	11S 474114.91 E 3730806.44 N	16	N/A	Dry	---	---	2x2	---	---	---	---	---	---	---	---	---	---	D, TT	
26	11S 474054.01 E 3730658.96 N	16	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
27	11S 474062.38 E 3730641.79 N	16	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
28	11S 474224.04 E 3730682.24 N	16	N/A	Dry	---	---	4x1	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 2/14/24, BRLI

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

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Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Crescent Garden | County: Riverside | Quad: San Bernardino Princpial Meridian | Township: 5 South | Range: 4 West | Section: 22

Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 2/29/2024 | Time: 13:30 | Weather Conditions: | Temp (°C): 16 | Wind (mph): 1-3 | Cloud Cover: 80%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
29/30	11S 474249.58 E 3730824.83 N	16	N/A	Dry	---	---	6x4.5	---	---	---	---	---	---	---	---	---	---	D, TT	
31	11S 474095.08 E 3730881.42 N	16	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
32	11S 474217.54 E 3730568.99 N	16	N/A	Dry	---	---	9x3	---	---	---	---	---	---	---	---	---	---	D, TT	
33	11S 474401.49 E 3730619.14 N	16	22.2	7	12	3x2	9x3	BRLI	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/31/24, BRLI 10s
34	11S 474282.05 E 3730838.24 N	16	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
35	11S 474291.68 E 3731038.88 N	16	N/A	Dry	---	---	5x2	---	---	---	---	---	---	---	---	---	---	D, TT	
36	11S 474333.75 E 3731107.10 N	16	N/A	Dry	---	---	3x1.5	---	---	---	---	---	---	---	---	---	---	D, TT	
37	11S 474214.76 E 3730710.31 N	16	N/A	Dry	---	---	9x5	---	---	---	---	---	---	---	---	---	---	D, TT	
38	11S 474304.72 E 3731082.61 N	16	N/A	Dry	---	---	6x2	---	---	---	---	---	---	---	---	---	---	D, TT	
39	11S 474284.74 E 3730687.95 N	16	N/A	Dry	---	---	3x3	---	---	---	---	---	---	---	---	---	---	D, TT	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

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Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Crescent Garden | County: Riverside | Quad: San Bernardino Princpial Meridian | Township: 5 South | Range: 4 West | Section: 22

Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 3/6/2024 | Time: 07:30 | Weather Conditions: | Temp (°C): 10 | Wind (mph): 0-1 | Cloud Cover: 40%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
1	11S 474284.25 E 3730673.36 N	10	N/A	Dry	---	---	7.5x2	---	---	---	---	---	---	---	---	---	---	D, TT	
2	11S 474265.76 E 3730731.81 N	10	N/A	Dry	---	---	6x2	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 2/14/2024, BRLI
3	11S 474279.58 E 3730655.17 N	10	13.7	8	12	24x3	24x4	BRLI	---	---	---	---	X	---	X	---	---	D, TT	Vouchered 1/31/2024, BRLI 100s
4	11S 474282.52 E 3730618.17 N	10	N/A	Dry	---	---	6x5	---	---	---	---	---	---	---	---	---	---	D, TT	
5	11S 474285.29 E 3730602.14 N	10	N/A	Dry	---	---	6x5	---	---	---	---	---	---	---	---	---	---	D, TT	
6	11S 474279.10 E 3730576.16 N	10	N/A	Dry	---	---	7x1	---	---	---	---	---	---	---	---	---	---	D, TT	
7	11S 474279.16 E 3730562.72 N	10	N/A	Dry	---	---	18x4	---	---	---	---	---	---	---	---	---	---	D, TT	
8	11S 474281.68 E 3730696.59 N	10	12.3	5	9	4x2	10x3	BRLI	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/31/2024, BRLI 100s
9	11S 474239.96 E 3730720.47 N	10	N/A	Dry	---	---	9x2	---	---	---	---	---	---	---	---	---	---	D, TT	
10	11S 474276.30 E 3730692.36 N	10	12.7	1	2	0.3x0.2	22x4	BRLI	---	---	---	---	X	---	X	---	---	D, TT	Vouchered 2/14/24, BRLI 1000s
11	11S 474225.41 E 3730712.55 N	10	N/A	Dry	---	---	8x2.5	---	---	---	---	---	---	---	---	---	---	D, TT	
12	11S 474230.46 E 3730715.23 N	10	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
13	11S 474200.21 E 3730722.29 N	10	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
14	11S 474288.09 E 3730766.58 N	10	N/A	Dry	---	---	10x4	---	---	---	---	---	---	---	---	---	---	D, TT	

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Site or Project Name: Crescent Garden County: Riverside Quad: San Bernardino Princpial Meridian Township: 5 South Range: 4 West Section: 22

Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 3/6/2024 Time: 07:30 Weather Conditions: Temp (°C): 10 Wind (mph): 0-1 Cloud Cover: 40%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
15	11S 474285.09 E 3730911.97 N	10	N/A	Dry	---	---	4x2	---	---	---	---	---	---	---	---	---	---	D, TT	
16	11S 474259.55 E 3731028.23 N	10	N/A	Dry	---	---	8x6	---	---	---	---	---	---	---	---	---	---	D, TT	
17	11S 474258.99 E 3731024.22 N	10	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
18	11S 474289.47 E 3731071.92 N	10	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
19	11S 473950.77 E 3730809.87 N	10	N/A	Dry	---	---	4x3	---	---	---	---	---	---	---	---	---	---	D, TT	
20	11S 474282.32 E 3730633.32 N	10	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
21	11S 474062.93 E 3730658.96 N	10	N/A	Dry	---	---	4x1	---	---	---	---	---	---	---	---	---	---	D, TT	
22	11S 474062.81 E 3730633.32 N	10	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
23	11S 474060.27 E 3730665.53 N	10	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
24	11S 474062.04 E 3730673.52 N	10	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
25	11S 474114.91 E 3730806.44 N	10	N/A	Dry	---	---	2x2	---	---	---	---	---	---	---	---	---	---	D, TT	
26	11S 474054.01 E 3730658.96 N	10	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
27	11S 474062.38 E 3730641.79 N	10	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
28	11S 474224.04 E 3730682.24 N	10	N/A	Dry	---	---	4x1	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 2/14/24, BRLI

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

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Date: 3/6/2024 Time: 07:30 Weather Conditions: Temp (°C): 10 Wind (mph): 0-1 Cloud Cover: 40%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
29/30	11S 474249.58 E 3730824.83 N	10	N/A	Dry	---	---	6x4.5	---	---	---	---	---	---	---	---	---	---	D, TT	
31	11S 474095.08 E 3730881.42 N	10	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
32	11S 474217.54 E 3730568.99 N	10	N/A	Dry	---	---	9x3	---	---	---	---	---	---	---	---	---	---	D, TT	
33	11S 474401.49 E 3730619.14 N	10	14	5	8	4x3	10x4	BRLI	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/31/24, BRLI 10s
34	11S 474282.05 E 3730838.24 N	10	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
35	11S 474291.68 E 3731038.88 N	10	N/A	Dry	---	---	5x2	---	---	---	---	---	---	---	---	---	---	D, TT	
36	11S 474333.75 E 3731107.10 N	10	N/A	Dry	---	---	3x1.5	---	---	---	---	---	---	---	---	---	---	D, TT	
37	11S 474214.76 E 3730710.31 N	10	N/A	Dry	---	---	9x5	---	---	---	---	---	---	---	---	---	---	D, TT	
38	11S 474304.72 E 3731082.61 N	10	N/A	Dry	---	---	6x2	---	---	---	---	---	---	---	---	---	---	D, TT	
39	11S 474284.74 E 3730687.95 N	10	N/A	Dry	---	---	3x3	---	---	---	---	---	---	---	---	---	---	D, TT	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.

(Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Crescent Garden | County: Riverside | Quad: San Bernardino Princpial Meridian | Township: 5 South | Range: 4 West | Section: 22

Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 3/13/2024 | Time: 11:30 | Weather Conditions: | Temp (°C): 16 | Wind (mph): 2-4 | Cloud Cover: 10%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
1	11S 474284.25 E 3730673.36 N	16	N/A	Dry	---	---	7.5x2	---	---	---	---	---	---	---	---	---	---	D, TT	
2	11S 474265.76 E 3730731.81 N	16	24.1	4	9	3x2	6x2	BRsp	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 2/14/2024, BRLI 1,000s juveniles
3	11S 474279.58 E 3730655.17 N	16	25.7	10	15	25x3	25x4	BRLI	---	---	---	---	X	---	X	---	---	D, TT	Vouchered 1/31/2024, BRLI 100s
4	11S 474282.52 E 3730618.17 N	16	N/A	Dry	---	---	6x5	---	---	---	---	---	---	---	---	---	---	D, TT	
5	11S 474285.29 E 3730602.14 N	16	N/A	Dry	---	---	6x5	---	---	---	---	---	---	---	---	---	---	D, TT	
6	11S 474279.10 E 3730576.16 N	16	N/A	Dry	---	---	7x1	---	---	---	---	---	---	---	---	---	---	D, TT	
7	11S 474279.16 E 3730562.72 N	16	N/A	Dry	---	---	18x4	---	---	---	---	---	---	---	---	---	---	D, TT	
8	11S 474281.68 E 3730696.59 N	16	26	4	7	4x2	10x3	BRLI	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/31/2024, BRLI 100s
9	11S 474239.96 E 3730720.47 N	16	N/A	Dry	---	---	9x2	---	---	---	---	---	---	---	---	---	---	D, TT	
10	11S 474276.30 E 3730692.36 N	16	23.7	7	13	10x2	22x4	BRLI	---	---	---	---	X	---	X	---	---	D, TT	Vouchered 2/14/24, BRLI 1000s
11	11S 474225.41 E 3730712.55 N	16	N/A	Dry	---	---	8x2.5	---	---	---	---	---	---	---	---	---	---	D, TT	
12	11S 474230.46 E 3730715.23 N	16	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
13	11S 474200.21 E 3730722.29 N	16	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
14	11S 474288.09 E 3730766.58 N	16	N/A	Dry	---	---	10x4	---	---	---	---	---	---	---	---	---	---	D, TT	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.

(Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Crescent Garden County: Riverside Quad: San Bernardino Princpial Meridian Township: 5 South Range: 4 West Section: 22

Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 3/13/2024 Time: 11:30 Weather Conditions: Temp (°C): 16 Wind (mph): 2-4 Cloud Cover: 10%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
15	11S 474285.09 E 3730911.97 N	16	N/A	Dry	---	---	4x2	---	---	---	---	---	---	---	---	---	---	D, TT	
16	11S 474259.55 E 3731028.23 N	16	N/A	Dry	---	---	8x6	---	---	---	---	---	---	---	---	---	---	D, TT	
17	11S 474258.99 E 3731024.22 N	16	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
18	11S 474289.47 E 3731071.92 N	16	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
19	11S 473950.77 E 3730809.87 N	16	N/A	Dry	---	---	4x3	---	---	---	---	---	---	---	---	---	---	D, TT	
20	11S 474282.32 E 3730633.32 N	16	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
21	11S 474062.93 E 3730658.96 N	16	N/A	Dry	---	---	4x1	---	---	---	---	---	---	---	---	---	---	D, TT	
22	11S 474062.81 E 3730633.32 N	16	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
23	11S 474060.27 E 3730665.53 N	16	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
24	11S 474062.04 E 3730673.52 N	16	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
25	11S 474114.91 E 3730806.44 N	16	N/A	Dry	---	---	2x2	---	---	---	---	---	---	---	---	---	---	D, TT	
26	11S 474054.01 E 3730658.96 N	16	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
27	11S 474062.38 E 3730641.79 N	16	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
28	11S 474224.04 E 3730682.24 N	16	N/A	Dry	---	---	4x1	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 2/14/24, BRLI

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.

(Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Crescent Garden County: Riverside Quad: San Bernardino Princpial Meridian Township: 5 South Range: 4 West Section: 22

Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 3/13/2024 Time: 11:30 Weather Conditions: Temp (°C): 16 Wind (mph): 2-4 Cloud Cover: 10%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
29/30	11S 474249.58 E 3730824.83 N	16	N/A	Dry	---	---	6x4.5	---	---	---	---	---	---	---	---	---	---	D, TT	
31	11S 474095.08 E 3730881.42 N	16	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
32	11S 474217.54 E 3730568.99 N	16	N/A	Dry	---	---	9x3	---	---	---	---	---	---	---	---	---	---	D, TT	
33	11S 474401.49 E 3730619.14 N	16	24.2	9	15	5x3	10x4	BRLI	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/31/24, BRLI 100s
34	11S 474282.05 E 3730838.24 N	16	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
35	11S 474291.68 E 3731038.88 N	16	N/A	Dry	---	---	5x2	---	---	---	---	---	---	---	---	---	---	D, TT	
36	11S 474333.75 E 3731107.10 N	16	N/A	Dry	---	---	3x1.5	---	---	---	---	---	---	---	---	---	---	D, TT	
37	11S 474214.76 E 3730710.31 N	16	N/A	Dry	---	---	9x5	---	---	---	---	---	---	---	---	---	---	D, TT	
38	11S 474304.72 E 3731082.61 N	16	N/A	Dry	---	---	6x2	---	---	---	---	---	---	---	---	---	---	D, TT	
39	11S 474284.74 E 3730687.95 N	16	N/A	Dry	---	---	3x3	---	---	---	---	---	---	---	---	---	---	D, TT	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

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(Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Crescent Garden | County: Riverside | Quad: San Bernardino Princpial Meridian | Township: 5 South | Range: 4 West | Section: 22

Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 3/20/2024 | Time: 08:00 | Weather Conditions: | Temp (°C): 13 | Wind (mph): 1-4 | Cloud Cover: 0%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
1	11S 474284.25 E 3730673.36 N	13	N/A	Dry	---	---	7.5x2	---	---	---	---	---	---	---	---	---	---	D, TT	
2	11S 474265.76 E 3730731.81 N	13	N/A	Dry	---	---	6x2	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 2/14/2024, BRLI
3	11S 474279.58 E 3730655.17 N	13	12.4	6	10	6x2 7x2	25x4	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/31/2024, BRLI
4	11S 474282.52 E 3730618.17 N	13	N/A	Dry	---	---	6x5	---	---	---	---	---	---	---	---	---	---	D, TT	
5	11S 474285.29 E 3730602.14 N	13	N/A	Dry	---	---	6x5	---	---	---	---	---	---	---	---	---	---	D, TT	
6	11S 474279.10 E 3730576.16 N	13	N/A	Dry	---	---	7x1	---	---	---	---	---	---	---	---	---	---	D, TT	
7	11S 474279.16 E 3730562.72 N	13	N/A	Dry	---	---	18x4	---	---	---	---	---	---	---	---	---	---	D, TT	
8	11S 474281.68 E 3730696.59 N	13	N/A	Dry	---	---	10x3	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/31/2024, BRLI
9	11S 474239.96 E 3730720.47 N	13	N/A	Dry	---	---	9x2	---	---	---	---	---	---	---	---	---	---	D, TT	
10	11S 474276.30 E 3730692.36 N	13	12.5	3	6	4x2	22x4	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 2/14/24, BRLI
11	11S 474225.41 E 3730712.55 N	13	N/A	Dry	---	---	8x2.5	---	---	---	---	---	---	---	---	---	---	D, TT	
12	11S 474230.46 E 3730715.23 N	13	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
13	11S 474200.21 E 3730722.29 N	13	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
14	11S 474288.09 E 3730766.58 N	13	N/A	Dry	---	---	10x4	---	---	---	---	---	---	---	---	---	---	D, TT	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

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Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Crescent Garden County: Riverside Quad: San Bernardino Princpial Meridian Township: 5 South Range: 4 West Section: 22

Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 3/20/2024 Time: 08:00 Weather Conditions: Temp (°C): 13 Wind (mph): 1-4 Cloud Cover: 0%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
15	11S 474285.09 E 3730911.97 N	13	N/A	Dry	---	---	4x2	---	---	---	---	---	---	---	---	---	---	D, TT	
16	11S 474259.55 E 3731028.23 N	13	N/A	Dry	---	---	8x6	---	---	---	---	---	---	---	---	---	---	D, TT	
17	11S 474258.99 E 3731024.22 N	13	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
18	11S 474289.47 E 3731071.92 N	13	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
19	11S 473950.77 E 3730809.87 N	13	N/A	Dry	---	---	4x3	---	---	---	---	---	---	---	---	---	---	D, TT	
20	11S 474282.32 E 3730633.32 N	13	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
21	11S 474062.93 E 3730658.96 N	13	N/A	Dry	---	---	4x1	---	---	---	---	---	---	---	---	---	---	D, TT	
22	11S 474062.81 E 3730633.32 N	13	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
23	11S 474060.27 E 3730665.53 N	13	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
24	11S 474062.04 E 3730673.52 N	13	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
25	11S 474114.91 E 3730806.44 N	13	N/A	Dry	---	---	2x2	---	---	---	---	---	---	---	---	---	---	D, TT	
26	11S 474054.01 E 3730658.96 N	13	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
27	11S 474062.38 E 3730641.79 N	13	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
28	11S 474224.04 E 3730682.24 N	13	N/A	Dry	---	---	4x1	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 2/14/24, BRLI

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

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Date: 3/20/2024 Time: 08:00 Weather Conditions: Temp (°C): 13 Wind (mph): 1-4 Cloud Cover: 0%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
29/30	11S 474249.58 E 3730824.83 N	13	N/A	Dry	---	---	6x4.5	---	---	---	---	---	---	---	---	---	---	D, TT	
31	11S 474095.08 E 3730881.42 N	13	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
32	11S 474217.54 E 3730568.99 N	13	N/A	Dry	---	---	9x3	---	---	---	---	---	---	---	---	---	---	D, TT	
33	11S 474401.49 E 3730619.14 N	13	N/A	Dry	---	---	10x4	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/31/24, BRLI
34	11S 474282.05 E 3730838.24 N	13	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
35	11S 474291.68 E 3731038.88 N	13	N/A	Dry	---	---	5x2	---	---	---	---	---	---	---	---	---	---	D, TT	
36	11S 474333.75 E 3731107.10 N	13	N/A	Dry	---	---	3x1.5	---	---	---	---	---	---	---	---	---	---	D, TT	
37	11S 474214.76 E 3730710.31 N	13	N/A	Dry	---	---	9x5	---	---	---	---	---	---	---	---	---	---	D, TT	
38	11S 474304.72 E 3731082.61 N	13	N/A	Dry	---	---	6x2	---	---	---	---	---	---	---	---	---	---	D, TT	
39	11S 474284.74 E 3730687.95 N	13	N/A	Dry	---	---	3x3	---	---	---	---	---	---	---	---	---	---	D, TT	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

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Site or Project Name: Crescent Garden | County: Riverside | Quad: San Bernardino Princpial Meridian | Township: 5 South | Range: 4 West | Section: 22

Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 3/27/2024 | Time: 09:30 | Weather Conditions: | Temp (°C): 13 | Wind (mph): 2-4 | Cloud Cover: 5%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
1	11S 474284.25 E 3730673.36 N	13	N/A	Dry	---	---	7.5x2	---	---	---	---	---	---	---	---	---	---	D, TT	
2	11S 474265.76 E 3730731.81 N	13	N/A	Dry	---	---	6x2	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 2/14/2024, BRLI
3	11S 474279.58 E 3730655.17 N	13	16.7	5	8	4x1 4x1	25x4	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/31/2024, BRLI
4	11S 474282.52 E 3730618.17 N	13	N/A	Dry	---	---	6x5	---	---	---	---	---	---	---	---	---	---	D, TT	
5	11S 474285.29 E 3730602.14 N	13	N/A	Dry	---	---	6x5	---	---	---	---	---	---	---	---	---	---	D, TT	
6	11S 474279.10 E 3730576.16 N	13	N/A	Dry	---	---	7x1	---	---	---	---	---	---	---	---	---	---	D, TT	
7	11S 474279.16 E 3730562.72 N	13	N/A	Dry	---	---	18x4	---	---	---	---	---	---	---	---	---	---	D, TT	
8	11S 474281.68 E 3730696.59 N	13	N/A	Dry	---	---	10x3	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/31/2024, BRLI
9	11S 474239.96 E 3730720.47 N	13	N/A	Dry	---	---	9x2	---	---	---	---	---	---	---	---	---	---	D, TT	
10	11S 474276.30 E 3730692.36 N	13	N/A	Dry	---	---	22x4	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 2/14/24, BRLI
11	11S 474225.41 E 3730712.55 N	13	N/A	Dry	---	---	8x2.5	---	---	---	---	---	---	---	---	---	---	D, TT	
12	11S 474230.46 E 3730715.23 N	13	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
13	11S 474200.21 E 3730722.29 N	13	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
14	11S 474288.09 E 3730766.58 N	13	N/A	Dry	---	---	10x4	---	---	---	---	---	---	---	---	---	---	D, TT	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.

(Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Crescent Garden | County: Riverside | Quad: San Bernardino Princpial Meridian | Township: 5 South | Range: 4 West | Section: 22

Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 3/27/2024 | Time: 09:30 | Weather Conditions: | Temp (°C): 13 | Wind (mph): 2-4 | Cloud Cover: 5%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
15	11S 474285.09 E 3730911.97 N	13	N/A	Dry	---	---	4x2	---	---	---	---	---	---	---	---	---	---	D, TT	
16	11S 474259.55 E 3731028.23 N	13	N/A	Dry	---	---	8x6	---	---	---	---	---	---	---	---	---	---	D, TT	
17	11S 474258.99 E 3731024.22 N	13	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
18	11S 474289.47 E 3731071.92 N	13	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
19	11S 473950.77 E 3730809.87 N	13	N/A	Dry	---	---	4x3	---	---	---	---	---	---	---	---	---	---	D, TT	
20	11S 474282.32 E 3730633.32 N	13	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
21	11S 474062.93 E 3730658.96 N	13	N/A	Dry	---	---	4x1	---	---	---	---	---	---	---	---	---	---	D, TT	
22	11S 474062.81 E 3730633.32 N	13	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
23	11S 474060.27 E 3730665.53 N	13	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
24	11S 474062.04 E 3730673.52 N	13	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
25	11S 474114.91 E 3730806.44 N	13	N/A	Dry	---	---	2x2	---	---	---	---	---	---	---	---	---	---	D, TT	
26	11S 474054.01 E 3730658.96 N	13	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
27	11S 474062.38 E 3730641.79 N	13	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
28	11S 474224.04 E 3730682.24 N	13	N/A	Dry	---	---	4x1	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 2/14/24, BRLI

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.

(Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Crescent Garden | County: Riverside | Quad: San Bernardino Princpial Meridian | Township: 5 South | Range: 4 West | Section: 22

Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 3/27/2024 | Time: 09:30 | Weather Conditions: | Temp (°C): 13 | Wind (mph): 2-4 | Cloud Cover: 5%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
29/30	11S 474249.58 E 3730824.83 N	13	N/A	Dry	---	---	6x4.5	---	---	---	---	---	---	---	---	---	---	D, TT	
31	11S 474095.08 E 3730881.42 N	13	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
32	11S 474217.54 E 3730568.99 N	13	N/A	Dry	---	---	9x3	---	---	---	---	---	---	---	---	---	---	D, TT	
33	11S 474401.49 E 3730619.14 N	13	N/A	Dry	---	---	10x4	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/31/24, BRLI
34	11S 474282.05 E 3730838.24 N	13	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
35	11S 474291.68 E 3731038.88 N	13	N/A	Dry	---	---	5x2	---	---	---	---	---	---	---	---	---	---	D, TT	
36	11S 474333.75 E 3731107.10 N	13	N/A	Dry	---	---	3x1.5	---	---	---	---	---	---	---	---	---	---	D, TT	
37	11S 474214.76 E 3730710.31 N	13	N/A	Dry	---	---	9x5	---	---	---	---	---	---	---	---	---	---	D, TT	
38	11S 474304.72 E 3731082.61 N	13	N/A	Dry	---	---	6x2	---	---	---	---	---	---	---	---	---	---	D, TT	
39	11S 474284.74 E 3730687.95 N	13	N/A	Dry	---	---	3x3	---	---	---	---	---	---	---	---	---	---	D, TT	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.

(Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Crescent Garden | County: Riverside | Quad: San Bernardino Princpial Meridian | Township: 5 South | Range: 4 West | Section: 22

Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 4/3/2024 | Time: 07:30 | Weather Conditions: | Temp (°C): 16 | Wind (mph): 0-1 | Cloud Cover: 0%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
1	11S 474284.25 E 3730673.36 N	16	N/A	Dry	---	---	7.5x2	---	---	---	---	---	---	---	---	---	---	D, TT	
2	11S 474265.76 E 3730731.81 N	16	18.3	3	5	2x2	6x2	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 2/14/2024, BRLI
3	11S 474279.58 E 3730655.17 N	16	17.1	10	18	7x2	25x4	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/31/2024, BRLI
4	11S 474282.52 E 3730618.17 N	16	N/A	Dry	---	---	6x5	---	---	---	---	---	---	---	---	---	---	D, TT	
5	11S 474285.29 E 3730602.14 N	16	N/A	Dry	---	---	6x5	---	---	---	---	---	---	---	---	---	---	D, TT	
6	11S 474279.10 E 3730576.16 N	16	N/A	Dry	---	---	7x1	---	---	---	---	---	---	---	---	---	---	D, TT	
7	11S 474279.16 E 3730562.72 N	16	N/A	Dry	---	---	18x4	---	---	---	---	---	---	---	---	---	---	D, TT	
8	11S 474281.68 E 3730696.59 N	16	18.1	3	6	2x1	10x3	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/31/2024, BRLI
9	11S 474239.96 E 3730720.47 N	16	N/A	Dry	---	---	9x2	---	---	---	---	---	---	---	---	---	---	D, TT	
10	11S 474276.30 E 3730692.36 N	16	16.9	6	10	4x2	22x4	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 2/14/24, BRLI
11	11S 474225.41 E 3730712.55 N	16	N/A	Dry	---	---	8x2.5	---	---	---	---	---	---	---	---	---	---	D, TT	
12	11S 474230.46 E 3730715.23 N	16	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
13	11S 474200.21 E 3730722.29 N	16	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
14	11S 474288.09 E 3730766.58 N	16	N/A	Dry	---	---	10x4	---	---	---	---	---	---	---	---	---	---	D, TT	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

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(Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Crescent Garden | County: Riverside | Quad: San Bernardino Princpial Meridian | Township: 5 South | Range: 4 West | Section: 22

Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 4/3/2024 | Time: 07:30 | Weather Conditions: | Temp (°C): 16 | Wind (mph): 0-1 | Cloud Cover: 0%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
15	11S 474285.09 E 3730911.97 N	16	N/A	Dry	---	---	4x2	---	---	---	---	---	---	---	---	---	---	D, TT	
16	11S 474259.55 E 3731028.23 N	16	N/A	Dry	---	---	8x6	---	---	---	---	---	---	---	---	---	---	D, TT	
17	11S 474258.99 E 3731024.22 N	16	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
18	11S 474289.47 E 3731071.92 N	16	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
19	11S 473950.77 E 3730809.87 N	16	N/A	Dry	---	---	4x3	---	---	---	---	---	---	---	---	---	---	D, TT	
20	11S 474282.32 E 3730633.32 N	16	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
21	11S 474062.93 E 3730658.96 N	16	N/A	Dry	---	---	4x1	---	---	---	---	---	---	---	---	---	---	D, TT	
22	11S 474062.81 E 3730633.32 N	16	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
23	11S 474060.27 E 3730665.53 N	16	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
24	11S 474062.04 E 3730673.52 N	16	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
25	11S 474114.91 E 3730806.44 N	16	N/A	Dry	---	---	2x2	---	---	---	---	---	---	---	---	---	---	D, TT	
26	11S 474054.01 E 3730658.96 N	16	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
27	11S 474062.38 E 3730641.79 N	16	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
28	11S 474224.04 E 3730682.24 N	16	N/A	Dry	---	---	4x1	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 2/14/24, BRLI

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

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(Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Crescent Garden County: Riverside Quad: San Bernardino Princpial Meridian Township: 5 South Range: 4 West Section: 22

Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 4/3/2024 Time: 07:30 Weather Conditions: Temp (°C): 16 Wind (mph): 0-1 Cloud Cover: 0%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
29/30	11S 474249.58 E 3730824.83 N	16	N/A	Dry	---	---	6x4.5	---	---	---	---	---	---	---	---	---	---	D, TT	
31	11S 474095.08 E 3730881.42 N	16	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
32	11S 474217.54 E 3730568.99 N	16	N/A	Dry	---	---	9x3	---	---	---	---	---	---	---	---	---	---	D, TT	
33	11S 474401.49 E 3730619.14 N	16	18.9	5	8	4x2	10x4	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/31/24, BRLI
34	11S 474282.05 E 3730838.24 N	16	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
35	11S 474291.68 E 3731038.88 N	16	N/A	Dry	---	---	5x2	---	---	---	---	---	---	---	---	---	---	D, TT	
36	11S 474333.75 E 3731107.10 N	16	N/A	Dry	---	---	3x1.5	---	---	---	---	---	---	---	---	---	---	D, TT	
37	11S 474214.76 E 3730710.31 N	16	N/A	Dry	---	---	9x5	---	---	---	---	---	---	---	---	---	---	D, TT	
38	11S 474304.72 E 3731082.61 N	16	N/A	Dry	---	---	6x2	---	---	---	---	---	---	---	---	---	---	D, TT	
39	11S 474284.74 E 3730687.95 N	16	N/A	Dry	---	---	3x3	---	---	---	---	---	---	---	---	---	---	D, TT	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

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(Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Crescent Garden | County: Riverside | Quad: San Bernardino Princpial Meridian | Township: 5 South | Range: 4 West | Section: 22

Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 4/10/2024 | Time: 12:00 | Weather Conditions: | Temp (°C): 26 | Wind (mph): 1-3 | Cloud Cover: 0%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
1	11S 474284.25 E 3730673.36 N	26	N/A	Dry	---	---	7.5x2	---	---	---	---	---	---	---	---	---	---	D, TT	
2	11S 474265.76 E 3730731.81 N	26	N/A	Dry	---	---	6x2	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 2/14/2024, BRLI
3	11S 474279.58 E 3730655.17 N	26	28.1	5	12	5x2	25x4	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/31/2024, BRLI
4	11S 474282.52 E 3730618.17 N	26	N/A	Dry	---	---	6x5	---	---	---	---	---	---	---	---	---	---	D, TT	
5	11S 474285.29 E 3730602.14 N	26	N/A	Dry	---	---	6x5	---	---	---	---	---	---	---	---	---	---	D, TT	
6	11S 474279.10 E 3730576.16 N	26	N/A	Dry	---	---	7x1	---	---	---	---	---	---	---	---	---	---	D, TT	
7	11S 474279.16 E 3730562.72 N	26	N/A	Dry	---	---	18x4	---	---	---	---	---	---	---	---	---	---	D, TT	
8	11S 474281.68 E 3730696.59 N	26	29.8	4	6	3x1	10x3	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/31/2024, BRLI
9	11S 474239.96 E 3730720.47 N	26	N/A	Dry	---	---	9x2	---	---	---	---	---	---	---	---	---	---	D, TT	
10	11S 474276.30 E 3730692.36 N	26	N/A	Dry	---	---	22x4	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 2/14/24, BRLI
11	11S 474225.41 E 3730712.55 N	26	N/A	Dry	---	---	8x2.5	---	---	---	---	---	---	---	---	---	---	D, TT	
12	11S 474230.46 E 3730715.23 N	26	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
13	11S 474200.21 E 3730722.29 N	26	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
14	11S 474288.09 E 3730766.58 N	26	N/A	Dry	---	---	10x4	---	---	---	---	---	---	---	---	---	---	D, TT	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.

(Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Crescent Garden County: Riverside Quad: San Bernardino Princpial Meridian Township: 5 South Range: 4 West Section: 22

Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 4/10/2024 Time: 12:00 Weather Conditions: Temp (°C): 26 Wind (mph): 1-3 Cloud Cover: 0%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
15	11S 474285.09 E 3730911.97 N	26	N/A	Dry	---	---	4x2	---	---	---	---	---	---	---	---	---	---	D, TT	
16	11S 474259.55 E 3731028.23 N	26	N/A	Dry	---	---	8x6	---	---	---	---	---	---	---	---	---	---	D, TT	
17	11S 474258.99 E 3731024.22 N	26	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
18	11S 474289.47 E 3731071.92 N	26	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
19	11S 473950.77 E 3730809.87 N	26	N/A	Dry	---	---	4x3	---	---	---	---	---	---	---	---	---	---	D, TT	
20	11S 474282.32 E 3730633.32 N	26	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
21	11S 474062.93 E 3730658.96 N	26	N/A	Dry	---	---	4x1	---	---	---	---	---	---	---	---	---	---	D, TT	
22	11S 474062.81 E 3730633.32 N	26	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
23	11S 474060.27 E 3730665.53 N	26	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
24	11S 474062.04 E 3730673.52 N	26	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
25	11S 474114.91 E 3730806.44 N	26	N/A	Dry	---	---	2x2	---	---	---	---	---	---	---	---	---	---	D, TT	
26	11S 474054.01 E 3730658.96 N	26	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
27	11S 474062.38 E 3730641.79 N	26	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
28	11S 474224.04 E 3730682.24 N	26	N/A	Dry	---	---	4x1	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 2/14/24, BRLI

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.

(Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Crescent Garden County: Riverside Quad: San Bernardino Princpial Meridian Township: 5 South Range: 4 West Section: 22

Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 4/10/2024 Time: 12:00 Weather Conditions: Temp (°C): 26 Wind (mph): 1-3 Cloud Cover: 0%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
29/30	11S 474249.58 E 3730824.83 N	26	N/A	Dry	---	---	6x4.5	---	---	---	---	---	---	---	---	---	---	D, TT	
31	11S 474095.08 E 3730881.42 N	26	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
32	11S 474217.54 E 3730568.99 N	26	N/A	Dry	---	---	9x3	---	---	---	---	---	---	---	---	---	---	D, TT	
33	11S 474401.49 E 3730619.14 N	26	N/A	Dry	---	---	10x4	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/31/24, BRLI
34	11S 474282.05 E 3730838.24 N	26	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
35	11S 474291.68 E 3731038.88 N	26	N/A	Dry	---	---	5x2	---	---	---	---	---	---	---	---	---	---	D, TT	
36	11S 474333.75 E 3731107.10 N	26	N/A	Dry	---	---	3x1.5	---	---	---	---	---	---	---	---	---	---	D, TT	
37	11S 474214.76 E 3730710.31 N	26	N/A	Dry	---	---	9x5	---	---	---	---	---	---	---	---	---	---	D, TT	
38	11S 474304.72 E 3731082.61 N	26	N/A	Dry	---	---	6x2	---	---	---	---	---	---	---	---	---	---	D, TT	
39	11S 474284.74 E 3730687.95 N	26	N/A	Dry	---	---	3x3	---	---	---	---	---	---	---	---	---	---	D, TT	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.

(Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Crescent Garden | County: Riverside | Quad: San Bernardino Princpial Meridian | Township: 5 South | Range: 4 West | Section: 22

Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 4/17/2024 | Time: 12:00 | Weather Conditions: | Temp (°C): 26 | Wind (mph): 1-3 | Cloud Cover: 0%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
1	11S 474284.25 E 3730673.36 N	26	N/A	Dry	---	---	7.5x2	---	---	---	---	---	---	---	---	---	---	D, TT	
2	11S 474265.76 E 3730731.81 N	26	N/A	Dry	---	---	6x2	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 2/14/2024, BRLI
3	11S 474279.58 E 3730655.17 N	26	24.8	5	7	6x1	25x4	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/31/2024, BRLI
4	11S 474282.52 E 3730618.17 N	26	N/A	Dry	---	---	6x5	---	---	---	---	---	---	---	---	---	---	D, TT	
5	11S 474285.29 E 3730602.14 N	26	N/A	Dry	---	---	6x5	---	---	---	---	---	---	---	---	---	---	D, TT	
6	11S 474279.10 E 3730576.16 N	26	N/A	Dry	---	---	7x1	---	---	---	---	---	---	---	---	---	---	D, TT	
7	11S 474279.16 E 3730562.72 N	26	N/A	Dry	---	---	18x4	---	---	---	---	---	---	---	---	---	---	D, TT	
8	11S 474281.68 E 3730696.59 N	26	N/A	Dry	---	---	10x3	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/31/2024, BRLI
9	11S 474239.96 E 3730720.47 N	26	N/A	Dry	---	---	9x2	---	---	---	---	---	---	---	---	---	---	D, TT	
10	11S 474276.30 E 3730692.36 N	26	N/A	Dry	---	---	22x4	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 2/14/24, BRLI
11	11S 474225.41 E 3730712.55 N	26	N/A	Dry	---	---	8x2.5	---	---	---	---	---	---	---	---	---	---	D, TT	
12	11S 474230.46 E 3730715.23 N	26	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
13	11S 474200.21 E 3730722.29 N	26	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
14	11S 474288.09 E 3730766.58 N	26	N/A	Dry	---	---	10x4	---	---	---	---	---	---	---	---	---	---	D, TT	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

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Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Crescent Garden County: Riverside Quad: San Bernardino Princpial Meridian Township: 5 South Range: 4 West Section: 22

Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 4/17/2024 Time: 12:00 Weather Conditions: Temp (°C): 26 Wind (mph): 1-3 Cloud Cover: 0%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
15	11S 474285.09 E 3730911.97 N	26	N/A	Dry	---	---	4x2	---	---	---	---	---	---	---	---	---	---	D, TT	
16	11S 474259.55 E 3731028.23 N	26	N/A	Dry	---	---	8x6	---	---	---	---	---	---	---	---	---	---	D, TT	
17	11S 474258.99 E 3731024.22 N	26	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
18	11S 474289.47 E 3731071.92 N	26	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
19	11S 473950.77 E 3730809.87 N	26	N/A	Dry	---	---	4x3	---	---	---	---	---	---	---	---	---	---	D, TT	
20	11S 474282.32 E 3730633.32 N	26	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
21	11S 474062.93 E 3730658.96 N	26	N/A	Dry	---	---	4x1	---	---	---	---	---	---	---	---	---	---	D, TT	
22	11S 474062.81 E 3730633.32 N	26	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
23	11S 474060.27 E 3730665.53 N	26	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
24	11S 474062.04 E 3730673.52 N	26	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
25	11S 474114.91 E 3730806.44 N	26	N/A	Dry	---	---	2x2	---	---	---	---	---	---	---	---	---	---	D, TT	
26	11S 474054.01 E 3730658.96 N	26	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
27	11S 474062.38 E 3730641.79 N	26	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
28	11S 474224.04 E 3730682.24 N	26	N/A	Dry	---	---	4x1	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 2/14/24, BRLI

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Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 4/17/2024 Time: 12:00 Weather Conditions: Temp (°C): 26 Wind (mph): 1-3 Cloud Cover: 0%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
29/30	11S 474249.58 E 3730824.83 N	26	N/A	Dry	---	---	6x4.5	---	---	---	---	---	---	---	---	---	---	D, TT	
31	11S 474095.08 E 3730881.42 N	26	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
32	11S 474217.54 E 3730568.99 N	26	N/A	Dry	---	---	9x3	---	---	---	---	---	---	---	---	---	---	D, TT	
33	11S 474401.49 E 3730619.14 N	26	N/A	Dry	---	---	10x4	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/31/24, BRLI
34	11S 474282.05 E 3730838.24 N	26	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
35	11S 474291.68 E 3731038.88 N	26	N/A	Dry	---	---	5x2	---	---	---	---	---	---	---	---	---	---	D, TT	
36	11S 474333.75 E 3731107.10 N	26	N/A	Dry	---	---	3x1.5	---	---	---	---	---	---	---	---	---	---	D, TT	
37	11S 474214.76 E 3730710.31 N	26	N/A	Dry	---	---	9x5	---	---	---	---	---	---	---	---	---	---	D, TT	
38	11S 474304.72 E 3731082.61 N	26	N/A	Dry	---	---	6x2	---	---	---	---	---	---	---	---	---	---	D, TT	
39	11S 474284.74 E 3730687.95 N	26	N/A	Dry	---	---	3x3	---	---	---	---	---	---	---	---	---	---	D, TT	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

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Site or Project Name: Crescent Garden | County: Riverside | Quad: San Bernardino Princpial Meridian | Township: 5 South | Range: 4 West | Section: 22

Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 4/24/2024 | Time: 12:00 | Weather Conditions: | Temp (°C): 28 | Wind (mph): 1-3 | Cloud Cover: 20%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
1	11S 474284.25 E 3730673.36 N	26	N/A	Dry	---	---	7.5x2	---	---	---	---	---	---	---	---	---	---	D, TT	
2	11S 474265.76 E 3730731.81 N	26	N/A	Dry	---	---	6x2	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 2/14/2024, BRLI
3	11S 474279.58 E 3730655.17 N	26	N/A	Dry	---	---	25x4	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/31/2024, BRLI
4	11S 474282.52 E 3730618.17 N	26	N/A	Dry	---	---	6x5	---	---	---	---	---	---	---	---	---	---	D, TT	
5	11S 474285.29 E 3730602.14 N	26	N/A	Dry	---	---	6x5	---	---	---	---	---	---	---	---	---	---	D, TT	
6	11S 474279.10 E 3730576.16 N	26	N/A	Dry	---	---	7x1	---	---	---	---	---	---	---	---	---	---	D, TT	
7	11S 474279.16 E 3730562.72 N	26	N/A	Dry	---	---	18x4	---	---	---	---	---	---	---	---	---	---	D, TT	
8	11S 474281.68 E 3730696.59 N	26	N/A	Dry	---	---	10x3	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/31/2024, BRLI
9	11S 474239.96 E 3730720.47 N	26	N/A	Dry	---	---	9x2	---	---	---	---	---	---	---	---	---	---	D, TT	
10	11S 474276.30 E 3730692.36 N	26	N/A	Dry	---	---	22x4	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 2/14/24, BRLI
11	11S 474225.41 E 3730712.55 N	26	N/A	Dry	---	---	8x2.5	---	---	---	---	---	---	---	---	---	---	D, TT	
12	11S 474230.46 E 3730715.23 N	26	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
13	11S 474200.21 E 3730722.29 N	26	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
14	11S 474288.09 E 3730766.58 N	26	N/A	Dry	---	---	10x4	---	---	---	---	---	---	---	---	---	---	D, TT	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.

(Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Crescent Garden County: Riverside Quad: San Bernardino Princpial Meridian Township: 5 South Range: 4 West Section: 22

Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 4/24/2024 Time: 12:00 Weather Conditions: Temp (°C): 28 Wind (mph): 1-3 Cloud Cover: 20%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
15	11S 474285.09 E 3730911.97 N	26	N/A	Dry	---	---	4x2	---	---	---	---	---	---	---	---	---	---	D, TT	
16	11S 474259.55 E 3731028.23 N	26	N/A	Dry	---	---	8x6	---	---	---	---	---	---	---	---	---	---	D, TT	
17	11S 474258.99 E 3731024.22 N	26	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
18	11S 474289.47 E 3731071.92 N	26	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
19	11S 473950.77 E 3730809.87 N	26	N/A	Dry	---	---	4x3	---	---	---	---	---	---	---	---	---	---	D, TT	
20	11S 474282.32 E 3730633.32 N	26	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
21	11S 474062.93 E 3730658.96 N	26	N/A	Dry	---	---	4x1	---	---	---	---	---	---	---	---	---	---	D, TT	
22	11S 474062.81 E 3730633.32 N	26	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
23	11S 474060.27 E 3730665.53 N	26	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
24	11S 474062.04 E 3730673.52 N	26	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
25	11S 474114.91 E 3730806.44 N	26	N/A	Dry	---	---	2x2	---	---	---	---	---	---	---	---	---	---	D, TT	
26	11S 474054.01 E 3730658.96 N	26	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
27	11S 474062.38 E 3730641.79 N	26	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
28	11S 474224.04 E 3730682.24 N	26	N/A	Dry	---	---	4x1	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 2/14/24, BRLI

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.

(Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Appendix 1. U.S. Fish and Wildlife Service - Data Sheet for Wet Season Surveys for Listed Large Branchiopods

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Surveyor/Permit Number: Mandy Mathews; ES778195-15

Date: 4/24/2024 Time: 12:00 Weather Conditions: Temp (°C): 28 Wind (mph): 1-3 Cloud Cover: 20%

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m x m)		Crustaceans					Insects				Platyhelminths	Habitat Condition	Notes/Voucher Information
		Air	Water	Average	Est. Max	Present	Est. Max	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomidae			
29/30	11S 474249.58 E 3730824.83 N	26	N/A	Dry	---	---	6x4.5	---	---	---	---	---	---	---	---	---	---	D, TT	
31	11S 474095.08 E 3730881.42 N	26	N/A	Dry	---	---	2x0.5	---	---	---	---	---	---	---	---	---	---	D, TT	
32	11S 474217.54 E 3730568.99 N	26	N/A	Dry	---	---	9x3	---	---	---	---	---	---	---	---	---	---	D, TT	
33	11S 474401.49 E 3730619.14 N	26	N/A	Dry	---	---	10x4	---	---	---	---	---	---	---	---	---	---	D, TT	Vouchered 1/31/24, BRLI
34	11S 474282.05 E 3730838.24 N	26	N/A	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	D, TT	
35	11S 474291.68 E 3731038.88 N	26	N/A	Dry	---	---	5x2	---	---	---	---	---	---	---	---	---	---	D, TT	
36	11S 474333.75 E 3731107.10 N	26	N/A	Dry	---	---	3x1.5	---	---	---	---	---	---	---	---	---	---	D, TT	
37	11S 474214.76 E 3730710.31 N	26	N/A	Dry	---	---	9x5	---	---	---	---	---	---	---	---	---	---	D, TT	
38	11S 474304.72 E 3731082.61 N	26	N/A	Dry	---	---	6x2	---	---	---	---	---	---	---	---	---	---	D, TT	
39	11S 474284.74 E 3730687.95 N	26	N/A	Dry	---	---	3x3	---	---	---	---	---	---	---	---	---	---	D, TT	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli).

For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present.

(Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

Attachment B

Representative Site Photos



Photo 1: Feature 2, facing west. Taken February 7, 2024.



Photo 2: Feature 3, facing south. Taken February 7, 2024.

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Photo 3: Feature 11, facing southwest. Taken February 7, 2024.



Photo 4: Feature 22, facing north. Taken February 7, 2024.

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Photo 5: Feature 23, facing north. Taken February 7, 2024.

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Appendix F Hydrology Study

November 2023

PRELIMINARY HYDROLOGY REPORT

For

CRESCENT GARDENS CEMETERY

Meadowbrook Community

County of Riverside, CA

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Muslim Mortuary & Cemetery Committee

13121 Brookhurst Street, Suite C
Garden Grove, CA 92843

Tel: 310-619-0082
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PRELIMINARY HYDROLOGY REPORT
FOR
CRESCENT GARDENS CEMETERY
MEADOWBROOK COMMUNITY
COUNTY OF RIVERSIDE

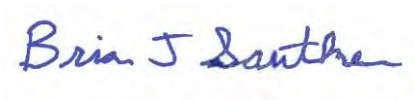
Prepared For:

MUSLIM MORTUARY & CEMETERY COMMITTEE

13121 Brookhurst Street, Suite C.
Garden Grove, CA 92843

PREPARED BY

HUNSAKER & ASSOCIATES IRVUNE, INC.
3 HUGHES
IRVINE, CA 92618



11/10/23

Brian J. Sauther, R.C.E. 76028, Exp. 06/30/24 Date:

PRELIMINARY HYDROLOGY REPORT
FOR
CRESCENT GARDENS CEMETERY

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SECTION 1
DISCUSSION

A. PROJECT SITE

The Project Site for the Crescent Gardens Cemetery is located in the SW ¼ and SE ¼ of Section 22, T5S, R4W S.B.B.M. in the Meadowbrook Area of Riverside County, California. The Project Site is to the east of the terminus of Garfield Street, as shown in Figure 1.

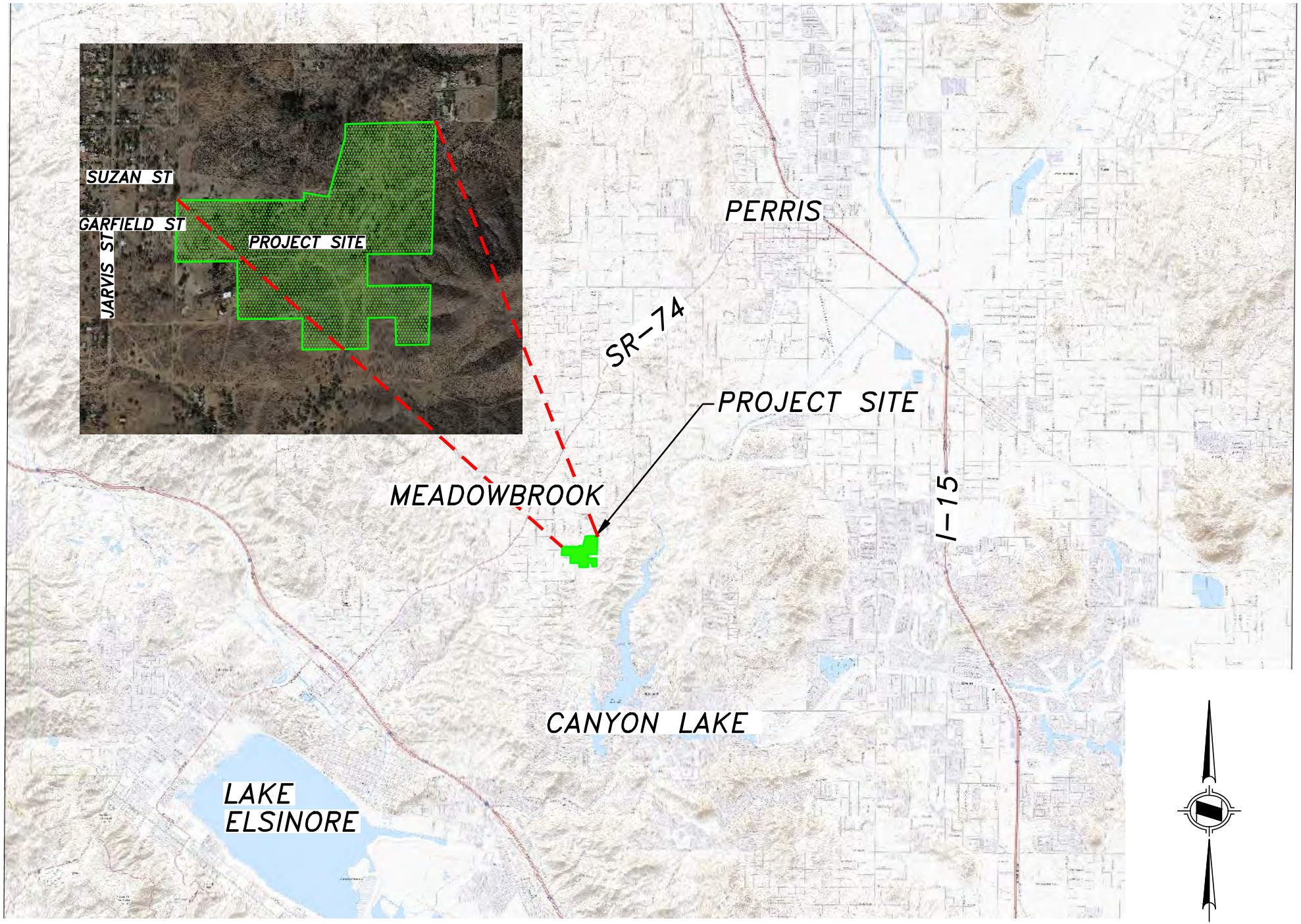
B. PURPOSE AND SCOPE

The purpose of this study is to perform hydrologic study of the Project Site for pre-project and post-project conditions, and to provide preliminary sizing of the drainage facilities needed to provide attenuation for 10-year storm event, and flood protection from the 100-year storm event.

The scope of this study includes the following:

- Provide Rational Method hydrologic calculations for the 2 year, 10-year, and 100-year storms for pre-project (existing) condition.
- Provide Rational Method hydrologic calculations for the 2 year, 10-year, and 100-post-project (proposed) condition for the sizing of the proposed storm drain facilities.
- Provide Existing Condition and Proposed Condition hydrology maps showing delineated drainage areas and points of discharge as a result of the Rational Method calculations included in this report.
- Provide sizing of proposed basin for the purpose of flood control attenuation.
- Provide Unit Hydrograph calculations to support the sizing of proposed basins.
- Provide hydraulics calculations to support the design of proposed storm drain facilities.

Figure 1. Vicinity Map



C. EXISTING CONDITION

The project site is composed of 100% undeveloped land. A topographic analysis of the Project Site indicates that the site contains several ridges that create several drainage basins and points of off-site discharge on the property. For the purposes of this report, these Drainage Basins are designated as Areas A, D, E, F, G, H, I, and J (see Figure 2).

Drainage Area A, the largest Drainage Basin in this study, drains toward project site from northwest and originates from developed residential property located south of Senola Ave. Drainage Area A drains from the west onto, through and then off the property.

Drainage Area D is a small area located southwest end of the property. Drainage on Area D originates on the property then drains off the property to the southwest.

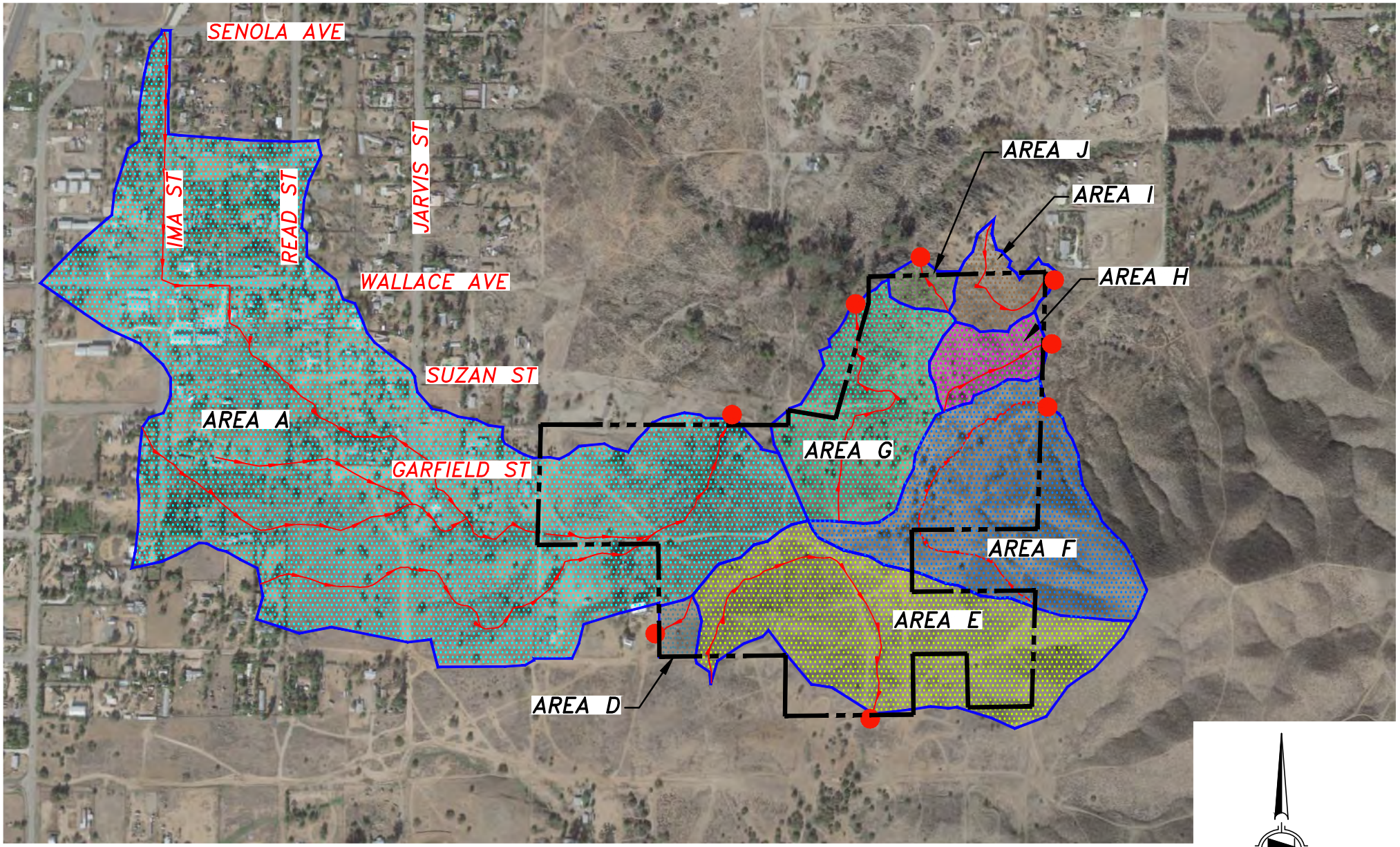
Drainage Area E is an area located south end of the property. Most of the drainage from Area E originates on the property where it eventually drains south off the property.

Drainage Area F is an area located east side the property. Drainage from area F drains west onto the property before turn northeast draining off the property.

Drainage Area G is an area located northwest side the property. Drainage from Area G originates on the property where it drains northwest off the property.

Drainage Areas H, I, and J are located north side the property. Drainage from these areas mostly originates from onsite property where the drains north off the property.

Figure 2. Existing Condition



D. PROPOSED CONDITION

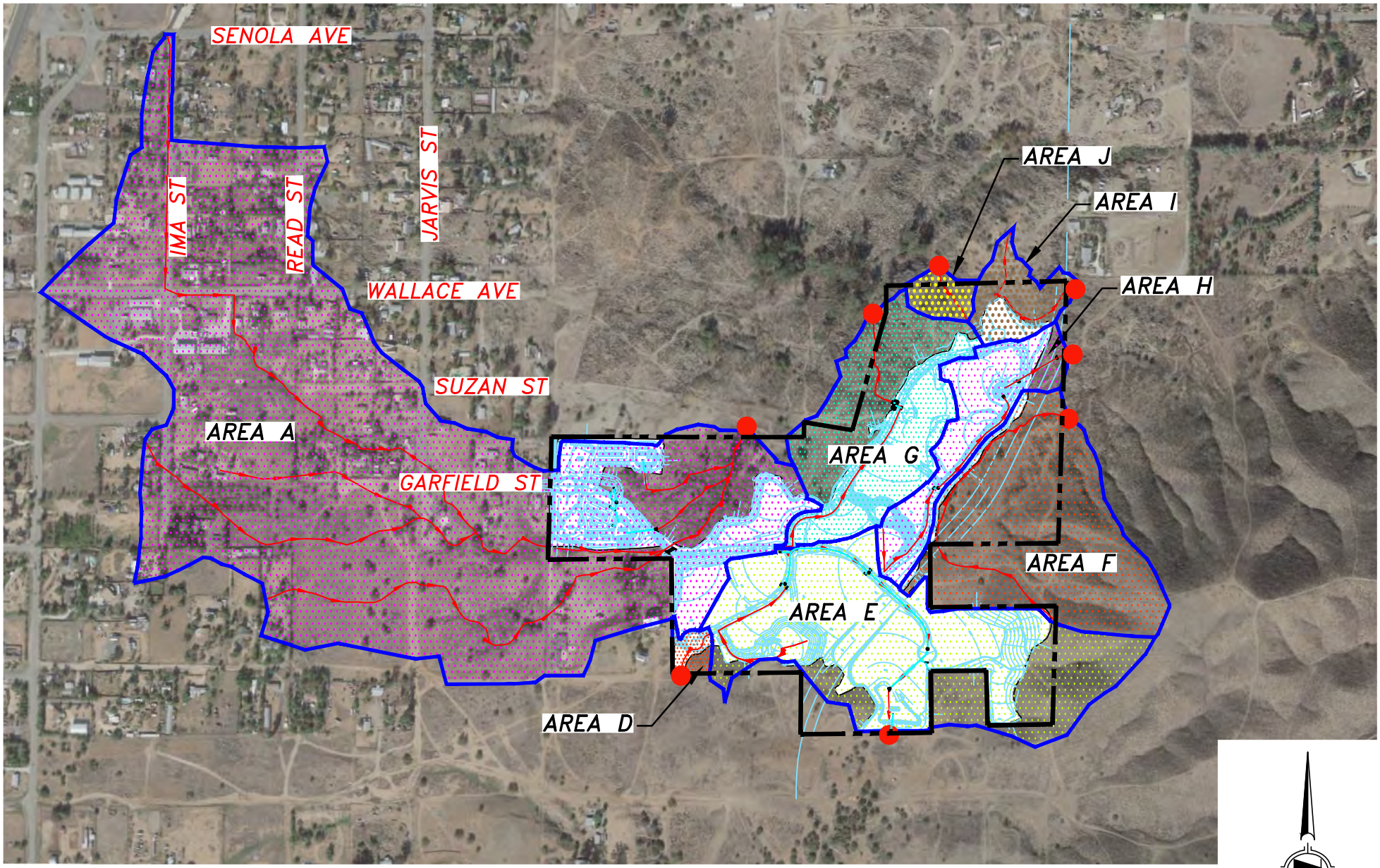
The project proposes to develop the Project Site into a cemetery with supporting facilities including a chapel, a mortuary, caretaker residence, and supporting infrastructure and utilities.

Drainage from the improved site will be collected in a series of surface drainage facilities and underground conduits. Drainage from the proposed surface drainage and storm drain facilities will either be conveyed to detention and/or water quality basin or be conveyed off-site to existing natural channels depending on mitigation requirements. First flush of all storm runoff will be treated prior to leaving the Project Site, as detail a separate Water Quality Management Plan report.

The proposed grading of the Project Site slightly alters the original drainage boundaries and drainage areas of the existing Project Site but does not significantly alter the original drainage patterns or runoff discharge locations. The new boundaries and grading are shown in Figure 3.

The proposed drainage systems will be designed to convey the 100-year peak flow generated on the Project Site and will be designed mitigate any increase in flow from existing conditions for the 10-year storm.

Figure 3. Proposed Condition



LEGEND

- DRAINAGE AREA BOUNDARY
- FLOW PATH
- DISCHARGE POINT
- PROPERTY BOUNDARY

E. METHODOLOGY

The methodology used to for this hydrology study is based on the Riverside County Flood Control and Water Conservation District's (RCFC&WCD) Hydrology Manual dated April 1976. The hydrology and hydraulic software utilized are accepted by the RCFC&WCD which include the following:

Rational Method: Hydrology – Riverside County – Civil Design Software - Version 9.0.

Unit Hydrograph: Hydrology – Riverside County – Civil Design Software - Version 9.0.

Stream Hydraulics: HEC-RAS – U.S. Army Corps of Engineers Hydrologic Engineering Center – Version 5.0.7.

The Hydrologic Soil Groups used for this study were based on the soils information shown on the National Cooperative Soil Survey (NCSS) website provided by the Natural Resource Conservation Service. The soils map provided by the website shows that most of the area in the Project Site is classified as Hydrologic Soil Group D soil. Pockets of type Hydrologic Soil Group C soils exist at the south end of the property. A copy of the Soils Map and explanation of soil types are provided in Section 6 – References.

Existing and Proposed land use and imperviousness for the proposed Project Site and surrounding areas are based on the land use/imperviousness data provided in Plate D-5.5 and D-5.6 of the Hydrology Manual. The following table list percentage imperviousness used for the various Soil Cover Types found in the proposed project:

Table 1. Land Use and Imperviousness

Soil Cover Type	Impervious % (Ai)	Equivalent Land Use Type Per Hydrology Manual
Paved Road and Parking Lots	90%	Commercial
Burial Areas	0%	Commercial Landscaping
Graded Slopes	0%	Commercial Landscaping
Natural Ungraded Areas	0%	Undeveloped (Poor Condition)
Residential	20%	Single Family (1 Acre) lots

F. HYDROLOGIC RESULTS

RATIONAL METHOD ANALISYS

The peak flows from the 2-year, 10-year, and 100-year storms generated in the existing and proposed condition were analyzed using the Rational Method. The Rational Method Calculations for the proposed and existing condition are based on the methods outlined in Section D of the Hydrology Manual. Hydrology Maps showing the results of the Rational Method calculations for the proposed and existing conditions can be found in Section 2 – Existing Condition Hydrology Rational Method Analysis and Section 3 – Proposed Condition Hydrology Rational Method Analysis.

The results of the Rational Method calculations are summarized in the following tables:

Table 2. Summary of Rational Method Calculations Existing Condition

Drainage Area Name	Node #	Tributary Area(acres)	2-year Peak Flow (cfs)	10-year Peak Flow (cfs)	100-year Peak Flow (cfs)
A	111	119.92	44.0	122.6	220.5
D	511	1.39	1.1	2.4	4.1
E	502	30.67	14.8	38.7	67.6
F	602	26.56	14.5	35.8	61.5
G	402	17.00	9.8	23.8	41.0
H	611	4.56	2.7	6.4	10.9
I	631	4.04	2.3	5.4	9.2
J	621	1.70	1.3	3.0	5.1

Table 3. Summary of Rational Method Calculations Proposed Condition

Drainage Area Name	Node #	Tributary Area(acres)	2-year Peak Flow (cfs)	10-year Peak Flow (cfs)	100-year Peak Flow (cfs)
A	111	120.21	44.8	123.4	221.6
D	511	1.04	0.8	1.8	3.0
E	503	31.79	12.6	35.7	63.6
F	602	23.14	12.8	31.4	50.9
G	403	16.79	9.6	23.6	40.8
H	612	8.53	4.7	11.7	20.2
I	631	4.12	2.3	5.5	9.3
J	621	1.70	1.3	3.0	5.1

G. ANALYSIS OF RESULTS

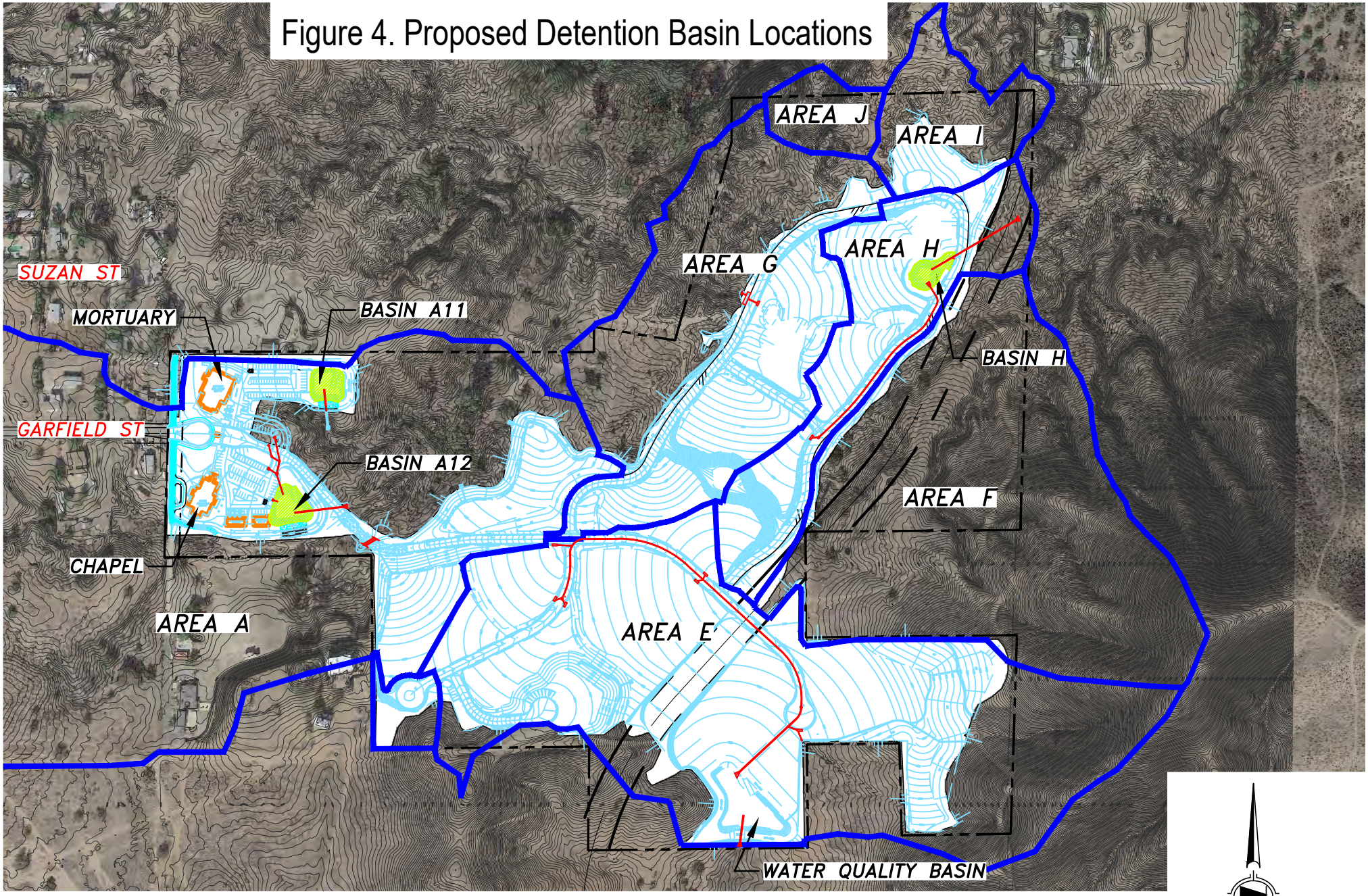
Based on the Existing Condition and Proposed Condition Rational Method results, the peak flow rates from the Proposed Conditions increased from Existing Conditions only for drainage areas A and H. The peak flow generated on the remaining drainage areas (D, E, F, G, I, and J) do not increase peak flow from Existing Conditions.

Per RCFC&WCD's Increase Runoff Criteria, any increase in flow between the existing and proposed conditions must be mitigated for all storms up to and including the 10-year storm. Basins provided for flood control mitigation must provide a volume equal to or exceeding the difference in volumes between the existing and proposed condition 100-year, 24-hr storm event.

In order to meet RCFC&WCD's Increase Runoff Criteria, the project proposes constructing three (3) detention basins: Basin A11, Basin A12, and Basin H. The proposed basin locations are shown in Figure 4:

Basin A11 is to be located east of the Mortuary Building in Drainage Area A and is on the west side of the project site. Basin A12 is to be located east of the Chapel Building in Drainage Area A and is on the west side of the project site. Basin H is to be located near the downstream end of Drainage Area H and is located on the northeast end of the project site.

Figure 4. Proposed Detention Basin Locations



Sizing of the proposed retention basins to RCFC&WCD's requirements is based on the results of a Unit Hydrograph analysis comparing the peak flow and runoff volume from existing and proposed condition drainage areas tributary to each basin based on the 10-year, 24-hr storm event.

The Unit Hydrograph Calculations for the Project Site were performed using the methods outlined in Section E of the Hydrology Manual.

Precipitation values used in the development of the unit hydrographs for the proposed and existing condition for the project site were obtained from NOAA Atlas 14, Volume 6, Version 2. Copies of the precipitation values is available in Section 6 – References.

Lag time, area average mean soil loss rate (F), minimum soil loss rate (Fm) and low loss rate (F*) where developed using procedures shown on Plate E-1.1 of the Hydrology manual and calculated within the Civil Design Software program.

The parameters as mentioned above were entered into the Civil Design Software program and following tables summarizes the results:

Table 4. Unit Hydrographs Analysis Results for Area A and Area H (10-year, 24 hr Storm)

Drainage Area Name	Incorporated Detention Basins	Condition	Tributary Area (ac)	Peak Flow (cfs)	Runoff Volume (Ac-ft)
A	A11 & A12	Existing	119.92	33.0	11.5
		Proposed	120.22	33.2	12.2
Minimum Volume of Basins Required in Drainage Area A					***0.7***
H	H	Existing	4.46	1.7	0.6
		Proposed	8.53	2.7	0.9
Minimum Volume of Basin Required in Drainage Area H					**0.3**

Supporting Unit Hydrograph calculations can be found in Section 4 – Existing Condition & Proposed Condition Hydrology Unit Hydrograph Analysis.

To meet RCFC&WCD's mitigation requirements, proposed basins must provide a minimum volume as shown in Table 4 above. The following table summarizes the actual sizes of basin provided on the Project Site:

Table 5. Proposed Detention Basin Volumes Provided

Drainage Area Name	Detention Basins	Storage Volume Provided (Ac-ft)	Minium Volume of Basins Required (Ac-ft)
A	A11	0.33	
	A12	0.47	
Net Volume Provided		***0.8***	0.7
H	H	0.33	0.3

Basin sizing calculations can be found in Section 4 – Existing Condition & Proposed Condition Hydrology Unit Hydrograph Analysis.

H. FLOOD DELINATION OF EXISTING DRAINGE SWALE

The existing swale running though the project site in Drainage Area A and the proposed roadway/culvert crossing were analyzed to determine the extent of the floorplan and the performance of the proposed road/culvert crossing using HEC-RAS software. Cross sections of the existing swale were developed and imported into the HEC-RAS Model. A 8' (W) x 2' (H) box culvert and the roadway embankment was added to the model. Peak flows of 200 cfs (100-year Storm) and 111 cfs (10-year Storm) as determined from node 110.5 of the Rational Analysis were used to run the HEC-RAS Model.

The results of the HEC-RAS model indicate that during the 100-year storm 134 cfs will pass below the proposed roadway within the 8' (W) x 2' (H) box culvert. The remaining flow of 66 cfs will pass over the proposed roadway at a maximum depth of 8", an average velocity of 2.1 fps, and a spread of 95'. The results of the model also indicated that entire 10-year peak flow (111 cfs) will pass below the roadway within the proposed culvert with no flow crossing the roadway.

The results of this HEC-RAS analysis can be found in Section 5 – HEC-RAS Analysis.

I. CONCLUSION

The proposed drainage improvements along with the three detention basin will provide adequate on-site flood protection and mitigate off-site impacts in conformance with RCFC&WCD's criteria.

SECTION 2
EXISTING CONDITION HYDROLOGY
RATIONAL METHOD ANALYSIS

2 – YEAR RATIONAL METHOD CALCULATIONS
(ALL DRAINAGE AREAS A THROUGH AREA J)

```
                    Riverside County Rational Hydrology Program

      CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
              Rational Hydrology Study        Date: 10/17/23
File:CRESCENTEX2.out
      ---------------------------------------------------------------------------
      Crescent Gardens
      Existing Conditon Hydrology
      AREAS A THROUGH J
      10/17/23
      ---------------------------------------------------------------------------
       *********   Hydrology Study Control Information **********

       English (in-lb) Units used in input data file

      ---------------------------------------------------------------------------


      Program License Serial Number 6406

      ---------------------------------------------------------------------------
      Rational Method Hydrology Program based on
      Riverside County Flood Control & Water Conservation District
      1978 hydrology manual

      Storm event (year) =    2.00 Antecedent Moisture Condition = 1

      2 year, 1 hour precipitation =  0.486(In.)
      100 year, 1 hour precipitation =  1.440(In.)

      Storm event year =   2.0
      Calculated rainfall intensity data:
      1 hour intensity =  0.486(In/Hr)
      Slope of intensity duration curve = 0.4500




      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
      Process from Point/Station      100.000 to Point/Station      101.000
      **** INITIAL AREA EVALUATION ****
      ----------------------------------------------------------------------
      Initial area flow distance =   894.400(Ft.)
      Top (of initial area) elevation =  1694.000(Ft.)
      Bottom (of initial area) elevation =  1665.000(Ft.)
      Difference in elevation =    29.000(Ft.)
      Slope =    0.03242  s(percent)=       3.24
      TC = k(0.480)*[(length^3)/(elevation change)]^0.2
      Initial area time of concentration =   14.444 min.
      Rainfall intensity =      0.922(In/Hr) for a     2.0 year storm
      SINGLE FAMILY (1 Acre Lot)
      Runoff Coefficient = 0.265
      Decimal fraction soil group A = 1.000
      Decimal fraction soil group B = 0.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 0.000
      RI index for soil(AMC 1)  =  16.20
      Pervious area fraction =  0.800; Impervious fraction =  0.200
```

Area A

```
      Initial subarea runoff =      0.826(CFS)
      Total initial stream area =       3.380(Ac.)
      Pervious area fraction = 0.800


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
      Process from Point/Station      101.000 to Point/Station      102.000
      **** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
      ----------------------------------------------------------------------
      Estimated mean flow rate at midpoint of channel =      4.341(CFS)
      Depth of flow =   0.290(Ft.), Average velocity =   4.564(Ft/s)
             ******* Irregular Channel Data ***********
      ----------------------------------------------------------------------
      Information entered for subchannel number 1 :
      Point number      'X' coordinate     'Y' coordinate
             1              0.00              3.49
             2              6.98              0.00
             3             11.98              0.25
             4             23.98              0.49
      Manning's 'N' friction factor =   0.015
      ----------------------------------------------------------------------
      Sub-Channel flow  =      4.341(CFS)
        '     '         flow top width =      7.594(Ft.)
        '     '    velocity=    4.564(Ft/s)
        '     '         area =      0.951(Sq.Ft)
        '     '         Froude number =     2.273

      Upstream point elevation =  1665.000(Ft.)
      Downstream point elevation =  1638.000(Ft.)
      Flow length =   786.700(Ft.)
      Travel time  =    2.87 min.
      Time of concentration =   17.32 min.
      Depth of flow =   0.290(Ft.)
      Average velocity =   4.564(Ft/s)
      Total irregular channel flow =     4.341(CFS)
      Irregular channel normal depth above invert elev. =   0.290(Ft.)
      Average velocity of channel(s) =   4.564(Ft/s)
       Adding area flow to channel
      SINGLE FAMILY (1 Acre Lot)
      Runoff Coefficient = 0.510
      Decimal fraction soil group A = 0.000
      Decimal fraction soil group B = 0.000
      Decimal fraction soil group C = 0.000
      Decimal fraction soil group D = 1.000
      RI index for soil(AMC 1)  =  57.00
      Pervious area fraction =  0.800; Impervious fraction =  0.200
      Rainfall intensity =      0.850(In/Hr) for a     2.0 year storm
      Subarea runoff =      7.130(CFS) for     16.450(Ac.)
      Total runoff =      7.956(CFS)    Total area =      19.830(Ac.)
      Depth of flow =   0.359(Ft.), Average velocity =   4.988(Ft/s)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
      Process from Point/Station      102.000 to Point/Station      103.000
      **** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
      ----------------------------------------------------------------------
      Top of natural channel elevation =   1638.000(Ft.)
      End of natural channel elevation =   1614.000(Ft.)
      Length of natural channel  =  1328.900(Ft.)
      Estimated mean flow rate at midpoint of channel =     13.665(CFS)
```

```
Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.64(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0181
Corrected/adjusted channel slope =  0.0181
Travel time =    6.09 min.     TC =   23.40  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.473
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.080
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.920
RI index for soil(AMC 1)  =  59.40
Pervious area fraction =  0.860; Impervious fraction =  0.140
Rainfall intensity =      0.742(In/Hr) for a     2.0 year storm
Subarea runoff =     10.004(CFS) for     28.460(Ac.)
Total runoff =     17.959(CFS)     Total area =      48.290(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------
Upstream point/station elevation =  1614.000(Ft.)
Downstream point/station elevation =  1612.000(Ft.)
Pipe length  =   182.60(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    17.959(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    17.959(CFS)
Normal flow depth in pipe =   15.63(In.)
Flow top width inside pipe =   22.87(In.)
Critical Depth =   18.32(In.)
Pipe flow velocity =      8.29(Ft/s)
Travel time through pipe =    0.37 min.
Time of concentration (TC) =    23.77 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      105.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
----------------------------------------------------------------------
Depth of flow =   1.066(Ft.), Average velocity =   3.160(Ft/s)
      ******* Irregular Channel Data ***********
----------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1             0.00             3.00
        2            15.00             0.00
        3            30.00             3.00
Manning's 'N' friction factor =   0.035
----------------------------------------------------------------------
Sub-Channel flow  =     17.959(CFS)
  '     '         flow top width =     10.661(Ft.)
  '     '    velocity=    3.160(Ft/s)
  '     '         area =      5.683(Sq.Ft)
  '     '         Froude number =     0.763

Upstream point elevation =  1612.000(Ft.)
Downstream point elevation =  1611.000(Ft.)
Flow length =    76.000(Ft.)
Travel time  =    0.40 min.
Time of concentration =   24.17 min.
Depth of flow =   1.066(Ft.)
Average velocity =   3.160(Ft/s)
Total irregular channel flow =    17.959(CFS)
Irregular channel normal depth above invert elev. =   1.066(Ft.)
Average velocity of channel(s) =   3.160(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      106.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------
Upstream point/station elevation =  1611.000(Ft.)
Downstream point/station elevation =  1610.000(Ft.)
Pipe length  =    70.90(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    17.959(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    17.959(CFS)
Normal flow depth in pipe =   16.41(In.)
Flow top width inside pipe =   17.36(In.)
Critical Depth =   18.52(In.)
Pipe flow velocity =      8.91(Ft/s)
Travel time through pipe =    0.13 min.
Time of concentration (TC) =    24.30 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      106.000 to Point/Station      107.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
----------------------------------------------------------------------
Depth of flow =   0.993(Ft.), Average velocity =   3.644(Ft/s)
      ******* Irregular Channel Data ***********
----------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1             0.00             3.00
        2            15.00             0.00
        3            30.00             3.00
Manning's 'N' friction factor =   0.035
----------------------------------------------------------------------
Sub-Channel flow  =     17.959(CFS)
  '     '         flow top width =      9.928(Ft.)
  '     '    velocity=    3.644(Ft/s)
  '     '         area =      4.928(Sq.Ft)
  '     '         Froude number =     0.912

Upstream point elevation =  1610.000(Ft.)
Downstream point elevation =  1604.500(Ft.)
Flow length =   285.800(Ft.)
Travel time  =    1.31 min.
Time of concentration =   25.61 min.
```

```
Depth of flow =   0.993(Ft.)
Average velocity =   3.644(Ft/s)
Total irregular channel flow =    17.959(CFS)
Irregular channel normal depth above invert elev. =   0.993(Ft.)
Average velocity of channel(s) =   3.644(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      107.000 to Point/Station      107.000
**** CONFLUENCE OF MAIN STREAMS ****
----------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     48.290(Ac.)
Runoff from this stream =     17.959(CFS)
Time of concentration =   25.61 min.
Rainfall intensity =     0.713(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      200.000 to Point/Station      201.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------------
Initial area flow distance =   811.600(Ft.)
Top (of initial area) elevation =  1650.000(Ft.)
Bottom (of initial area) elevation =  1631.000(Ft.)
Difference in elevation =    19.000(Ft.)
Slope =    0.02341  s(percent)=       2.34
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.828 min.
Rainfall intensity =      0.912(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.522
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  57.00
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      3.285(CFS)
Total initial stream area =        6.900(Ac.)
Pervious area fraction = 0.800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Process from Point/Station      201.000 to Point/Station      202.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------------
Top of natural channel elevation =   1631.000(Ft.)
End of natural channel elevation =   1613.000(Ft.)
Length of natural channel  =   872.300(Ft.)
Estimated mean flow rate at midpoint of channel =      5.638(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.12(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0206
Corrected/adjusted channel slope =  0.0206
Travel time =    4.66 min.     TC =   19.49  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.504
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  59.40
Pervious area fraction =  0.830; Impervious fraction =  0.170
Rainfall intensity =      0.806(In/Hr) for a     2.0 year storm
Subarea runoff =      4.011(CFS) for      9.880(Ac.)
Total runoff =      7.296(CFS)    Total area =      16.780(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      202.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 1
Stream flow area =     16.780(Ac.)
Runoff from this stream =      7.296(CFS)
Time of concentration =   19.49 min.
Rainfall intensity =     0.806(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      210.000 to Point/Station      211.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------------
Initial area flow distance =   742.800(Ft.)
Top (of initial area) elevation =  1641.000(Ft.)
Bottom (of initial area) elevation =  1622.000(Ft.)
Difference in elevation =    19.000(Ft.)
Slope =    0.02558  s(percent)=       2.56
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.061 min.
Rainfall intensity =      0.934(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.527
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  57.00
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      0.664(CFS)
Total initial stream area =        1.350(Ac.)
Pervious area fraction = 0.800


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      211.000 to Point/Station      202.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
----------------------------------------------------------------------------
```

```
Depth of flow =   0.163(Ft.), Average velocity =   1.248(Ft/s)
       ******* Irregular Channel Data ***********
--------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              3.00
        2             60.00              0.00
        3            120.00              3.00
Manning's 'N' friction factor =   0.035
--------------------------------------------------------------------
Sub-Channel flow  =      0.664(CFS)
  '     '          flow top width =      6.524(Ft.)
  '     '    velocity=    1.248(Ft/s)
  '     '          area =      0.532(Sq.Ft)
  '     '          Froude number =     0.770

Upstream point elevation =  1622.000(Ft.)
Downstream point elevation =  1613.000(Ft.)
Flow length =   368.000(Ft.)
Travel time  =    4.92 min.
Time of concentration =   18.98 min.
Depth of flow =   0.163(Ft.)
Average velocity =   1.248(Ft/s)
Total irregular channel flow =     0.664(CFS)
Irregular channel normal depth above invert elev. =   0.163(Ft.)
Average velocity of channel(s) =   1.248(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      202.000
**** CONFLUENCE OF MINOR STREAMS ****
--------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      1.350(Ac.)
Runoff from this stream =      0.664(CFS)
Time of concentration =   18.98 min.
Rainfall intensity =     0.816(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        7.296     19.49                0.806
2        0.664     18.98                0.816
Largest stream flow has longer time of concentration
Qp =      7.296 + sum of
          Qb         Ia/Ib
           0.664 *    0.988 =      0.656
Qp =      7.952

Total of 2 streams to confluence:
Flow rates before confluence point:
       7.296       0.664
Area of streams before confluence:
      16.780       1.350
Results of confluence:
Total flow rate =      7.952(CFS)
Time of concentration =    19.491 min.
Effective stream area after confluence =     18.130(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      107.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
--------------------------------------------------------------------
Depth of flow =   0.707(Ft.), Average velocity =   3.185(Ft/s)
       ******* Irregular Channel Data ***********
--------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              3.00
        2             15.00              0.00
        3             30.00              3.00
Manning's 'N' friction factor =   0.035
--------------------------------------------------------------------
Sub-Channel flow  =      7.952(CFS)
  '     '          flow top width =      7.066(Ft.)
  '     '    velocity=    3.185(Ft/s)
  '     '          area =      2.497(Sq.Ft)
  '     '          Froude number =     0.944

Upstream point elevation =  1613.000(Ft.)
Downstream point elevation =  1604.500(Ft.)
Flow length =   367.500(Ft.)
Travel time  =    1.92 min.
Time of concentration =   21.41 min.
Depth of flow =   0.707(Ft.)
Average velocity =   3.185(Ft/s)
Total irregular channel flow =     7.952(CFS)
Irregular channel normal depth above invert elev. =   0.707(Ft.)
Average velocity of channel(s) =   3.185(Ft/s)


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Process from Point/Station      107.000 to Point/Station      107.000
**** CONFLUENCE OF MAIN STREAMS ****
--------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     18.130(Ac.)
Runoff from this stream =      7.952(CFS)
Time of concentration =   21.41 min.
Rainfall intensity =     0.773(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       17.959     25.61           0.713
2        7.952     21.41           0.773
Largest stream flow has longer time of concentration
Qp =     17.959 + sum of
           Qb         Ia/Ib
            7.952 *    0.923 =      7.337
Qp =     25.296

Total of 2 main streams to confluence:
Flow rates before confluence point:
```

```
     17.959       7.952
Area of streams before confluence:
      48.290       18.130


Results of confluence:
Total flow rate =     25.296(CFS)
Time of concentration =    25.610 min.
Effective stream area after confluence  =     66.420(Ac.)


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Process from Point/Station      107.000 to Point/Station      108.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------
Top of natural channel elevation =   1604.500(Ft.)
End of natural channel elevation =   1600.000(Ft.)
Length of natural channel  =   465.800(Ft.)
Estimated mean flow rate at midpoint of channel =     27.684(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.22(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0097
Corrected/adjusted channel slope =  0.0097
Travel time =    2.41 min.     TC =   28.02  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.426
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.300
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.700
RI index for soil(AMC 1)  =  56.64
Pervious area fraction =  0.880; Impervious fraction =  0.120
Rainfall intensity =      0.685(In/Hr) for a     2.0 year storm
Subarea runoff =      3.657(CFS) for     12.540(Ac.)
Total runoff =     28.953(CFS)     Total area =      78.960(Ac.)


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Process from Point/Station      108.000 to Point/Station      109.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------
Upstream point/station elevation =  1600.000(Ft.)
Downstream point/station elevation =  1599.000(Ft.)
Pipe length  =    52.70(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    28.953(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    28.953(CFS)
Normal flow depth in pipe =   18.28(In.)
Flow top width inside pipe =   20.45(In.)
Critical Depth =   22.14(In.)
Pipe flow velocity =     11.26(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    28.10 min.


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Process from Point/Station      109.000 to Point/Station      110.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
----------------------------------------------------------------------
Depth of flow =   1.158(Ft.), Average velocity =   4.316(Ft/s)
      ******* Irregular Channel Data ***********
----------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              3.00
        2             15.00              0.00
        3             30.00              3.00
Manning's 'N' friction factor =   0.035
----------------------------------------------------------------------
Sub-Channel flow  =     28.953(CFS)
  '     '         flow top width =     11.583(Ft.)
  '     '    velocity=    4.316(Ft/s)
  '     '         area =      6.708(Sq.Ft)
  '     '         Froude number =     1.000

Upstream point elevation =  1599.000(Ft.)
Downstream point elevation =  1586.000(Ft.)
Flow length =   591.500(Ft.)
Travel time  =    2.28 min.
Time of concentration =   30.38 min.
Depth of flow =   1.158(Ft.)
Average velocity =   4.316(Ft/s)
Total irregular channel flow =    28.953(CFS)
Irregular channel normal depth above invert elev. =   1.158(Ft.)
Average velocity of channel(s) =   4.316(Ft/s)


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Process from Point/Station      110.000 to Point/Station      110.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     78.960(Ac.)
Runoff from this stream =     28.953(CFS)
Time of concentration =   30.38 min.
Rainfall intensity =     0.660(In/Hr)


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Process from Point/Station      300.000 to Point/Station      301.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------
Initial area flow distance =   527.800(Ft.)
Top (of initial area) elevation =  1635.000(Ft.)
Bottom (of initial area) elevation =  1623.000(Ft.)
Difference in elevation =    12.000(Ft.)
Slope =    0.02274  s(percent)=       2.27
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.865 min.
Rainfall intensity =      0.940(In/Hr) for a     2.0 year storm
UNDEVELOPED (poor cover) subarea
```

```
Runoff Coefficient = 0.626
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  76.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      1.587(CFS)
Total initial stream area =       2.700(Ac.)
Pervious area fraction = 1.000


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Process from Point/Station      301.000 to Point/Station      302.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
Top of natural channel elevation =   1623.000(Ft.)
End of natural channel elevation =   1608.000(Ft.)
Length of natural channel  =   715.100(Ft.)
Estimated mean flow rate at midpoint of channel =      3.445(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   2.80(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0210
Corrected/adjusted channel slope =  0.0210
Travel time =    4.25 min.     TC =   18.11  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.602
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  76.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.833(In/Hr) for a     2.0 year storm
Subarea runoff =      3.171(CFS) for      6.320(Ac.)
Total runoff =      4.758(CFS)     Total area =      9.020(Ac.)


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Process from Point/Station      302.000 to Point/Station      110.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
Top of natural channel elevation =   1608.000(Ft.)
End of natural channel elevation =   1586.000(Ft.)
Length of natural channel  =  1275.000(Ft.)
Estimated mean flow rate at midpoint of channel =      9.161(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.21(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0173
Corrected/adjusted channel slope =  0.0173
Travel time =    6.62 min.     TC =   24.73  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.485
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.210
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.790
RI index for soil(AMC 1)  =  64.68
Pervious area fraction =  0.920; Impervious fraction =  0.080
Rainfall intensity =      0.724(In/Hr) for a     2.0 year storm
Subarea runoff =      5.860(CFS) for     16.690(Ac.)
Total runoff =     10.619(CFS)     Total area =      25.710(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      110.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     25.710(Ac.)
Runoff from this stream =     10.619(CFS)
Time of concentration =   24.73 min.
Rainfall intensity =     0.724(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       28.953     30.38                 0.660
2       10.619     24.73                 0.724
Largest stream flow has longer time of concentration
Qp =     28.953 + sum of
           Qb         Ia/Ib
           10.619 *    0.912 =      9.680
Qp =     38.633

Total of 2 streams to confluence:
Flow rates before confluence point:
      28.953      10.619
Area of streams before confluence:
       78.960       25.710
Results of confluence:
Total flow rate =     38.633(CFS)
Time of concentration =    30.383 min.
Effective stream area after confluence =    104.670(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      111.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
```

```
Top of natural channel elevation =   1586.000(Ft.)
End of natural channel elevation =   1562.200(Ft.)
Length of natural channel  =   769.100(Ft.)
Estimated mean flow rate at midpoint of channel =     41.447(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   6.45(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0309
Corrected/adjusted channel slope =  0.0309
Travel time =    1.99 min.     TC =   32.37  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.548
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  76.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.642(In/Hr) for a     2.0 year storm
Subarea runoff =      5.363(CFS) for     15.250(Ac.)
Total runoff =     43.995(CFS)     Total area =     119.920(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      310.000 to Point/Station      311.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------
Initial area flow distance =   545.200(Ft.)
Top (of initial area) elevation =  1642.000(Ft.)
Bottom (of initial area) elevation =  1621.000(Ft.)
Difference in elevation =    21.000(Ft.)
Slope =    0.03852  s(percent)=       3.85
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.641 min.
Rainfall intensity =      0.980(In/Hr) for a     2.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.634
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  76.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      0.999(CFS)
Total initial stream area =        1.610(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      311.000 to Point/Station      312.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------
```

Area A

Area B

```
Top of natural channel elevation =   1621.000(Ft.)
End of natural channel elevation =   1607.000(Ft.)
Length of natural channel  =   534.000(Ft.)
Estimated mean flow rate at midpoint of channel =      1.620(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   2.67(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0262
Corrected/adjusted channel slope =  0.0262
Travel time =    3.34 min.     TC =   15.98  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.465
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.770
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.230
RI index for soil(AMC 1)  =  61.80
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.882(In/Hr) for a     2.0 year storm
Subarea runoff =      0.820(CFS) for      2.000(Ac.)
Total runoff =      1.819(CFS)     Total area =      3.610(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      320.000 to Point/Station      321.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------
Initial area flow distance =   543.400(Ft.)
Top (of initial area) elevation =  1613.000(Ft.)
Bottom (of initial area) elevation =  1604.000(Ft.)
Difference in elevation =     9.000(Ft.)
Slope =    0.01656  s(percent)=       1.66
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.945 min.
Rainfall intensity =      0.908(In/Hr) for a     2.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.481
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.840
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.160
RI index for soil(AMC 1)  =  62.71
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      1.008(CFS)
Total initial stream area =        2.310(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      510.000 to Point/Station      511.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------
```

Area C

```
Initial area flow distance =   268.700(Ft.)
Top (of initial area) elevation =  1630.500(Ft.)
Bottom (of initial area) elevation =  1614.000(Ft.)
Difference in elevation =    16.500(Ft.)
Slope =    0.06141  s(percent)=       6.14
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.676 min.
Rainfall intensity =      1.160(In/Hr) for a     2.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.664
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  76.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      1.071(CFS)
Total initial stream area =        1.390(Ac.)
Pervious area fraction = 1.000
```

Area D

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      500.000 to Point/Station      501.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Initial area flow distance =   658.400(Ft.)
Top (of initial area) elevation =  1653.000(Ft.)
Bottom (of initial area) elevation =  1605.000(Ft.)
Difference in elevation =    48.000(Ft.)
Slope =    0.07290  s(percent)=       7.29
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.998 min.
Rainfall intensity =      1.003(In/Hr) for a     2.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.638
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  76.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      2.175(CFS)
Total initial stream area =        3.400(Ac.)
Pervious area fraction = 1.000
```

Area E

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      501.000 to Point/Station      502.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
Top of natural channel elevation =   1605.000(Ft.)
End of natural channel elevation =   1576.000(Ft.)
Length of natural channel  =  1342.600(Ft.)
Estimated mean flow rate at midpoint of channel =     10.898(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.75(Ft/s)
Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0216
Corrected/adjusted channel slope =  0.0216
Travel time =    5.96 min.     TC =   17.96  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.551
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.400
Decimal fraction soil group D = 0.600
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.836(In/Hr) for a     2.0 year storm
Subarea runoff =     12.575(CFS) for     27.270(Ac.)
Total runoff =     14.750(CFS)     Total area =      30.670(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      400.000 to Point/Station      401.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Initial area flow distance =   456.800(Ft.)
Top (of initial area) elevation =  1598.000(Ft.)
Bottom (of initial area) elevation =  1566.000(Ft.)
Difference in elevation =    32.000(Ft.)
Slope =    0.07005  s(percent)=       7.01
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.449 min.
Rainfall intensity =      1.067(In/Hr) for a     2.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.649
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  76.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      1.836(CFS)
Total initial stream area =        2.650(Ac.)
Pervious area fraction = 1.000
```

Area G

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      401.000 to Point/Station      402.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
Top of natural channel elevation =   1566.000(Ft.)
End of natural channel elevation =   1544.500(Ft.)
Length of natural channel  =   997.100(Ft.)
Estimated mean flow rate at midpoint of channel =      6.805(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.34(Ft/s)
```

```
Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0216
Corrected/adjusted channel slope =  0.0216
Travel time =    4.98 min.     TC =   15.43  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.616
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  76.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.895(In/Hr) for a     2.0 year storm
Subarea runoff =      7.915(CFS) for     14.340(Ac.)
Total runoff =      9.751(CFS)     Total area =      16.990(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      600.000 to Point/Station      601.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------
Initial area flow distance =   850.600(Ft.)
Top (of initial area) elevation =  1665.000(Ft.)
Bottom (of initial area) elevation =  1575.000(Ft.)
Difference in elevation =    90.000(Ft.)
Slope =    0.10581  s(percent)=      10.58
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.339 min.
Rainfall intensity =      0.990(In/Hr) for a     2.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.633
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.060
Decimal fraction soil group D = 0.940
RI index for soil(AMC 1)  =  76.11
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      2.318(CFS)
Total initial stream area =       3.700(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      601.000 to Point/Station      602.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------
Top of natural channel elevation =   1575.000(Ft.)
End of natural channel elevation =   1540.000(Ft.)
Length of natural channel  =  1005.700(Ft.)
Estimated mean flow rate at midpoint of channel =      9.478(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.60(Ft/s)
```

Area F

```
Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0348
Corrected/adjusted channel slope =  0.0348
Travel time =    3.64 min.     TC =   15.98  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.608
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.100
Decimal fraction soil group D = 0.900
RI index for soil(AMC 1)  =  75.92
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.881(In/Hr) for a     2.0 year storm
Subarea runoff =     12.254(CFS) for     22.860(Ac.)
Total runoff =     14.572(CFS)     Total area =      26.560(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      610.000 to Point/Station      611.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------
Initial area flow distance =   680.600(Ft.)
Top (of initial area) elevation =  1570.000(Ft.)
Bottom (of initial area) elevation =  1541.000(Ft.)
Difference in elevation =    29.000(Ft.)
Slope =    0.04261  s(percent)=       4.26
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.537 min.
Rainfall intensity =      0.950(In/Hr) for a     2.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.628
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  76.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      2.719(CFS)
Total initial stream area =       4.560(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      630.000 to Point/Station      631.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------
Initial area flow distance =   881.300(Ft.)
Top (of initial area) elevation =  1576.000(Ft.)
Bottom (of initial area) elevation =  1540.000(Ft.)
Difference in elevation =    36.000(Ft.)
Slope =    0.04085  s(percent)=       4.08
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.139 min.
Rainfall intensity =      0.903(In/Hr) for a     2.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.618
```

Area H

Area I

```
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  76.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      2.255(CFS)
Total initial stream area =        4.040(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      620.000 to Point/Station      621.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Initial area flow distance =   325.800(Ft.)
Top (of initial area) elevation =  1571.000(Ft.)
Bottom (of initial area) elevation =  1537.000(Ft.)
Difference in elevation =    34.000(Ft.)
Slope =    0.10436  s(percent)=      10.44
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.429 min.
Rainfall intensity =      1.175(In/Hr) for a     2.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.666
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  76.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      1.332(CFS)
Total initial stream area =        1.700(Ac.)
Pervious area fraction = 1.000
End of computations, total study area =          211.75 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.933
Area averaged RI index number =  82.2
```

Area J

10 – YEAR RATIONAL METHOD CALCULATIONS
(ALL DRAINAGE AREAS A THROUGH AREA J)

```
                    Riverside County Rational Hydrology Program

        CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
                Rational Hydrology Study        Date: 10/17/23
File:CRESCENTEX10.out
        ------------------------------------------------------------------------
        Crescent Gardens
        Existing Conditon Hydrology
        AREAS A THROUGH J
        10/17/23
        ------------------------------------------------------------------------
         *********   Hydrology Study Control Information **********

         English (in-lb) Units used in input data file

        ------------------------------------------------------------------------


        Program License Serial Number 6406

        ------------------------------------------------------------------------
        Rational Method Hydrology Program based on
        Riverside County Flood Control & Water Conservation District
        1978 hydrology manual

        Storm event (year) =   10.00 Antecedent Moisture Condition = 2

        2 year, 1 hour precipitation =  0.486(In.)
        100 year, 1 hour precipitation =  1.440(In.)

        Storm event year =  10.0
        Calculated rainfall intensity data:
        1 hour intensity =  0.878(In/Hr)
        Slope of intensity duration curve = 0.4500




        ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
        Process from Point/Station      100.000 to Point/Station      101.000
        **** INITIAL AREA EVALUATION ****
        ______________________________________________________________________
        Initial area flow distance =   894.400(Ft.)
        Top (of initial area) elevation =  1694.000(Ft.)
        Bottom (of initial area) elevation =  1665.000(Ft.)
        Difference in elevation =    29.000(Ft.)
        Slope =    0.03242  s(percent)=       3.24
        TC = k(0.480)*[(length^3)/(elevation change)]^0.2
        Initial area time of concentration =   14.444 min.
        Rainfall intensity =      1.667(In/Hr) for a    10.0 year storm
        SINGLE FAMILY (1 Acre Lot)
        Runoff Coefficient = 0.447
        Decimal fraction soil group A = 1.000
        Decimal fraction soil group B = 0.000
        Decimal fraction soil group C = 0.000
        Decimal fraction soil group D = 0.000
        RI index for soil(AMC 2)  =  32.00
        Pervious area fraction =  0.800; Impervious fraction =  0.200
```

Area A

```
        Initial subarea runoff =      2.518(CFS)
        Total initial stream area =        3.380(Ac.)
        Pervious area fraction = 0.800


        ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
        Process from Point/Station      101.000 to Point/Station      102.000
        **** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
        ______________________________________________________________________
        Estimated mean flow rate at midpoint of channel =     11.953(CFS)
        Depth of flow =   0.408(Ft.), Average velocity =   5.404(Ft/s)
                ******* Irregular Channel Data ***********
        ------------------------------------------------------------------
        Information entered for subchannel number 1 :
        Point number      'X' coordinate     'Y' coordinate
                1              0.00              3.49
                2              6.98              0.00
                3             11.98              0.25
                4             23.98              0.49
        Manning's 'N' friction factor =   0.015
        ------------------------------------------------------------------
        Sub-Channel flow  =     11.953(CFS)
          '     '         flow top width =     13.740(Ft.)
          '     '    velocity=    5.404(Ft/s)
          '     '         area =      2.212(Sq.Ft)
          '     '         Froude number =     2.373

        Upstream point elevation =  1665.000(Ft.)
        Downstream point elevation =  1638.000(Ft.)
        Flow length =   786.700(Ft.)
        Travel time  =    2.43 min.
        Time of concentration =   16.87 min.
        Depth of flow =   0.408(Ft.)
        Average velocity =   5.404(Ft/s)
        Total irregular channel flow =    11.953(CFS)
        Irregular channel normal depth above invert elev. =   0.408(Ft.)
        Average velocity of channel(s) =   5.404(Ft/s)
         Adding area flow to channel
        SINGLE FAMILY (1 Acre Lot)
        Runoff Coefficient = 0.740
        Decimal fraction soil group A = 0.000
        Decimal fraction soil group B = 0.000
        Decimal fraction soil group C = 0.000
        Decimal fraction soil group D = 1.000
        RI index for soil(AMC 2)  =  75.00
        Pervious area fraction =  0.800; Impervious fraction =  0.200
        Rainfall intensity =      1.555(In/Hr) for a    10.0 year storm
        Subarea runoff =     18.926(CFS) for     16.450(Ac.)
        Total runoff =     21.444(CFS)     Total area =      19.830(Ac.)
        Depth of flow =   0.489(Ft.), Average velocity =   6.137(Ft/s)


        ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
        Process from Point/Station      102.000 to Point/Station      103.000
        **** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
        ______________________________________________________________________
        Top of natural channel elevation =   1638.000(Ft.)
        End of natural channel elevation =   1614.000(Ft.)
        Length of natural channel  =  1328.900(Ft.)
        Estimated mean flow rate at midpoint of channel =     36.832(CFS)
```

```
Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.77(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0181
Corrected/adjusted channel slope =  0.0181
Travel time =    4.65 min.     TC =   21.52  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.728
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.080
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.920
RI index for soil(AMC 2)  =  77.00
Pervious area fraction =  0.860; Impervious fraction =  0.140
Rainfall intensity =      1.394(In/Hr) for a    10.0 year storm
Subarea runoff =     28.874(CFS) for     28.460(Ac.)
Total runoff =     50.318(CFS)     Total area =      48.290(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1614.000(Ft.)
Downstream point/station elevation =  1612.000(Ft.)
Pipe length  =   182.60(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    50.318(CFS)
Nearest computed pipe diameter  =     33.00(In.)
Calculated individual pipe flow  =    50.318(CFS)
Normal flow depth in pipe =   24.70(In.)
Flow top width inside pipe =   28.63(In.)
Critical Depth =   28.00(In.)
Pipe flow velocity =     10.56(Ft/s)
Travel time through pipe =    0.29 min.
Time of concentration (TC) =    21.80 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      105.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Depth of flow =   1.569(Ft.), Average velocity =   4.089(Ft/s)
       ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1             0.00             3.00
        2            15.00             0.00
        3            30.00             3.00
Manning's 'N' friction factor =   0.035
------------------------------------------------------------------
Sub-Channel flow  =     50.318(CFS)
  '     '         flow top width =     15.689(Ft.)
  '     '    velocity=    4.089(Ft/s)
  '     '         area =     12.307(Sq.Ft)
  '     '         Froude number =     0.814

Upstream point elevation =  1612.000(Ft.)
Downstream point elevation =  1611.000(Ft.)
Flow length =    76.000(Ft.)
Travel time  =    0.31 min.
Time of concentration =   22.11 min.
Depth of flow =   1.569(Ft.)
Average velocity =   4.089(Ft/s)
Total irregular channel flow =    50.318(CFS)
Irregular channel normal depth above invert elev. =   1.569(Ft.)
Average velocity of channel(s) =   4.089(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      106.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1611.000(Ft.)
Downstream point/station elevation =  1610.000(Ft.)
Pipe length  =    70.90(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    50.318(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    50.318(CFS)
Normal flow depth in pipe =   25.59(In.)
Flow top width inside pipe =   21.24(In.)
Critical Depth =   27.63(In.)
Pipe flow velocity =     11.28(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =    22.22 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      106.000 to Point/Station      107.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Depth of flow =   1.461(Ft.), Average velocity =   4.715(Ft/s)
       ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1             0.00             3.00
        2            15.00             0.00
        3            30.00             3.00
Manning's 'N' friction factor =   0.035
------------------------------------------------------------------
Sub-Channel flow  =     50.318(CFS)
  '     '         flow top width =     14.609(Ft.)
  '     '    velocity=    4.715(Ft/s)
  '     '         area =     10.672(Sq.Ft)
  '     '         Froude number =     0.972

Upstream point elevation =  1610.000(Ft.)
Downstream point elevation =  1604.500(Ft.)
Flow length =   285.800(Ft.)
Travel time  =    1.01 min.
Time of concentration =   23.23 min.
```

```
Depth of flow =   1.461(Ft.)
Average velocity =   4.715(Ft/s)
Total irregular channel flow =    50.318(CFS)
Irregular channel normal depth above invert elev. =   1.461(Ft.)
Average velocity of channel(s) =   4.715(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      107.000 to Point/Station      107.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     48.290(Ac.)
Runoff from this stream =     50.318(CFS)
Time of concentration =   23.23 min.
Rainfall intensity =     1.346(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      200.000 to Point/Station      201.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   811.600(Ft.)
Top (of initial area) elevation =  1650.000(Ft.)
Bottom (of initial area) elevation =  1631.000(Ft.)
Difference in elevation =    19.000(Ft.)
Slope =    0.02341  s(percent)=       2.34
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.828 min.
Rainfall intensity =      1.648(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.747
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      8.494(CFS)
Total initial stream area =        6.900(Ac.)
Pervious area fraction = 0.800


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Process from Point/Station      201.000 to Point/Station      202.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1631.000(Ft.)
End of natural channel elevation =   1613.000(Ft.)
Length of natural channel  =   872.300(Ft.)
Estimated mean flow rate at midpoint of channel =     14.575(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.96(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0206
Corrected/adjusted channel slope =  0.0206
Travel time =    3.67 min.     TC =   18.50  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.743
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  77.00
Pervious area fraction =  0.830; Impervious fraction =  0.170
Rainfall intensity =      1.492(In/Hr) for a    10.0 year storm
Subarea runoff =     10.943(CFS) for      9.880(Ac.)
Total runoff =     19.437(CFS)     Total area =      16.780(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      202.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =     16.780(Ac.)
Runoff from this stream =     19.437(CFS)
Time of concentration =   18.50 min.
Rainfall intensity =     1.492(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      210.000 to Point/Station      211.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   742.800(Ft.)
Top (of initial area) elevation =  1641.000(Ft.)
Bottom (of initial area) elevation =  1622.000(Ft.)
Difference in elevation =    19.000(Ft.)
Slope =    0.02558  s(percent)=       2.56
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.061 min.
Rainfall intensity =      1.688(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.750
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      1.709(CFS)
Total initial stream area =        1.350(Ac.)
Pervious area fraction = 0.800


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Process from Point/Station      211.000 to Point/Station      202.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________________
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Depth of flow =   0.233(Ft.), Average velocity =   1.580(Ft/s)
       ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              3.00
        2             60.00              0.00
        3            120.00              3.00
Manning's 'N' friction factor =   0.035
------------------------------------------------------------------
Sub-Channel flow  =      1.709(CFS)
  '     '          flow top width =      9.300(Ft.)
  '     '    velocity=    1.580(Ft/s)
  '     '          area =      1.081(Sq.Ft)
  '     '          Froude number =     0.817

Upstream point elevation =  1622.000(Ft.)
Downstream point elevation =  1613.000(Ft.)
Flow length =   368.000(Ft.)
Travel time  =    3.88 min.
Time of concentration =   17.94 min.
Depth of flow =   0.233(Ft.)
Average velocity =   1.580(Ft/s)
Total irregular channel flow =     1.709(CFS)
Irregular channel normal depth above invert elev. =   0.233(Ft.)
Average velocity of channel(s) =   1.580(Ft/s)


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Process from Point/Station      202.000 to Point/Station      202.000
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      1.350(Ac.)
Runoff from this stream =      1.709(CFS)
Time of concentration =   17.94 min.
Rainfall intensity =     1.512(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       19.437     18.50                1.492
2        1.709     17.94                1.512
Largest stream flow has longer time of concentration
Qp =     19.437 + sum of
           Qb         Ia/Ib
            1.709 *    0.986 =      1.685
Qp =     21.122

Total of 2 streams to confluence:
Flow rates before confluence point:
      19.437       1.709
Area of streams before confluence:
       16.780        1.350
Results of confluence:
Total flow rate =     21.122(CFS)
Time of concentration =    18.503 min.
Effective stream area after confluence =     18.130(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      107.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
____________________________________________________________________
Depth of flow =   1.019(Ft.), Average velocity =   4.066(Ft/s)
       ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              3.00
        2             15.00              0.00
        3             30.00              3.00
Manning's 'N' friction factor =   0.035
------------------------------------------------------------------
Sub-Channel flow  =     21.122(CFS)
  '     '          flow top width =     10.193(Ft.)
  '     '    velocity=    4.066(Ft/s)
  '     '          area =      5.195(Sq.Ft)
  '     '          Froude number =     1.004

Upstream point elevation =  1613.000(Ft.)
Downstream point elevation =  1604.500(Ft.)
Flow length =   367.500(Ft.)
Travel time  =    1.51 min.
Time of concentration =   20.01 min.
Depth of flow =   1.019(Ft.)
Average velocity =   4.066(Ft/s)
Total irregular channel flow =    21.122(CFS)
Irregular channel normal depth above invert elev. =   1.019(Ft.)
Average velocity of channel(s) =   4.066(Ft/s)


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Process from Point/Station      107.000 to Point/Station      107.000
**** CONFLUENCE OF MAIN STREAMS ****
____________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     18.130(Ac.)
Runoff from this stream =     21.122(CFS)
Time of concentration =   20.01 min.
Rainfall intensity =     1.440(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       50.318     23.23           1.346
2       21.122     20.01           1.440
Largest stream flow has longer time of concentration
Qp =     50.318 + sum of
           Qb         Ia/Ib
           21.122 *    0.935 =     19.750
Qp =     70.068

Total of 2 main streams to confluence:
Flow rates before confluence point:
```

```
      50.318      21.122
Area of streams before confluence:
       48.290       18.130


Results of confluence:
Total flow rate =     70.068(CFS)
Time of concentration =    23.229 min.
Effective stream area after confluence  =     66.420(Ac.)


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Process from Point/Station      107.000 to Point/Station      108.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1604.500(Ft.)
End of natural channel elevation =   1600.000(Ft.)
Length of natural channel  =   465.800(Ft.)
Estimated mean flow rate at midpoint of channel =     76.683(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.31(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0097
Corrected/adjusted channel slope =  0.0097
Travel time =    1.80 min.     TC =   25.03  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.696
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.300
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.700
RI index for soil(AMC 2)  =  74.70
Pervious area fraction =  0.880; Impervious fraction =  0.120
Rainfall intensity =      1.302(In/Hr) for a    10.0 year storm
Subarea runoff =     11.364(CFS) for     12.540(Ac.)
Total runoff =     81.432(CFS)     Total area =      78.960(Ac.)


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Process from Point/Station      108.000 to Point/Station      109.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1600.000(Ft.)
Downstream point/station elevation =  1599.000(Ft.)
Pipe length  =    52.70(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    81.432(CFS)
Nearest computed pipe diameter  =     36.00(In.)
Calculated individual pipe flow  =    81.432(CFS)
Normal flow depth in pipe =   26.34(In.)
Flow top width inside pipe =   31.90(In.)
Critical Depth =   33.38(In.)
Pipe flow velocity =     14.68(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =    25.09 min.


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Process from Point/Station      109.000 to Point/Station      110.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Depth of flow =   1.707(Ft.), Average velocity =   5.590(Ft/s)
       ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              3.00
        2             15.00              0.00
        3             30.00              3.00
Manning's 'N' friction factor =   0.035
------------------------------------------------------------------
Sub-Channel flow  =     81.432(CFS)
  '     '         flow top width =     17.069(Ft.)
  '     '    velocity=    5.590(Ft/s)
  '     '         area =     14.568(Sq.Ft)
  '     '         Froude number =     1.066

Upstream point elevation =  1599.000(Ft.)
Downstream point elevation =  1586.000(Ft.)
Flow length =   591.500(Ft.)
Travel time  =    1.76 min.
Time of concentration =   26.85 min.
Depth of flow =   1.707(Ft.)
Average velocity =   5.590(Ft/s)
Total irregular channel flow =    81.432(CFS)
Irregular channel normal depth above invert elev. =   1.707(Ft.)
Average velocity of channel(s) =   5.590(Ft/s)


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Process from Point/Station      110.000 to Point/Station      110.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     78.960(Ac.)
Runoff from this stream =     81.432(CFS)
Time of concentration =   26.85 min.
Rainfall intensity =     1.261(In/Hr)


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Process from Point/Station      300.000 to Point/Station      301.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   527.800(Ft.)
Top (of initial area) elevation =  1635.000(Ft.)
Bottom (of initial area) elevation =  1623.000(Ft.)
Difference in elevation =    12.000(Ft.)
Slope =    0.02274  s(percent)=       2.27
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.865 min.
Rainfall intensity =      1.698(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
```

```
Runoff Coefficient = 0.820
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      3.762(CFS)
Total initial stream area =        2.700(Ac.)
Pervious area fraction = 1.000


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Process from Point/Station      301.000 to Point/Station      302.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1623.000(Ft.)
End of natural channel elevation =   1608.000(Ft.)
Length of natural channel  =   715.100(Ft.)
Estimated mean flow rate at midpoint of channel =      8.165(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.44(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0210
Corrected/adjusted channel slope =  0.0210
Travel time =    3.46 min.     TC =   17.33  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.813
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.536(In/Hr) for a    10.0 year storm
Subarea runoff =      7.891(CFS) for      6.320(Ac.)
Total runoff =     11.653(CFS)     Total area =       9.020(Ac.)


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Process from Point/Station      302.000 to Point/Station      110.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1608.000(Ft.)
End of natural channel elevation =   1586.000(Ft.)
Length of natural channel  =  1275.000(Ft.)
Estimated mean flow rate at midpoint of channel =     22.435(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.06(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0173
Corrected/adjusted channel slope =  0.0173
Travel time =    5.23 min.     TC =   22.56  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.747
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.210
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.790
RI index for soil(AMC 2)  =  81.20
Pervious area fraction =  0.920; Impervious fraction =  0.080
Rainfall intensity =      1.364(In/Hr) for a    10.0 year storm
Subarea runoff =     17.013(CFS) for     16.690(Ac.)
Total runoff =     28.666(CFS)     Total area =      25.710(Ac.)


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Process from Point/Station      110.000 to Point/Station      110.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     25.710(Ac.)
Runoff from this stream =     28.666(CFS)
Time of concentration =   22.56 min.
Rainfall intensity =     1.364(In/Hr)
Summary of stream data:

Stream   Flow rate      TC             Rainfall Intensity
 No.       (CFS)       (min)                  (In/Hr)


1       81.432     26.85                  1.261
2       28.666     22.56                  1.364
Largest stream flow has longer time of concentration
Qp =     81.432 + sum of
           Qb         Ia/Ib
           28.666 *    0.925 =     26.506
Qp =    107.938

Total of 2 streams to confluence:
Flow rates before confluence point:
      81.432      28.666
Area of streams before confluence:
       78.960       25.710
Results of confluence:
Total flow rate =    107.938(CFS)
Time of concentration =    26.854 min.
Effective stream area after confluence =    104.670(Ac.)


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Process from Point/Station      110.000 to Point/Station      111.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
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Top of natural channel elevation =   1586.000(Ft.)
End of natural channel elevation =   1562.200(Ft.)
Length of natural channel  =   769.100(Ft.)
Estimated mean flow rate at midpoint of channel =    115.801(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   8.73(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0309
Corrected/adjusted channel slope =  0.0309
Travel time =    1.47 min.     TC =   28.32  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.794
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.232(In/Hr) for a    10.0 year storm
Subarea runoff =     14.908(CFS) for     15.250(Ac.)
Total runoff =    122.846(CFS)     Total area =     119.920(Ac.)


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Process from Point/Station      310.000 to Point/Station      311.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   545.200(Ft.)
Top (of initial area) elevation =  1642.000(Ft.)
Bottom (of initial area) elevation =  1621.000(Ft.)
Difference in elevation =    21.000(Ft.)
Slope =    0.03852  s(percent)=       3.85
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.641 min.
Rainfall intensity =      1.771(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.823
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      2.347(CFS)
Total initial stream area =        1.610(Ac.)
Pervious area fraction = 1.000


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Process from Point/Station      311.000 to Point/Station      312.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
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Area A

Area B

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Top of natural channel elevation =   1621.000(Ft.)
End of natural channel elevation =   1607.000(Ft.)
Length of natural channel  =   534.000(Ft.)
Estimated mean flow rate at midpoint of channel =      3.805(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.21(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0262
Corrected/adjusted channel slope =  0.0262
Travel time =    2.78 min.     TC =   15.42  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.738
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.770
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.230
RI index for soil(AMC 2)  =  79.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.619(In/Hr) for a    10.0 year storm
Subarea runoff =      2.391(CFS) for      2.000(Ac.)
Total runoff =      4.738(CFS)     Total area =       3.610(Ac.)


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Process from Point/Station      320.000 to Point/Station      321.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   543.400(Ft.)
Top (of initial area) elevation =  1613.000(Ft.)
Bottom (of initial area) elevation =  1604.000(Ft.)
Difference in elevation =     9.000(Ft.)
Slope =    0.01656  s(percent)=       1.66
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.945 min.
Rainfall intensity =      1.642(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.746
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.840
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.160
RI index for soil(AMC 2)  =  79.76
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      2.831(CFS)
Total initial stream area =        2.310(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      510.000 to Point/Station      511.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
```

Area C

```
Initial area flow distance =   268.700(Ft.)
Top (of initial area) elevation =  1630.500(Ft.)
Bottom (of initial area) elevation =  1614.000(Ft.)
Difference in elevation =    16.500(Ft.)
Slope =    0.06141  s(percent)=       6.14
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.676 min.
Rainfall intensity =      2.097(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.834
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      2.433(CFS)
Total initial stream area =        1.390(Ac.)
Pervious area fraction = 1.000
```

Area D

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      500.000 to Point/Station      501.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------
Initial area flow distance =   658.400(Ft.)
Top (of initial area) elevation =  1653.000(Ft.)
Bottom (of initial area) elevation =  1605.000(Ft.)
Difference in elevation =    48.000(Ft.)
Slope =    0.07290  s(percent)=       7.29
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.998 min.
Rainfall intensity =      1.813(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.825
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      5.084(CFS)
Total initial stream area =        3.400(Ac.)
Pervious area fraction = 1.000
```

Area E

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      501.000 to Point/Station      502.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------
Top of natural channel elevation =   1605.000(Ft.)
End of natural channel elevation =   1576.000(Ft.)
Length of natural channel  =  1342.600(Ft.)
Estimated mean flow rate at midpoint of channel =     25.474(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.70(Ft/s)
```

```
Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0216
Corrected/adjusted channel slope =  0.0216
Travel time =    4.76 min.     TC =   16.76  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.790
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.400
Decimal fraction soil group D = 0.600
RI index for soil(AMC 2)  =  86.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.560(In/Hr) for a    10.0 year storm
Subarea runoff =     33.602(CFS) for     27.270(Ac.)
Total runoff =     38.687(CFS)     Total area =      30.670(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      400.000 to Point/Station      401.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------
Initial area flow distance =   456.800(Ft.)
Top (of initial area) elevation =  1598.000(Ft.)
Bottom (of initial area) elevation =  1566.000(Ft.)
Difference in elevation =    32.000(Ft.)
Slope =    0.07005  s(percent)=       7.01
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.449 min.
Rainfall intensity =      1.929(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.829
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      4.238(CFS)
Total initial stream area =        2.650(Ac.)
Pervious area fraction = 1.000
```

Area G

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      401.000 to Point/Station      402.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------
Top of natural channel elevation =   1566.000(Ft.)
End of natural channel elevation =   1544.500(Ft.)
Length of natural channel  =   997.100(Ft.)
Estimated mean flow rate at midpoint of channel =     15.706(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.12(Ft/s)
```

```
Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0216
Corrected/adjusted channel slope =  0.0216
Travel time =    4.03 min.     TC =   14.48  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.819
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.666(In/Hr) for a    10.0 year storm
Subarea runoff =     19.562(CFS) for     14.340(Ac.)
Total runoff =     23.800(CFS)     Total area =      16.990(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      600.000 to Point/Station      601.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   850.600(Ft.)
Top (of initial area) elevation =  1665.000(Ft.)
Bottom (of initial area) elevation =  1575.000(Ft.)
Difference in elevation =    90.000(Ft.)
Slope =    0.10581  s(percent)=      10.58
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.339 min.
Rainfall intensity =      1.790(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.823
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.060
Decimal fraction soil group D = 0.940
RI index for soil(AMC 2)  =  88.82
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      5.449(CFS)
Total initial stream area =        3.700(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      601.000 to Point/Station      602.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1575.000(Ft.)
End of natural channel elevation =   1540.000(Ft.)
Length of natural channel  =  1005.700(Ft.)
Estimated mean flow rate at midpoint of channel =     22.284(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   5.76(Ft/s)
```

Area F

```
Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0348
Corrected/adjusted channel slope =  0.0348
Travel time =    2.91 min.     TC =   15.25  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.815
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.100
Decimal fraction soil group D = 0.900
RI index for soil(AMC 2)  =  88.70
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.627(In/Hr) for a    10.0 year storm
Subarea runoff =     30.312(CFS) for     22.860(Ac.)
Total runoff =     35.762(CFS)     Total area =      26.560(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      610.000 to Point/Station      611.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   680.600(Ft.)
Top (of initial area) elevation =  1570.000(Ft.)
Bottom (of initial area) elevation =  1541.000(Ft.)
Difference in elevation =    29.000(Ft.)
Slope =    0.04261  s(percent)=       4.26
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.537 min.
Rainfall intensity =      1.717(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.821
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      6.429(CFS)
Total initial stream area =        4.560(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      630.000 to Point/Station      631.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   881.300(Ft.)
Top (of initial area) elevation =  1576.000(Ft.)
Bottom (of initial area) elevation =  1540.000(Ft.)
Difference in elevation =    36.000(Ft.)
Slope =    0.04085  s(percent)=       4.08
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.139 min.
Rainfall intensity =      1.633(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.817
```

Area H

Area I

```
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      5.392(CFS)
Total initial stream area =        4.040(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      620.000 to Point/Station      621.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Initial area flow distance =   325.800(Ft.)
Top (of initial area) elevation =  1571.000(Ft.)
Bottom (of initial area) elevation =  1537.000(Ft.)
Difference in elevation =    34.000(Ft.)
Slope =    0.10436  s(percent)=      10.44
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.429 min.
Rainfall intensity =      2.125(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.835
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      3.017(CFS)
Total initial stream area =        1.700(Ac.)
Pervious area fraction = 1.000
End of computations, total study area =          211.75 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.933
Area averaged RI index number =  82.2
```

Area J

100 – YEAR RATIONAL METHOD CALCULATIONS
(ALL DRAINAGE AREAS A THROUGH AREA J)

```
                    Riverside County Rational Hydrology Program

        CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
                Rational Hydrology Study        Date: 10/17/23
File:CRESCENTEX100.out
        ------------------------------------------------------------------------
        Crescent Gardens
        Existing Conditon Hydrology
        AREAS A THROUGH J
        10/17/23
        ------------------------------------------------------------------------
         *********   Hydrology Study Control Information **********

         English (in-lb) Units used in input data file

        ------------------------------------------------------------------------


        Program License Serial Number 6406

        ------------------------------------------------------------------------
        Rational Method Hydrology Program based on
        Riverside County Flood Control & Water Conservation District
        1978 hydrology manual

        Storm event (year) =  100.00 Antecedent Moisture Condition = 2

        2 year, 1 hour precipitation =  0.486(In.)
        100 year, 1 hour precipitation =  1.440(In.)

        Storm event year = 100.0
        Calculated rainfall intensity data:
        1 hour intensity =  1.440(In/Hr)
        Slope of intensity duration curve = 0.4500




        ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
        Process from Point/Station      100.000 to Point/Station      101.000
        **** INITIAL AREA EVALUATION ****
        ________________________________________________________________________
        Initial area flow distance =   894.400(Ft.)
        Top (of initial area) elevation =  1694.000(Ft.)
        Bottom (of initial area) elevation =  1665.000(Ft.)
        Difference in elevation =    29.000(Ft.)
        Slope =    0.03242  s(percent)=       3.24
        TC = k(0.480)*[(length^3)/(elevation change)]^0.2
        Initial area time of concentration =   14.444 min.
        Rainfall intensity =      2.733(In/Hr) for a   100.0 year storm
        SINGLE FAMILY (1 Acre Lot)
        Runoff Coefficient = 0.534
        Decimal fraction soil group A = 1.000
        Decimal fraction soil group B = 0.000
        Decimal fraction soil group C = 0.000
        Decimal fraction soil group D = 0.000
        RI index for soil(AMC 2)  =  32.00
        Pervious area fraction =  0.800; Impervious fraction =  0.200
```

Area A

```
        Initial subarea runoff =      4.929(CFS)
        Total initial stream area =        3.380(Ac.)
        Pervious area fraction = 0.800


        ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
        Process from Point/Station      101.000 to Point/Station      102.000
        **** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
        ________________________________________________________________________
        Estimated mean flow rate at midpoint of channel =     21.663(CFS)
        Depth of flow =   0.491(Ft.), Average velocity =   6.157(Ft/s)
                ******* Irregular Channel Data ***********
        ------------------------------------------------------------------------
        Information entered for subchannel number 1 :
        Point number      'X' coordinate     'Y' coordinate
                1              0.00              3.49
                2              6.98              0.00
                3             11.98              0.25
                4             23.98              0.49
        Manning's 'N' friction factor =   0.015
        ------------------------------------------------------------------------
        Sub-Channel flow  =     21.663(CFS)
          '     '         flow top width =     17.981(Ft.)
          '     '    velocity=    6.157(Ft/s)
          '     '         area =      3.518(Sq.Ft)
          '     '         Froude number =     2.453

        Upstream point elevation =  1665.000(Ft.)
        Downstream point elevation =  1638.000(Ft.)
        Flow length =   786.700(Ft.)
        Travel time  =    2.13 min.
        Time of concentration =   16.57 min.
        Depth of flow =   0.491(Ft.)
        Average velocity =   6.157(Ft/s)
        Total irregular channel flow =    21.663(CFS)
        Irregular channel normal depth above invert elev. =   0.491(Ft.)
        Average velocity of channel(s) =   6.157(Ft/s)
         Adding area flow to channel
        SINGLE FAMILY (1 Acre Lot)
        Runoff Coefficient = 0.794
        Decimal fraction soil group A = 0.000
        Decimal fraction soil group B = 0.000
        Decimal fraction soil group C = 0.000
        Decimal fraction soil group D = 1.000
        RI index for soil(AMC 2)  =  75.00
        Pervious area fraction =  0.800; Impervious fraction =  0.200
        Rainfall intensity =      2.569(In/Hr) for a   100.0 year storm
        Subarea runoff =     33.549(CFS) for     16.450(Ac.)
        Total runoff =     38.478(CFS)     Total area =      19.830(Ac.)
        Depth of flow =   0.572(Ft.), Average velocity =   7.717(Ft/s)


        ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
        Process from Point/Station      102.000 to Point/Station      103.000
        **** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
        ________________________________________________________________________
        Top of natural channel elevation =   1638.000(Ft.)
        End of natural channel elevation =   1614.000(Ft.)
        Length of natural channel  =  1328.900(Ft.)
        Estimated mean flow rate at midpoint of channel =     66.090(CFS)
```

```
Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   5.64(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0181
Corrected/adjusted channel slope =  0.0181
Travel time =    3.93 min.     TC =   20.50  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.787
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.080
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.920
RI index for soil(AMC 2)  =  77.00
Pervious area fraction =  0.860; Impervious fraction =  0.140
Rainfall intensity =      2.335(In/Hr) for a   100.0 year storm
Subarea runoff =     52.308(CFS) for     28.460(Ac.)
Total runoff =     90.786(CFS)     Total area =      48.290(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1614.000(Ft.)
Downstream point/station elevation =  1612.000(Ft.)
Pipe length  =   182.60(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    90.786(CFS)
Nearest computed pipe diameter  =     39.00(In.)
Calculated individual pipe flow  =    90.786(CFS)
Normal flow depth in pipe =   34.13(In.)
Flow top width inside pipe =   25.80(In.)
Critical Depth =   35.25(In.)
Pipe flow velocity =     11.80(Ft/s)
Travel time through pipe =    0.26 min.
Time of concentration (TC) =    20.76 min.


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Process from Point/Station      104.000 to Point/Station      105.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Depth of flow =   1.958(Ft.), Average velocity =   4.739(Ft/s)
       ******* Irregular Channel Data ***********
----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1             0.00             3.00
        2            15.00             0.00
        3            30.00             3.00
Manning's 'N' friction factor =   0.035
----------------------------------------------------------------
Sub-Channel flow  =     90.786(CFS)
  '     '         flow top width =     19.575(Ft.)
  '     '    velocity=    4.739(Ft/s)
  '     '         area =     19.159(Sq.Ft)
  '     '         Froude number =     0.844

Upstream point elevation =  1612.000(Ft.)
Downstream point elevation =  1611.000(Ft.)
Flow length =    76.000(Ft.)
Travel time  =    0.27 min.
Time of concentration =   21.02 min.
Depth of flow =   1.958(Ft.)
Average velocity =   4.739(Ft/s)
Total irregular channel flow =    90.786(CFS)
Irregular channel normal depth above invert elev. =   1.958(Ft.)
Average velocity of channel(s) =   4.739(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      106.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1611.000(Ft.)
Downstream point/station elevation =  1610.000(Ft.)
Pipe length  =    70.90(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    90.786(CFS)
Nearest computed pipe diameter  =     39.00(In.)
Calculated individual pipe flow  =    90.786(CFS)
Normal flow depth in pipe =   29.63(In.)
Flow top width inside pipe =   33.33(In.)
Critical Depth =   35.25(In.)
Pipe flow velocity =     13.42(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =    21.11 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      106.000 to Point/Station      107.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Depth of flow =   1.823(Ft.), Average velocity =   5.465(Ft/s)
       ******* Irregular Channel Data ***********
----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1             0.00             3.00
        2            15.00             0.00
        3            30.00             3.00
Manning's 'N' friction factor =   0.035
----------------------------------------------------------------
Sub-Channel flow  =     90.787(CFS)
  '     '         flow top width =     18.228(Ft.)
  '     '    velocity=    5.465(Ft/s)
  '     '         area =     16.613(Sq.Ft)
  '     '         Froude number =     1.009

Upstream point elevation =  1610.000(Ft.)
Downstream point elevation =  1604.500(Ft.)
Flow length =   285.800(Ft.)
Travel time  =    0.87 min.
Time of concentration =   21.98 min.
```

```
Depth of flow =   1.823(Ft.)
Average velocity =   5.465(Ft/s)
Total irregular channel flow =    90.786(CFS)
Irregular channel normal depth above invert elev. =   1.823(Ft.)
Average velocity of channel(s) =   5.465(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      107.000 to Point/Station      107.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     48.290(Ac.)
Runoff from this stream =     90.786(CFS)
Time of concentration =   21.98 min.
Rainfall intensity =     2.262(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      200.000 to Point/Station      201.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   811.600(Ft.)
Top (of initial area) elevation =  1650.000(Ft.)
Bottom (of initial area) elevation =  1631.000(Ft.)
Difference in elevation =    19.000(Ft.)
Slope =    0.02341  s(percent)=       2.34
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.828 min.
Rainfall intensity =      2.701(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.798
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =     14.878(CFS)
Total initial stream area =        6.900(Ac.)
Pervious area fraction = 0.800


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      201.000 to Point/Station      202.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1631.000(Ft.)
End of natural channel elevation =   1613.000(Ft.)
Length of natural channel  =   872.300(Ft.)
Estimated mean flow rate at midpoint of channel =     25.529(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.60(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0206
Corrected/adjusted channel slope =  0.0206
Travel time =    3.16 min.     TC =   17.99  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.796
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  77.00
Pervious area fraction =  0.830; Impervious fraction =  0.170
Rainfall intensity =      2.476(In/Hr) for a   100.0 year storm
Subarea runoff =     19.486(CFS) for      9.880(Ac.)
Total runoff =     34.364(CFS)     Total area =      16.780(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      202.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =     16.780(Ac.)
Runoff from this stream =     34.364(CFS)
Time of concentration =   17.99 min.
Rainfall intensity =     2.476(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      210.000 to Point/Station      211.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   742.800(Ft.)
Top (of initial area) elevation =  1641.000(Ft.)
Bottom (of initial area) elevation =  1622.000(Ft.)
Difference in elevation =    19.000(Ft.)
Slope =    0.02558  s(percent)=       2.56
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.061 min.
Rainfall intensity =      2.766(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.800
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      2.989(CFS)
Total initial stream area =        1.350(Ac.)
Pervious area fraction = 0.800


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      211.000 to Point/Station      202.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________________
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Depth of flow =   0.287(Ft.), Average velocity =   1.817(Ft/s)
        ******* Irregular Channel Data ***********
--------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              3.00
        2             60.00              0.00
        3            120.00              3.00
Manning's 'N' friction factor =   0.035
--------------------------------------------------------------------
Sub-Channel flow  =      2.989(CFS)
  '     '          flow top width =     11.471(Ft.)
  '     '    velocity=    1.817(Ft/s)
  '     '          area =      1.645(Sq.Ft)
  '     '          Froude number =     0.846

Upstream point elevation =  1622.000(Ft.)
Downstream point elevation =  1613.000(Ft.)
Flow length =   368.000(Ft.)
Travel time  =    3.37 min.
Time of concentration =   17.44 min.
Depth of flow =   0.287(Ft.)
Average velocity =   1.817(Ft/s)
Total irregular channel flow =     2.989(CFS)
Irregular channel normal depth above invert elev. =   0.287(Ft.)
Average velocity of channel(s) =   1.817(Ft/s)


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Process from Point/Station      202.000 to Point/Station      202.000
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      1.350(Ac.)
Runoff from this stream =      2.989(CFS)
Time of concentration =   17.44 min.
Rainfall intensity =     2.511(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       34.364     17.99                2.476
2        2.989     17.44                2.511
Largest stream flow has longer time of concentration
Qp =     34.364 + sum of
           Qb         Ia/Ib
            2.989 *    0.986 =      2.947
Qp =     37.311

Total of 2 streams to confluence:
Flow rates before confluence point:
      34.364       2.989
Area of streams before confluence:
       16.780        1.350
Results of confluence:
Total flow rate =     37.311(CFS)
Time of concentration =    17.989 min.
Effective stream area after confluence =     18.130(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      107.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
____________________________________________________________________
Depth of flow =   1.262(Ft.), Average velocity =   4.688(Ft/s)
        ******* Irregular Channel Data ***********
--------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              3.00
        2             15.00              0.00
        3             30.00              3.00
Manning's 'N' friction factor =   0.035
--------------------------------------------------------------------
Sub-Channel flow  =     37.311(CFS)
  '     '          flow top width =     12.617(Ft.)
  '     '    velocity=    4.688(Ft/s)
  '     '          area =      7.959(Sq.Ft)
  '     '          Froude number =     1.040

Upstream point elevation =  1613.000(Ft.)
Downstream point elevation =  1604.500(Ft.)
Flow length =   367.500(Ft.)
Travel time  =    1.31 min.
Time of concentration =   19.30 min.
Depth of flow =   1.262(Ft.)
Average velocity =   4.688(Ft/s)
Total irregular channel flow =    37.311(CFS)
Irregular channel normal depth above invert elev. =   1.262(Ft.)
Average velocity of channel(s) =   4.688(Ft/s)


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Process from Point/Station      107.000 to Point/Station      107.000
**** CONFLUENCE OF MAIN STREAMS ****
____________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     18.130(Ac.)
Runoff from this stream =     37.311(CFS)
Time of concentration =   19.30 min.
Rainfall intensity =     2.399(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       90.786     21.98           2.262
2       37.311     19.30           2.399
Largest stream flow has longer time of concentration
Qp =     90.786 + sum of
           Qb         Ia/Ib
           37.311 *    0.943 =     35.183
Qp =    125.970

Total of 2 main streams to confluence:
Flow rates before confluence point:
```

```
      90.786      37.311
Area of streams before confluence:
       48.290       18.130


Results of confluence:
Total flow rate =    125.970(CFS)
Time of concentration =    21.985 min.
Effective stream area after confluence  =     66.420(Ac.)


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Process from Point/Station      107.000 to Point/Station      108.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1604.500(Ft.)
End of natural channel elevation =   1600.000(Ft.)
Length of natural channel  =   465.800(Ft.)
Estimated mean flow rate at midpoint of channel =    137.861(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   5.14(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0097
Corrected/adjusted channel slope =  0.0097
Travel time =    1.51 min.     TC =   23.49  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.765
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.300
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.700
RI index for soil(AMC 2)  =  74.70
Pervious area fraction =  0.880; Impervious fraction =  0.120
Rainfall intensity =      2.196(In/Hr) for a   100.0 year storm
Subarea runoff =     21.062(CFS) for     12.540(Ac.)
Total runoff =    147.032(CFS)    Total area =      78.960(Ac.)


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Process from Point/Station      108.000 to Point/Station      109.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1600.000(Ft.)
Downstream point/station elevation =  1599.000(Ft.)
Pipe length  =    52.70(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   147.032(CFS)
Nearest computed pipe diameter  =     42.00(In.)
Calculated individual pipe flow  =   147.032(CFS)
Normal flow depth in pipe =   37.41(In.)
Flow top width inside pipe =   26.22(In.)
Critical depth could not be calculated.
Pipe flow velocity =     16.25(Ft/s)
Travel time through pipe =    0.05 min.
Time of concentration (TC) =    23.55 min.


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Process from Point/Station      109.000 to Point/Station      110.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Depth of flow =   2.130(Ft.), Average velocity =   6.480(Ft/s)
       ******* Irregular Channel Data ***********
------------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              3.00
        2             15.00              0.00
        3             30.00              3.00
Manning's 'N' friction factor =   0.035
------------------------------------------------------------------------
Sub-Channel flow  =    147.032(CFS)
  '     '         flow top width =     21.303(Ft.)
  '     '    velocity=    6.480(Ft/s)
  '     '         area =     22.692(Sq.Ft)
  '     '         Froude number =     1.106

Upstream point elevation =  1599.000(Ft.)
Downstream point elevation =  1586.000(Ft.)
Flow length =   591.500(Ft.)
Travel time  =    1.52 min.
Time of concentration =   25.07 min.
Depth of flow =   2.130(Ft.)
Average velocity =   6.480(Ft/s)
Total irregular channel flow =   147.032(CFS)
Irregular channel normal depth above invert elev. =   2.130(Ft.)
Average velocity of channel(s) =   6.480(Ft/s)


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Process from Point/Station      110.000 to Point/Station      110.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     78.960(Ac.)
Runoff from this stream =    147.032(CFS)
Time of concentration =   25.07 min.
Rainfall intensity =     2.133(In/Hr)


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Process from Point/Station      300.000 to Point/Station      301.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   527.800(Ft.)
Top (of initial area) elevation =  1635.000(Ft.)
Bottom (of initial area) elevation =  1623.000(Ft.)
Difference in elevation =    12.000(Ft.)
Slope =    0.02274  s(percent)=       2.27
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.865 min.
Rainfall intensity =      2.784(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
```

```
Runoff Coefficient = 0.850
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      6.387(CFS)
Total initial stream area =        2.700(Ac.)
Pervious area fraction = 1.000


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Process from Point/Station      301.000 to Point/Station      302.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1623.000(Ft.)
End of natural channel elevation =   1608.000(Ft.)
Length of natural channel  =   715.100(Ft.)
Estimated mean flow rate at midpoint of channel =     13.862(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.94(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0210
Corrected/adjusted channel slope =  0.0210
Travel time =    3.03 min.     TC =   16.89  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.845
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.547(In/Hr) for a   100.0 year storm
Subarea runoff =     13.608(CFS) for      6.320(Ac.)
Total runoff =     19.995(CFS)     Total area =       9.020(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      302.000 to Point/Station      110.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1608.000(Ft.)
End of natural channel elevation =   1586.000(Ft.)
Length of natural channel  =  1275.000(Ft.)
Estimated mean flow rate at midpoint of channel =     38.494(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.72(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0173
Corrected/adjusted channel slope =  0.0173
Travel time =    4.50 min.     TC =   21.40  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.802
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.210
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.790
RI index for soil(AMC 2)  =  81.20
Pervious area fraction =  0.920; Impervious fraction =  0.080
Rainfall intensity =      2.290(In/Hr) for a   100.0 year storm
Subarea runoff =     30.642(CFS) for     16.690(Ac.)
Total runoff =     50.638(CFS)     Total area =      25.710(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      110.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     25.710(Ac.)
Runoff from this stream =     50.638(CFS)
Time of concentration =   21.40 min.
Rainfall intensity =     2.290(In/Hr)
Summary of stream data:

Stream   Flow rate      TC             Rainfall Intensity
 No.       (CFS)       (min)                  (In/Hr)


1      147.032     25.07                 2.133
2       50.638     21.40                 2.290
Largest stream flow has longer time of concentration
Qp =    147.032 + sum of
          Qb         Ia/Ib
          50.638 *    0.931 =     47.153
Qp =    194.184

Total of 2 streams to confluence:
Flow rates before confluence point:
     147.032      50.638
Area of streams before confluence:
       78.960       25.710
Results of confluence:
Total flow rate =    194.184(CFS)
Time of concentration =    25.070 min.
Effective stream area after confluence =    104.670(Ac.)


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Process from Point/Station      110.000 to Point/Station      111.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
```

```
Top of natural channel elevation =   1586.000(Ft.)
End of natural channel elevation =   1562.200(Ft.)
Length of natural channel  =   769.100(Ft.)
Estimated mean flow rate at midpoint of channel =    208.330(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =  10.45(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0309
Corrected/adjusted channel slope =  0.0309
Travel time =    1.23 min.     TC =   26.30  min.
```

Area A

```
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.834
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.087(In/Hr) for a   100.0 year storm
Subarea runoff =     26.551(CFS) for     15.250(Ac.)
Total runoff =    220.736(CFS)     Total area =     119.920(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      310.000 to Point/Station      311.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   545.200(Ft.)
Top (of initial area) elevation =  1642.000(Ft.)
Bottom (of initial area) elevation =  1621.000(Ft.)
Difference in elevation =    21.000(Ft.)
Slope =    0.03852  s(percent)=       3.85
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.641 min.
Rainfall intensity =      2.902(In/Hr) for a   100.0 year storm
```

Area B

```
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.852
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      3.979(CFS)
Total initial stream area =        1.610(Ac.)
Pervious area fraction = 1.000

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      311.000 to Point/Station      312.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
```

```
Top of natural channel elevation =   1621.000(Ft.)
End of natural channel elevation =   1607.000(Ft.)
Length of natural channel  =   534.000(Ft.)
Estimated mean flow rate at midpoint of channel =      6.451(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.63(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0262
Corrected/adjusted channel slope =  0.0262
Travel time =    2.45 min.     TC =   15.09  min.

 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.795
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.770
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.230
RI index for soil(AMC 2)  =  79.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.680(In/Hr) for a   100.0 year storm
Subarea runoff =      4.260(CFS) for      2.000(Ac.)
Total runoff =      8.239(CFS)     Total area =       3.610(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      320.000 to Point/Station      321.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   543.400(Ft.)
Top (of initial area) elevation =  1613.000(Ft.)
Bottom (of initial area) elevation =  1604.000(Ft.)
Difference in elevation =     9.000(Ft.)
Slope =    0.01656  s(percent)=       1.66
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.945 min.
Rainfall intensity =      2.692(In/Hr) for a   100.0 year storm
```

Area C

```
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.799
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.840
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.160
RI index for soil(AMC 2)  =  79.76
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      4.971(CFS)
Total initial stream area =        2.310(Ac.)
Pervious area fraction = 1.000

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Process from Point/Station      510.000 to Point/Station      511.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
```

```
Initial area flow distance =   268.700(Ft.)
Top (of initial area) elevation =  1630.500(Ft.)
Bottom (of initial area) elevation =  1614.000(Ft.)
Difference in elevation =    16.500(Ft.)
Slope =    0.06141  s(percent)=       6.14
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.676 min.
Rainfall intensity =      3.438(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.859
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      4.104(CFS)
Total initial stream area =        1.390(Ac.)
Pervious area fraction = 1.000
```

Area D

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Process from Point/Station      500.000 to Point/Station      501.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Initial area flow distance =   658.400(Ft.)
Top (of initial area) elevation =  1653.000(Ft.)
Bottom (of initial area) elevation =  1605.000(Ft.)
Difference in elevation =    48.000(Ft.)
Slope =    0.07290  s(percent)=       7.29
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.998 min.
Rainfall intensity =      2.971(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.853
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      8.614(CFS)
Total initial stream area =        3.400(Ac.)
Pervious area fraction = 1.000
```

Area E

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      501.000 to Point/Station      502.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
Top of natural channel elevation =   1605.000(Ft.)
End of natural channel elevation =   1576.000(Ft.)
Length of natural channel  =  1342.600(Ft.)
Estimated mean flow rate at midpoint of channel =     43.159(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   5.45(Ft/s)
Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0216
Corrected/adjusted channel slope =  0.0216
Travel time =    4.10 min.     TC =   16.10  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.831
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.400
Decimal fraction soil group D = 0.600
RI index for soil(AMC 2)  =  86.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.603(In/Hr) for a   100.0 year storm
Subarea runoff =     58.963(CFS) for     27.270(Ac.)
Total runoff =     67.577(CFS)     Total area =      30.670(Ac.)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      400.000 to Point/Station      401.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Initial area flow distance =   456.800(Ft.)
Top (of initial area) elevation =  1598.000(Ft.)
Bottom (of initial area) elevation =  1566.000(Ft.)
Difference in elevation =    32.000(Ft.)
Slope =    0.07005  s(percent)=       7.01
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.449 min.
Rainfall intensity =      3.162(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.855
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      7.167(CFS)
Total initial stream area =        2.650(Ac.)
Pervious area fraction = 1.000
```

Area G

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      401.000 to Point/Station      402.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
Top of natural channel elevation =   1566.000(Ft.)
End of natural channel elevation =   1544.500(Ft.)
Length of natural channel  =   997.100(Ft.)
Estimated mean flow rate at midpoint of channel =     26.560(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.75(Ft/s)
```

```
Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0216
Corrected/adjusted channel slope =  0.0216
Travel time =    3.50 min.     TC =   13.94  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.850
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.777(In/Hr) for a   100.0 year storm
Subarea runoff =     33.830(CFS) for     14.340(Ac.)
Total runoff =     40.997(CFS)     Total area =      16.990(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      600.000 to Point/Station      601.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   850.600(Ft.)
Top (of initial area) elevation =  1665.000(Ft.)
Bottom (of initial area) elevation =  1575.000(Ft.)
Difference in elevation =    90.000(Ft.)
Slope =    0.10581  s(percent)=      10.58
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.339 min.
Rainfall intensity =      2.934(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.851
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.060
Decimal fraction soil group D = 0.940
RI index for soil(AMC 2)  =  88.82
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      9.242(CFS)
Total initial stream area =        3.700(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      601.000 to Point/Station      602.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1575.000(Ft.)
End of natural channel elevation =   1540.000(Ft.)
Length of natural channel  =  1005.700(Ft.)
Estimated mean flow rate at midpoint of channel =     37.791(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   6.67(Ft/s)
```

Area F

```
Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0348
Corrected/adjusted channel slope =  0.0348
Travel time =    2.51 min.     TC =   14.85  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.847
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.100
Decimal fraction soil group D = 0.900
RI index for soil(AMC 2)  =  88.70
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.699(In/Hr) for a   100.0 year storm
Subarea runoff =     52.242(CFS) for     22.860(Ac.)
Total runoff =     61.484(CFS)     Total area =      26.560(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      610.000 to Point/Station      611.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   680.600(Ft.)
Top (of initial area) elevation =  1570.000(Ft.)
Bottom (of initial area) elevation =  1541.000(Ft.)
Difference in elevation =    29.000(Ft.)
Slope =    0.04261  s(percent)=       4.26
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.537 min.
Rainfall intensity =      2.814(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.850
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =     10.910(CFS)
Total initial stream area =        4.560(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      630.000 to Point/Station      631.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   881.300(Ft.)
Top (of initial area) elevation =  1576.000(Ft.)
Bottom (of initial area) elevation =  1540.000(Ft.)
Difference in elevation =    36.000(Ft.)
Slope =    0.04085  s(percent)=       4.08
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.139 min.
Rainfall intensity =      2.676(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.848
```

Area H

Area I

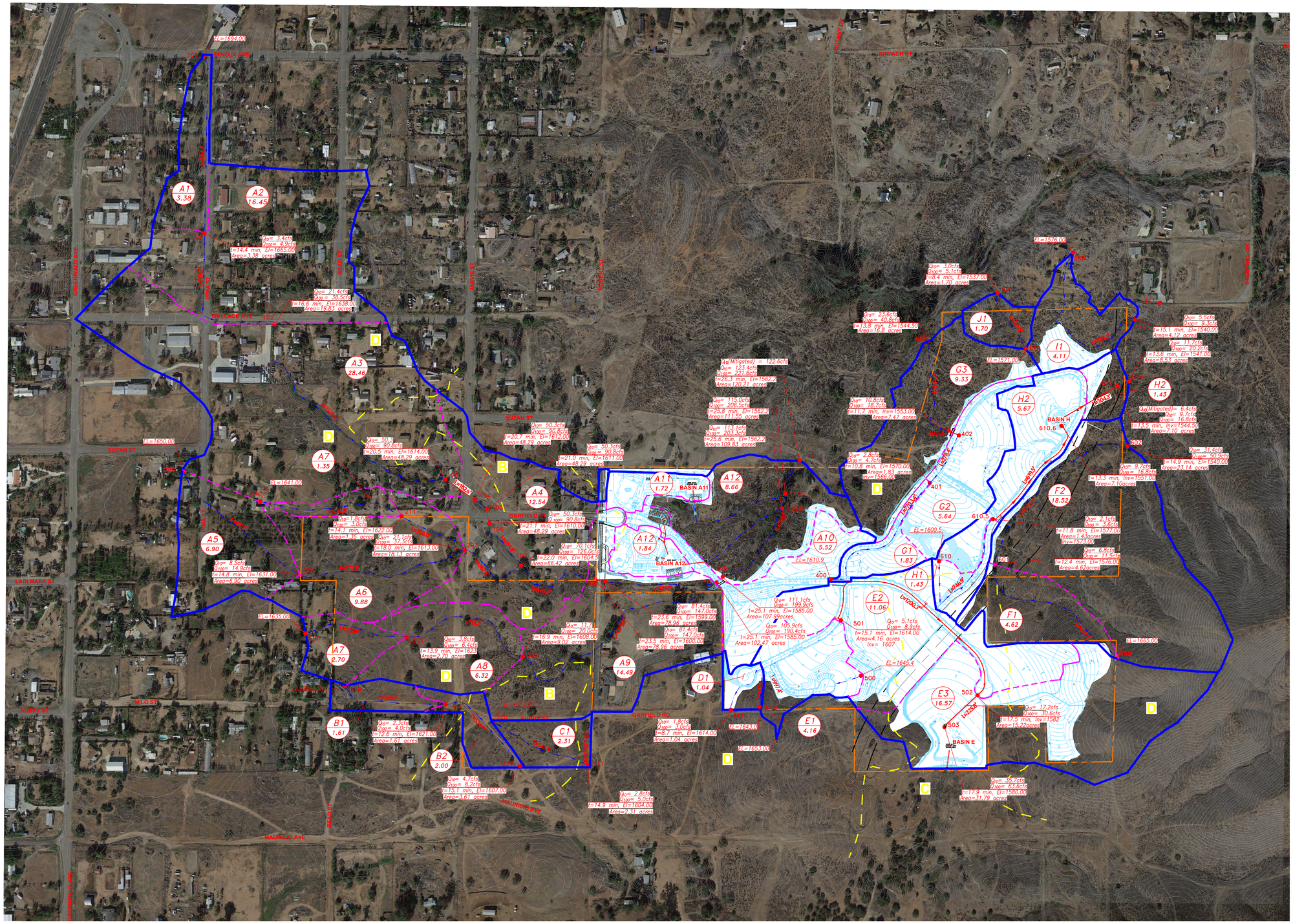
```
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      9.166(CFS)
Total initial stream area =        4.040(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      620.000 to Point/Station      621.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   325.800(Ft.)
Top (of initial area) elevation =  1571.000(Ft.)
Bottom (of initial area) elevation =  1537.000(Ft.)
Difference in elevation =    34.000(Ft.)
Slope =    0.10436  s(percent)=      10.44
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.429 min.
Rainfall intensity =      3.483(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.859
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      5.088(CFS)
Total initial stream area =        1.700(Ac.)
Pervious area fraction = 1.000
End of computations, total study area =          211.75 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.933
Area averaged RI index number =  82.2
```

Area J

HYDROLOGY MAP


A1 3.38
A2 16.45
A3 28.46
A4 12.54
A5 6.90
A6 9.88
A7 1.35
A8 6.32
A9 14.49
A10 5.52
A11 1.72
A12 8.66
A12 1.84
B1 1.61
B2 2.00
C1 2.31
D1 1.04
E1 4.16
E2 11.06
E3 16.57
F1 4.62
F2 18.52
G1 1.85
G2 5.64
G3 9.33
H1 1.43
H2 1.43
H2 5.67
I1 4.11
J1 1.70
BASIN A11
BASIN A12
BASIN H
BASIN E
EL=1694.00
EL=1650.00
EL=1641.60
EL=1635.00
EL=1576.00
EL=1571.00
EL=1645.4
EL=1600.5
EL=1610.9
EL=1665.00
EL=1664.30
EL=1663.00
LAUREL AVE
GREENWELL AVE
SUSAN ST
LAKEMARK ST
MILO ST
MAURICE AVE
GARFIELD RD
RIDGE ST
MAPLE ST
BRENNER ST
LEACH ST
LEACH ST
LEACH

SECTION 3
PROPOSED CONDITION HYDROLOGY
RATIONAL METHOD ANALYSIS

2 – YEAR RATIONAL METHOD CALCULATIONS

DRAINAGE AREA A

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 10/17/23 File:crproa2.out

Crescent Gardens
Proposed Condition Hydrology
Riverside Co.
Area A 10/13/23

********* Hydrology Study Control Information **********

English (in-lb) Units used in input data file

Program License Serial Number 6406

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 2.00 Antecedent Moisture Condition = 1

2 year, 1 hour precipitation = 0.486(In.)
100 year, 1 hour precipitation = 1.440(In.)

Storm event year = 2.0
Calculated rainfall intensity data:
1 hour intensity = 0.486(In/Hr)
Slope of intensity duration curve = 0.4500

++
Process from Point/Station 100.000 to Point/Station 101.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 894.400(Ft.)
Top (of initial area) elevation = 1694.000(Ft.)
Bottom (of initial area) elevation = 1665.000(Ft.)
Difference in elevation = 29.000(Ft.)
Slope = 0.03242 s(percent)= 3.24
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 14.444 min.
Rainfall intensity = 0.922(In/Hr) for a 2.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.265
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1) = 16.20
Pervious area fraction = 0.800; Impervious fraction = 0.200
Initial subarea runoff = 0.826(CFS)
Total initial stream area = 3.380(Ac.)
Pervious area fraction = 0.800

++
Process from Point/Station 101.000 to Point/Station 102.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Estimated mean flow rate at midpoint of channel = 4.341(CFS)
Depth of flow = 0.290(Ft.), Average velocity = 4.564(Ft/s)
******* Irregular Channel Data **********

Information entered for subchannel number 1 :

Point number	'X' coordinate	'Y' coordinate
1	0.00	3.49
2	6.98	0.00
3	11.98	0.25
4	23.98	0.49

Manning's 'N' friction factor = 0.015

Sub-Channel flow = 4.341(CFS)
' ' flow top width = 7.594(Ft.)
' ' velocity= 4.564(Ft/s)
' ' area = 0.951(Sq.Ft)
' ' Froude number = 2.273

Upstream point elevation = 1665.000(Ft.)
Downstream point elevation = 1638.000(Ft.)
Flow length = 786.700(Ft.)
Travel time = 2.87 min.
Time of concentration = 17.32 min.
Depth of flow = 0.290(Ft.)
Average velocity = 4.564(Ft/s)
Total irregular channel flow = 4.341(CFS)
Irregular channel normal depth above invert elev. = 0.290(Ft.)
Average velocity of channel(s) = 4.564(Ft/s)
Adding area flow to channel
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.510
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1) = 57.00
Pervious area fraction = 0.800; Impervious fraction = 0.200
Rainfall intensity = 0.850(In/Hr) for a 2.0 year storm
Subarea runoff = 7.130(CFS) for 16.450(Ac.)
Total runoff = 7.956(CFS) Total area = 19.830(Ac.)
Depth of flow = 0.359(Ft.), Average velocity = 4.988(Ft/s)

++
Process from Point/Station 102.000 to Point/Station 103.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 1638.000(Ft.)
End of natural channel elevation = 1614.000(Ft.)
Length of natural channel = 1328.900(Ft.)
Estimated mean flow rate at midpoint of channel = 13.665(CFS)

```
Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.64(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0181
Corrected/adjusted channel slope =  0.0181
Travel time =    6.09 min.     TC =   23.40  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.473
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.080
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.920
RI index for soil(AMC 1)  =  59.40
Pervious area fraction =  0.860; Impervious fraction =  0.140
Rainfall intensity =      0.742(In/Hr) for a     2.0 year storm
Subarea runoff =     10.004(CFS) for     28.460(Ac.)
Total runoff =     17.959(CFS)     Total area =      48.290(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1614.000(Ft.)
Downstream point/station elevation =  1612.000(Ft.)
Pipe length  =   182.60(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    17.959(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    17.959(CFS)
Normal flow depth in pipe =   15.63(In.)
Flow top width inside pipe =   22.87(In.)
Critical Depth =   18.32(In.)
Pipe flow velocity =      8.29(Ft/s)
Travel time through pipe =    0.37 min.
Time of concentration (TC) =    23.77 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      105.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Depth of flow =   1.066(Ft.), Average velocity =   3.160(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1             0.00             3.00
        2            15.00             0.00
        3            30.00             3.00
Manning's 'N' friction factor =   0.035
------------------------------------------------------------------
Sub-Channel flow  =     17.959(CFS)
  '     '         flow top width =     10.661(Ft.)
  '     '    velocity=    3.160(Ft/s)
  '     '         area =      5.683(Sq.Ft)
  '     '         Froude number =     0.763

Upstream point elevation =  1612.000(Ft.)
Downstream point elevation =  1611.000(Ft.)
Flow length =    76.000(Ft.)
Travel time  =    0.40 min.
Time of concentration =   24.17 min.
Depth of flow =   1.066(Ft.)
Average velocity =   3.160(Ft/s)
Total irregular channel flow =    17.959(CFS)
Irregular channel normal depth above invert elev. =   1.066(Ft.)
Average velocity of channel(s) =   3.160(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      106.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1611.000(Ft.)
Downstream point/station elevation =  1610.000(Ft.)
Pipe length  =    70.90(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    17.959(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    17.959(CFS)
Normal flow depth in pipe =   16.41(In.)
Flow top width inside pipe =   17.36(In.)
Critical Depth =   18.52(In.)
Pipe flow velocity =      8.91(Ft/s)
Travel time through pipe =    0.13 min.
Time of concentration (TC) =    24.30 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      106.000 to Point/Station      107.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Depth of flow =   0.993(Ft.), Average velocity =   3.644(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1             0.00             3.00
        2            15.00             0.00
        3            30.00             3.00
Manning's 'N' friction factor =   0.035
------------------------------------------------------------------
Sub-Channel flow  =     17.959(CFS)
  '     '         flow top width =      9.928(Ft.)
  '     '    velocity=    3.644(Ft/s)
  '     '         area =      4.928(Sq.Ft)
  '     '         Froude number =     0.912

Upstream point elevation =  1610.000(Ft.)
Downstream point elevation =  1604.500(Ft.)
Flow length =   285.800(Ft.)
Travel time  =    1.31 min.
Time of concentration =   25.61 min.
Depth of flow =   0.993(Ft.)
```

```
Average velocity =   3.644(Ft/s)
Total irregular channel flow =    17.959(CFS)
Irregular channel normal depth above invert elev. =   0.993(Ft.)
Average velocity of channel(s) =   3.644(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      107.000 to Point/Station      107.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     48.290(Ac.)
Runoff from this stream =     17.959(CFS)
Time of concentration =   25.61 min.
Rainfall intensity =     0.713(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      200.000 to Point/Station      201.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   811.600(Ft.)
Top (of initial area) elevation =  1650.000(Ft.)
Bottom (of initial area) elevation =  1631.000(Ft.)
Difference in elevation =    19.000(Ft.)
Slope =    0.02341  s(percent)=       2.34
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.828 min.
Rainfall intensity =      0.912(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.522
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  57.00
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      3.285(CFS)
Total initial stream area =        6.900(Ac.)
Pervious area fraction = 0.800


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      201.000 to Point/Station      202.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1631.000(Ft.)
End of natural channel elevation =   1613.000(Ft.)
Length of natural channel  =   872.300(Ft.)
Estimated mean flow rate at midpoint of channel =      5.638(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.12(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0206
Corrected/adjusted channel slope =  0.0206
Travel time =    4.66 min.     TC =   19.49  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.504
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  59.40
Pervious area fraction =  0.830; Impervious fraction =  0.170
Rainfall intensity =      0.806(In/Hr) for a     2.0 year storm
Subarea runoff =      4.011(CFS) for      9.880(Ac.)
Total runoff =      7.296(CFS)     Total area =      16.780(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      202.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =     16.780(Ac.)
Runoff from this stream =      7.296(CFS)
Time of concentration =   19.49 min.
Rainfall intensity =     0.806(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      210.000 to Point/Station      211.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   742.800(Ft.)
Top (of initial area) elevation =  1641.000(Ft.)
Bottom (of initial area) elevation =  1622.000(Ft.)
Difference in elevation =    19.000(Ft.)
Slope =    0.02558  s(percent)=       2.56
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.061 min.
Rainfall intensity =      0.934(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.527
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  57.00
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      0.664(CFS)
Total initial stream area =        1.350(Ac.)
Pervious area fraction = 0.800


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      211.000 to Point/Station      202.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Depth of flow =   0.163(Ft.), Average velocity =   1.248(Ft/s)
```

```
       ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1             0.00             3.00
        2            60.00             0.00
        3           120.00             3.00
Manning's 'N' friction factor =   0.035
------------------------------------------------------------------
Sub-Channel flow  =      0.664(CFS)
  '     '         flow top width =      6.524(Ft.)
  '     '    velocity=    1.248(Ft/s)
  '     '         area =      0.532(Sq.Ft)
  '     '         Froude number =     0.770

Upstream point elevation =  1622.000(Ft.)
Downstream point elevation =  1613.000(Ft.)
Flow length =   368.000(Ft.)
Travel time  =    4.92 min.
Time of concentration =   18.98 min.
Depth of flow =   0.163(Ft.)
Average velocity =   1.248(Ft/s)
Total irregular channel flow =     0.664(CFS)
Irregular channel normal depth above invert elev. =   0.163(Ft.)
Average velocity of channel(s) =   1.248(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      202.000
**** CONFLUENCE OF MINOR STREAMS ****
__________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      1.350(Ac.)
Runoff from this stream =      0.664(CFS)
Time of concentration =   18.98 min.
Rainfall intensity =     0.816(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        7.296     19.49                 0.806
2        0.664     18.98                 0.816
Largest stream flow has longer time of concentration
Qp =      7.296 + sum of
           Qb         Ia/Ib
            0.664 *    0.988 =      0.656
Qp =      7.952

Total of 2 streams to confluence:
Flow rates before confluence point:
       7.296       0.664
Area of streams before confluence:
       16.780        1.350
Results of confluence:
Total flow rate =      7.952(CFS)
Time of concentration =    19.491 min.
Effective stream area after confluence =     18.130(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      107.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
__________________________________________________________________
Depth of flow =   0.707(Ft.), Average velocity =   3.185(Ft/s)
       ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1             0.00             3.00
        2            15.00             0.00
        3            30.00             3.00
Manning's 'N' friction factor =   0.035
------------------------------------------------------------------
Sub-Channel flow  =      7.952(CFS)
  '     '         flow top width =      7.066(Ft.)
  '     '    velocity=    3.185(Ft/s)
  '     '         area =      2.497(Sq.Ft)
  '     '         Froude number =     0.944

Upstream point elevation =  1613.000(Ft.)
Downstream point elevation =  1604.500(Ft.)
Flow length =   367.500(Ft.)
Travel time  =    1.92 min.
Time of concentration =   21.41 min.
Depth of flow =   0.707(Ft.)
Average velocity =   3.185(Ft/s)
Total irregular channel flow =     7.952(CFS)
Irregular channel normal depth above invert elev. =   0.707(Ft.)
Average velocity of channel(s) =   3.185(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      107.000 to Point/Station      107.000
**** CONFLUENCE OF MAIN STREAMS ****
__________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     18.130(Ac.)
Runoff from this stream =      7.952(CFS)
Time of concentration =   21.41 min.
Rainfall intensity =     0.773(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       17.959     25.61           0.713
2        7.952     21.41           0.773
Largest stream flow has longer time of concentration
Qp =     17.959 + sum of
           Qb         Ia/Ib
            7.952 *    0.923 =      7.337
Qp =     25.296

Total of 2 main streams to confluence:
Flow rates before confluence point:
      17.959       7.952
```

```
Area of streams before confluence:
       48.290       18.130


Results of confluence:
Total flow rate =     25.296(CFS)
Time of concentration =    25.610 min.
Effective stream area after confluence  =     66.420(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      107.000 to Point/Station      108.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1604.500(Ft.)
End of natural channel elevation =   1600.000(Ft.)
Length of natural channel  =   465.800(Ft.)
Estimated mean flow rate at midpoint of channel =     27.684(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.22(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
         Normal channel slope =  0.0097
Corrected/adjusted channel slope =  0.0097
Travel time =    2.41 min.     TC =   28.02  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.426
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.300
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.700
RI index for soil(AMC 1)  =  56.64
Pervious area fraction =  0.880; Impervious fraction =  0.120
Rainfall intensity =      0.685(In/Hr) for a     2.0 year storm
Subarea runoff =      3.657(CFS) for     12.540(Ac.)
Total runoff =     28.953(CFS)     Total area =      78.960(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      109.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1600.000(Ft.)
Downstream point/station elevation =  1599.000(Ft.)
Pipe length  =    52.70(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    28.953(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    28.953(CFS)
Normal flow depth in pipe =   18.28(In.)
Flow top width inside pipe =   20.45(In.)
Critical Depth =   22.14(In.)
Pipe flow velocity =     11.26(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    28.10 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      109.000 to Point/Station      110.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Depth of flow =   1.158(Ft.), Average velocity =   4.316(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              3.00
        2             15.00              0.00
        3             30.00              3.00
Manning's 'N' friction factor =   0.035
------------------------------------------------------------------------
Sub-Channel flow  =     28.953(CFS)
  '     '         flow top width =     11.583(Ft.)
  '     '    velocity=    4.316(Ft/s)
  '     '         area =      6.708(Sq.Ft)
  '     '         Froude number =     1.000

Upstream point elevation =  1599.000(Ft.)
Downstream point elevation =  1586.000(Ft.)
Flow length =   591.500(Ft.)
Travel time  =    2.28 min.
Time of concentration =   30.38 min.
Depth of flow =   1.158(Ft.)
Average velocity =   4.316(Ft/s)
Total irregular channel flow =    28.953(CFS)
Irregular channel normal depth above invert elev. =   1.158(Ft.)
Average velocity of channel(s) =   4.316(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      110.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     78.960(Ac.)
Runoff from this stream =     28.953(CFS)
Time of concentration =   30.38 min.
Rainfall intensity =     0.660(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      300.000 to Point/Station      301.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   527.800(Ft.)
Top (of initial area) elevation =  1635.000(Ft.)
Bottom (of initial area) elevation =  1623.000(Ft.)
Difference in elevation =    12.000(Ft.)
Slope =    0.02274  s(percent)=       2.27
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.865 min.
Rainfall intensity =      0.940(In/Hr) for a     2.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.626
```

```
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  76.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      1.587(CFS)
Total initial stream area =        2.700(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      301.000 to Point/Station      302.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1623.000(Ft.)
End of natural channel elevation =   1608.000(Ft.)
Length of natural channel  =   715.100(Ft.)
Estimated mean flow rate at midpoint of channel =      3.445(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   2.80(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0210
Corrected/adjusted channel slope =  0.0210
Travel time =    4.25 min.     TC =   18.11  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.602
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  76.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.833(In/Hr) for a     2.0 year storm
Subarea runoff =      3.171(CFS) for      6.320(Ac.)
Total runoff =      4.758(CFS)     Total area =       9.020(Ac.)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Process from Point/Station      302.000 to Point/Station      110.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1608.000(Ft.)
End of natural channel elevation =   1585.000(Ft.)
Length of natural channel  =  1275.000(Ft.)
Estimated mean flow rate at midpoint of channel =      8.580(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.23(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0180
Corrected/adjusted channel slope =  0.0180
Travel time =    6.58 min.     TC =   24.69  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.491
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.240
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.760
RI index for soil(AMC 1)  =  63.84
Pervious area fraction =  0.890; Impervious fraction =  0.110
Rainfall intensity =      0.725(In/Hr) for a     2.0 year storm
Subarea runoff =      5.158(CFS) for     14.490(Ac.)
Total runoff =      9.917(CFS)     Total area =      23.510(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      110.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     23.510(Ac.)
Runoff from this stream =      9.917(CFS)
Time of concentration =   24.69 min.
Rainfall intensity =     0.725(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       28.953     30.38                 0.660
2        9.917     24.69                 0.725
Largest stream flow has longer time of concentration
Qp =     28.953 + sum of
          Qb         Ia/Ib
           9.917 *    0.911 =      9.033
Qp =     37.986

Total of 2 streams to confluence:
Flow rates before confluence point:
      28.953       9.917
Area of streams before confluence:
       78.960       23.510
Results of confluence:
Total flow rate =     37.986(CFS)
Time of concentration =    30.383 min.
Effective stream area after confluence =    102.470(Ac.)


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Process from Point/Station      110.000 to Point/Station      110.500
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
USER INPUT of soil data for subarea
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```
Runoff Coefficient = 0.511
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  63.28
Pervious area fraction =  0.800; Impervious fraction =  0.200
Time of concentration =    30.38 min.
Rainfall intensity =      0.660(In/Hr) for a     2.0 year storm
Subarea runoff =      1.864(CFS) for      5.520(Ac.)
Total runoff =     39.850(CFS)     Total area =     107.990(Ac.)


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Process from Point/Station      110.500 to Point/Station      110.600
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1599.000(Ft.)
End of natural channel elevation =   1565.000(Ft.)
Length of natural channel  =   508.700(Ft.)
Estimated mean flow rate at midpoint of channel =     39.850(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   9.38(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0668
Corrected/adjusted channel slope =  0.0668
Travel time =    0.90 min.     TC =   31.29  min.


 Adding area flow to channel
COMMERCIAL subarea type
Runoff Coefficient = 0.845
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  57.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      0.651(In/Hr) for a     2.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =     39.850(CFS)     Total area =     107.990(Ac.)


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Process from Point/Station      110.600 to Point/Station      110.600
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.845
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  57.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    31.29 min.
Rainfall intensity =      0.651(In/Hr) for a     2.0 year storm
Subarea runoff =      1.013(CFS) for      1.840(Ac.)
Total runoff =     40.863(CFS)     Total area =     109.830(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.600 to Point/Station      110.700
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1565.000(Ft.)
End of natural channel elevation =   1564.000(Ft.)
Length of natural channel  =    77.200(Ft.)
Estimated mean flow rate at midpoint of channel =     40.863(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.16(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0130
Corrected/adjusted channel slope =  0.0130
Travel time =    0.31 min.     TC =   31.60  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.550
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  76.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.649(In/Hr) for a     2.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =     40.863(CFS)     Total area =     109.830(Ac.)


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Process from Point/Station      110.700 to Point/Station      110.700
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.845
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  57.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    31.60 min.
Rainfall intensity =      0.649(In/Hr) for a     2.0 year storm
Subarea runoff =      0.943(CFS) for      1.720(Ac.)
Total runoff =     41.806(CFS)     Total area =     111.550(Ac.)


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Process from Point/Station      110.700 to Point/Station      111.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------------
Top of natural channel elevation =   1564.000(Ft.)
End of natural channel elevation =   1562.200(Ft.)
Length of natural channel  =   184.900(Ft.)
Estimated mean flow rate at midpoint of channel =     43.429(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.67(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0097
Corrected/adjusted channel slope =  0.0097
Travel time =    0.84 min.     TC =   32.44  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.548
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  76.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.641(In/Hr) for a     2.0 year storm
Subarea runoff =      3.041(CFS) for      8.660(Ac.)
Total runoff =     44.848(CFS)    Total area =     120.210(Ac.)
End of computations, total study area =          120.21 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.845
Area averaged RI index number =  77.4
```

DRAINAGE AREAS
B, C, D, F, I, &J

```
                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
        Rational Hydrology Study        Date: 10/17/23  File:crprob2.out
------------------------------------------------------------------------
Crescent Gardens
Proposed Condition Hydrology
AREAS B,C,D,F,I & J
10/16/23
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------


Program License Serial Number 6406

------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =    2.00 Antecedent Moisture Condition = 1

2 year, 1 hour precipitation =  0.486(In.)
100 year, 1 hour precipitation =  1.440(In.)

Storm event year =   2.0
Calculated rainfall intensity data:
1 hour intensity =  0.486(In/Hr)
Slope of intensity duration curve = 0.4500




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Process from Point/Station      310.000 to Point/Station      311.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   545.200(Ft.)
Top (of initial area) elevation =  1642.000(Ft.)
Bottom (of initial area) elevation =  1621.000(Ft.)
Difference in elevation =    21.000(Ft.)
Slope =    0.03852  s(percent)=       3.85
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.641 min.
Rainfall intensity =      0.980(In/Hr) for a     2.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.634
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  76.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      0.999(CFS)
```

Area B

```
Total initial stream area =        1.610(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      311.000 to Point/Station      312.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1621.000(Ft.)
End of natural channel elevation =   1607.000(Ft.)
Length of natural channel  =   534.000(Ft.)
Estimated mean flow rate at midpoint of channel =      1.620(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   2.67(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0262
Corrected/adjusted channel slope =  0.0262
Travel time =    3.34 min.     TC =   15.98  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.465
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.770
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.230
RI index for soil(AMC 1)  =  61.80
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.882(In/Hr) for a     2.0 year storm
Subarea runoff =      0.820(CFS) for      2.000(Ac.)
Total runoff =      1.819(CFS)     Total area =       3.610(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      320.000 to Point/Station      321.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   543.400(Ft.)
Top (of initial area) elevation =  1613.000(Ft.)
Bottom (of initial area) elevation =  1604.000(Ft.)
Difference in elevation =     9.000(Ft.)
Slope =    0.01656  s(percent)=       1.66
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.945 min.
Rainfall intensity =      0.908(In/Hr) for a     2.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.481
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.840
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.160
RI index for soil(AMC 1)  =  62.71
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      1.008(CFS)
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Area C

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Total initial stream area =        2.310(Ac.)
Pervious area fraction = 1.000


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Process from Point/Station      510.000 to Point/Station      511.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Initial area flow distance =   477.300(Ft.)
Top (of initial area) elevation =  1643.000(Ft.)
Bottom (of initial area) elevation =  1614.000(Ft.)
Difference in elevation =    29.000(Ft.)
Slope =    0.06076  s(percent)=       6.08
TC = k(0.420)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.671 min.
Rainfall intensity =      1.161(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1/2 Acre Lot)
Runoff Coefficient = 0.649
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  57.00
Pervious area fraction =  0.600; Impervious fraction =  0.400
Initial subarea runoff =      0.784(CFS)
Total initial stream area =        1.040(Ac.)
Pervious area fraction = 0.600


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      600.000 to Point/Station      601.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Initial area flow distance =   849.100(Ft.)
Top (of initial area) elevation =  1665.000(Ft.)
Bottom (of initial area) elevation =  1576.000(Ft.)
Difference in elevation =    89.000(Ft.)
Slope =    0.10482  s(percent)=      10.48
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.353 min.
Rainfall intensity =      0.990(In/Hr) for a     2.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.623
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.260
Decimal fraction soil group D = 0.740
RI index for soil(AMC 1)  =  75.15
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      2.847(CFS)
Total initial stream area =        4.620(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      601.000 to Point/Station      602.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
Top of natural channel elevation =   1576.000(Ft.)
End of natural channel elevation =   1540.000(Ft.)
```

Area D

Area F

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Length of natural channel  =  1005.700(Ft.)
Estimated mean flow rate at midpoint of channel =      8.553(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.55(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0358
Corrected/adjusted channel slope =  0.0358
Travel time =    3.69 min.     TC =   16.04  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.613
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  76.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.880(In/Hr) for a     2.0 year storm
Subarea runoff =      9.991(CFS) for     18.520(Ac.)
Total runoff =     12.838(CFS)     Total area =      23.140(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      630.000 to Point/Station      631.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Initial area flow distance =   881.300(Ft.)
Top (of initial area) elevation =  1576.000(Ft.)
Bottom (of initial area) elevation =  1540.000(Ft.)
Difference in elevation =    36.000(Ft.)
Slope =    0.04085  s(percent)=       4.08
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.139 min.
Rainfall intensity =      0.903(In/Hr) for a     2.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.618
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  76.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      2.294(CFS)
Total initial stream area =        4.110(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      620.000 to Point/Station      621.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Initial area flow distance =   325.800(Ft.)
Top (of initial area) elevation =  1571.000(Ft.)
```

Area I

```
Bottom (of initial area) elevation =  1537.000(Ft.)
Difference in elevation =    34.000(Ft.)
Slope =    0.10436  s(percent)=      10.44
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.429 min.
Rainfall intensity =      1.175(In/Hr) for a     2.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.666
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  76.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      1.332(CFS)
Total initial stream area =        1.700(Ac.)
Pervious area fraction = 1.000
End of computations, total study area =           35.91 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.988
Area averaged RI index number =  87.3
```

Area J

DRAINAGE AREA E

```
                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
        Rational Hydrology Study        Date: 10/17/23  File:crproe2.out
------------------------------------------------------------------------
Crescent Gardens
Proposed Condtion Hydrology
AREA E
10/06/23
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------


Program License Serial Number 6406

------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =    2.00 Antecedent Moisture Condition = 1

2 year, 1 hour precipitation =  0.486(In.)
100 year, 1 hour precipitation =  1.440(In.)

Storm event year =   2.0
Calculated rainfall intensity data:
1 hour intensity =  0.486(In/Hr)
Slope of intensity duration curve = 0.4500




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      500.000 to Point/Station      501.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   997.400(Ft.)
Top (of initial area) elevation =  1645.400(Ft.)
Bottom (of initial area) elevation =  1614.000(Ft.)
Difference in elevation =    31.400(Ft.)
Slope =    0.03148  s(percent)=       3.15
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.177 min.
Rainfall intensity =      0.902(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.520
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  57.00
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      1.953(CFS)
Total initial stream area =        4.160(Ac.)
Pervious area fraction = 0.800


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      501.000 to Point/Station      502.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1607.000(Ft.)
Downstream point/station elevation =  1582.000(Ft.)
Pipe length  =  1200.30(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.953(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.953(CFS)
Normal flow depth in pipe =    6.19(In.)
Flow top width inside pipe =    8.34(In.)
Critical Depth =    7.63(In.)
Pipe flow velocity =      6.03(Ft/s)
Travel time through pipe =    3.32 min.
Time of concentration (TC) =    18.50 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      502.000 to Point/Station      502.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
USER INPUT of soil data for subarea
Runoff Coefficient = 0.467
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.280
Decimal fraction soil group D = 0.720
RI index for soil(AMC 1)  =  58.44
Pervious area fraction =  0.900; Impervious fraction =  0.100
Time of concentration =    18.50 min.
Rainfall intensity =      0.825(In/Hr) for a     2.0 year storm
Subarea runoff =      4.262(CFS) for     11.060(Ac.)
Total runoff =      6.215(CFS)     Total area =      15.220(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      502.000 to Point/Station      503.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1582.000(Ft.)
Downstream point/station elevation =  1580.000(Ft.)
Pipe length  =   225.80(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.215(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     6.215(CFS)
Normal flow depth in pipe =   10.35(In.)
Flow top width inside pipe =   17.80(In.)
Critical Depth =   11.56(In.)
Pipe flow velocity =      5.91(Ft/s)
Travel time through pipe =    0.64 min.
Time of concentration (TC) =    19.13 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      503.000 to Point/Station      503.000
```

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**** SUBAREA FLOW ADDITION ****
_____________________________________________________________
USER INPUT of soil data for subarea
Runoff Coefficient = 0.478
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.270
Decimal fraction soil group D = 0.730
RI index for soil(AMC 1)  =  64.96
Pervious area fraction =  1.000; Impervious fraction =  0.000
Time of concentration =    19.13 min.
Rainfall intensity =      0.813(In/Hr) for a     2.0 year storm
Subarea runoff =      6.431(CFS) for     16.570(Ac.)
Total runoff =     12.647(CFS)    Total area =      31.790(Ac.)
End of computations, total study area =           31.79 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.939
Area averaged RI index number =  78.8
```

DRAINAGE AREA G

```
                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
        Rational Hydrology Study        Date: 10/17/23  File:crprog2r.out
------------------------------------------------------------------------
Crescent Gardens
Proposed Condtion Hydrology
Area G
10/16/23
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------


Program License Serial Number 6406

------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =    2.00 Antecedent Moisture Condition = 1

2 year, 1 hour precipitation =  0.486(In.)
100 year, 1 hour precipitation =  1.440(In.)

Storm event year =   2.0
Calculated rainfall intensity data:
1 hour intensity =  0.486(In/Hr)
Slope of intensity duration curve = 0.4500




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      400.000 to Point/Station      401.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   770.300(Ft.)
Top (of initial area) elevation =  1610.900(Ft.)
Bottom (of initial area) elevation =  1570.000(Ft.)
Difference in elevation =    40.900(Ft.)
Slope =    0.05310  s(percent)=       5.31
TC = k(0.420)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.787 min.
Rainfall intensity =      1.052(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1/2 Acre Lot)
Runoff Coefficient = 0.636
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  57.00
Pervious area fraction =  0.600; Impervious fraction =  0.400
Initial subarea runoff =      1.224(CFS)
Total initial stream area =        1.830(Ac.)
Pervious area fraction = 0.600


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      401.000 to Point/Station      402.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1570.000(Ft.)
End of street segment elevation =  1557.200(Ft.)
Length of street segment  =   278.400(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  16.000(Ft.)
Distance from crown to crossfall grade break  =  10.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =   4.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      2.839(CFS)
Depth of flow =   0.216(Ft.), Average velocity =   4.067(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   8.112(Ft.)
Flow velocity =   4.07(Ft/s)
Travel time =    1.14 min.     TC =   11.93  min.
 Adding area flow to street
USER INPUT of soil data for subarea
Runoff Coefficient = 0.555
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  61.80
Pervious area fraction =  0.850; Impervious fraction =  0.150
Rainfall intensity =      1.005(In/Hr) for a     2.0 year storm
Subarea runoff =      3.149(CFS) for      5.640(Ac.)
Total runoff =      4.374(CFS)     Total area =       7.470(Ac.)
Street flow at end of street =      4.374(CFS)
Half street flow at end of street =      4.374(CFS)
Depth of flow =   0.246(Ft.), Average velocity =   4.515(Ft/s)
Flow width (from curb towards crown)=   9.637(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      402.000 to Point/Station      402.500
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1553.500(Ft.)
Downstream point/station elevation =  1553.000(Ft.)
Pipe length  =    43.50(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.374(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     4.374(CFS)
Normal flow depth in pipe =    8.65(In.)
Flow top width inside pipe =   14.82(In.)
```

```
Critical Depth =   10.16(In.)
Pipe flow velocity =      5.97(Ft/s)
Travel time through pipe =    0.12 min.
Time of concentration (TC) =    12.05 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      402.000 to Point/Station      403.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1553.000(Ft.)
End of natural channel elevation =   1544.500(Ft.)
Length of natural channel  =   544.100(Ft.)
Estimated mean flow rate at midpoint of channel =      7.105(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   2.87(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
         Normal channel slope =  0.0156
Corrected/adjusted channel slope =  0.0156
Travel time =    3.16 min.     TC =   15.21  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.618
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  76.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.901(In/Hr) for a     2.0 year storm
Subarea runoff =      5.194(CFS) for      9.330(Ac.)
Total runoff =      9.568(CFS)    Total area =      16.800(Ac.)
End of computations, total study area =           16.80 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.906
Area averaged RI index number =  84.1
```

DRAINAGE AREA H

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 10/24/23 File:crproh2.out

Crescent Gardens
Proposed Condition Hydrology
Area H
10/17/23

********* Hydrology Study Control Information **********

English (in-lb) Units used in input data file

Program License Serial Number 6406

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 2.00 Antecedent Moisture Condition = 1

2 year, 1 hour precipitation = 0.486(In.)
100 year, 1 hour precipitation = 1.440(In.)

Storm event year = 2.0
Calculated rainfall intensity data:
1 hour intensity = 0.486(In/Hr)
Slope of intensity duration curve = 0.4500

++
Process from Point/Station 610.000 to Point/Station 610.500
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 746.900(Ft.)
Top (of initial area) elevation = 1600.500(Ft.)
Bottom (of initial area) elevation = 1577.000(Ft.)
Difference in elevation = 23.500(Ft.)
Slope = 0.03146 s(percent)= 3.15
TC = k(0.420)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 11.830 min.
Rainfall intensity = 1.009(In/Hr) for a 2.0 year storm
SINGLE FAMILY (1/2 Acre Lot)
Runoff Coefficient = 0.630
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1) = 57.00
Pervious area fraction = 0.600; Impervious fraction = 0.400
Initial subarea runoff = 0.910(CFS)
Total initial stream area = 1.430(Ac.)
Pervious area fraction = 0.600

++
Process from Point/Station 610.500 to Point/Station 610.600
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1573.000(Ft.)
Downstream point/station elevation = 1551.000(Ft.)
Pipe length = 619.50(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 0.910(CFS)
Nearest computed pipe diameter = 6.00(In.)
Calculated individual pipe flow = 0.910(CFS)
Normal flow depth in pipe = 4.29(In.)
Flow top width inside pipe = 5.42(In.)
Critical Depth = 5.55(In.)
Pipe flow velocity = 6.06(Ft/s)
Travel time through pipe = 1.70 min.
Time of concentration (TC) = 13.54 min.

++
Process from Point/Station 610.600 to Point/Station 610.600
**** SUBAREA FLOW ADDITION ****

USER INPUT of soil data for subarea
Runoff Coefficient = 0.550
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1) = 61.92
Pervious area fraction = 0.840; Impervious fraction = 0.160
Time of concentration = 13.54 min.
Rainfall intensity = 0.950(In/Hr) for a 2.0 year storm
Subarea runoff = 2.961(CFS) for 5.670(Ac.)
Total runoff = 3.870(CFS) Total area = 7.100(Ac.)

++
Process from Point/Station 610.600 to Point/Station 611.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1551.000(Ft.)
Downstream point/station elevation = 1544.500(Ft.)
Pipe length = 304.30(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 3.870(CFS)
Nearest computed pipe diameter = 12.00(In.)
Calculated individual pipe flow = 3.870(CFS)
Normal flow depth in pipe = 7.71(In.)
Flow top width inside pipe = 11.51(In.)
Critical Depth = 10.03(In.)
Pipe flow velocity = 7.26(Ft/s)
Travel time through pipe = 0.70 min.
Time of concentration (TC) = 14.23 min.

++
Process from Point/Station 611.000 to Point/Station 612.000

```
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
_____________________________________________________________
Top of natural channel elevation =   1544.500(Ft.)
End of natural channel elevation =   1541.000(Ft.)
Length of natural channel  =    58.000(Ft.)
Estimated mean flow rate at midpoint of channel =      4.260(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.99(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
         Normal channel slope =  0.0603
Corrected/adjusted channel slope =  0.0603
Travel time =    0.19 min.     TC =   14.43  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.622
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  76.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.923(In/Hr) for a     2.0 year storm
Subarea runoff =      0.821(CFS) for      1.430(Ac.)
Total runoff =      4.692(CFS)     Total area =       8.530(Ac.)
End of computations, total study area =            8.53 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.827
Area averaged RI index number =  80.1
```

10 – YEAR RATIONAL METHOD CALCULATIONS

DRAINAGE AREA A

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 10/13/23 File:crproa10.out

Crescent Gardens
Proposed Condtion Hydrology
Riverside Co.
Area A 10/13/23

********* Hydrology Study Control Information **********

English (in-lb) Units used in input data file

Program License Serial Number 6406

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 10.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation = 0.486(In.)
100 year, 1 hour precipitation = 1.440(In.)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.878(In/Hr)
Slope of intensity duration curve = 0.4500

++
Process from Point/Station 100.000 to Point/Station 101.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 894.400(Ft.)
Top (of initial area) elevation = 1694.000(Ft.)
Bottom (of initial area) elevation = 1665.000(Ft.)
Difference in elevation = 29.000(Ft.)
Slope = 0.03242 s(percent)= 3.24
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 14.444 min.
Rainfall intensity = 1.667(In/Hr) for a 10.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.447
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 32.00
Pervious area fraction = 0.800; Impervious fraction = 0.200
Initial subarea runoff = 2.518(CFS)
Total initial stream area = 3.380(Ac.)
Pervious area fraction = 0.800

++
Process from Point/Station 101.000 to Point/Station 102.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Estimated mean flow rate at midpoint of channel = 11.953(CFS)
Depth of flow = 0.408(Ft.), Average velocity = 5.404(Ft/s)
******* Irregular Channel Data **********

Information entered for subchannel number 1 :

Point number	'X' coordinate	'Y' coordinate
1	0.00	3.49
2	6.98	0.00
3	11.98	0.25
4	23.98	0.49

Manning's 'N' friction factor = 0.015

Sub-Channel flow = 11.953(CFS)
' ' flow top width = 13.740(Ft.)
' ' velocity= 5.404(Ft/s)
' ' area = 2.212(Sq.Ft)
' ' Froude number = 2.373

Upstream point elevation = 1665.000(Ft.)
Downstream point elevation = 1638.000(Ft.)
Flow length = 786.700(Ft.)
Travel time = 2.43 min.
Time of concentration = 16.87 min.
Depth of flow = 0.408(Ft.)
Average velocity = 5.404(Ft/s)
Total irregular channel flow = 11.953(CFS)
Irregular channel normal depth above invert elev. = 0.408(Ft.)
Average velocity of channel(s) = 5.404(Ft/s)
Adding area flow to channel
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.740
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 75.00
Pervious area fraction = 0.800; Impervious fraction = 0.200
Rainfall intensity = 1.555(In/Hr) for a 10.0 year storm
Subarea runoff = 18.926(CFS) for 16.450(Ac.)
Total runoff = 21.444(CFS) Total area = 19.830(Ac.)
Depth of flow = 0.489(Ft.), Average velocity = 6.137(Ft/s)

++
Process from Point/Station 102.000 to Point/Station 103.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 1638.000(Ft.)
End of natural channel elevation = 1614.000(Ft.)
Length of natural channel = 1328.900(Ft.)
Estimated mean flow rate at midpoint of channel = 36.832(CFS)

```
Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.77(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0181
Corrected/adjusted channel slope =  0.0181
Travel time =    4.65 min.     TC =   21.52  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.728
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.080
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.920
RI index for soil(AMC 2)  =  77.00
Pervious area fraction =  0.860; Impervious fraction =  0.140
Rainfall intensity =      1.394(In/Hr) for a    10.0 year storm
Subarea runoff =     28.874(CFS) for     28.460(Ac.)
Total runoff =     50.318(CFS)    Total area =      48.290(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1614.000(Ft.)
Downstream point/station elevation =  1612.000(Ft.)
Pipe length  =   182.60(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    50.318(CFS)
Nearest computed pipe diameter  =     33.00(In.)
Calculated individual pipe flow  =    50.318(CFS)
Normal flow depth in pipe =   24.70(In.)
Flow top width inside pipe =   28.63(In.)
Critical Depth =   28.00(In.)
Pipe flow velocity =     10.56(Ft/s)
Travel time through pipe =    0.29 min.
Time of concentration (TC) =    21.80 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      105.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Depth of flow =   1.569(Ft.), Average velocity =   4.089(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1             0.00             3.00
        2            15.00             0.00
        3            30.00             3.00
Manning's 'N' friction factor =   0.035
------------------------------------------------------------------
Sub-Channel flow  =     50.318(CFS)
  '     '         flow top width =     15.689(Ft.)
  '     '    velocity=    4.089(Ft/s)
  '     '         area =     12.307(Sq.Ft)
  '     '         Froude number =     0.814

Upstream point elevation =  1612.000(Ft.)
Downstream point elevation =  1611.000(Ft.)
Flow length =    76.000(Ft.)
Travel time  =    0.31 min.
Time of concentration =   22.11 min.
Depth of flow =   1.569(Ft.)
Average velocity =   4.089(Ft/s)
Total irregular channel flow =    50.318(CFS)
Irregular channel normal depth above invert elev. =   1.569(Ft.)
Average velocity of channel(s) =   4.089(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      106.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1611.000(Ft.)
Downstream point/station elevation =  1610.000(Ft.)
Pipe length  =    70.90(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    50.318(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    50.318(CFS)
Normal flow depth in pipe =   25.59(In.)
Flow top width inside pipe =   21.24(In.)
Critical Depth =   27.63(In.)
Pipe flow velocity =     11.28(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =    22.22 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      106.000 to Point/Station      107.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Depth of flow =   1.461(Ft.), Average velocity =   4.715(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1             0.00             3.00
        2            15.00             0.00
        3            30.00             3.00
Manning's 'N' friction factor =   0.035
------------------------------------------------------------------
Sub-Channel flow  =     50.318(CFS)
  '     '         flow top width =     14.609(Ft.)
  '     '    velocity=    4.715(Ft/s)
  '     '         area =     10.672(Sq.Ft)
  '     '         Froude number =     0.972

Upstream point elevation =  1610.000(Ft.)
Downstream point elevation =  1604.500(Ft.)
Flow length =   285.800(Ft.)
Travel time  =    1.01 min.
Time of concentration =   23.23 min.
Depth of flow =   1.461(Ft.)
```

```
Average velocity =   4.715(Ft/s)
Total irregular channel flow =    50.318(CFS)
Irregular channel normal depth above invert elev. =   1.461(Ft.)
Average velocity of channel(s) =   4.715(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      107.000 to Point/Station      107.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     48.290(Ac.)
Runoff from this stream =     50.318(CFS)
Time of concentration =   23.23 min.
Rainfall intensity =     1.346(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      200.000 to Point/Station      201.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   811.600(Ft.)
Top (of initial area) elevation =  1650.000(Ft.)
Bottom (of initial area) elevation =  1631.000(Ft.)
Difference in elevation =    19.000(Ft.)
Slope =    0.02341  s(percent)=       2.34
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.828 min.
Rainfall intensity =      1.648(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.747
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      8.494(CFS)
Total initial stream area =        6.900(Ac.)
Pervious area fraction = 0.800


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Process from Point/Station      201.000 to Point/Station      202.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1631.000(Ft.)
End of natural channel elevation =   1613.000(Ft.)
Length of natural channel  =   872.300(Ft.)
Estimated mean flow rate at midpoint of channel =     14.575(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.96(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0206
Corrected/adjusted channel slope =  0.0206
Travel time =    3.67 min.     TC =   18.50  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.743
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  77.00
Pervious area fraction =  0.830; Impervious fraction =  0.170
Rainfall intensity =      1.492(In/Hr) for a    10.0 year storm
Subarea runoff =     10.943(CFS) for      9.880(Ac.)
Total runoff =     19.437(CFS)    Total area =      16.780(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      202.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =     16.780(Ac.)
Runoff from this stream =     19.437(CFS)
Time of concentration =   18.50 min.
Rainfall intensity =     1.492(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      210.000 to Point/Station      211.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   742.800(Ft.)
Top (of initial area) elevation =  1641.000(Ft.)
Bottom (of initial area) elevation =  1622.000(Ft.)
Difference in elevation =    19.000(Ft.)
Slope =    0.02558  s(percent)=       2.56
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.061 min.
Rainfall intensity =      1.688(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.750
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      1.709(CFS)
Total initial stream area =        1.350(Ac.)
Pervious area fraction = 0.800


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      211.000 to Point/Station      202.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Depth of flow =   0.233(Ft.), Average velocity =   1.580(Ft/s)
```

```
       ******* Irregular Channel Data ***********
-------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1             0.00              3.00
        2            60.00              0.00
        3           120.00              3.00
Manning's 'N' friction factor =   0.035
-------------------------------------------------------------------
Sub-Channel flow  =      1.709(CFS)
  '     '         flow top width =      9.300(Ft.)
  '     '    velocity=    1.580(Ft/s)
  '     '         area =      1.081(Sq.Ft)
  '     '         Froude number =     0.817

Upstream point elevation =  1622.000(Ft.)
Downstream point elevation =  1613.000(Ft.)
Flow length =   368.000(Ft.)
Travel time  =    3.88 min.
Time of concentration =   17.94 min.
Depth of flow =   0.233(Ft.)
Average velocity =   1.580(Ft/s)
Total irregular channel flow =     1.709(CFS)
Irregular channel normal depth above invert elev. =   0.233(Ft.)
Average velocity of channel(s) =   1.580(Ft/s)


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Process from Point/Station      202.000 to Point/Station      202.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      1.350(Ac.)
Runoff from this stream =      1.709(CFS)
Time of concentration =   17.94 min.
Rainfall intensity =     1.512(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1       19.437     18.50                1.492
2        1.709     17.94                1.512
Largest stream flow has longer time of concentration
Qp =     19.437 + sum of
           Qb         Ia/Ib
            1.709 *    0.986 =      1.685
Qp =     21.122

Total of 2 streams to confluence:
Flow rates before confluence point:
      19.437       1.709
Area of streams before confluence:
       16.780        1.350
Results of confluence:
Total flow rate =     21.122(CFS)
Time of concentration =    18.503 min.
Effective stream area after confluence =     18.130(Ac.)

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Process from Point/Station      202.000 to Point/Station      107.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Depth of flow =   1.019(Ft.), Average velocity =   4.066(Ft/s)
       ******* Irregular Channel Data ***********
-------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1             0.00              3.00
        2            15.00              0.00
        3            30.00              3.00
Manning's 'N' friction factor =   0.035
-------------------------------------------------------------------
Sub-Channel flow  =     21.122(CFS)
  '     '         flow top width =     10.193(Ft.)
  '     '    velocity=    4.066(Ft/s)
  '     '         area =      5.195(Sq.Ft)
  '     '         Froude number =     1.004

Upstream point elevation =  1613.000(Ft.)
Downstream point elevation =  1604.500(Ft.)
Flow length =   367.500(Ft.)
Travel time  =    1.51 min.
Time of concentration =   20.01 min.
Depth of flow =   1.019(Ft.)
Average velocity =   4.066(Ft/s)
Total irregular channel flow =    21.122(CFS)
Irregular channel normal depth above invert elev. =   1.019(Ft.)
Average velocity of channel(s) =   4.066(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      107.000 to Point/Station      107.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     18.130(Ac.)
Runoff from this stream =     21.122(CFS)
Time of concentration =   20.01 min.
Rainfall intensity =     1.440(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1       50.318     23.23           1.346
2       21.122     20.01           1.440
Largest stream flow has longer time of concentration
Qp =     50.318 + sum of
           Qb         Ia/Ib
           21.122 *    0.935 =     19.750
Qp =     70.068

Total of 2 main streams to confluence:
Flow rates before confluence point:
      50.318      21.122
```

```
Area of streams before confluence:
       48.290       18.130


Results of confluence:
Total flow rate =     70.068(CFS)
Time of concentration =    23.229 min.
Effective stream area after confluence  =     66.420(Ac.)


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Process from Point/Station      107.000 to Point/Station      108.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1604.500(Ft.)
End of natural channel elevation =   1600.000(Ft.)
Length of natural channel  =   465.800(Ft.)
Estimated mean flow rate at midpoint of channel =     76.683(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.31(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
         Normal channel slope =  0.0097
Corrected/adjusted channel slope =  0.0097
Travel time =    1.80 min.     TC =   25.03  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.696
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.300
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.700
RI index for soil(AMC 2)  =  74.70
Pervious area fraction =  0.880; Impervious fraction =  0.120
Rainfall intensity =      1.302(In/Hr) for a    10.0 year storm
Subarea runoff =     11.364(CFS) for     12.540(Ac.)
Total runoff =     81.432(CFS)    Total area =      78.960(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      109.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1600.000(Ft.)
Downstream point/station elevation =  1599.000(Ft.)
Pipe length  =    52.70(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    81.432(CFS)
Nearest computed pipe diameter  =     36.00(In.)
Calculated individual pipe flow  =    81.432(CFS)
Normal flow depth in pipe =   26.34(In.)
Flow top width inside pipe =   31.90(In.)
Critical Depth =   33.38(In.)
Pipe flow velocity =     14.68(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =    25.09 min.


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Process from Point/Station      109.000 to Point/Station      110.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Depth of flow =   1.707(Ft.), Average velocity =   5.590(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              3.00
        2             15.00              0.00
        3             30.00              3.00
Manning's 'N' friction factor =   0.035
------------------------------------------------------------------
Sub-Channel flow  =     81.432(CFS)
  '     '         flow top width =     17.069(Ft.)
  '     '    velocity=    5.590(Ft/s)
  '     '         area =     14.568(Sq.Ft)
  '     '         Froude number =     1.066

Upstream point elevation =  1599.000(Ft.)
Downstream point elevation =  1586.000(Ft.)
Flow length =   591.500(Ft.)
Travel time  =    1.76 min.
Time of concentration =   26.85 min.
Depth of flow =   1.707(Ft.)
Average velocity =   5.590(Ft/s)
Total irregular channel flow =    81.432(CFS)
Irregular channel normal depth above invert elev. =   1.707(Ft.)
Average velocity of channel(s) =   5.590(Ft/s)


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Process from Point/Station      110.000 to Point/Station      110.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     78.960(Ac.)
Runoff from this stream =     81.432(CFS)
Time of concentration =   26.85 min.
Rainfall intensity =     1.261(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      300.000 to Point/Station      301.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   527.800(Ft.)
Top (of initial area) elevation =  1635.000(Ft.)
Bottom (of initial area) elevation =  1623.000(Ft.)
Difference in elevation =    12.000(Ft.)
Slope =    0.02274  s(percent)=       2.27
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.865 min.
Rainfall intensity =      1.698(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.820
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Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      3.762(CFS)
Total initial stream area =        2.700(Ac.)
Pervious area fraction = 1.000


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Process from Point/Station      301.000 to Point/Station      302.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1623.000(Ft.)
End of natural channel elevation =   1608.000(Ft.)
Length of natural channel  =   715.100(Ft.)
Estimated mean flow rate at midpoint of channel =      8.165(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.44(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0210
Corrected/adjusted channel slope =  0.0210
Travel time =    3.46 min.     TC =   17.33  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.813
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.536(In/Hr) for a    10.0 year storm
Subarea runoff =      7.891(CFS) for      6.320(Ac.)
Total runoff =     11.653(CFS)    Total area =       9.020(Ac.)


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Process from Point/Station      302.000 to Point/Station      110.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1608.000(Ft.)
End of natural channel elevation =   1585.000(Ft.)
Length of natural channel  =  1275.000(Ft.)
Estimated mean flow rate at midpoint of channel =     21.014(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.08(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0180
Corrected/adjusted channel slope =  0.0180
Travel time =    5.21 min.     TC =   22.54  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.748
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.240
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.760
RI index for soil(AMC 2)  =  80.60
Pervious area fraction =  0.890; Impervious fraction =  0.110
Rainfall intensity =      1.365(In/Hr) for a    10.0 year storm
Subarea runoff =     14.783(CFS) for     14.490(Ac.)
Total runoff =     26.436(CFS)    Total area =      23.510(Ac.)


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Process from Point/Station      110.000 to Point/Station      110.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     23.510(Ac.)
Runoff from this stream =     26.436(CFS)
Time of concentration =   22.54 min.
Rainfall intensity =     1.365(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1       81.432     26.85                 1.261
2       26.436     22.54                 1.365
Largest stream flow has longer time of concentration
Qp =     81.432 + sum of
           Qb         Ia/Ib
           26.436 *    0.924 =     24.433
Qp =    105.865

Total of 2 streams to confluence:
Flow rates before confluence point:
      81.432      26.436
Area of streams before confluence:
       78.960       23.510
Results of confluence:
Total flow rate =    105.865(CFS)
Time of concentration =    26.854 min.
Effective stream area after confluence =    102.470(Ac.)


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Process from Point/Station      110.000 to Point/Station      110.500
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
USER INPUT of soil data for subarea
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Runoff Coefficient = 0.751
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  80.20
Pervious area fraction =  0.800; Impervious fraction =  0.200
Time of concentration =    26.85 min.
Rainfall intensity =      1.261(In/Hr) for a    10.0 year storm
Subarea runoff =      5.229(CFS) for      5.520(Ac.)
Total runoff =    111.094(CFS)    Total area =     107.990(Ac.)


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Process from Point/Station      110.500 to Point/Station      110.600
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1599.000(Ft.)
End of natural channel elevation =   1565.000(Ft.)
Length of natural channel  =   508.700(Ft.)
Estimated mean flow rate at midpoint of channel =    111.094(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =  12.67(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0668
Corrected/adjusted channel slope =  0.0668
Travel time =    0.67 min.     TC =   27.52  min.


 Adding area flow to channel
COMMERCIAL subarea type
Runoff Coefficient = 0.876
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      1.247(In/Hr) for a    10.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =    111.094(CFS)    Total area =     107.990(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.600 to Point/Station      110.600
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.876
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    27.52 min.
Rainfall intensity =      1.247(In/Hr) for a    10.0 year storm
Subarea runoff =      2.012(CFS) for      1.840(Ac.)
Total runoff =    113.105(CFS)    Total area =     109.830(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.600 to Point/Station      110.700
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1565.000(Ft.)
End of natural channel elevation =   1564.000(Ft.)
Length of natural channel  =    77.200(Ft.)
Estimated mean flow rate at midpoint of channel =    113.105(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   5.61(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0130
Corrected/adjusted channel slope =  0.0130
Travel time =    0.23 min.     TC =   27.75  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.795
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.243(In/Hr) for a    10.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =    113.105(CFS)    Total area =     109.830(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.700 to Point/Station      110.700
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.876
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    27.75 min.
Rainfall intensity =      1.243(In/Hr) for a    10.0 year storm
Subarea runoff =      1.873(CFS) for      1.720(Ac.)
Total runoff =    114.979(CFS)    Total area =     111.550(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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```
Process from Point/Station      110.700 to Point/Station      111.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------------
Top of natural channel elevation =   1564.000(Ft.)
End of natural channel elevation =   1562.200(Ft.)
Length of natural channel  =   184.900(Ft.)
Estimated mean flow rate at midpoint of channel =    119.442(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.94(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
         Normal channel slope =  0.0097
Corrected/adjusted channel slope =  0.0097
Travel time =    0.62 min.     TC =   28.38  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.794
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.230(In/Hr) for a    10.0 year storm
Subarea runoff =      8.458(CFS) for      8.660(Ac.)
Total runoff =    123.436(CFS)    Total area =     120.210(Ac.)
End of computations, total study area =          120.21 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.845
Area averaged RI index number =  77.4
```

DRAINAGE AREAS
B, C, D, F, I, &J

```
                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
        Rational Hydrology Study        Date: 10/16/23  File:CRPROB10.out
------------------------------------------------------------------------
Crescent Gardens
Proposed Condtion Hydrology
AREAS B,C,D,F,I & J
10/16/23
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------


Program License Serial Number 6406

------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =   10.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation =  0.486(In.)
100 year, 1 hour precipitation =  1.440(In.)

Storm event year =  10.0
Calculated rainfall intensity data:
1 hour intensity =  0.878(In/Hr)
Slope of intensity duration curve = 0.4500




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      310.000 to Point/Station      311.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   545.200(Ft.)
Top (of initial area) elevation =  1642.000(Ft.)
Bottom (of initial area) elevation =  1621.000(Ft.)
Difference in elevation =    21.000(Ft.)
Slope =    0.03852  s(percent)=       3.85
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.641 min.
Rainfall intensity =      1.771(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.823
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      2.347(CFS)
```

Area B

```
Total initial stream area =        1.610(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      311.000 to Point/Station      312.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1621.000(Ft.)
End of natural channel elevation =   1607.000(Ft.)
Length of natural channel  =   534.000(Ft.)
Estimated mean flow rate at midpoint of channel =      3.805(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.21(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0262
Corrected/adjusted channel slope =  0.0262
Travel time =    2.78 min.     TC =   15.42  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.738
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.770
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.230
RI index for soil(AMC 2)  =  79.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.619(In/Hr) for a    10.0 year storm
Subarea runoff =      2.391(CFS) for      2.000(Ac.)
Total runoff =      4.738(CFS)    Total area =       3.610(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      320.000 to Point/Station      321.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   543.400(Ft.)
Top (of initial area) elevation =  1613.000(Ft.)
Bottom (of initial area) elevation =  1604.000(Ft.)
Difference in elevation =     9.000(Ft.)
Slope =    0.01656  s(percent)=       1.66
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.945 min.
Rainfall intensity =      1.642(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.746
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.840
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.160
RI index for soil(AMC 2)  =  79.76
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      2.831(CFS)
```

Area C

```
Total initial stream area =        2.310(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      510.000 to Point/Station      511.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------
Initial area flow distance =   477.300(Ft.)
Top (of initial area) elevation =  1643.000(Ft.)
Bottom (of initial area) elevation =  1614.000(Ft.)
Difference in elevation =    29.000(Ft.)
Slope =    0.06076  s(percent)=       6.08
TC = k(0.420)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.671 min.
Rainfall intensity =      2.098(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/2 Acre Lot)
Runoff Coefficient = 0.806
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.600; Impervious fraction =  0.400
Initial subarea runoff =      1.758(CFS)
Total initial stream area =        1.040(Ac.)
Pervious area fraction = 0.600


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      600.000 to Point/Station      601.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------
Initial area flow distance =   849.100(Ft.)
Top (of initial area) elevation =  1665.000(Ft.)
Bottom (of initial area) elevation =  1576.000(Ft.)
Difference in elevation =    89.000(Ft.)
Slope =    0.10482  s(percent)=      10.48
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.353 min.
Rainfall intensity =      1.789(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.819
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.260
Decimal fraction soil group D = 0.740
RI index for soil(AMC 2)  =  88.22
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      6.765(CFS)
Total initial stream area =        4.620(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      601.000 to Point/Station      602.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------
Top of natural channel elevation =   1576.000(Ft.)
End of natural channel elevation =   1540.000(Ft.)
```

Area D

Area F

```
Length of natural channel  =  1005.700(Ft.)
Estimated mean flow rate at midpoint of channel =     20.325(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   5.69(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0358
Corrected/adjusted channel slope =  0.0358
Travel time =    2.94 min.     TC =   15.30  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.817
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.625(In/Hr) for a    10.0 year storm
Subarea runoff =     24.590(CFS) for     18.520(Ac.)
Total runoff =     31.356(CFS)    Total area =      23.140(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      630.000 to Point/Station      631.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------
Initial area flow distance =   881.300(Ft.)
Top (of initial area) elevation =  1576.000(Ft.)
Bottom (of initial area) elevation =  1540.000(Ft.)
Difference in elevation =    36.000(Ft.)
Slope =    0.04085  s(percent)=       4.08
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.139 min.
Rainfall intensity =      1.633(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.817
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      5.485(CFS)
Total initial stream area =        4.110(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      620.000 to Point/Station      621.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------
Initial area flow distance =   325.800(Ft.)
Top (of initial area) elevation =  1571.000(Ft.)
```

Area I

```
Bottom (of initial area) elevation =  1537.000(Ft.)
Difference in elevation =    34.000(Ft.)
Slope =    0.10436  s(percent)=      10.44
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.429 min.
Rainfall intensity =      2.125(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.835
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      3.017(CFS)
Total initial stream area =        1.700(Ac.)
Pervious area fraction = 1.000
End of computations, total study area =           35.91 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.988
Area averaged RI index number =  87.3
```

Area J

DRAINAGE AREA E

```
                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
        Rational Hydrology Study        Date: 10/16/23  File:CRPROE10.out
------------------------------------------------------------------------
Crescent Gardens
Proposed Condtion Hydrology
AREA E
10/06/23
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------


Program License Serial Number 6406

------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =   10.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation =  0.486(In.)
100 year, 1 hour precipitation =  1.440(In.)

Storm event year =  10.0
Calculated rainfall intensity data:
1 hour intensity =  0.878(In/Hr)
Slope of intensity duration curve = 0.4500




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      500.000 to Point/Station      501.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   997.400(Ft.)
Top (of initial area) elevation =  1645.400(Ft.)
Bottom (of initial area) elevation =  1614.000(Ft.)
Difference in elevation =    31.400(Ft.)
Slope =    0.03148  s(percent)=       3.15
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.177 min.
Rainfall intensity =      1.631(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.746
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      5.059(CFS)
Total initial stream area =        4.160(Ac.)
Pervious area fraction = 0.800


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      501.000 to Point/Station      502.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1607.000(Ft.)
Downstream point/station elevation =  1582.000(Ft.)
Pipe length  =  1200.30(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.059(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     5.059(CFS)
Normal flow depth in pipe =    9.66(In.)
Flow top width inside pipe =    9.51(In.)
Critical Depth =   11.03(In.)
Pipe flow velocity =      7.46(Ft/s)
Travel time through pipe =    2.68 min.
Time of concentration (TC) =    17.86 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      502.000 to Point/Station      502.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
USER INPUT of soil data for subarea
Runoff Coefficient = 0.725
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.280
Decimal fraction soil group D = 0.720
RI index for soil(AMC 2)  =  76.20
Pervious area fraction =  0.900; Impervious fraction =  0.100
Time of concentration =    17.86 min.
Rainfall intensity =      1.516(In/Hr) for a    10.0 year storm
Subarea runoff =     12.160(CFS) for     11.060(Ac.)
Total runoff =     17.219(CFS)    Total area =      15.220(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      502.000 to Point/Station      503.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1582.000(Ft.)
Downstream point/station elevation =  1580.000(Ft.)
Pipe length  =   225.80(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    17.219(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    17.219(CFS)
Normal flow depth in pipe =   16.36(In.)
Flow top width inside pipe =   22.36(In.)
Critical Depth =   17.94(In.)
Pipe flow velocity =      7.54(Ft/s)
Travel time through pipe =    0.50 min.
Time of concentration (TC) =    18.36 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      503.000 to Point/Station      503.000
```

```
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________
USER INPUT of soil data for subarea
Runoff Coefficient = 0.748
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.270
Decimal fraction soil group D = 0.730
RI index for soil(AMC 2)  =  81.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Time of concentration =    18.36 min.
Rainfall intensity =      1.497(In/Hr) for a    10.0 year storm
Subarea runoff =     18.548(CFS) for     16.570(Ac.)
Total runoff =     35.767(CFS)    Total area =      31.790(Ac.)
End of computations, total study area =           31.79 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.939
Area averaged RI index number =  78.8
```

DRAINAGE AREA G

```
                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
        Rational Hydrology Study        Date: 10/17/23  File:crprog10r.out
------------------------------------------------------------------------
Crescent Gardens
Proposed Condtion Hydrology
Area G
10/16/23
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------


Program License Serial Number 6406

------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =   10.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation =  0.486(In.)
100 year, 1 hour precipitation =  1.440(In.)

Storm event year =  10.0
Calculated rainfall intensity data:
1 hour intensity =  0.878(In/Hr)
Slope of intensity duration curve = 0.4500




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      400.000 to Point/Station      401.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   770.300(Ft.)
Top (of initial area) elevation =  1610.900(Ft.)
Bottom (of initial area) elevation =  1570.000(Ft.)
Difference in elevation =    40.900(Ft.)
Slope =    0.05310  s(percent)=       5.31
TC = k(0.420)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.787 min.
Rainfall intensity =      1.901(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/2 Acre Lot)
Runoff Coefficient = 0.798
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.600; Impervious fraction =  0.400
Initial subarea runoff =      2.776(CFS)
Total initial stream area =        1.830(Ac.)
Pervious area fraction = 0.600


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      401.000 to Point/Station      402.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1570.000(Ft.)
End of street segment elevation =  1557.200(Ft.)
Length of street segment  =   278.400(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  16.000(Ft.)
Distance from crown to crossfall grade break  =  10.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =   4.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      6.820(CFS)
Depth of flow =   0.283(Ft.), Average velocity =   5.032(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  11.469(Ft.)
Flow velocity =   5.03(Ft/s)
Travel time =    0.92 min.     TC =   11.71  min.
 Adding area flow to street
USER INPUT of soil data for subarea
Runoff Coefficient = 0.776
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  79.00
Pervious area fraction =  0.850; Impervious fraction =  0.150
Rainfall intensity =      1.833(In/Hr) for a    10.0 year storm
Subarea runoff =      8.021(CFS) for      5.640(Ac.)
Total runoff =     10.797(CFS)    Total area =       7.470(Ac.)
Street flow at end of street =     10.797(CFS)
Half street flow at end of street =     10.797(CFS)
Depth of flow =   0.327(Ft.), Average velocity =   5.634(Ft/s)
Flow width (from curb towards crown)=  13.698(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      402.000 to Point/Station      402.500
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1553.500(Ft.)
Downstream point/station elevation =  1553.000(Ft.)
Pipe length  =    43.50(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    10.797(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    10.797(CFS)
Normal flow depth in pipe =   14.13(In.)
Flow top width inside pipe =   14.79(In.)
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Critical Depth =   15.12(In.)
Pipe flow velocity =      7.26(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =    11.81 min.


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Process from Point/Station      402.000 to Point/Station      403.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1553.000(Ft.)
End of natural channel elevation =   1544.500(Ft.)
Length of natural channel  =   544.100(Ft.)
Estimated mean flow rate at midpoint of channel =     17.539(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.62(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
         Normal channel slope =  0.0156
Corrected/adjusted channel slope =  0.0156
Travel time =    2.51 min.     TC =   14.32  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.819
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.674(In/Hr) for a    10.0 year storm
Subarea runoff =     12.797(CFS) for      9.330(Ac.)
Total runoff =     23.594(CFS)    Total area =      16.800(Ac.)
End of computations, total study area =           16.80 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.906
Area averaged RI index number =  84.1
```

DRAINAGE AREA H

```
                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
        Rational Hydrology Study        Date: 10/24/23  File:crproh10.out
------------------------------------------------------------------------
Crescent Gardens
Proposed Condition Hydrology
Area H
10/17/23
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------


Program License Serial Number 6406

------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =   10.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation =  0.486(In.)
100 year, 1 hour precipitation =  1.440(In.)

Storm event year =  10.0
Calculated rainfall intensity data:
1 hour intensity =  0.878(In/Hr)
Slope of intensity duration curve = 0.4500




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      610.000 to Point/Station      610.500
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   746.900(Ft.)
Top (of initial area) elevation =  1600.500(Ft.)
Bottom (of initial area) elevation =  1577.000(Ft.)
Difference in elevation =    23.500(Ft.)
Slope =    0.03146  s(percent)=       3.15
TC = k(0.420)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.830 min.
Rainfall intensity =      1.824(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/2 Acre Lot)
Runoff Coefficient = 0.794
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.600; Impervious fraction =  0.400
Initial subarea runoff =      2.072(CFS)
Total initial stream area =        1.430(Ac.)
Pervious area fraction = 0.600


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      610.500 to Point/Station      610.600
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1573.000(Ft.)
Downstream point/station elevation =  1551.000(Ft.)
Pipe length  =   619.50(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.072(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     2.072(CFS)
Normal flow depth in pipe =    5.36(In.)
Flow top width inside pipe =    8.83(In.)
Critical Depth =    7.81(In.)
Pipe flow velocity =      7.55(Ft/s)
Travel time through pipe =    1.37 min.
Time of concentration (TC) =    13.20 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      610.600 to Point/Station      610.600
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
USER INPUT of soil data for subarea
Runoff Coefficient = 0.772
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  79.10
Pervious area fraction =  0.840; Impervious fraction =  0.160
Time of concentration =    13.20 min.
Rainfall intensity =      1.736(In/Hr) for a    10.0 year storm
Subarea runoff =      7.606(CFS) for      5.670(Ac.)
Total runoff =      9.678(CFS)     Total area =       7.100(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      610.600 to Point/Station      611.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1551.000(Ft.)
Downstream point/station elevation =  1544.500(Ft.)
Pipe length  =   304.30(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     9.678(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     9.678(CFS)
Normal flow depth in pipe =   10.36(In.)
Flow top width inside pipe =   17.79(In.)
Critical Depth =   14.41(In.)
Pipe flow velocity =      9.18(Ft/s)
Travel time through pipe =    0.55 min.
Time of concentration (TC) =    13.75 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      611.000 to Point/Station      612.000
```

```
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
_____________________________________________________________
Top of natural channel elevation =   1544.500(Ft.)
End of natural channel elevation =   1541.000(Ft.)
Length of natural channel  =    58.000(Ft.)
Estimated mean flow rate at midpoint of channel =     10.652(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   6.24(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
         Normal channel slope =  0.0603
Corrected/adjusted channel slope =  0.0603
Travel time =    0.15 min.     TC =   13.91  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.820
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.696(In/Hr) for a    10.0 year storm
Subarea runoff =      1.990(CFS) for      1.430(Ac.)
Total runoff =     11.667(CFS)     Total area =       8.530(Ac.)
End of computations, total study area =            8.53 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.827
Area averaged RI index number =  80.1
```

100 – YEAR RATIONAL METHOD CALCULATIONS

DRAINAGE AREA A

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 10/17/23 File:crproa100.out

Crescent Gardens
Proposed Condtion Hydrology
Riverside Co.
Area A 10/13/23

********* Hydrology Study Control Information **********

English (in-lb) Units used in input data file

Program License Serial Number 6406

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 100.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation = 0.486(In.)
100 year, 1 hour precipitation = 1.440(In.)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.440(In/Hr)
Slope of intensity duration curve = 0.4500

++
Process from Point/Station 100.000 to Point/Station 101.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 894.400(Ft.)
Top (of initial area) elevation = 1694.000(Ft.)
Bottom (of initial area) elevation = 1665.000(Ft.)
Difference in elevation = 29.000(Ft.)
Slope = 0.03242 s(percent)= 3.24
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 14.444 min.
Rainfall intensity = 2.733(In/Hr) for a 100.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.534
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 32.00
Pervious area fraction = 0.800; Impervious fraction = 0.200
Initial subarea runoff = 4.929(CFS)
Total initial stream area = 3.380(Ac.)
Pervious area fraction = 0.800

++
Process from Point/Station 101.000 to Point/Station 102.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Estimated mean flow rate at midpoint of channel = 21.663(CFS)
Depth of flow = 0.491(Ft.), Average velocity = 6.157(Ft/s)
******* Irregular Channel Data **********

Information entered for subchannel number 1 :

Point number	'X' coordinate	'Y' coordinate
1	0.00	3.49
2	6.98	0.00
3	11.98	0.25
4	23.98	0.49

Manning's 'N' friction factor = 0.015

Sub-Channel flow = 21.663(CFS)
' ' flow top width = 17.981(Ft.)
' ' velocity= 6.157(Ft/s)
' ' area = 3.518(Sq.Ft)
' ' Froude number = 2.453

Upstream point elevation = 1665.000(Ft.)
Downstream point elevation = 1638.000(Ft.)
Flow length = 786.700(Ft.)
Travel time = 2.13 min.
Time of concentration = 16.57 min.
Depth of flow = 0.491(Ft.)
Average velocity = 6.157(Ft/s)
Total irregular channel flow = 21.663(CFS)
Irregular channel normal depth above invert elev. = 0.491(Ft.)
Average velocity of channel(s) = 6.157(Ft/s)
Adding area flow to channel
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.794
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 75.00
Pervious area fraction = 0.800; Impervious fraction = 0.200
Rainfall intensity = 2.569(In/Hr) for a 100.0 year storm
Subarea runoff = 33.549(CFS) for 16.450(Ac.)
Total runoff = 38.478(CFS) Total area = 19.830(Ac.)
Depth of flow = 0.572(Ft.), Average velocity = 7.717(Ft/s)

++
Process from Point/Station 102.000 to Point/Station 103.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 1638.000(Ft.)
End of natural channel elevation = 1614.000(Ft.)
Length of natural channel = 1328.900(Ft.)
Estimated mean flow rate at midpoint of channel = 66.090(CFS)

```
Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   5.64(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0181
Corrected/adjusted channel slope =  0.0181
Travel time =    3.93 min.     TC =   20.50  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.787
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.080
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.920
RI index for soil(AMC 2)  =  77.00
Pervious area fraction =  0.860; Impervious fraction =  0.140
Rainfall intensity =      2.335(In/Hr) for a   100.0 year storm
Subarea runoff =     52.308(CFS) for     28.460(Ac.)
Total runoff =     90.786(CFS)    Total area =      48.290(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1614.000(Ft.)
Downstream point/station elevation =  1612.000(Ft.)
Pipe length  =   182.60(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    90.786(CFS)
Nearest computed pipe diameter  =     39.00(In.)
Calculated individual pipe flow  =    90.786(CFS)
Normal flow depth in pipe =   34.13(In.)
Flow top width inside pipe =   25.80(In.)
Critical Depth =   35.25(In.)
Pipe flow velocity =     11.80(Ft/s)
Travel time through pipe =    0.26 min.
Time of concentration (TC) =    20.76 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      105.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Depth of flow =   1.958(Ft.), Average velocity =   4.739(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1             0.00             3.00
        2            15.00             0.00
        3            30.00             3.00
Manning's 'N' friction factor =   0.035
------------------------------------------------------------------
Sub-Channel flow  =     90.786(CFS)
  '     '         flow top width =     19.575(Ft.)
  '     '    velocity=    4.739(Ft/s)
  '     '         area =     19.159(Sq.Ft)
  '     '         Froude number =     0.844

Upstream point elevation =  1612.000(Ft.)
Downstream point elevation =  1611.000(Ft.)
Flow length =    76.000(Ft.)
Travel time  =    0.27 min.
Time of concentration =   21.02 min.
Depth of flow =   1.958(Ft.)
Average velocity =   4.739(Ft/s)
Total irregular channel flow =    90.786(CFS)
Irregular channel normal depth above invert elev. =   1.958(Ft.)
Average velocity of channel(s) =   4.739(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      106.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1611.000(Ft.)
Downstream point/station elevation =  1610.000(Ft.)
Pipe length  =    70.90(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    90.786(CFS)
Nearest computed pipe diameter  =     39.00(In.)
Calculated individual pipe flow  =    90.786(CFS)
Normal flow depth in pipe =   29.63(In.)
Flow top width inside pipe =   33.33(In.)
Critical Depth =   35.25(In.)
Pipe flow velocity =     13.42(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =    21.11 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      106.000 to Point/Station      107.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Depth of flow =   1.823(Ft.), Average velocity =   5.465(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1             0.00             3.00
        2            15.00             0.00
        3            30.00             3.00
Manning's 'N' friction factor =   0.035
------------------------------------------------------------------
Sub-Channel flow  =     90.787(CFS)
  '     '         flow top width =     18.228(Ft.)
  '     '    velocity=    5.465(Ft/s)
  '     '         area =     16.613(Sq.Ft)
  '     '         Froude number =     1.009

Upstream point elevation =  1610.000(Ft.)
Downstream point elevation =  1604.500(Ft.)
Flow length =   285.800(Ft.)
Travel time  =    0.87 min.
Time of concentration =   21.98 min.
Depth of flow =   1.823(Ft.)
```

```
Average velocity =   5.465(Ft/s)
Total irregular channel flow =    90.786(CFS)
Irregular channel normal depth above invert elev. =   1.823(Ft.)
Average velocity of channel(s) =   5.465(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      107.000 to Point/Station      107.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     48.290(Ac.)
Runoff from this stream =     90.786(CFS)
Time of concentration =   21.98 min.
Rainfall intensity =     2.262(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      200.000 to Point/Station      201.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   811.600(Ft.)
Top (of initial area) elevation =  1650.000(Ft.)
Bottom (of initial area) elevation =  1631.000(Ft.)
Difference in elevation =    19.000(Ft.)
Slope =    0.02341  s(percent)=       2.34
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.828 min.
Rainfall intensity =      2.701(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.798
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =     14.878(CFS)
Total initial stream area =        6.900(Ac.)
Pervious area fraction = 0.800


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      201.000 to Point/Station      202.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1631.000(Ft.)
End of natural channel elevation =   1613.000(Ft.)
Length of natural channel  =   872.300(Ft.)
Estimated mean flow rate at midpoint of channel =     25.529(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.60(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0206
Corrected/adjusted channel slope =  0.0206
Travel time =    3.16 min.     TC =   17.99  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.796
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  77.00
Pervious area fraction =  0.830; Impervious fraction =  0.170
Rainfall intensity =      2.476(In/Hr) for a   100.0 year storm
Subarea runoff =     19.486(CFS) for      9.880(Ac.)
Total runoff =     34.364(CFS)    Total area =      16.780(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      202.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =     16.780(Ac.)
Runoff from this stream =     34.364(CFS)
Time of concentration =   17.99 min.
Rainfall intensity =     2.476(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      210.000 to Point/Station      211.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   742.800(Ft.)
Top (of initial area) elevation =  1641.000(Ft.)
Bottom (of initial area) elevation =  1622.000(Ft.)
Difference in elevation =    19.000(Ft.)
Slope =    0.02558  s(percent)=       2.56
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.061 min.
Rainfall intensity =      2.766(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.800
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      2.989(CFS)
Total initial stream area =        1.350(Ac.)
Pervious area fraction = 0.800


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      211.000 to Point/Station      202.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Depth of flow =   0.287(Ft.), Average velocity =   1.817(Ft/s)
```

```
       ******* Irregular Channel Data ***********
-------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1             0.00             3.00
        2            60.00             0.00
        3           120.00             3.00
Manning's 'N' friction factor =   0.035
-------------------------------------------------------------------
Sub-Channel flow  =      2.989(CFS)
  '     '         flow top width =     11.471(Ft.)
  '     '    velocity=    1.817(Ft/s)
  '     '         area =      1.645(Sq.Ft)
  '     '         Froude number =     0.846

Upstream point elevation =  1622.000(Ft.)
Downstream point elevation =  1613.000(Ft.)
Flow length =   368.000(Ft.)
Travel time  =    3.37 min.
Time of concentration =   17.44 min.
Depth of flow =   0.287(Ft.)
Average velocity =   1.817(Ft/s)
Total irregular channel flow =     2.989(CFS)
Irregular channel normal depth above invert elev. =   0.287(Ft.)
Average velocity of channel(s) =   1.817(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      202.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      1.350(Ac.)
Runoff from this stream =      2.989(CFS)
Time of concentration =   17.44 min.
Rainfall intensity =     2.511(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1       34.364     17.99                2.476
2        2.989     17.44                2.511
Largest stream flow has longer time of concentration
Qp =     34.364 + sum of
           Qb         Ia/Ib
            2.989 *    0.986 =      2.947
Qp =     37.311

Total of 2 streams to confluence:
Flow rates before confluence point:
      34.364       2.989
Area of streams before confluence:
       16.780        1.350
Results of confluence:
Total flow rate =     37.311(CFS)
Time of concentration =    17.989 min.
Effective stream area after confluence =     18.130(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      107.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Depth of flow =   1.262(Ft.), Average velocity =   4.688(Ft/s)
       ******* Irregular Channel Data ***********
-------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1             0.00             3.00
        2            15.00             0.00
        3            30.00             3.00
Manning's 'N' friction factor =   0.035
-------------------------------------------------------------------
Sub-Channel flow  =     37.311(CFS)
  '     '         flow top width =     12.617(Ft.)
  '     '    velocity=    4.688(Ft/s)
  '     '         area =      7.959(Sq.Ft)
  '     '         Froude number =     1.040

Upstream point elevation =  1613.000(Ft.)
Downstream point elevation =  1604.500(Ft.)
Flow length =   367.500(Ft.)
Travel time  =    1.31 min.
Time of concentration =   19.30 min.
Depth of flow =   1.262(Ft.)
Average velocity =   4.688(Ft/s)
Total irregular channel flow =    37.311(CFS)
Irregular channel normal depth above invert elev. =   1.262(Ft.)
Average velocity of channel(s) =   4.688(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      107.000 to Point/Station      107.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     18.130(Ac.)
Runoff from this stream =     37.311(CFS)
Time of concentration =   19.30 min.
Rainfall intensity =     2.399(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1       90.786     21.98           2.262
2       37.311     19.30           2.399
Largest stream flow has longer time of concentration
Qp =     90.786 + sum of
           Qb         Ia/Ib
           37.311 *    0.943 =     35.183
Qp =    125.970

Total of 2 main streams to confluence:
Flow rates before confluence point:
      90.786      37.311
```

```
Area of streams before confluence:
       48.290       18.130


Results of confluence:
Total flow rate =    125.970(CFS)
Time of concentration =    21.985 min.
Effective stream area after confluence  =     66.420(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      107.000 to Point/Station      108.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1604.500(Ft.)
End of natural channel elevation =   1600.000(Ft.)
Length of natural channel  =   465.800(Ft.)
Estimated mean flow rate at midpoint of channel =    137.861(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   5.14(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0097
Corrected/adjusted channel slope =  0.0097
Travel time =    1.51 min.     TC =   23.49  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.765
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.300
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.700
RI index for soil(AMC 2)  =  74.70
Pervious area fraction =  0.880; Impervious fraction =  0.120
Rainfall intensity =      2.196(In/Hr) for a   100.0 year storm
Subarea runoff =     21.062(CFS) for     12.540(Ac.)
Total runoff =    147.032(CFS)    Total area =      78.960(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      109.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1600.000(Ft.)
Downstream point/station elevation =  1599.000(Ft.)
Pipe length  =    52.70(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   147.032(CFS)
Nearest computed pipe diameter  =     42.00(In.)
Calculated individual pipe flow  =   147.032(CFS)
Normal flow depth in pipe =   37.41(In.)
Flow top width inside pipe =   26.22(In.)
Critical depth could not be calculated.
Pipe flow velocity =     16.25(Ft/s)
Travel time through pipe =    0.05 min.
Time of concentration (TC) =    23.55 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      109.000 to Point/Station      110.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Depth of flow =   2.130(Ft.), Average velocity =   6.480(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              3.00
        2             15.00              0.00
        3             30.00              3.00
Manning's 'N' friction factor =   0.035
------------------------------------------------------------------
Sub-Channel flow  =    147.032(CFS)
  '     '         flow top width =     21.303(Ft.)
  '     '    velocity=    6.480(Ft/s)
  '     '         area =     22.692(Sq.Ft)
  '     '         Froude number =     1.106

Upstream point elevation =  1599.000(Ft.)
Downstream point elevation =  1586.000(Ft.)
Flow length =   591.500(Ft.)
Travel time  =    1.52 min.
Time of concentration =   25.07 min.
Depth of flow =   2.130(Ft.)
Average velocity =   6.480(Ft/s)
Total irregular channel flow =   147.032(CFS)
Irregular channel normal depth above invert elev. =   2.130(Ft.)
Average velocity of channel(s) =   6.480(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      110.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     78.960(Ac.)
Runoff from this stream =    147.032(CFS)
Time of concentration =   25.07 min.
Rainfall intensity =     2.133(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      300.000 to Point/Station      301.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   527.800(Ft.)
Top (of initial area) elevation =  1635.000(Ft.)
Bottom (of initial area) elevation =  1623.000(Ft.)
Difference in elevation =    12.000(Ft.)
Slope =    0.02274  s(percent)=       2.27
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.865 min.
Rainfall intensity =      2.784(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.850
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Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      6.387(CFS)
Total initial stream area =        2.700(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      301.000 to Point/Station      302.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1623.000(Ft.)
End of natural channel elevation =   1608.000(Ft.)
Length of natural channel  =   715.100(Ft.)
Estimated mean flow rate at midpoint of channel =     13.862(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.94(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0210
Corrected/adjusted channel slope =  0.0210
Travel time =    3.03 min.     TC =   16.89  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.845
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.547(In/Hr) for a   100.0 year storm
Subarea runoff =     13.608(CFS) for      6.320(Ac.)
Total runoff =     19.995(CFS)    Total area =       9.020(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      302.000 to Point/Station      110.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1608.000(Ft.)
End of natural channel elevation =   1585.000(Ft.)
Length of natural channel  =  1275.000(Ft.)
Estimated mean flow rate at midpoint of channel =     36.056(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.74(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0180
Corrected/adjusted channel slope =  0.0180
Travel time =    4.49 min.     TC =   21.38  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.802
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.240
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.760
RI index for soil(AMC 2)  =  80.60
Pervious area fraction =  0.890; Impervious fraction =  0.110
Rainfall intensity =      2.291(In/Hr) for a   100.0 year storm
Subarea runoff =     26.610(CFS) for     14.490(Ac.)
Total runoff =     46.606(CFS)    Total area =      23.510(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      110.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     23.510(Ac.)
Runoff from this stream =     46.606(CFS)
Time of concentration =   21.38 min.
Rainfall intensity =     2.291(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1      147.032     25.07                2.133
2       46.606     21.38                2.291
Largest stream flow has longer time of concentration
Qp =    147.032 + sum of
           Qb         Ia/Ib
           46.606 *    0.931 =     43.383
Qp =    190.415

Total of 2 streams to confluence:
Flow rates before confluence point:
     147.032      46.606
Area of streams before confluence:
       78.960       23.510
Results of confluence:
Total flow rate =    190.415(CFS)
Time of concentration =    25.070 min.
Effective stream area after confluence =    102.470(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      110.500
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
USER INPUT of soil data for subarea
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Runoff Coefficient = 0.804
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  80.20
Pervious area fraction =  0.800; Impervious fraction =  0.200
Time of concentration =    25.07 min.
Rainfall intensity =      2.133(In/Hr) for a   100.0 year storm
Subarea runoff =      9.461(CFS) for      5.520(Ac.)
Total runoff =    199.876(CFS)    Total area =     107.990(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.500 to Point/Station      110.600
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1599.000(Ft.)
End of natural channel elevation =   1565.000(Ft.)
Length of natural channel  =   508.700(Ft.)
Estimated mean flow rate at midpoint of channel =    199.876(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =  15.16(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0668
Corrected/adjusted channel slope =  0.0668
Travel time =    0.56 min.     TC =   25.63  min.


 Adding area flow to channel
COMMERCIAL subarea type
Runoff Coefficient = 0.884
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      2.112(In/Hr) for a   100.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =    199.876(CFS)    Total area =     107.990(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.600 to Point/Station      110.600
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.884
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    25.63 min.
Rainfall intensity =      2.112(In/Hr) for a   100.0 year storm
Subarea runoff =      3.436(CFS) for      1.840(Ac.)
Total runoff =    203.312(CFS)    Total area =     109.830(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.600 to Point/Station      110.700
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1565.000(Ft.)
End of natural channel elevation =   1564.000(Ft.)
Length of natural channel  =    77.200(Ft.)
Estimated mean flow rate at midpoint of channel =    203.312(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   6.71(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0130
Corrected/adjusted channel slope =  0.0130
Travel time =    0.19 min.     TC =   25.82  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.835
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.104(In/Hr) for a   100.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =    203.312(CFS)    Total area =     109.830(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.700 to Point/Station      110.700
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.884
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    25.82 min.
Rainfall intensity =      2.104(In/Hr) for a   100.0 year storm
Subarea runoff =      3.201(CFS) for      1.720(Ac.)
Total runoff =    206.513(CFS)    Total area =     111.550(Ac.)


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Process from Point/Station      110.700 to Point/Station      111.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------------
Top of natural channel elevation =   1564.000(Ft.)
End of natural channel elevation =   1562.200(Ft.)
Length of natural channel  =   184.900(Ft.)
Estimated mean flow rate at midpoint of channel =    214.529(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   5.91(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
         Normal channel slope =  0.0097
Corrected/adjusted channel slope =  0.0097
Travel time =    0.52 min.     TC =   26.34  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.834
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.086(In/Hr) for a   100.0 year storm
Subarea runoff =     15.065(CFS) for      8.660(Ac.)
Total runoff =    221.578(CFS)    Total area =     120.210(Ac.)
End of computations, total study area =          120.21 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.845
Area averaged RI index number =  77.4
```

DRAINAGE AREAS
B, C, D, F, I, &J

```
                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
        Rational Hydrology Study        Date: 10/17/23  File:crprob100.out
------------------------------------------------------------------------
Crescent Gardens
Proposed Condtion Hydrology
AREAS B,C,D,F,I & J
10/16/23
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------


Program License Serial Number 6406

------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =  100.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation =  0.486(In.)
100 year, 1 hour precipitation =  1.440(In.)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity =  1.440(In/Hr)
Slope of intensity duration curve = 0.4500




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      310.000 to Point/Station      311.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   545.200(Ft.)
Top (of initial area) elevation =  1642.000(Ft.)
Bottom (of initial area) elevation =  1621.000(Ft.)
Difference in elevation =    21.000(Ft.)
Slope =    0.03852  s(percent)=       3.85
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.641 min.
Rainfall intensity =      2.902(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.852
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      3.979(CFS)
```

Area B

```
Total initial stream area =        1.610(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      311.000 to Point/Station      312.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1621.000(Ft.)
End of natural channel elevation =   1607.000(Ft.)
Length of natural channel  =   534.000(Ft.)
Estimated mean flow rate at midpoint of channel =      6.451(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.63(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0262
Corrected/adjusted channel slope =  0.0262
Travel time =    2.45 min.     TC =   15.09  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.795
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.770
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.230
RI index for soil(AMC 2)  =  79.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.680(In/Hr) for a   100.0 year storm
Subarea runoff =      4.260(CFS) for      2.000(Ac.)
Total runoff =      8.239(CFS)    Total area =       3.610(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      320.000 to Point/Station      321.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   543.400(Ft.)
Top (of initial area) elevation =  1613.000(Ft.)
Bottom (of initial area) elevation =  1604.000(Ft.)
Difference in elevation =     9.000(Ft.)
Slope =    0.01656  s(percent)=       1.66
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.945 min.
Rainfall intensity =      2.692(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.799
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.840
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.160
RI index for soil(AMC 2)  =  79.76
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      4.971(CFS)
```

Area C

```
Total initial stream area =        2.310(Ac.)
Pervious area fraction = 1.000


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Process from Point/Station      510.000 to Point/Station      511.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------
Initial area flow distance =   477.300(Ft.)
Top (of initial area) elevation =  1643.000(Ft.)
Bottom (of initial area) elevation =  1614.000(Ft.)
Difference in elevation =    29.000(Ft.)
Slope =    0.06076  s(percent)=       6.08
TC = k(0.420)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.671 min.
Rainfall intensity =      3.439(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/2 Acre Lot)
Runoff Coefficient = 0.838
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.600; Impervious fraction =  0.400
Initial subarea runoff =      2.998(CFS)
Total initial stream area =        1.040(Ac.)
Pervious area fraction = 0.600


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      600.000 to Point/Station      601.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------
Initial area flow distance =   849.100(Ft.)
Top (of initial area) elevation =  1665.000(Ft.)
Bottom (of initial area) elevation =  1576.000(Ft.)
Difference in elevation =    89.000(Ft.)
Slope =    0.10482  s(percent)=      10.48
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.353 min.
Rainfall intensity =      2.932(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.848
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.260
Decimal fraction soil group D = 0.740
RI index for soil(AMC 2)  =  88.22
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =     11.495(CFS)
Total initial stream area =        4.620(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      601.000 to Point/Station      602.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------
Top of natural channel elevation =   1576.000(Ft.)
End of natural channel elevation =   1540.000(Ft.)
```

Area D

Area F

```
Length of natural channel  =  1005.700(Ft.)
Estimated mean flow rate at midpoint of channel =     34.536(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   6.59(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0358
Corrected/adjusted channel slope =  0.0358
Travel time =    2.54 min.     TC =   14.90  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.848
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.696(In/Hr) for a   100.0 year storm
Subarea runoff =     42.341(CFS) for     18.520(Ac.)
Total runoff =     53.836(CFS)    Total area =      23.140(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      630.000 to Point/Station      631.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------
Initial area flow distance =   881.300(Ft.)
Top (of initial area) elevation =  1576.000(Ft.)
Bottom (of initial area) elevation =  1540.000(Ft.)
Difference in elevation =    36.000(Ft.)
Slope =    0.04085  s(percent)=       4.08
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.139 min.
Rainfall intensity =      2.676(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.848
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      9.324(CFS)
Total initial stream area =        4.110(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      620.000 to Point/Station      621.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------
Initial area flow distance =   325.800(Ft.)
Top (of initial area) elevation =  1571.000(Ft.)
```

Area I

```
Bottom (of initial area) elevation =  1537.000(Ft.)
Difference in elevation =    34.000(Ft.)
Slope =    0.10436  s(percent)=      10.44
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.429 min.
Rainfall intensity =      3.483(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.859
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      5.088(CFS)
Total initial stream area =        1.700(Ac.)
Pervious area fraction = 1.000
End of computations, total study area =           35.91 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.988
Area averaged RI index number =  87.3
```

Area J

DRAINAGE AREA E

```
                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
        Rational Hydrology Study        Date: 10/17/23  File:crproe100.out
------------------------------------------------------------------------
Crescent Gardens
Proposed Condtion Hydrology
AREA E
10/06/23
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------


Program License Serial Number 6406

------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =  100.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation =  0.486(In.)
100 year, 1 hour precipitation =  1.440(In.)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity =  1.440(In/Hr)
Slope of intensity duration curve = 0.4500




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      500.000 to Point/Station      501.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   997.400(Ft.)
Top (of initial area) elevation =  1645.400(Ft.)
Bottom (of initial area) elevation =  1614.000(Ft.)
Difference in elevation =    31.400(Ft.)
Slope =    0.03148  s(percent)=       3.15
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.177 min.
Rainfall intensity =      2.673(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.797
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      8.866(CFS)
Total initial stream area =        4.160(Ac.)
Pervious area fraction = 0.800


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      501.000 to Point/Station      502.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1607.000(Ft.)
Downstream point/station elevation =  1582.000(Ft.)
Pipe length  =  1200.30(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.866(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     8.866(CFS)
Normal flow depth in pipe =   11.68(In.)
Flow top width inside pipe =   12.45(In.)
Critical Depth =   13.81(In.)
Pipe flow velocity =      8.65(Ft/s)
Travel time through pipe =    2.31 min.
Time of concentration (TC) =    17.49 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      502.000 to Point/Station      502.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
USER INPUT of soil data for subarea
Runoff Coefficient = 0.785
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.280
Decimal fraction soil group D = 0.720
RI index for soil(AMC 2)  =  76.20
Pervious area fraction =  0.900; Impervious fraction =  0.100
Time of concentration =    17.49 min.
Rainfall intensity =      2.508(In/Hr) for a   100.0 year storm
Subarea runoff =     21.762(CFS) for     11.060(Ac.)
Total runoff =     30.628(CFS)    Total area =      15.220(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      502.000 to Point/Station      503.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1582.000(Ft.)
Downstream point/station elevation =  1580.000(Ft.)
Pipe length  =   225.80(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    30.628(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    30.628(CFS)
Normal flow depth in pipe =   23.63(In.)
Flow top width inside pipe =   17.86(In.)
Critical Depth =   22.97(In.)
Pipe flow velocity =      8.30(Ft/s)
Travel time through pipe =    0.45 min.
Time of concentration (TC) =    17.94 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      503.000 to Point/Station      503.000
```

```
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________
USER INPUT of soil data for subarea
Runoff Coefficient = 0.801
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.270
Decimal fraction soil group D = 0.730
RI index for soil(AMC 2)  =  81.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Time of concentration =    17.94 min.
Rainfall intensity =      2.479(In/Hr) for a   100.0 year storm
Subarea runoff =     32.922(CFS) for     16.570(Ac.)
Total runoff =     63.551(CFS)    Total area =      31.790(Ac.)
End of computations, total study area =           31.79 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.939
Area averaged RI index number =  78.8
```

DRAINAGE AREA G

```
                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
        Rational Hydrology Study        Date: 10/17/23  File:crprog100r.out
------------------------------------------------------------------------
Crescent Gardens
Proposed Condtion Hydrology
Area G
10/17/23
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------


Program License Serial Number 6406

------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =  100.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation =  0.486(In.)
100 year, 1 hour precipitation =  1.440(In.)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity =  1.440(In/Hr)
Slope of intensity duration curve = 0.4500




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      400.000 to Point/Station      401.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   770.300(Ft.)
Top (of initial area) elevation =  1610.900(Ft.)
Bottom (of initial area) elevation =  1570.000(Ft.)
Difference in elevation =    40.900(Ft.)
Slope =    0.05310  s(percent)=       5.31
TC = k(0.420)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.787 min.
Rainfall intensity =      3.117(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/2 Acre Lot)
Runoff Coefficient = 0.833
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.600; Impervious fraction =  0.400
Initial subarea runoff =      4.749(CFS)
Total initial stream area =        1.830(Ac.)
Pervious area fraction = 0.600


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      401.000 to Point/Station      402.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1570.000(Ft.)
End of street segment elevation =  1557.200(Ft.)
Length of street segment  =   278.400(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  16.000(Ft.)
Distance from crown to crossfall grade break  =  10.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =   4.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     11.767(CFS)
Depth of flow =   0.337(Ft.), Average velocity =   5.755(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  14.159(Ft.)
Flow velocity =   5.75(Ft/s)
Travel time =    0.81 min.     TC =   11.59  min.
 Adding area flow to street
USER INPUT of soil data for subarea
Runoff Coefficient = 0.820
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  79.00
Pervious area fraction =  0.850; Impervious fraction =  0.150
Rainfall intensity =      3.017(In/Hr) for a   100.0 year storm
Subarea runoff =     13.948(CFS) for      5.640(Ac.)
Total runoff =     18.697(CFS)    Total area =       7.470(Ac.)
Street flow at end of street =     18.697(CFS)
Half street flow at end of street =     18.697(CFS)
Depth of flow =   0.388(Ft.), Average velocity =   6.594(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  16.000(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      402.000 to Point/Station      402.500
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1553.500(Ft.)
Downstream point/station elevation =  1553.000(Ft.)
Pipe length  =    43.50(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    18.697(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    18.697(CFS)
Normal flow depth in pipe =   15.82(In.)
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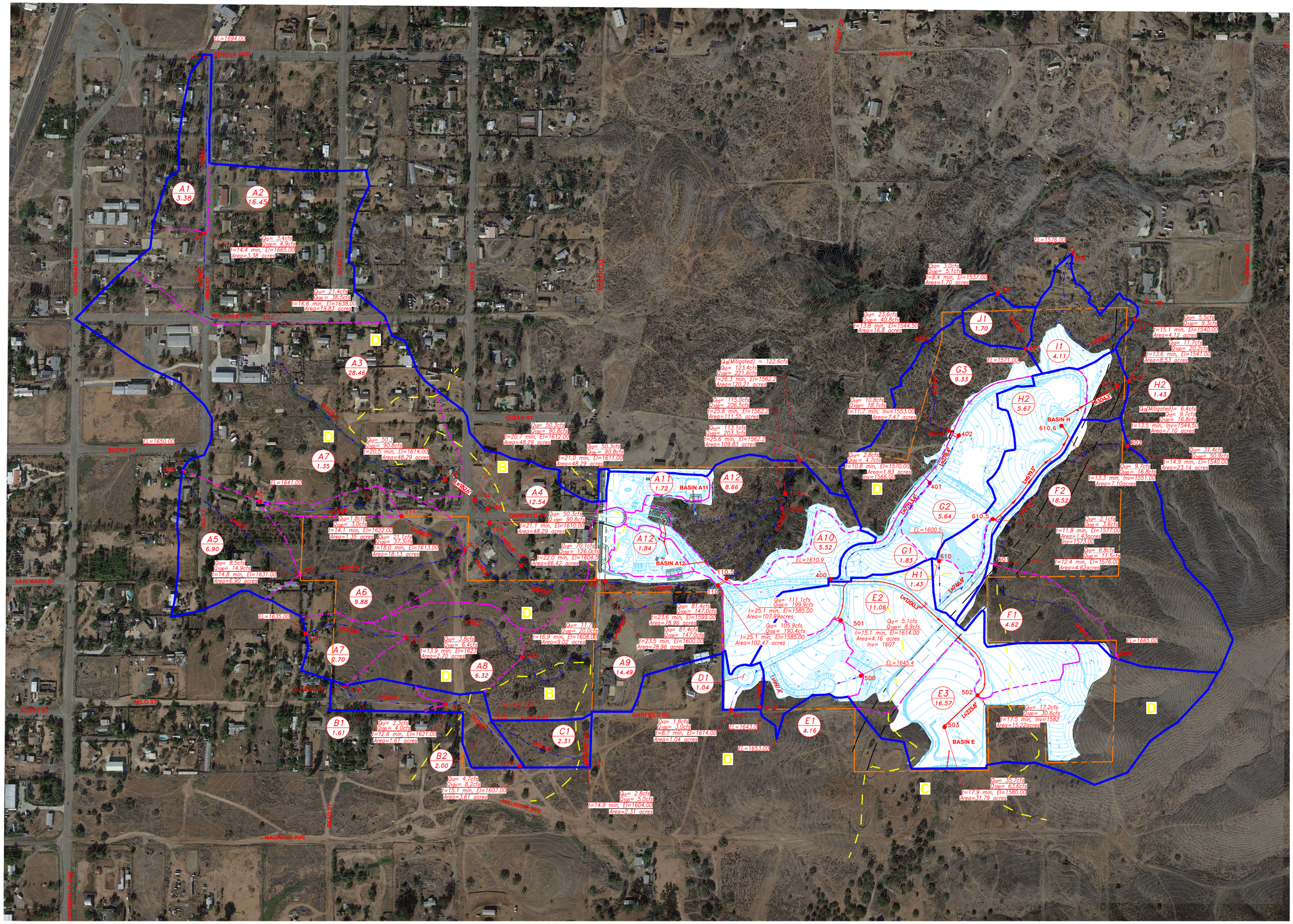
```
Flow top width inside pipe =   22.75(In.)
Critical Depth =   18.68(In.)
Pipe flow velocity =      8.52(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =    11.68 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      402.000 to Point/Station      403.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1553.000(Ft.)
End of natural channel elevation =   1544.500(Ft.)
Length of natural channel  =   544.100(Ft.)
Estimated mean flow rate at midpoint of channel =     30.374(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.20(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
         Normal channel slope =  0.0156
Corrected/adjusted channel slope =  0.0156
Travel time =    2.16 min.     TC =   13.84  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.850
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.786(In/Hr) for a   100.0 year storm
Subarea runoff =     22.091(CFS) for      9.330(Ac.)
Total runoff =     40.789(CFS)    Total area =      16.800(Ac.)
End of computations, total study area =           16.80 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.906
Area averaged RI index number =  84.1
```

DRAINAGE AREA H

```
                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
        Rational Hydrology Study        Date: 10/24/23  File:crproh100.out
------------------------------------------------------------------------
Crescent Gardens
Proposed Condtion Hydrology
AREA H
10/24/23
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------


Program License Serial Number 6406

------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =  100.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation =  0.486(In.)
100 year, 1 hour precipitation =  1.440(In.)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity =  1.440(In/Hr)
Slope of intensity duration curve = 0.4500




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      610.000 to Point/Station      610.500
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   746.900(Ft.)
Top (of initial area) elevation =  1600.500(Ft.)
Bottom (of initial area) elevation =  1577.000(Ft.)
Difference in elevation =    23.500(Ft.)
Slope =    0.03146  s(percent)=       3.15
TC = k(0.420)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.830 min.
Rainfall intensity =      2.990(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/2 Acre Lot)
Runoff Coefficient = 0.830
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.600; Impervious fraction =  0.400
Initial subarea runoff =      3.549(CFS)
Total initial stream area =        1.430(Ac.)
Pervious area fraction = 0.600


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      610.500 to Point/Station      610.600
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1573.000(Ft.)
Downstream point/station elevation =  1551.000(Ft.)
Pipe length  =   619.50(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.549(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     3.549(CFS)
Normal flow depth in pipe =    6.20(In.)
Flow top width inside pipe =   11.99(In.)
Critical Depth =    9.65(In.)
Pipe flow velocity =      8.67(Ft/s)
Travel time through pipe =    1.19 min.
Time of concentration (TC) =    13.02 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      610.600 to Point/Station      610.600
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
USER INPUT of soil data for subarea
Runoff Coefficient = 0.817
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  79.10
Pervious area fraction =  0.840; Impervious fraction =  0.160
Time of concentration =    13.02 min.
Rainfall intensity =      2.864(In/Hr) for a   100.0 year storm
Subarea runoff =     13.269(CFS) for      5.670(Ac.)
Total runoff =     16.818(CFS)     Total area =       7.100(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      610.600 to Point/Station      611.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1551.000(Ft.)
Downstream point/station elevation =  1544.500(Ft.)
Pipe length  =   304.30(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    16.818(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    16.818(CFS)
Normal flow depth in pipe =   13.27(In.)
Flow top width inside pipe =   20.26(In.)
Critical Depth =   18.06(In.)
Pipe flow velocity =     10.50(Ft/s)
Travel time through pipe =    0.48 min.
Time of concentration (TC) =    13.50 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      611.000 to Point/Station      612.000
```

```
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
_____________________________________________________________
Top of natural channel elevation =   1544.500(Ft.)
End of natural channel elevation =   1541.000(Ft.)
Length of natural channel  =    58.000(Ft.)
Estimated mean flow rate at midpoint of channel =     18.512(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   7.21(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
         Normal channel slope =  0.0603
Corrected/adjusted channel slope =  0.0603
Travel time =    0.13 min.     TC =   13.64  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.850
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.805(In/Hr) for a   100.0 year storm
Subarea runoff =      3.409(CFS) for      1.430(Ac.)
Total runoff =     20.228(CFS)     Total area =       8.530(Ac.)
End of computations, total study area =            8.53 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.827
Area averaged RI index number =  80.1
```

HYDROLOGY MAP


A1 3.38
A2 16.45
A3 28.46
A4 12.54
A5 6.90
A6 9.88
A7 2.70
A8 6.32
A9 14.49
A7 1.35
B1 1.61
B2 2.00
C1 2.31
D1 1.04
E1 4.16
E2 11.06
E3 16.57
F1 4.62
F2 18.52
G1 1.85
G2 5.64
G3 9.33
H1 1.43
H2 1.43
H2 5.67
I1 4.11
J1 1.70
A1 1.72
A12 8.66
A12 1.84
A10 5.52
BASIN A11
BASIN A12
BASIN H
BASIN E
Qa(Mitigated) = 122.6cfs
Q10= 221.6cfs
t=26.3 min, El=1582.2
Area=120.21 acres
Qa(Mitigated)= 6.4cfs
Q100= 9.7cfs
t=13.5 min, Inv=1544.00
Area=7.10 acres
Qa= 111.7cfs
Q100= 199.9cfs
t=25.1 min, El=1585.00
Area=107.99acres
Qa= 105.9cfs
Q100= 190.4cfs
t=25.1 min, El=1585.00
Area=102.47 acres
Qa= 81.4cfs
Q100= 147.0cfs
t=23.6 min, El=1599.00
Area=78.96 acres
Qa= 81.4cfs
Q100= 147.0cfs
t=23.5 min, El=1600.00
Area=78.96 acres
Qa= 50.3cfs
Q100= 90.8cfs
t=20.7 min, El=1612.00
Area=48.29 acres
Qa= 50.3cfs
Q100= 90.8cfs
t=20.5 min, El=1614.00
Area=48.29 acres
Qa= 50.3cfs
Q100= 90.8cfs
t=21.0 min, El=1611.00
Area=48.29 acres
Qa= 50.3cfs
Q100= 90.8cfs
t=21.5 min, El=1610.00
Area=48.29 acres
Qa= 70.1cfs
Q100= 126.0cfs
t=22.0 min, El=1604.5
Area=65.42 acres
Qa= 111.7
Q100= 200.0cfs
t=16.9 min, El=1608.00
Area=99.72 acres
Qa= 3.0cfs
Q100= 5.1cfs
t=8.4 min, El=1537.00
Area=1.70 acres
Qa= 23.6cfs
Q100= 40.8cfs
t=13.8 min, El=1544.50
Area=19.8 acres
Qa= 10.8cfs
Q100= 18.7cfs
t=11.7 min, Inv=1553.00
Area=7.47 acres
Qa= 2.8cfs
Q100= 4.7cfs
t=10.8 min, El=1570.00
Area=1.83 acres
Inv=1568.00
Qa= 5.5cfs
Q100= 9.3cfs
t=15.1 min, El=1540.00
Area=4.12 acres
Qa= 11.7cfs
Q100= 20.2cfs
t=13.6 min, El=1541.00
Area=8.33 acres
Qa= 31.4cfs
Q100= 50.9cfs
t=14.9 min, El=1540.00
Area=23.14 acres
Qa= 9.7cfs
Q100= 16.8cfs
t=13.3 min, Inv=1551.00
Area=7.10acres
Qa= 2.1cfs
Q100= 3.6cfs
t=11.8 min, El=1577.00
Area=1.43acres
Inv=1574.00
Qa= 6.9cfs
Q100= 11.6cfs
t=12.4 min, El=1576.00
Area=4.62acres
Qa= 17.2cfs
Q100= 30.6cfs
t=17.5 min, Inv=1582
Area=12.22acres
Qa= 35.7cfs
Q100= 63.6cfs
t=17.9 min, El=1580.00
Area=31.79 acres
Qa= 2.8cfs
Q100= 5.0cfs
t=14.9 min, El=1604.00
Area=2.31 acres
Qa= 4.7cfs
Q100= 8.2cfs
t=15.1 min, El=1607.00
Area=3.61 acres
Qa= 2.3cfs
Q100= 4.0cfs
t=12.6 min, El=1621.00
Area=1.61 acres
Qa= 3.8cfs
Q100= 6.4cfs
t=13.9 min, El=1623
Area=2.70 acres
Qa= 1.8cfs
Q100= 3.0cfs
t=14.1 min, El=1622.00
Area=1.35 acres
Qa= 41.1cfs
Q100= 67.2cfs
t=18.0 min, El=1613.00
Area=18.13 acres
Qa= 8.5cfs
Q100= 14.9cfs
t=14.8 min, El=1631.00
Area=6.90 acres
Qa= 3.4cfs
Q100= 4.5cfs
t=14.4 min, El=1665.00
Area=3.38 acres
Qa= 21.4cfs
Q100= 35.1cfs
t=16.6 min, El=1638.00
Area=19.83 acres
Qa= 1.8cfs
Q100= 3.0cfs
t=8.7 min, El=1614.00
Area=1.04 acres
Qa= 111.1cfs
Q100= 199.9cfs
t=25.1 min, El=1585.00
Area=107.99acres
Qa= 5.1cfs
Q100= 8.3cfs
t=15.1 min, El=1614.00
Area=4.16 acres
Inv= 1607
EL=1600.5
EL=1610.9
EL=1645.4
EL=1664.30
EL=1663.00
EL=1576.00
EL=1571.00
EL=1650.00
EL=1641.00
EL=1635.00
EL=1665.00
SUSAN ST
GARFIELD RD
MAURICE AVE
MILO ST
LARK ISLE ST
LAKE ST
GREENFIELD AVE
MAPLE ST
ELSINORE AVE
BRIDGE ST
LEACH ST
LEACH ST
LEACH

SECTION 4
EXISTING & PROPOSED CONDITION HYDROLOGY
UNIT HYDROGRAPH METHOD ANALYSIS

UNIT HYDROGRAPH RESULTS EXISTING CONDITION (10-YEAR, 24HR STORM)

DRAINAGE AREA A

U n i t H y d r o g r a p h A n a l y s i s

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2014, Version 9.0
Study date 10/16/23 File: crea10uh2410.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6406

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

CRESCENT GARDENS
Existing Condition
Area A
10/16/23

Drainage Area = 119.92(Ac.) = 0.187 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 119.92(Ac.) = 0.187 Sq. Mi.
Length along longest watercourse = 5504.00(Ft.)
Length along longest watercourse measured to centroid = 2594.00(Ft.)
Length along longest watercourse = 1.042 Mi.
Length along longest watercourse measured to centroid = 0.491 Mi.
Difference in elevation = 131.80(Ft.)
Slope along watercourse = 126.4360 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time = 0.223 Hr.
Lag time = 13.36 Min.
25% of lag time = 3.34 Min.
40% of lag time = 5.34 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
119.92	2.21	265.02

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
119.92	5.82	697.93

STORM EVENT (YEAR) = 10.00
Area Averaged 2-Year Rainfall = 2.210(In)
Area Averaged 100-Year Rainfall = 5.820(In)

Point rain (area averaged) = 3.695(In)
Areal adjustment factor = 99.98 %
Adjusted average point rain = 3.694(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
119.920	78.10	0.118

Total Area Entered = 119.92(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
78.1	78.1	0.266	0.118	0.238	1.000	0.238
					Sum (F) =	0.238

Area averaged mean soil loss (F) (In/Hr) = 0.238
Minimum soil loss rate ((In/Hr)) = 0.119
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.806

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	37.435	3.948	4.772
2	0.167	74.870	15.900	19.217
3	0.250	112.305	25.143	30.387
4	0.333	149.740	18.667	22.560
5	0.417	187.175	9.371	11.326
6	0.500	224.610	5.615	6.787
7	0.583	262.045	4.164	5.032
8	0.667	299.480	3.270	3.952
9	0.750	336.914	2.513	3.037
10	0.833	374.349	2.119	2.561
11	0.917	411.784	1.661	2.008
12	1.000	449.219	1.303	1.575
13	1.083	486.654	1.162	1.404
14	1.167	524.089	1.061	1.282
15	1.250	561.524	0.836	1.010
16	1.333	598.959	0.710	0.858
17	1.417	636.394	0.603	0.729
18	1.500	673.829	0.494	0.597
19	1.583	711.264	0.384	0.464
20	1.667	748.699	0.374	0.452
21	1.750	786.134	0.374	0.452
22	1.833	823.569	0.326	0.394
			Sum = 100.000	Sum= 120.857

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.030	(0.422)	0.024	0.006
2	0.17	0.07	0.030	(0.420)	0.024	0.006
3	0.25	0.07	0.030	(0.419)	0.024	0.006
4	0.33	0.10	0.044	(0.417)	0.036	0.009
5	0.42	0.10	0.044	(0.416)	0.036	0.009
6	0.50	0.10	0.044	(0.414)	0.036	0.009
7	0.58	0.10	0.044	(0.412)	0.036	0.009
8	0.67	0.10	0.044	(0.411)	0.036	0.009
9	0.75	0.10	0.044	(0.409)	0.036	0.009
10	0.83	0.13	0.059	(0.408)	0.048	0.011
11	0.92	0.13	0.059	(0.406)	0.048	0.011
12	1.00	0.13	0.059	(0.404)	0.048	0.011
13	1.08	0.10	0.044	(0.403)	0.036	0.009
14	1.17	0.10	0.044	(0.401)	0.036	0.009
15	1.25	0.10	0.044	(0.400)	0.036	0.009
16	1.33	0.10	0.044	(0.398)	0.036	0.009
17	1.42	0.10	0.044	(0.396)	0.036	0.009
18	1.50	0.10	0.044	(0.395)	0.036	0.009
19	1.58	0.10	0.044	(0.393)	0.036	0.009
20	1.67	0.10	0.044	(0.392)	0.036	0.009
21	1.75	0.10	0.044	(0.390)	0.036	0.009
22	1.83	0.13	0.059	(0.389)	0.048	0.011
23	1.92	0.13	0.059	(0.387)	0.048	0.011
24	2.00	0.13	0.059	(0.385)	0.048	0.011
25	2.08	0.13	0.059	(0.384)	0.048	0.011
26	2.17	0.13	0.059	(0.382)	0.048	0.011
27	2.25	0.13	0.059	(0.381)	0.048	0.011
28	2.33	0.13	0.059	(0.379)	0.048	0.011
29	2.42	0.13	0.059	(0.378)	0.048	0.011
30	2.50	0.13	0.059	(0.376)	0.048	0.011
31	2.58	0.17	0.074	(0.375)	0.060	0.014
32	2.67	0.17	0.074	(0.373)	0.060	0.014
33	2.75	0.17	0.074	(0.371)	0.060	0.014
34	2.83	0.17	0.074	(0.370)	0.060	0.014
35	2.92	0.17	0.074	(0.368)	0.060	0.014
36	3.00	0.17	0.074	(0.367)	0.060	0.014
37	3.08	0.17	0.074	(0.365)	0.060	0.014
38	3.17	0.17	0.074	(0.364)	0.060	0.014
39	3.25	0.17	0.074	(0.362)	0.060	0.014
40	3.33	0.17	0.074	(0.361)	0.060	0.014
41	3.42	0.17	0.074	(0.359)	0.060	0.014
42	3.50	0.17	0.074	(0.358)	0.060	0.014
43	3.58	0.17	0.074	(0.356)	0.060	0.014
44	3.67	0.17	0.074	(0.355)	0.060	0.014
45	3.75	0.17	0.074	(0.353)	0.060	0.014
46	3.83	0.20	0.089	(0.352)	0.071	0.017
47	3.92	0.20	0.089	(0.350)	0.071	0.017
48	4.00	0.20	0.089	(0.349)	0.071	0.017
49	4.08	0.20	0.089	(0.347)	0.071	0.017
50	4.17	0.20	0.089	(0.346)	0.071	0.017
51	4.25	0.20	0.089	(0.344)	0.071	0.017
52	4.33	0.23	0.103	(0.343)	0.083	0.020
53	4.42	0.23	0.103	(0.342)	0.083	0.020
54	4.50	0.23	0.103	(0.340)	0.083	0.020
55	4.58	0.23	0.103	(0.339)	0.083	0.020
56	4.67	0.23	0.103	(0.337)	0.083	0.020
57	4.75	0.23	0.103	(0.336)	0.083	0.020
58	4.83	0.27	0.118	(0.334)	0.095	0.023
59	4.92	0.27	0.118	(0.333)	0.095	0.023
60	5.00	0.27	0.118	(0.331)	0.095	0.023
61	5.08	0.20	0.089	(0.330)	0.071	0.017
62	5.17	0.20	0.089	(0.328)	0.071	0.017
63	5.25	0.20	0.089	(0.327)	0.071	0.017
64	5.33	0.23	0.103	(0.326)	0.083	0.020
65	5.42	0.23	0.103	(0.324)	0.083	0.020
66	5.50	0.23	0.103	(0.323)	0.083	0.020
67	5.58	0.27	0.118	(0.321)	0.095	0.023
68	5.67	0.27	0.118	(0.320)	0.095	0.023
69	5.75	0.27	0.118	(0.319)	0.095	0.023
70	5.83	0.27	0.118	(0.317)	0.095	0.023
71	5.92	0.27	0.118	(0.316)	0.095	0.023
72	6.00	0.27	0.118	(0.314)	0.095	0.023
73	6.08	0.30	0.133	(0.313)	0.107	0.026
74	6.17	0.30	0.133	(0.312)	0.107	0.026
75	6.25	0.30	0.133	(0.310)	0.107	0.026
76	6.33	0.30	0.133	(0.309)	0.107	0.026
77	6.42	0.30	0.133	(0.307)	0.107	0.026
78	6.50	0.30	0.133	(0.306)	0.107	0.026
79	6.58	0.33	0.148	(0.305)	0.119	0.029
80	6.67	0.33	0.148	(0.303)	0.119	0.029
81	6.75	0.33	0.148	(0.302)	0.119	0.029
82	6.83	0.33	0.148	(0.301)	0.119	0.029
83	6.92	0.33	0.148	(0.299)	0.119	0.029
84	7.00	0.33	0.148	(0.298)	0.119	0.029
85	7.08	0.33	0.148	(0.296)	0.119	0.029
86	7.17	0.33	0.148	(0.295)	0.119	0.029
87	7.25	0.33	0.148	(0.294)	0.119	0.029
88	7.33	0.37	0.163	(0.292)	0.131	0.032
89	7.42	0.37	0.163	(0.291)	0.131	0.032
90	7.50	0.37	0.163	(0.290)	0.131	0.032
91	7.58	0.40	0.177	(0.288)	0.143	0.034
92	7.67	0.40	0.177	(0.287)	0.143	0.034
93	7.75	0.40	0.177	(0.286)	0.143	0.034
94	7.83	0.43	0.192	(0.284)	0.155	0.037
95	7.92	0.43	0.192	(0.283)	0.155	0.037
96	8.00	0.43	0.192	(0.282)	0.155	0.037
97	8.08	0.50	0.222	(0.281)	0.179	0.043
98	8.17	0.50	0.222	(0.279)	0.179	0.043
99	8.25	0.50	0.222	(0.278)	0.179	0.043
100	8.33	0.50	0.222	(0.277)	0.179	0.043
101	8.42	0.50	0.222	(0.275)	0.179	0.043
102	8.50	0.50	0.222	(0.274)	0.179	0.043
103	8.58	0.53	0.236	(0.273)	0.190	0.046
104	8.67	0.53	0.236	(0.271)	0.190	0.046
105	8.75	0.53	0.236	(0.270)	0.190	0.046
106	8.83	0.57	0.251	(0.269)	0.202	0.049
107	8.92	0.57	0.251	(0.268)	0.202	0.049
108	9.00	0.57	0.251	(0.266)	0.202	0.049
109	9.08	0.63	0.281	(0.265)	0.226	0.055
110	9.17	0.63	0.281	(0.264)	0.226	0.055
111	9.25	0.63	0.281	(0.263)	0.226	0.055
112	9.33	0.67	0.296	(0.261)	0.238	0.057
113	9.42	0.67	0.296	(0.260)	0.238	0.057
114	9.50	0.67	0.296	(0.259)	0.238	0.057
115	9.58	0.70	0.310	(0.258)	0.250	0.060
116	9.67	0.70	0.310	(0.256)	0.250	0.060
117	9.75	0.70	0.310	(0.255)	0.250	0.060

118	9.83	0.73	0.325		0.254	(0.262)	0.071	178	14.83	0.83	0.369		0.188	(0.298)	0.182
119	9.92	0.73	0.325		0.253	(0.262)	0.072	179	14.92	0.83	0.369		0.187	(0.298)	0.182
120	10.00	0.73	0.325		0.251	(0.262)	0.074	180	15.00	0.83	0.369		0.186	(0.298)	0.183
121	10.08	0.50	0.222	(0.250)		0.179	0.043	181	15.08	0.80	0.355		0.185	(0.286)	0.170
122	10.17	0.50	0.222	(0.249)		0.179	0.043	182	15.17	0.80	0.355		0.184	(0.286)	0.171
123	10.25	0.50	0.222	(0.248)		0.179	0.043	183	15.25	0.80	0.355		0.183	(0.286)	0.172
124	10.33	0.50	0.222	(0.247)		0.179	0.043	184	15.33	0.77	0.340		0.182	(0.274)	0.158
125	10.42	0.50	0.222	(0.245)		0.179	0.043	185	15.42	0.77	0.340		0.181	(0.274)	0.159
126	10.50	0.50	0.222	(0.244)		0.179	0.043	186	15.50	0.77	0.340		0.180	(0.274)	0.160
127	10.58	0.67	0.296	(0.243)		0.238	0.057	187	15.58	0.63	0.281		0.179	(0.226)	0.101
128	10.67	0.67	0.296	(0.242)		0.238	0.057	188	15.67	0.63	0.281		0.178	(0.226)	0.102
129	10.75	0.67	0.296	(0.241)		0.238	0.057	189	15.75	0.63	0.281		0.178	(0.226)	0.103
130	10.83	0.67	0.296	(0.239)		0.238	0.057	190	15.83	0.63	0.281		0.177	(0.226)	0.104
131	10.92	0.67	0.296	(0.238)		0.238	0.057	191	15.92	0.63	0.281		0.176	(0.226)	0.105
132	11.00	0.67	0.296		0.237	(0.238)	0.058	192	16.00	0.63	0.281		0.175	(0.226)	0.106
133	11.08	0.63	0.281	(0.236)		0.226	0.055	193	16.08	0.13	0.059	(0.174)		0.048	0.011
134	11.17	0.63	0.281	(0.235)		0.226	0.055	194	16.17	0.13	0.059	(0.173)		0.048	0.011
135	11.25	0.63	0.281	(0.234)		0.226	0.055	195	16.25	0.13	0.059	(0.172)		0.048	0.011
136	11.33	0.63	0.281	(0.232)		0.226	0.055	196	16.33	0.13	0.059	(0.171)		0.048	0.011
137	11.42	0.63	0.281	(0.231)		0.226	0.055	197	16.42	0.13	0.059	(0.170)		0.048	0.011
138	11.50	0.63	0.281	(0.230)		0.226	0.055	198	16.50	0.13	0.059	(0.170)		0.048	0.011
139	11.58	0.57	0.251	(0.229)		0.202	0.049	199	16.58	0.10	0.044	(0.169)		0.036	0.009
140	11.67	0.57	0.251	(0.228)		0.202	0.049	200	16.67	0.10	0.044	(0.168)		0.036	0.009
141	11.75	0.57	0.251	(0.227)		0.202	0.049	201	16.75	0.10	0.044	(0.167)		0.036	0.009
142	11.83	0.60	0.266	(0.226)		0.214	0.052	202	16.83	0.10	0.044	(0.166)		0.036	0.009
143	11.92	0.60	0.266	(0.225)		0.214	0.052	203	16.92	0.10	0.044	(0.165)		0.036	0.009
144	12.00	0.60	0.266	(0.223)		0.214	0.052	204	17.00	0.10	0.044	(0.164)		0.036	0.009
145	12.08	0.83	0.369		0.222	(0.298)	0.147	205	17.08	0.17	0.074	(0.164)		0.060	0.014
146	12.17	0.83	0.369		0.221	(0.298)	0.148	206	17.17	0.17	0.074	(0.163)		0.060	0.014
147	12.25	0.83	0.369		0.220	(0.298)	0.149	207	17.25	0.17	0.074	(0.162)		0.060	0.014
148	12.33	0.87	0.384		0.219	(0.310)	0.165	208	17.33	0.17	0.074	(0.161)		0.060	0.014
149	12.42	0.87	0.384		0.218	(0.310)	0.166	209	17.42	0.17	0.074	(0.160)		0.060	0.014
150	12.50	0.87	0.384		0.217	(0.310)	0.167	210	17.50	0.17	0.074	(0.160)		0.060	0.014
151	12.58	0.93	0.414		0.216	(0.333)	0.198	211	17.58	0.17	0.074	(0.159)		0.060	0.014
152	12.67	0.93	0.414		0.215	(0.333)	0.199	212	17.67	0.17	0.074	(0.158)		0.060	0.014
153	12.75	0.93	0.414		0.214	(0.333)	0.200	213	17.75	0.17	0.074	(0.157)		0.060	0.014
154	12.83	0.97	0.429		0.212	(0.345)	0.216	214	17.83	0.13	0.059	(0.156)		0.048	0.011
155	12.92	0.97	0.429		0.211	(0.345)	0.217	215	17.92	0.13	0.059	(0.156)		0.048	0.011
156	13.00	0.97	0.429		0.210	(0.345)	0.218	216	18.00	0.13	0.059	(0.155)		0.048	0.011
157	13.08	1.13	0.502		0.209	(0.405)	0.293	217	18.08	0.13	0.059	(0.154)		0.048	0.011
158	13.17	1.13	0.502		0.208	(0.405)	0.294	218	18.17	0.13	0.059	(0.153)		0.048	0.011
159	13.25	1.13	0.502		0.207	(0.405)	0.295	219	18.25	0.13	0.059	(0.153)		0.048	0.011
160	13.33	1.13	0.502		0.206	(0.405)	0.296	220	18.33	0.13	0.059	(0.152)		0.048	0.011
161	13.42	1.13	0.502		0.205	(0.405)	0.297	221	18.42	0.13	0.059	(0.151)		0.048	0.011
162	13.50	1.13	0.502		0.204	(0.405)	0.298	222	18.50	0.13	0.059	(0.150)		0.048	0.011
163	13.58	0.77	0.340		0.203	(0.274)	0.137	223	18.58	0.10	0.044	(0.150)		0.036	0.009
164	13.67	0.77	0.340		0.202	(0.274)	0.138	224	18.67	0.10	0.044	(0.149)		0.036	0.009
165	13.75	0.77	0.340		0.201	(0.274)	0.139	225	18.75	0.10	0.044	(0.148)		0.036	0.009
166	13.83	0.77	0.340		0.200	(0.274)	0.140	226	18.83	0.07	0.030	(0.148)		0.024	0.006
167	13.92	0.77	0.340		0.199	(0.274)	0.141	227	18.92	0.07	0.030	(0.147)		0.024	0.006
168	14.00	0.77	0.340		0.198	(0.274)	0.142	228	19.00	0.07	0.030	(0.146)		0.024	0.006
169	14.08	0.90	0.399		0.197	(0.321)	0.202	229	19.08	0.10	0.044	(0.145)		0.036	0.009
170	14.17	0.90	0.399		0.196	(0.321)	0.203	230	19.17	0.10	0.044	(0.145)		0.036	0.009
171	14.25	0.90	0.399		0.195	(0.321)	0.204	231	19.25	0.10	0.044	(0.144)		0.036	0.009
172	14.33	0.87	0.384		0.194	(0.310)	0.190	232	19.33	0.13	0.059	(0.143)		0.048	0.011
173	14.42	0.87	0.384		0.193	(0.310)	0.191	233	19.42	0.13	0.059	(0.143)		0.048	0.011
174	14.50	0.87	0.384		0.192	(0.310)	0.192	234	19.50	0.13	0.059	(0.142)		0.048	0.011
175	14.58	0.87	0.384		0.191	(0.310)	0.193	235	19.58	0.10	0.044	(0.141)		0.036	0.009
176	14.67	0.87	0.384		0.190	(0.310)	0.194	236	19.67	0.10	0.044	(0.141)		0.036	0.009
177	14.75	0.87	0.384		0.189	(0.310)	0.195	237	19.75	0.10	0.044	(0.140)		0.036	0.009

238	19.83	0.07	0.030	(0.140)	0.024	0.006
239	19.92	0.07	0.030	(0.139)	0.024	0.006
240	20.00	0.07	0.030	(0.138)	0.024	0.006
241	20.08	0.10	0.044	(0.138)	0.036	0.009
242	20.17	0.10	0.044	(0.137)	0.036	0.009
243	20.25	0.10	0.044	(0.136)	0.036	0.009
244	20.33	0.10	0.044	(0.136)	0.036	0.009
245	20.42	0.10	0.044	(0.135)	0.036	0.009
246	20.50	0.10	0.044	(0.135)	0.036	0.009
247	20.58	0.10	0.044	(0.134)	0.036	0.009
248	20.67	0.10	0.044	(0.134)	0.036	0.009
249	20.75	0.10	0.044	(0.133)	0.036	0.009
250	20.83	0.07	0.030	(0.132)	0.024	0.006
251	20.92	0.07	0.030	(0.132)	0.024	0.006
252	21.00	0.07	0.030	(0.131)	0.024	0.006
253	21.08	0.10	0.044	(0.131)	0.036	0.009
254	21.17	0.10	0.044	(0.130)	0.036	0.009
255	21.25	0.10	0.044	(0.130)	0.036	0.009
256	21.33	0.07	0.030	(0.129)	0.024	0.006
257	21.42	0.07	0.030	(0.129)	0.024	0.006
258	21.50	0.07	0.030	(0.128)	0.024	0.006
259	21.58	0.10	0.044	(0.128)	0.036	0.009
260	21.67	0.10	0.044	(0.127)	0.036	0.009
261	21.75	0.10	0.044	(0.127)	0.036	0.009
262	21.83	0.07	0.030	(0.127)	0.024	0.006
263	21.92	0.07	0.030	(0.126)	0.024	0.006
264	22.00	0.07	0.030	(0.126)	0.024	0.006
265	22.08	0.10	0.044	(0.125)	0.036	0.009
266	22.17	0.10	0.044	(0.125)	0.036	0.009
267	22.25	0.10	0.044	(0.125)	0.036	0.009
268	22.33	0.07	0.030	(0.124)	0.024	0.006
269	22.42	0.07	0.030	(0.124)	0.024	0.006
270	22.50	0.07	0.030	(0.123)	0.024	0.006
271	22.58	0.07	0.030	(0.123)	0.024	0.006
272	22.67	0.07	0.030	(0.123)	0.024	0.006
273	22.75	0.07	0.030	(0.122)	0.024	0.006
274	22.83	0.07	0.030	(0.122)	0.024	0.006
275	22.92	0.07	0.030	(0.122)	0.024	0.006
276	23.00	0.07	0.030	(0.121)	0.024	0.006
277	23.08	0.07	0.030	(0.121)	0.024	0.006
278	23.17	0.07	0.030	(0.121)	0.024	0.006
279	23.25	0.07	0.030	(0.121)	0.024	0.006
280	23.33	0.07	0.030	(0.120)	0.024	0.006
281	23.42	0.07	0.030	(0.120)	0.024	0.006
282	23.50	0.07	0.030	(0.120)	0.024	0.006
283	23.58	0.07	0.030	(0.120)	0.024	0.006
284	23.67	0.07	0.030	(0.120)	0.024	0.006
285	23.75	0.07	0.030	(0.119)	0.024	0.006
286	23.83	0.07	0.030	(0.119)	0.024	0.006
287	23.92	0.07	0.030	(0.119)	0.024	0.006
288	24.00	0.07	0.030	(0.119)	0.024	0.006

(Loss Rate Not Used)

Sum = 100.0 Sum = 13.8

Flood volume = Effective rainfall 1.15(In)
times area 119.9(Ac.)/[(In)/(Ft.)] = 11.5(Ac.Ft)
Total soil loss = 2.54(In)
Total soil loss = 25.398(Ac.Ft)
Total rainfall = 3.69(In)
Flood volume = 501822.4 Cubic Feet
Total soil loss = 1106349.5 Cubic Feet

Peak flow rate of this hydrograph = 33.016(CFS)

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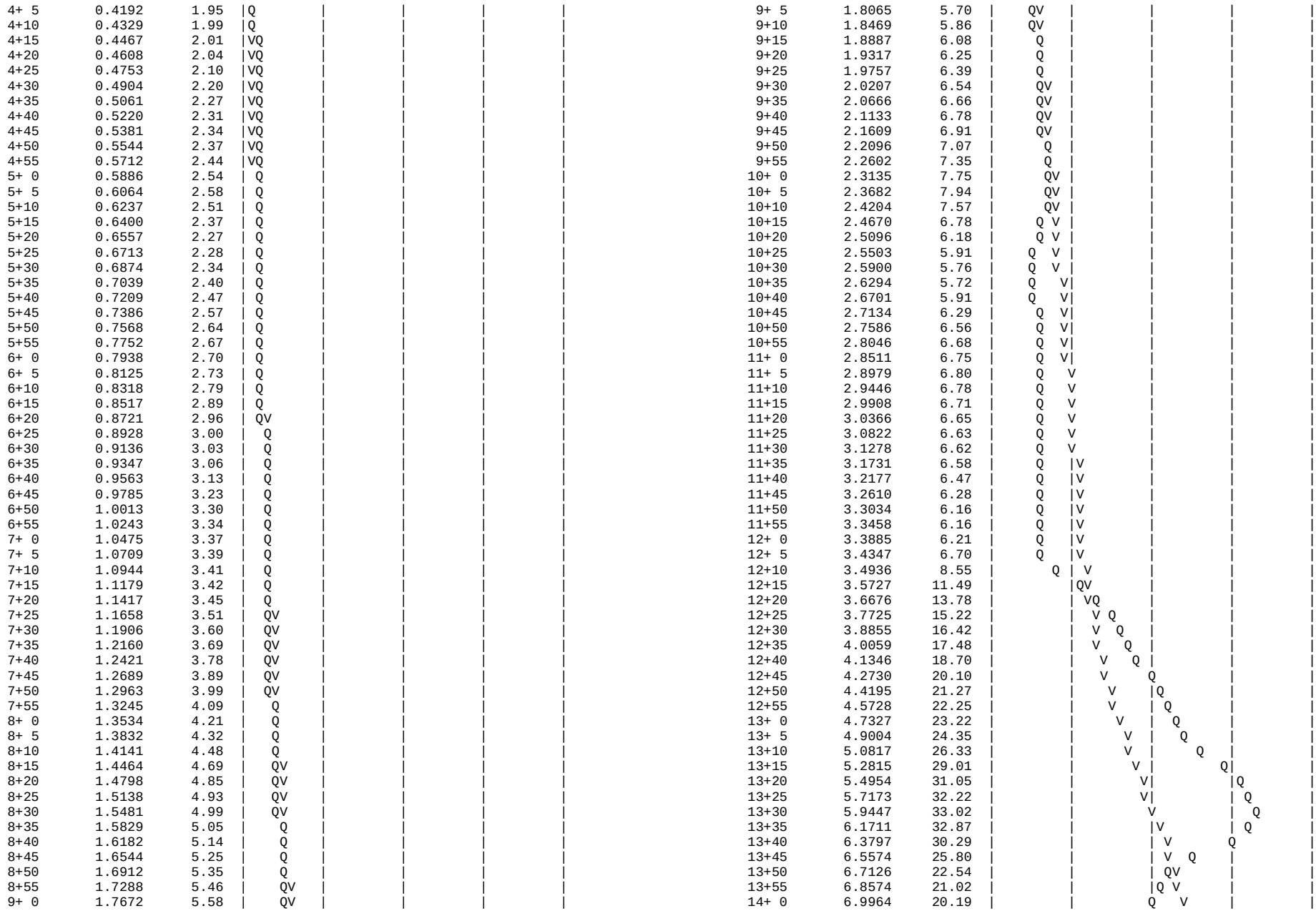
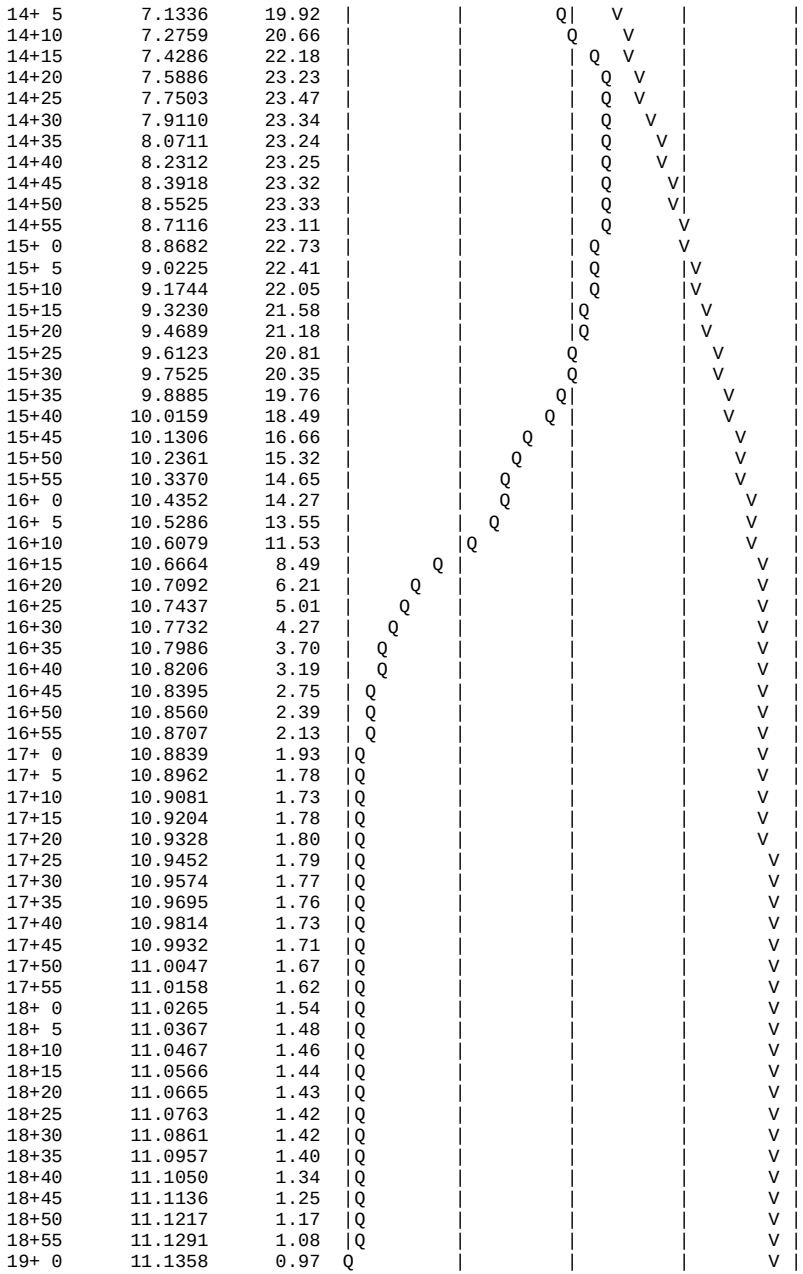
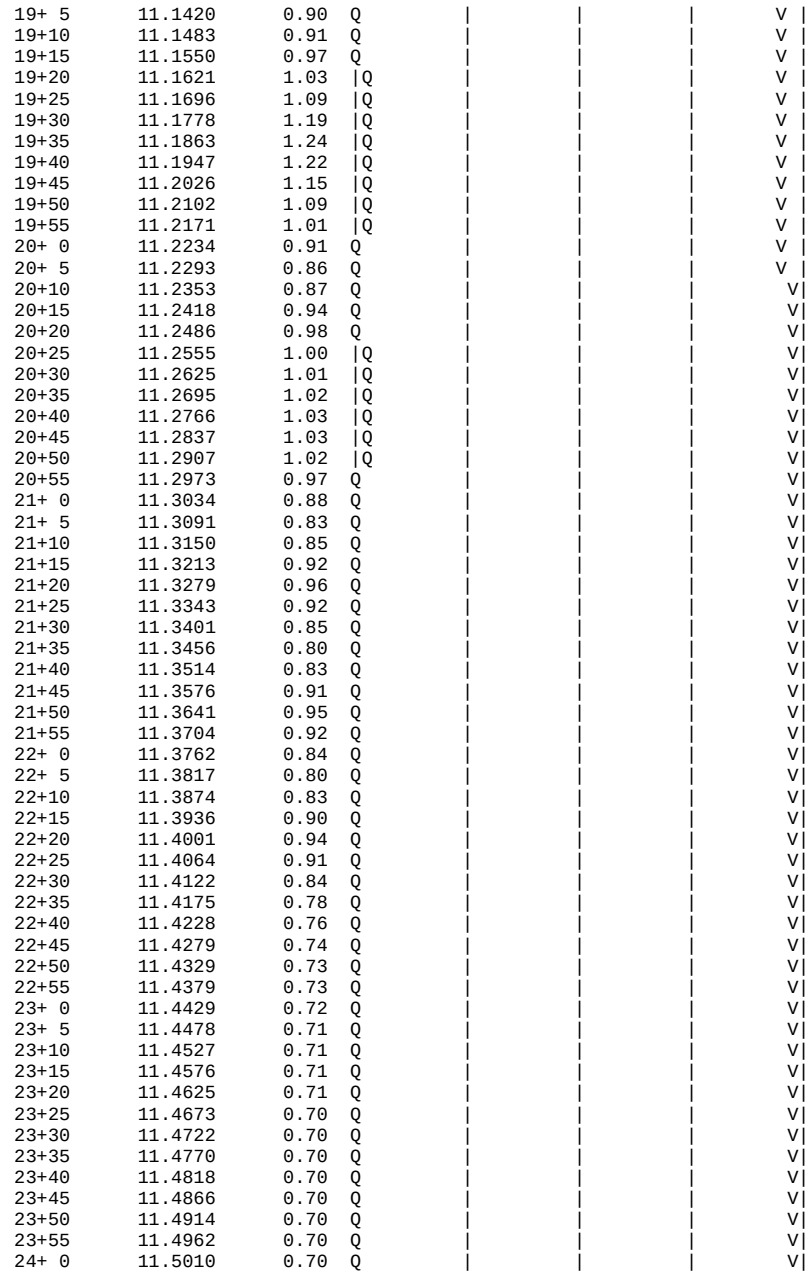
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	10.0	20.0	30.0	40.0
0+ 5	0.0002	0.03	Q	|	|	|	|
0+10	0.0011	0.14	Q	|	|	|	|
0+15	0.0033	0.31	Q	|	|	|	|
0+20	0.0064	0.46	Q	|	|	|	|
0+25	0.0104	0.58	Q	|	|	|	|
0+30	0.0152	0.70	Q	|	|	|	|
0+35	0.0207	0.80	Q	|	|	|	|
0+40	0.0266	0.85	Q	|	|	|	|
0+45	0.0327	0.89	Q	|	|	|	|
0+50	0.0391	0.93	Q	|	|	|	|
0+55	0.0461	1.01	VQ	|	|	|	|
1+ 0	0.0538	1.11	VQ	|	|	|	|
1+ 5	0.0619	1.18	VQ	|	|	|	|
1+10	0.0700	1.17	VQ	|	|	|	|
1+15	0.0776	1.11	VQ	|	|	|	|
1+20	0.0850	1.07	VQ	|	|	|	|
1+25	0.0923	1.06	VQ	|	|	|	|
1+30	0.0996	1.06	VQ	|	|	|	|
1+35	0.1068	1.05	VQ	|	|	|	|
1+40	0.1141	1.05	VQ	|	|	|	|
1+45	0.1213	1.05	VQ	|	|	|	|
1+50	0.1287	1.07	VQ	|	|	|	|
1+55	0.1364	1.12	VQ	|	|	|	|
2+ 0	0.1447	1.21	VQ	|	|	|	|
2+ 5	0.1535	1.27	VQ	|	|	|	|
2+10	0.1625	1.30	VQ	|	|	|	|
2+15	0.1716	1.32	VQ	|	|	|	|
2+20	0.1808	1.33	VQ	|	|	|	|
2+25	0.1900	1.35	VQ	|	|	|	|
2+30	0.1993	1.35	VQ	|	|	|	|
2+35	0.2088	1.37	VQ	|	|	|	|
2+40	0.2187	1.43	VQ	|	|	|	|
2+45	0.2292	1.52	VQ	|	|	|	|
2+50	0.2402	1.59	VQ	|	|	|	|
2+55	0.2514	1.63	VQ	|	|	|	|
3+ 0	0.2628	1.65	VQ	|	|	|	|
3+ 5	0.2742	1.67	VQ	|	|	|	|
3+10	0.2858	1.68	VQ	|	|	|	|
3+15	0.2975	1.69	|Q	|	|	|	|
3+20	0.3092	1.70	|Q	|	|	|	|
3+25	0.3210	1.71	|Q	|	|	|	|
3+30	0.3328	1.71	|Q	|	|	|	|
3+35	0.3446	1.72	|Q	|	|	|	|
3+40	0.3565	1.72	|Q	|	|	|	|
3+45	0.3683	1.73	|Q	|	|	|	|
3+50	0.3803	1.74	|Q	|	|	|	|
3+55	0.3927	1.80	|Q	|	|	|	|
4+ 0	0.4057	1.89	|Q	|	|	|	|




14+ 5 7.1336 19.92
14+10 7.2759 20.66
14+15 7.4286 22.18
14+20 7.5886 23.23
14+25 7.7503 23.47
14+30 7.9110 23.34
14+35 8.0711 23.24
14+40 8.2312 23.25
14+45 8.3918 23.32
14+50 8.5525 23.33
14+55 8.7116 23.11
15+ 0 8.8682 22.73
15+ 5 9.0225 22.41
15+10 9.1744 22.05
15+15 9.3230 21.58
15+20 9.4689 21.18
15+25 9.6123 20.81
15+30 9.7525 20.35
15+35 9.8885 19.76
15+40 10.0159 18.49
15+45 10.1306 16.66
15+50 10.2361 15.32
15+55 10.3370 14.65
16+ 0 10.4352 14.27
16+ 5 10.5286 13.55
16+10 10.6079 11.53
16+15 10.6664 8.49
16+20 10.7092 6.21
16+25 10.7437 5.01
16+30 10.7732 4.27
16+35 10.7986 3.70
16+40 10.8206 3.19
16+45 10.8395 2.75
16+50 10.8560 2.39
16+55 10.8707 2.13
17+ 0 10.8839 1.93
17+ 5 10.8962 1.78
17+10 10.9081 1.73
17+15 10.9204 1.78
17+20 10.9328 1.80
17+25 10.9452 1.79
17+30 10.9574 1.77
17+35 10.9695 1.76
17+40 10.9814 1.73
17+45 10.9932 1.71
17+50 11.0047 1.67
17+55 11.0158 1.62
18+ 0 11.0265 1.54
18+ 5 11.0367 1.48
18+10 11.0467 1.46
18+15 11.0566 1.44
18+20 11.0665 1.43
18+25 11.0763 1.42
18+30 11.0861 1.42
18+35 11.0957 1.40
18+40 11.1050 1.34
18+45 11.1136 1.25
18+50 11.1217 1.17
18+55 11.1291 1.08
19+ 0 11.1358 0.97


19+ 5 11.1420 0.90
19+10 11.1483 0.91
19+15 11.1550 0.97
19+20 11.1621 1.03
19+25 11.1696 1.09
19+30 11.1778 1.19
19+35 11.1863 1.24
19+40 11.1947 1.22
19+45 11.2026 1.15
19+50 11.2102 1.09
19+55 11.2171 1.01
20+ 0 11.2234 0.91
20+ 5 11.2293 0.86
20+10 11.2353 0.87
20+15 11.2418 0.94
20+20 11.2486 0.98
20+25 11.2555 1.00
20+30 11.2625 1.01
20+35 11.2695 1.02
20+40 11.2766 1.03
20+45 11.2837 1.03
20+50 11.2907 1.02
20+55 11.2973 0.97
21+ 0 11.3034 0.88
21+ 5 11.3091 0.83
21+10 11.3150 0.85
21+15 11.3213 0.92
21+20 11.3279 0.96
21+25 11.3343 0.92
21+30 11.3401 0.85
21+35 11.3456 0.80
21+40 11.3514 0.83
21+45 11.3576 0.91
21+50 11.3641 0.95
21+55 11.3704 0.92
22+ 0 11.3762 0.84
22+ 5 11.3817 0.80
22+10 11.3874 0.83
22+15 11.3936 0.90
22+20 11.4001 0.94
22+25 11.4064 0.91
22+30 11.4122 0.84
22+35 11.4175 0.78
22+40 11.4228 0.76
22+45 11.4279 0.74
22+50 11.4329 0.73
22+55 11.4379 0.73
23+ 0 11.4429 0.72
23+ 5 11.4478 0.71
23+10 11.4527 0.71
23+15 11.4576 0.71
23+20 11.4625 0.71
23+25 11.4673 0.70
23+30 11.4722 0.70
23+35 11.4770 0.70
23+40 11.4818 0.70
23+45 11.4866 0.70
23+50 11.4914 0.70
23+55 11.4962 0.70
24+ 0 11.5010 0.70

24+ 5	11.5056	0.67	Q	|	|	|	V|
24+10	11.5094	0.56	Q	|	|	|	V|
24+15	11.5121	0.38	Q	|	|	|	V|
24+20	11.5138	0.25	Q	|	|	|	V|
24+25	11.5151	0.19	Q	|	|	|	V|
24+30	11.5161	0.15	Q	|	|	|	V|
24+35	11.5169	0.12	Q	|	|	|	V|
24+40	11.5176	0.10	Q	|	|	|	V|
24+45	11.5182	0.08	Q	|	|	|	V|
24+50	11.5186	0.06	Q	|	|	|	V|
24+55	11.5190	0.05	Q	|	|	|	V|
25+ 0	11.5193	0.04	Q	|	|	|	V|
25+ 5	11.5195	0.04	Q	|	|	|	V|
25+10	11.5197	0.03	Q	|	|	|	V|
25+15	11.5199	0.02	Q	|	|	|	V|
25+20	11.5200	0.02	Q	|	|	|	V|
25+25	11.5201	0.01	Q	|	|	|	V|
25+30	11.5202	0.01	Q	|	|	|	V|
25+35	11.5202	0.01	Q	|	|	|	V|
25+40	11.5202	0.00	Q	|	|	|	V|
25+45	11.5203	0.00	Q	|	|	|	V|

DRAINAGE AREA H

U n i t H y d r o g r a p h A n a l y s i s

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2014, Version 9.0
Study date 10/16/23 File: creh10uh2410.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6406

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

CRESCENT GARDENS
EXISTING CONDITION
AREA H
10/16/23

Drainage Area = 4.46(Ac.) = 0.007 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 4.46(Ac.) = 0.007 Sq. Mi.
Length along longest watercourse = 680.60(Ft.)
Length along longest watercourse measured to centroid = 342.00(Ft.)
Length along longest watercourse = 0.129 Mi.
Length along longest watercourse measured to centroid = 0.065 Mi.
Difference in elevation = 71.00(Ft.)
Slope along watercourse = 550.8081 Ft./Mi.
Average Manning's 'N' = 0.040
Lag time = 0.047 Hr.
Lag time = 2.82 Min.
25% of lag time = 0.70 Min.
40% of lag time = 1.13 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
4.46	2.21	9.86

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
4.46	5.82	25.96

STORM EVENT (YEAR) = 10.00
Area Averaged 2-Year Rainfall = 2.210(In)
Area Averaged 100-Year Rainfall = 5.820(In)

Point rain (area averaged) = 3.695(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 3.695(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
4.460	89.00	0.000

Total Area Entered = 4.46(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
89.0	89.0	0.141	0.000	0.141	1.000	0.141
					Sum (F) =	0.141

Area averaged mean soil loss (F) (In/Hr) = 0.141
Minimum soil loss rate ((In/Hr)) = 0.071
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.900

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	177.464	39.219	1.763
2	0.167	354.928	44.970	2.021
3	0.250	532.392	9.778	0.439
4	0.333	709.856	4.034	0.181
5	0.417	887.320	2.000	0.090
		Sum = 100.000	Sum=	4.495

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.030	(0.251)	0.027	0.003
2	0.17	0.07	0.030	(0.250)	0.027	0.003
3	0.25	0.07	0.030	(0.249)	0.027	0.003
4	0.33	0.10	0.044	(0.248)	0.040	0.004
5	0.42	0.10	0.044	(0.247)	0.040	0.004
6	0.50	0.10	0.044	(0.246)	0.040	0.004
7	0.58	0.10	0.044	(0.245)	0.040	0.004
8	0.67	0.10	0.044	(0.244)	0.040	0.004
9	0.75	0.10	0.044	(0.243)	0.040	0.004
10	0.83	0.13	0.059	(0.242)	0.053	0.006
11	0.92	0.13	0.059	(0.241)	0.053	0.006
12	1.00	0.13	0.059	(0.240)	0.053	0.006
13	1.08	0.10	0.044	(0.239)	0.040	0.004
14	1.17	0.10	0.044	(0.238)	0.040	0.004

15	1.25	0.10	0.044	(0.237)	0.040	0.004
16	1.33	0.10	0.044	(0.236)	0.040	0.004
17	1.42	0.10	0.044	(0.235)	0.040	0.004
18	1.50	0.10	0.044	(0.234)	0.040	0.004
19	1.58	0.10	0.044	(0.234)	0.040	0.004
20	1.67	0.10	0.044	(0.233)	0.040	0.004
21	1.75	0.10	0.044	(0.232)	0.040	0.004
22	1.83	0.13	0.059	(0.231)	0.053	0.006
23	1.92	0.13	0.059	(0.230)	0.053	0.006
24	2.00	0.13	0.059	(0.229)	0.053	0.006
25	2.08	0.13	0.059	(0.228)	0.053	0.006
26	2.17	0.13	0.059	(0.227)	0.053	0.006
27	2.25	0.13	0.059	(0.226)	0.053	0.006
28	2.33	0.13	0.059	(0.225)	0.053	0.006
29	2.42	0.13	0.059	(0.224)	0.053	0.006
30	2.50	0.13	0.059	(0.223)	0.053	0.006
31	2.58	0.17	0.074	(0.222)	0.067	0.007
32	2.67	0.17	0.074	(0.221)	0.067	0.007
33	2.75	0.17	0.074	(0.221)	0.067	0.007
34	2.83	0.17	0.074	(0.220)	0.067	0.007
35	2.92	0.17	0.074	(0.219)	0.067	0.007
36	3.00	0.17	0.074	(0.218)	0.067	0.007
37	3.08	0.17	0.074	(0.217)	0.067	0.007
38	3.17	0.17	0.074	(0.216)	0.067	0.007
39	3.25	0.17	0.074	(0.215)	0.067	0.007
40	3.33	0.17	0.074	(0.214)	0.067	0.007
41	3.42	0.17	0.074	(0.213)	0.067	0.007
42	3.50	0.17	0.074	(0.212)	0.067	0.007
43	3.58	0.17	0.074	(0.212)	0.067	0.007
44	3.67	0.17	0.074	(0.211)	0.067	0.007
45	3.75	0.17	0.074	(0.210)	0.067	0.007
46	3.83	0.20	0.089	(0.209)	0.080	0.009
47	3.92	0.20	0.089	(0.208)	0.080	0.009
48	4.00	0.20	0.089	(0.207)	0.080	0.009
49	4.08	0.20	0.089	(0.206)	0.080	0.009
50	4.17	0.20	0.089	(0.205)	0.080	0.009
51	4.25	0.20	0.089	(0.205)	0.080	0.009
52	4.33	0.23	0.103	(0.204)	0.093	0.010
53	4.42	0.23	0.103	(0.203)	0.093	0.010
54	4.50	0.23	0.103	(0.202)	0.093	0.010
55	4.58	0.23	0.103	(0.201)	0.093	0.010
56	4.67	0.23	0.103	(0.200)	0.093	0.010
57	4.75	0.23	0.103	(0.199)	0.093	0.010
58	4.83	0.27	0.118	(0.198)	0.106	0.012
59	4.92	0.27	0.118	(0.198)	0.106	0.012
60	5.00	0.27	0.118	(0.197)	0.106	0.012
61	5.08	0.20	0.089	(0.196)	0.080	0.009
62	5.17	0.20	0.089	(0.195)	0.080	0.009
63	5.25	0.20	0.089	(0.194)	0.080	0.009
64	5.33	0.23	0.103	(0.193)	0.093	0.010
65	5.42	0.23	0.103	(0.193)	0.093	0.010
66	5.50	0.23	0.103	(0.192)	0.093	0.010
67	5.58	0.27	0.118	(0.191)	0.106	0.012
68	5.67	0.27	0.118	(0.190)	0.106	0.012
69	5.75	0.27	0.118	(0.189)	0.106	0.012
70	5.83	0.27	0.118	(0.188)	0.106	0.012
71	5.92	0.27	0.118	(0.187)	0.106	0.012
72	6.00	0.27	0.118	(0.187)	0.106	0.012
73	6.08	0.30	0.133	(0.186)	0.120	0.013
74	6.17	0.30	0.133	(0.185)	0.120	0.013
75	6.25	0.30	0.133	(0.184)	0.120	0.013
76	6.33	0.30	0.133	(0.183)	0.120	0.013
77	6.42	0.30	0.133	(0.183)	0.120	0.013
78	6.50	0.30	0.133	(0.182)	0.120	0.013
79	6.58	0.33	0.148	(0.181)	0.133	0.015
80	6.67	0.33	0.148	(0.180)	0.133	0.015
81	6.75	0.33	0.148	(0.179)	0.133	0.015
82	6.83	0.33	0.148	(0.178)	0.133	0.015
83	6.92	0.33	0.148	(0.178)	0.133	0.015
84	7.00	0.33	0.148	(0.177)	0.133	0.015
85	7.08	0.33	0.148	(0.176)	0.133	0.015
86	7.17	0.33	0.148	(0.175)	0.133	0.015
87	7.25	0.33	0.148	(0.174)	0.133	0.015
88	7.33	0.37	0.163	(0.174)	0.146	0.016
89	7.42	0.37	0.163	(0.173)	0.146	0.016
90	7.50	0.37	0.163	(0.172)	0.146	0.016
91	7.58	0.40	0.177	(0.171)	0.160	0.018
92	7.67	0.40	0.177	(0.170)	0.160	0.018
93	7.75	0.40	0.177	(0.170)	0.160	0.018
94	7.83	0.43	0.192	0.169	(0.173)	0.023
95	7.92	0.43	0.192	0.168	(0.173)	0.024
96	8.00	0.43	0.192	0.167	(0.173)	0.025
97	8.08	0.50	0.222	0.167	(0.200)	0.055
98	8.17	0.50	0.222	0.166	(0.200)	0.056
99	8.25	0.50	0.222	0.165	(0.200)	0.057
100	8.33	0.50	0.222	0.164	(0.200)	0.057
101	8.42	0.50	0.222	0.163	(0.200)	0.058
102	8.50	0.50	0.222	0.163	(0.200)	0.059
103	8.58	0.53	0.236	0.162	(0.213)	0.075
104	8.67	0.53	0.236	0.161	(0.213)	0.075
105	8.75	0.53	0.236	0.160	(0.213)	0.076
106	8.83	0.57	0.251	0.160	(0.226)	0.092
107	8.92	0.57	0.251	0.159	(0.226)	0.092
108	9.00	0.57	0.251	0.158	(0.226)	0.093
109	9.08	0.63	0.281	0.157	(0.253)	0.123
110	9.17	0.63	0.281	0.157	(0.253)	0.124
111	9.25	0.63	0.281	0.156	(0.253)	0.125
112	9.33	0.67	0.296	0.155	(0.266)	0.140
113	9.42	0.67	0.296	0.154	(0.266)	0.141
114	9.50	0.67	0.296	0.154	(0.266)	0.142
115	9.58	0.70	0.310	0.153	(0.279)	0.157
116	9.67	0.70	0.310	0.152	(0.279)	0.158
117	9.75	0.70	0.310	0.151	(0.279)	0.159
118	9.83	0.73	0.325	0.151	(0.293)	0.174
119	9.92	0.73	0.325	0.150	(0.293)	0.175
120	10.00	0.73	0.325	0.149	(0.293)	0.176
121	10.08	0.50	0.222	0.149	(0.200)	0.073
122	10.17	0.50	0.222	0.148	(0.200)	0.074
123	10.25	0.50	0.222	0.147	(0.200)	0.075
124	10.33	0.50	0.222	0.146	(0.200)	0.075
125	10.42	0.50	0.222	0.146	(0.200)	0.076
126	10.50	0.50	0.222	0.145	(0.200)	0.077
127	10.58	0.67	0.296	0.144	(0.266)	0.151
128	10.67	0.67	0.296	0.144	(0.266)	0.152
129	10.75	0.67	0.296	0.143	(0.266)	0.153
130	10.83	0.67	0.296	0.142	(0.266)	0.153
131	10.92	0.67	0.296	0.142	(0.266)	0.154
132	11.00	0.67	0.296	0.141	(0.266)	0.155
133	11.08	0.63	0.281	0.140	(0.253)	0.141
134	11.17	0.63	0.281	0.139	(0.253)	0.141

135	11.25	0.63	0.281	0.139	(0.253)	0.142
136	11.33	0.63	0.281	0.138	(0.253)	0.143
137	11.42	0.63	0.281	0.137	(0.253)	0.143
138	11.50	0.63	0.281	0.137	(0.253)	0.144
139	11.58	0.57	0.251	0.136	(0.226)	0.115
140	11.67	0.57	0.251	0.135	(0.226)	0.116
141	11.75	0.57	0.251	0.135	(0.226)	0.117
142	11.83	0.60	0.266	0.134	(0.239)	0.132
143	11.92	0.60	0.266	0.133	(0.239)	0.133
144	12.00	0.60	0.266	0.133	(0.239)	0.133
145	12.08	0.83	0.370	0.132	(0.333)	0.238
146	12.17	0.83	0.370	0.131	(0.333)	0.238
147	12.25	0.83	0.370	0.131	(0.333)	0.239
148	12.33	0.87	0.384	0.130	(0.346)	0.254
149	12.42	0.87	0.384	0.129	(0.346)	0.255
150	12.50	0.87	0.384	0.129	(0.346)	0.256
151	12.58	0.93	0.414	0.128	(0.372)	0.286
152	12.67	0.93	0.414	0.127	(0.372)	0.286
153	12.75	0.93	0.414	0.127	(0.372)	0.287
154	12.83	0.97	0.429	0.126	(0.386)	0.302
155	12.92	0.97	0.429	0.126	(0.386)	0.303
156	13.00	0.97	0.429	0.125	(0.386)	0.304
157	13.08	1.13	0.503	0.124	(0.452)	0.378
158	13.17	1.13	0.503	0.124	(0.452)	0.379
159	13.25	1.13	0.503	0.123	(0.452)	0.380
160	13.33	1.13	0.503	0.122	(0.452)	0.380
161	13.42	1.13	0.503	0.122	(0.452)	0.381
162	13.50	1.13	0.503	0.121	(0.452)	0.381
163	13.58	0.77	0.340	0.120	(0.306)	0.219
164	13.67	0.77	0.340	0.120	(0.306)	0.220
165	13.75	0.77	0.340	0.119	(0.306)	0.221
166	13.83	0.77	0.340	0.119	(0.306)	0.221
167	13.92	0.77	0.340	0.118	(0.306)	0.222
168	14.00	0.77	0.340	0.117	(0.306)	0.222
169	14.08	0.90	0.399	0.117	(0.359)	0.282
170	14.17	0.90	0.399	0.116	(0.359)	0.283
171	14.25	0.90	0.399	0.116	(0.359)	0.283
172	14.33	0.87	0.384	0.115	(0.346)	0.269
173	14.42	0.87	0.384	0.114	(0.346)	0.270
174	14.50	0.87	0.384	0.114	(0.346)	0.270
175	14.58	0.87	0.384	0.113	(0.346)	0.271
176	14.67	0.87	0.384	0.113	(0.346)	0.272
177	14.75	0.87	0.384	0.112	(0.346)	0.272
178	14.83	0.83	0.370	0.112	(0.333)	0.258
179	14.92	0.83	0.370	0.111	(0.333)	0.259
180	15.00	0.83	0.370	0.110	(0.333)	0.259
181	15.08	0.80	0.355	0.110	(0.319)	0.245
182	15.17	0.80	0.355	0.109	(0.319)	0.245
183	15.25	0.80	0.355	0.109	(0.319)	0.246
184	15.33	0.77	0.340	0.108	(0.306)	0.232
185	15.42	0.77	0.340	0.108	(0.306)	0.232
186	15.50	0.77	0.340	0.107	(0.306)	0.233
187	15.58	0.63	0.281	0.107	(0.253)	0.174
188	15.67	0.63	0.281	0.106	(0.253)	0.175
189	15.75	0.63	0.281	0.105	(0.253)	0.175
190	15.83	0.63	0.281	0.105	(0.253)	0.176
191	15.92	0.63	0.281	0.104	(0.253)	0.176
192	16.00	0.63	0.281	0.104	(0.253)	0.177
193	16.08	0.13	0.059	(0.103)	0.053	0.006
194	16.17	0.13	0.059	(0.103)	0.053	0.006
195	16.25	0.13	0.059	(0.102)	0.053	0.006
196	16.33	0.13	0.059	(0.102)	0.053	0.006
197	16.42	0.13	0.059	(0.101)	0.053	0.006
198	16.50	0.13	0.059	(0.101)	0.053	0.006
199	16.58	0.10	0.044	(0.100)	0.040	0.004
200	16.67	0.10	0.044	(0.100)	0.040	0.004
201	16.75	0.10	0.044	(0.099)	0.040	0.004
202	16.83	0.10	0.044	(0.099)	0.040	0.004
203	16.92	0.10	0.044	(0.098)	0.040	0.004
204	17.00	0.10	0.044	(0.098)	0.040	0.004
205	17.08	0.17	0.074	(0.097)	0.067	0.007
206	17.17	0.17	0.074	(0.097)	0.067	0.007
207	17.25	0.17	0.074	(0.096)	0.067	0.007
208	17.33	0.17	0.074	(0.096)	0.067	0.007
209	17.42	0.17	0.074	(0.095)	0.067	0.007
210	17.50	0.17	0.074	(0.095)	0.067	0.007
211	17.58	0.17	0.074	(0.094)	0.067	0.007
212	17.67	0.17	0.074	(0.094)	0.067	0.007
213	17.75	0.17	0.074	(0.093)	0.067	0.007
214	17.83	0.13	0.059	(0.093)	0.053	0.006
215	17.92	0.13	0.059	(0.092)	0.053	0.006
216	18.00	0.13	0.059	(0.092)	0.053	0.006
217	18.08	0.13	0.059	(0.092)	0.053	0.006
218	18.17	0.13	0.059	(0.091)	0.053	0.006
219	18.25	0.13	0.059	(0.091)	0.053	0.006
220	18.33	0.13	0.059	(0.090)	0.053	0.006
221	18.42	0.13	0.059	(0.090)	0.053	0.006
222	18.50	0.13	0.059	(0.089)	0.053	0.006
223	18.58	0.10	0.044	(0.089)	0.040	0.004
224	18.67	0.10	0.044	(0.088)	0.040	0.004
225	18.75	0.10	0.044	(0.088)	0.040	0.004
226	18.83	0.07	0.030	(0.088)	0.027	0.003
227	18.92	0.07	0.030	(0.087)	0.027	0.003
228	19.00	0.07	0.030	(0.087)	0.027	0.003
229	19.08	0.10	0.044	(0.086)	0.040	0.004
230	19.17	0.10	0.044	(0.086)	0.040	0.004
231	19.25	0.10	0.044	(0.086)	0.040	0.004
232	19.33	0.13	0.059	(0.085)	0.053	0.006
233	19.42	0.13	0.059	(0.085)	0.053	0.006
234	19.50	0.13	0.059	(0.084)	0.053	0.006
235	19.58	0.10	0.044	(0.084)	0.040	0.004
236	19.67	0.10	0.044	(0.084)	0.040	0.004
237	19.75	0.10	0.044	(0.083)	0.040	0.004
238	19.83	0.07	0.030	(0.083)	0.027	0.003
239	19.92	0.07	0.030	(0.082)	0.027	0.003
240	20.00	0.07	0.030	(0.082)	0.027	0.003
241	20.08	0.10	0.044	(0.082)	0.040	0.004
242	20.17	0.10	0.044	(0.081)	0.040	0.004
243	20.25	0.10	0.044	(0.081)	0.040	0.004
244	20.33	0.10	0.044	(0.081)	0.040	0.004
245	20.42	0.10	0.044	(0.080)	0.040	0.004
246	20.50	0.10	0.044	(0.080)	0.040	0.004
247	20.58	0.10	0.044	(0.080)	0.040	0.004
248	20.67	0.10	0.044	(0.079)	0.040	0.004
249	20.75	0.10	0.044	(0.079)	0.040	0.004
250	20.83	0.07	0.030	(0.079)	0.027	0.003
251	20.92	0.07	0.030	(0.078)	0.027	0.003
252	21.00	0.07	0.030	(0.078)	0.027	0.003
253	21.08	0.10	0.044	(0.078)	0.040	0.004
254	21.17	0.10	0.044	(0.077)	0.040	0.004

255	21.25	0.10	0.044	(0.077)	0.040	0.004
256	21.33	0.07	0.030	(0.077)	0.027	0.003
257	21.42	0.07	0.030	(0.077)	0.027	0.003
258	21.50	0.07	0.030	(0.076)	0.027	0.003
259	21.58	0.10	0.044	(0.076)	0.040	0.004
260	21.67	0.10	0.044	(0.076)	0.040	0.004
261	21.75	0.10	0.044	(0.075)	0.040	0.004
262	21.83	0.07	0.030	(0.075)	0.027	0.003
263	21.92	0.07	0.030	(0.075)	0.027	0.003
264	22.00	0.07	0.030	(0.075)	0.027	0.003
265	22.08	0.10	0.044	(0.074)	0.040	0.004
266	22.17	0.10	0.044	(0.074)	0.040	0.004
267	22.25	0.10	0.044	(0.074)	0.040	0.004
268	22.33	0.07	0.030	(0.074)	0.027	0.003
269	22.42	0.07	0.030	(0.073)	0.027	0.003
270	22.50	0.07	0.030	(0.073)	0.027	0.003
271	22.58	0.07	0.030	(0.073)	0.027	0.003
272	22.67	0.07	0.030	(0.073)	0.027	0.003
273	22.75	0.07	0.030	(0.073)	0.027	0.003
274	22.83	0.07	0.030	(0.072)	0.027	0.003
275	22.92	0.07	0.030	(0.072)	0.027	0.003
276	23.00	0.07	0.030	(0.072)	0.027	0.003
277	23.08	0.07	0.030	(0.072)	0.027	0.003
278	23.17	0.07	0.030	(0.072)	0.027	0.003
279	23.25	0.07	0.030	(0.072)	0.027	0.003
280	23.33	0.07	0.030	(0.071)	0.027	0.003
281	23.42	0.07	0.030	(0.071)	0.027	0.003
282	23.50	0.07	0.030	(0.071)	0.027	0.003
283	23.58	0.07	0.030	(0.071)	0.027	0.003
284	23.67	0.07	0.030	(0.071)	0.027	0.003
285	23.75	0.07	0.030	(0.071)	0.027	0.003
286	23.83	0.07	0.030	(0.071)	0.027	0.003
287	23.92	0.07	0.030	(0.071)	0.027	0.003
288	24.00	0.07	0.030	(0.071)	0.027	0.003

(Loss Rate Not Used)

Sum = 100.0 Sum = 19.5

Flood volume = Effective rainfall 1.63(In)
times area 4.5(Ac.)/[(In)/(Ft.)] = 0.6(Ac.Ft)
Total soil loss = 2.07(In)
Total soil loss = 0.768(Ac.Ft)
Total rainfall = 3.70(In)
Flood volume = 26372.0 Cubic Feet
Total soil loss = 33451.8 Cubic Feet

Peak flow rate of this hydrograph = 1.713(CFS)

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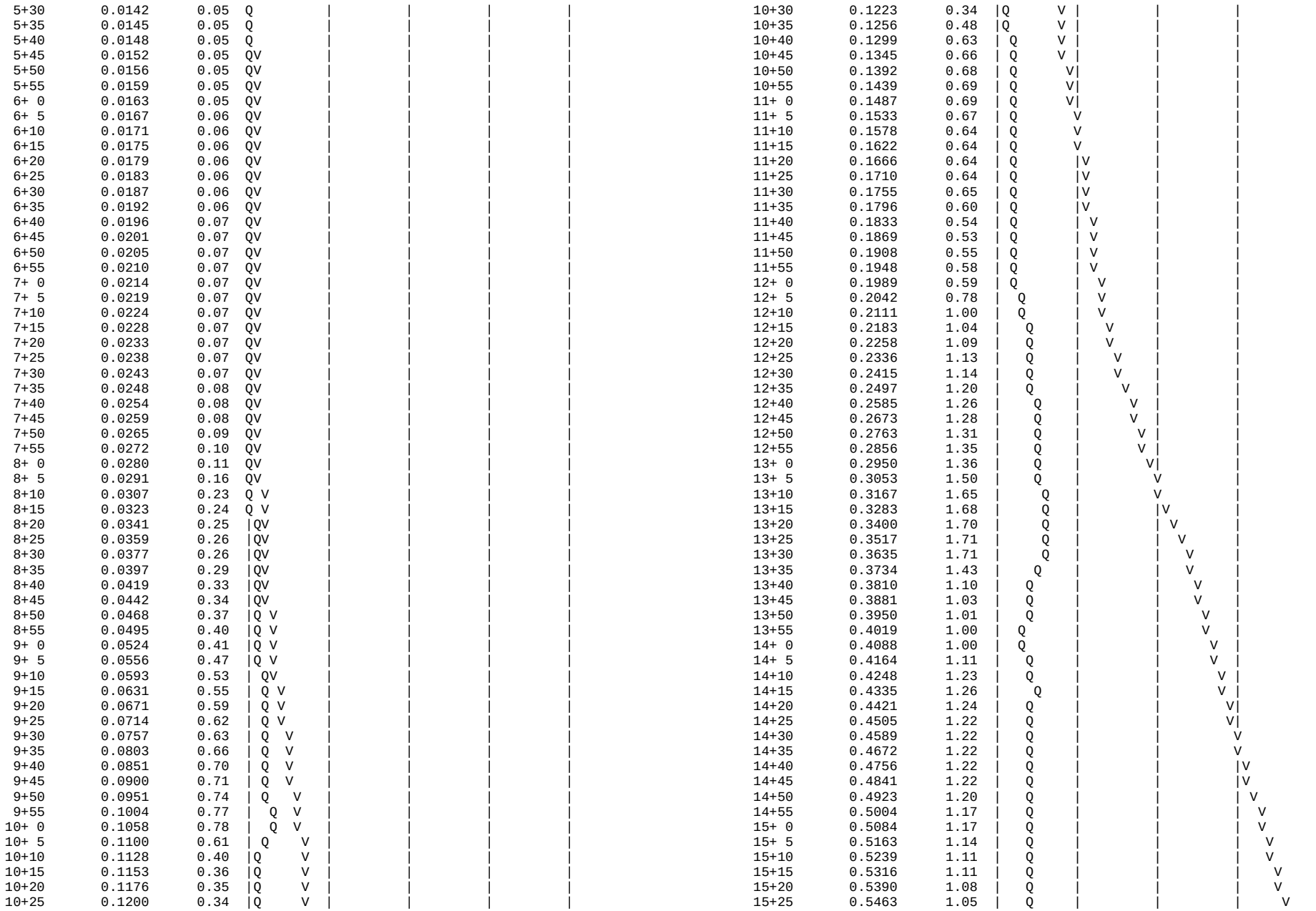
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0000	0.01	Q	|	|	|	|
0+10	0.0001	0.01	Q	|	|	|	|
0+15	0.0002	0.01	Q	|	|	|	|
0+20	0.0003	0.02	Q	|	|	|	|
0+25	0.0004	0.02	Q	|	|	|	|
0+30	0.0006	0.02	Q	|	|	|	|
0+35	0.0007	0.02	Q	|	|	|	|
0+40	0.0008	0.02	Q	|	|	|	|
0+45	0.0010	0.02	Q	|	|	|	|
0+50	0.0011	0.02	Q	|	|	|	|
0+55	0.0013	0.03	Q	|	|	|	|
1+ 0	0.0015	0.03	Q	|	|	|	|
1+ 5	0.0017	0.02	Q	|	|	|	|
1+10	0.0018	0.02	Q	|	|	|	|
1+15	0.0019	0.02	Q	|	|	|	|
1+20	0.0021	0.02	Q	|	|	|	|
1+25	0.0022	0.02	Q	|	|	|	|
1+30	0.0024	0.02	Q	|	|	|	|
1+35	0.0025	0.02	Q	|	|	|	|
1+40	0.0026	0.02	Q	|	|	|	|
1+45	0.0028	0.02	Q	|	|	|	|
1+50	0.0029	0.02	Q	|	|	|	|
1+55	0.0031	0.03	Q	|	|	|	|
2+ 0	0.0033	0.03	Q	|	|	|	|
2+ 5	0.0035	0.03	Q	|	|	|	|
2+10	0.0036	0.03	Q	|	|	|	|
2+15	0.0038	0.03	Q	|	|	|	|
2+20	0.0040	0.03	Q	|	|	|	|
2+25	0.0042	0.03	Q	|	|	|	|
2+30	0.0044	0.03	Q	|	|	|	|
2+35	0.0046	0.03	Q	|	|	|	|
2+40	0.0048	0.03	Q	|	|	|	|
2+45	0.0050	0.03	Q	|	|	|	|
2+50	0.0053	0.03	Q	|	|	|	|
2+55	0.0055	0.03	Q	|	|	|	|
3+ 0	0.0057	0.03	Q	|	|	|	|
3+ 5	0.0059	0.03	Q	|	|	|	|
3+10	0.0062	0.03	Q	|	|	|	|
3+15	0.0064	0.03	Q	|	|	|	|
3+20	0.0066	0.03	Q	|	|	|	|
3+25	0.0069	0.03	Q	|	|	|	|
3+30	0.0071	0.03	Q	|	|	|	|
3+35	0.0073	0.03	Q	|	|	|	|
3+40	0.0075	0.03	Q	|	|	|	|
3+45	0.0078	0.03	Q	|	|	|	|
3+50	0.0080	0.04	Q	|	|	|	|
3+55	0.0083	0.04	Q	|	|	|	|
4+ 0	0.0086	0.04	Q	|	|	|	|
4+ 5	0.0088	0.04	Q	|	|	|	|
4+10	0.0091	0.04	Q	|	|	|	|
4+15	0.0094	0.04	Q	|	|	|	|
4+20	0.0097	0.04	Q	|	|	|	|
4+25	0.0100	0.05	Q	|	|	|	|
4+30	0.0103	0.05	Q	|	|	|	|
4+35	0.0106	0.05	Q	|	|	|	|
4+40	0.0109	0.05	Q	|	|	|	|
4+45	0.0113	0.05	Q	|	|	|	|
4+50	0.0116	0.05	Q	|	|	|	|
4+55	0.0120	0.05	Q	|	|	|	|
5+ 0	0.0123	0.05	Q	|	|	|	|
5+ 5	0.0127	0.05	Q	|	|	|	|
5+10	0.0129	0.04	Q	|	|	|	|
5+15	0.0132	0.04	Q	|	|	|	|
5+20	0.0135	0.04	Q	|	|	|	|
5+25	0.0138	0.05	Q	|	|	|	|



15+30	0.5535	1.05	| Q	|	|	| V	|
15+35	0.5600	0.94	| Q	|	|	| V	|
15+40	0.5657	0.83	| Q	|	|	| V	|
15+45	0.5712	0.80	| Q	|	|	| V	|
15+50	0.5767	0.79	| Q	|	|	| V	|
15+55	0.5821	0.79	| Q	|	|	| V	|
16+ 0	0.5876	0.79	| Q	|	|	| V	|
16+ 5	0.5910	0.49	|Q	|	|	| V	|
16+10	0.5920	0.15	Q	|	|	| V	|
16+15	0.5925	0.07	Q	|	|	| V	|
16+20	0.5928	0.04	Q	|	|	| V	|
16+25	0.5930	0.03	Q	|	|	| V	|
16+30	0.5932	0.03	Q	|	|	| V	|
16+35	0.5933	0.02	Q	|	|	| V	|
16+40	0.5935	0.02	Q	|	|	| V	|
16+45	0.5936	0.02	Q	|	|	| V	|
16+50	0.5938	0.02	Q	|	|	| V	|
16+55	0.5939	0.02	Q	|	|	| V	|
17+ 0	0.5940	0.02	Q	|	|	| V	|
17+ 5	0.5942	0.03	Q	|	|	| V	|
17+10	0.5944	0.03	Q	|	|	| V	|
17+15	0.5947	0.03	Q	|	|	| V	|
17+20	0.5949	0.03	Q	|	|	| V	|
17+25	0.5951	0.03	Q	|	|	| V	|
17+30	0.5953	0.03	Q	|	|	| V	|
17+35	0.5956	0.03	Q	|	|	| V	|
17+40	0.5958	0.03	Q	|	|	| V	|
17+45	0.5960	0.03	Q	|	|	| V	|
17+50	0.5962	0.03	Q	|	|	| V	|
17+55	0.5964	0.03	Q	|	|	| V	|
18+ 0	0.5966	0.03	Q	|	|	| V	|
18+ 5	0.5968	0.03	Q	|	|	| V	|
18+10	0.5970	0.03	Q	|	|	| V	|
18+15	0.5972	0.03	Q	|	|	| V	|
18+20	0.5973	0.03	Q	|	|	| V	|
18+25	0.5975	0.03	Q	|	|	| V	|
18+30	0.5977	0.03	Q	|	|	| V	|
18+35	0.5979	0.02	Q	|	|	| V	|
18+40	0.5980	0.02	Q	|	|	| V	|
18+45	0.5982	0.02	Q	|	|	| V	|
18+50	0.5983	0.02	Q	|	|	| V	|
18+55	0.5984	0.01	Q	|	|	| V	|
19+ 0	0.5985	0.01	Q	|	|	| V	|
19+ 5	0.5986	0.02	Q	|	|	| V	|
19+10	0.5987	0.02	Q	|	|	| V	|
19+15	0.5988	0.02	Q	|	|	| V	|
19+20	0.5990	0.02	Q	|	|	| V	|
19+25	0.5992	0.03	Q	|	|	| V	|
19+30	0.5994	0.03	Q	|	|	| V	|
19+35	0.5995	0.02	Q	|	|	| V	|
19+40	0.5997	0.02	Q	|	|	| V	|
19+45	0.5998	0.02	Q	|	|	| V	|
19+50	0.5999	0.02	Q	|	|	| V	|
19+55	0.6000	0.01	Q	|	|	| V	|
20+ 0	0.6001	0.01	Q	|	|	| V	|
20+ 5	0.6002	0.02	Q	|	|	| V	|
20+10	0.6004	0.02	Q	|	|	| V	|
20+15	0.6005	0.02	Q	|	|	| V	|
20+20	0.6006	0.02	Q	|	|	| V	|
20+25	0.6008	0.02	Q	|	|	| V	|
20+30	0.6009	0.02	Q	|	|	| V	|
20+35	0.6010	0.02	Q	|	|	| V	|
20+40	0.6012	0.02	Q	|	|	| V	|
20+45	0.6013	0.02	Q	|	|	| V	|
20+50	0.6014	0.02	Q	|	|	| V	|
20+55	0.6015	0.01	Q	|	|	| V	|
21+ 0	0.6016	0.01	Q	|	|	| V	|
21+ 5	0.6017	0.02	Q	|	|	| V	|
21+10	0.6019	0.02	Q	|	|	| V	|
21+15	0.6020	0.02	Q	|	|	| V	|
21+20	0.6021	0.02	Q	|	|	| V	|
21+25	0.6022	0.01	Q	|	|	| V	|
21+30	0.6023	0.01	Q	|	|	| V	|
21+35	0.6024	0.02	Q	|	|	| V	|
21+40	0.6026	0.02	Q	|	|	| V	|
21+45	0.6027	0.02	Q	|	|	| V	|
21+50	0.6028	0.02	Q	|	|	| V	|
21+55	0.6029	0.01	Q	|	|	| V	|
22+ 0	0.6030	0.01	Q	|	|	| V	|
22+ 5	0.6031	0.02	Q	|	|	| V	|
22+10	0.6032	0.02	Q	|	|	| V	|
22+15	0.6034	0.02	Q	|	|	| V	|
22+20	0.6035	0.02	Q	|	|	| V	|
22+25	0.6036	0.01	Q	|	|	| V	|
22+30	0.6037	0.01	Q	|	|	| V	|
22+35	0.6038	0.01	Q	|	|	| V	|
22+40	0.6039	0.01	Q	|	|	| V	|
22+45	0.6040	0.01	Q	|	|	| V	|
22+50	0.6041	0.01	Q	|	|	| V	|
22+55	0.6042	0.01	Q	|	|	| V	|
23+ 0	0.6042	0.01	Q	|	|	| V	|
23+ 5	0.6043	0.01	Q	|	|	| V	|
23+10	0.6044	0.01	Q	|	|	| V	|
23+15	0.6045	0.01	Q	|	|	| V	|
23+20	0.6046	0.01	Q	|	|	| V	|
23+25	0.6047	0.01	Q	|	|	| V	|
23+30	0.6048	0.01	Q	|	|	| V	|
23+35	0.6049	0.01	Q	|	|	| V	|
23+40	0.6050	0.01	Q	|	|	| V	|
23+45	0.6051	0.01	Q	|	|	| V	|
23+50	0.6052	0.01	Q	|	|	| V	|
23+55	0.6052	0.01	Q	|	|	| V	|
24+ 0	0.6053	0.01	Q	|	|	| V	|
24+ 5	0.6054	0.01	Q	|	|	| V	|
24+10	0.6054	0.00	Q	|	|	| V	|
24+15	0.6054	0.00	Q	|	|	| V	|
24+20	0.6054	0.00	Q	|	|	| V	V

UNIT HYDROGRAPH RESULTS PROPOSED CONDITION (10-YEAR, 24HR STORM)

DRAINAGE AREA A

U n i t H y d r o g r a p h A n a l y s i s

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Study date 10/16/23 File: crpa10uh2410.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6406

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

CRESCENT GARDENS
Proposed Condition
Area A
10/16/23

Drainage Area = 120.22(Ac.) = 0.188 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 120.22(Ac.) = 0.188 Sq. Mi.
Length along longest watercourse = 5504.00(Ft.)
Length along longest watercourse measured to centroid = 2594.00(Ft.)
Length along longest watercourse = 1.042 Mi.
Length along longest watercourse measured to centroid = 0.491 Mi.
Difference in elevation = 131.80(Ft.)
Slope along watercourse = 126.4360 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time = 0.223 Hr.
Lag time = 13.36 Min.
25% of lag time = 3.34 Min.
40% of lag time = 5.34 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
120.22	2.21	265.69

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
120.22	5.82	699.68

STORM EVENT (YEAR) = 10.00
Area Averaged 2-Year Rainfall = 2.210(In)
Area Averaged 100-Year Rainfall = 5.820(In)

Point rain (area averaged) = 3.695(In)
Areal adjustment factor = 99.98 %
Adjusted average point rain = 3.694(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
120.220	77.40	0.155

Total Area Entered = 120.22(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
77.4	77.4	0.275	0.155	0.236	1.000	0.236
					Sum (F) =	0.236

Area averaged mean soil loss (F) (In/Hr) = 0.236
Minimum soil loss rate ((In/Hr)) = 0.118
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.776

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	37.435	3.948	4.784
2	0.167	74.870	15.900	19.265
3	0.250	112.305	25.143	30.463
4	0.333	149.740	18.667	22.617
5	0.417	187.175	9.371	11.354
6	0.500	224.610	5.615	6.804
7	0.583	262.045	4.164	5.045
8	0.667	299.480	3.270	3.961
9	0.750	336.914	2.513	3.044
10	0.833	374.349	2.119	2.568
11	0.917	411.784	1.661	2.013
12	1.000	449.219	1.303	1.579
13	1.083	486.654	1.162	1.408
14	1.167	524.089	1.061	1.286
15	1.250	561.524	0.836	1.012
16	1.333	598.959	0.710	0.860
17	1.417	636.394	0.603	0.731
18	1.500	673.829	0.494	0.598
19	1.583	711.264	0.384	0.466
20	1.667	748.699	0.374	0.454
21	1.750	786.134	0.374	0.454
22	1.833	823.569	0.326	0.395
			Sum = 100.000	Sum= 121.159

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.030	(0.419)	0.023	0.007
2	0.17	0.07	0.030	(0.417)	0.023	0.007
3	0.25	0.07	0.030	(0.416)	0.023	0.007
4	0.33	0.10	0.044	(0.414)	0.034	0.010
5	0.42	0.10	0.044	(0.413)	0.034	0.010
6	0.50	0.10	0.044	(0.411)	0.034	0.010
7	0.58	0.10	0.044	(0.409)	0.034	0.010
8	0.67	0.10	0.044	(0.408)	0.034	0.010
9	0.75	0.10	0.044	(0.406)	0.034	0.010
10	0.83	0.13	0.059	(0.405)	0.046	0.013
11	0.92	0.13	0.059	(0.403)	0.046	0.013
12	1.00	0.13	0.059	(0.401)	0.046	0.013
13	1.08	0.10	0.044	(0.400)	0.034	0.010
14	1.17	0.10	0.044	(0.398)	0.034	0.010
15	1.25	0.10	0.044	(0.397)	0.034	0.010
16	1.33	0.10	0.044	(0.395)	0.034	0.010
17	1.42	0.10	0.044	(0.393)	0.034	0.010
18	1.50	0.10	0.044	(0.392)	0.034	0.010
19	1.58	0.10	0.044	(0.390)	0.034	0.010
20	1.67	0.10	0.044	(0.389)	0.034	0.010
21	1.75	0.10	0.044	(0.387)	0.034	0.010
22	1.83	0.13	0.059	(0.386)	0.046	0.013
23	1.92	0.13	0.059	(0.384)	0.046	0.013
24	2.00	0.13	0.059	(0.383)	0.046	0.013
25	2.08	0.13	0.059	(0.381)	0.046	0.013
26	2.17	0.13	0.059	(0.379)	0.046	0.013
27	2.25	0.13	0.059	(0.378)	0.046	0.013
28	2.33	0.13	0.059	(0.376)	0.046	0.013
29	2.42	0.13	0.059	(0.375)	0.046	0.013
30	2.50	0.13	0.059	(0.373)	0.046	0.013
31	2.58	0.17	0.074	(0.372)	0.057	0.017
32	2.67	0.17	0.074	(0.370)	0.057	0.017
33	2.75	0.17	0.074	(0.369)	0.057	0.017
34	2.83	0.17	0.074	(0.367)	0.057	0.017
35	2.92	0.17	0.074	(0.366)	0.057	0.017
36	3.00	0.17	0.074	(0.364)	0.057	0.017
37	3.08	0.17	0.074	(0.363)	0.057	0.017
38	3.17	0.17	0.074	(0.361)	0.057	0.017
39	3.25	0.17	0.074	(0.360)	0.057	0.017
40	3.33	0.17	0.074	(0.358)	0.057	0.017
41	3.42	0.17	0.074	(0.357)	0.057	0.017
42	3.50	0.17	0.074	(0.355)	0.057	0.017
43	3.58	0.17	0.074	(0.354)	0.057	0.017
44	3.67	0.17	0.074	(0.352)	0.057	0.017
45	3.75	0.17	0.074	(0.351)	0.057	0.017
46	3.83	0.20	0.089	(0.349)	0.069	0.020
47	3.92	0.20	0.089	(0.348)	0.069	0.020
48	4.00	0.20	0.089	(0.346)	0.069	0.020
49	4.08	0.20	0.089	(0.345)	0.069	0.020
50	4.17	0.20	0.089	(0.343)	0.069	0.020
51	4.25	0.20	0.089	(0.342)	0.069	0.020
52	4.33	0.23	0.103	(0.340)	0.080	0.023
53	4.42	0.23	0.103	(0.339)	0.080	0.023
54	4.50	0.23	0.103	(0.338)	0.080	0.023
55	4.58	0.23	0.103	(0.336)	0.080	0.023
56	4.67	0.23	0.103	(0.335)	0.080	0.023
57	4.75	0.23	0.103	(0.333)	0.080	0.023
58	4.83	0.27	0.118	(0.332)	0.092	0.026
59	4.92	0.27	0.118	(0.330)	0.092	0.026
60	5.00	0.27	0.118	(0.329)	0.092	0.026
61	5.08	0.20	0.089	(0.327)	0.069	0.020
62	5.17	0.20	0.089	(0.326)	0.069	0.020
63	5.25	0.20	0.089	(0.325)	0.069	0.020
64	5.33	0.23	0.103	(0.323)	0.080	0.023
65	5.42	0.23	0.103	(0.322)	0.080	0.023
66	5.50	0.23	0.103	(0.320)	0.080	0.023
67	5.58	0.27	0.118	(0.319)	0.092	0.026
68	5.67	0.27	0.118	(0.318)	0.092	0.026
69	5.75	0.27	0.118	(0.316)	0.092	0.026
70	5.83	0.27	0.118	(0.315)	0.092	0.026
71	5.92	0.27	0.118	(0.313)	0.092	0.026
72	6.00	0.27	0.118	(0.312)	0.092	0.026
73	6.08	0.30	0.133	(0.311)	0.103	0.030
74	6.17	0.30	0.133	(0.309)	0.103	0.030
75	6.25	0.30	0.133	(0.308)	0.103	0.030
76	6.33	0.30	0.133	(0.306)	0.103	0.030
77	6.42	0.30	0.133	(0.305)	0.103	0.030
78	6.50	0.30	0.133	(0.304)	0.103	0.030
79	6.58	0.33	0.148	(0.302)	0.115	0.033
80	6.67	0.33	0.148	(0.301)	0.115	0.033
81	6.75	0.33	0.148	(0.300)	0.115	0.033
82	6.83	0.33	0.148	(0.298)	0.115	0.033
83	6.92	0.33	0.148	(0.297)	0.115	0.033
84	7.00	0.33	0.148	(0.296)	0.115	0.033
85	7.08	0.33	0.148	(0.294)	0.115	0.033
86	7.17	0.33	0.148	(0.293)	0.115	0.033
87	7.25	0.33	0.148	(0.292)	0.115	0.033
88	7.33	0.37	0.163	(0.290)	0.126	0.036
89	7.42	0.37	0.163	(0.289)	0.126	0.036
90	7.50	0.37	0.163	(0.288)	0.126	0.036
91	7.58	0.40	0.177	(0.286)	0.138	0.040
92	7.67	0.40	0.177	(0.285)	0.138	0.040
93	7.75	0.40	0.177	(0.284)	0.138	0.040
94	7.83	0.43	0.192	(0.282)	0.149	0.043
95	7.92	0.43	0.192	(0.281)	0.149	0.043
96	8.00	0.43	0.192	(0.280)	0.149	0.043
97	8.08	0.50	0.222	(0.278)	0.172	0.050
98	8.17	0.50	0.222	(0.277)	0.172	0.050
99	8.25	0.50	0.222	(0.276)	0.172	0.050
100	8.33	0.50	0.222	(0.275)	0.172	0.050
101	8.42	0.50	0.222	(0.273)	0.172	0.050
102	8.50	0.50	0.222	(0.272)	0.172	0.050
103	8.58	0.53	0.236	(0.271)	0.183	0.053
104	8.67	0.53	0.236	(0.269)	0.183	0.053
105	8.75	0.53	0.236	(0.268)	0.183	0.053
106	8.83	0.57	0.251	(0.267)	0.195	0.056
107	8.92	0.57	0.251	(0.266)	0.195	0.056
108	9.00	0.57	0.251	(0.264)	0.195	0.056
109	9.08	0.63	0.281	(0.263)	0.218	0.063
110	9.17	0.63	0.281	(0.262)	0.218	0.063
111	9.25	0.63	0.281	(0.261)	0.218	0.063
112	9.33	0.67	0.296	(0.259)	0.229	0.066
113	9.42	0.67	0.296	(0.258)	0.229	0.066
114	9.50	0.67	0.296	(0.257)	0.229	0.066
115	9.58	0.70	0.310	(0.256)	0.241	0.070
116	9.67	0.70	0.310	(0.254)	0.241	0.070
117	9.75	0.70	0.310	(0.253)	0.241	0.070

118	9.83	0.73	0.325	0.252	(0.252)	0.073
119	9.92	0.73	0.325	0.251	(0.252)	0.074
120	10.00	0.73	0.325	0.250	(0.252)	0.076
121	10.08	0.50	0.222	(0.248)	0.172	0.050
122	10.17	0.50	0.222	(0.247)	0.172	0.050
123	10.25	0.50	0.222	(0.246)	0.172	0.050
124	10.33	0.50	0.222	(0.245)	0.172	0.050
125	10.42	0.50	0.222	(0.244)	0.172	0.050
126	10.50	0.50	0.222	(0.242)	0.172	0.050
127	10.58	0.67	0.296	(0.241)	0.229	0.066
128	10.67	0.67	0.296	(0.240)	0.229	0.066
129	10.75	0.67	0.296	(0.239)	0.229	0.066
130	10.83	0.67	0.296	(0.238)	0.229	0.066
131	10.92	0.67	0.296	(0.237)	0.229	0.066
132	11.00	0.67	0.296	(0.235)	0.229	0.066
133	11.08	0.63	0.281	(0.234)	0.218	0.063
134	11.17	0.63	0.281	(0.233)	0.218	0.063
135	11.25	0.63	0.281	(0.232)	0.218	0.063
136	11.33	0.63	0.281	(0.231)	0.218	0.063
137	11.42	0.63	0.281	(0.230)	0.218	0.063
138	11.50	0.63	0.281	(0.228)	0.218	0.063
139	11.58	0.57	0.251	(0.227)	0.195	0.056
140	11.67	0.57	0.251	(0.226)	0.195	0.056
141	11.75	0.57	0.251	(0.225)	0.195	0.056
142	11.83	0.60	0.266	(0.224)	0.206	0.060
143	11.92	0.60	0.266	(0.223)	0.206	0.060
144	12.00	0.60	0.266	(0.222)	0.206	0.060
145	12.08	0.83	0.369	0.221	(0.287)	0.149
146	12.17	0.83	0.369	0.220	(0.287)	0.150
147	12.25	0.83	0.369	0.218	(0.287)	0.151
148	12.33	0.87	0.384	0.217	(0.298)	0.167
149	12.42	0.87	0.384	0.216	(0.298)	0.168
150	12.50	0.87	0.384	0.215	(0.298)	0.169
151	12.58	0.93	0.414	0.214	(0.321)	0.200
152	12.67	0.93	0.414	0.213	(0.321)	0.201
153	12.75	0.93	0.414	0.212	(0.321)	0.202
154	12.83	0.97	0.429	0.211	(0.333)	0.218
155	12.92	0.97	0.429	0.210	(0.333)	0.219
156	13.00	0.97	0.429	0.209	(0.333)	0.220
157	13.08	1.13	0.502	0.208	(0.390)	0.295
158	13.17	1.13	0.502	0.207	(0.390)	0.296
159	13.25	1.13	0.502	0.206	(0.390)	0.297
160	13.33	1.13	0.502	0.205	(0.390)	0.298
161	13.42	1.13	0.502	0.203	(0.390)	0.299
162	13.50	1.13	0.502	0.202	(0.390)	0.300
163	13.58	0.77	0.340	0.201	(0.264)	0.138
164	13.67	0.77	0.340	0.200	(0.264)	0.139
165	13.75	0.77	0.340	0.199	(0.264)	0.141
166	13.83	0.77	0.340	0.198	(0.264)	0.142
167	13.92	0.77	0.340	0.197	(0.264)	0.143
168	14.00	0.77	0.340	0.196	(0.264)	0.144
169	14.08	0.90	0.399	0.195	(0.310)	0.204
170	14.17	0.90	0.399	0.194	(0.310)	0.205
171	14.25	0.90	0.399	0.193	(0.310)	0.206
172	14.33	0.87	0.384	0.192	(0.298)	0.192
173	14.42	0.87	0.384	0.191	(0.298)	0.193
174	14.50	0.87	0.384	0.190	(0.298)	0.194
175	14.58	0.87	0.384	0.189	(0.298)	0.195
176	14.67	0.87	0.384	0.188	(0.298)	0.196
177	14.75	0.87	0.384	0.187	(0.298)	0.197
178	14.83	0.83	0.369	0.187	(0.287)	0.183
179	14.92	0.83	0.369	0.186	(0.287)	0.184
180	15.00	0.83	0.369	0.185	(0.287)	0.185
181	15.08	0.80	0.355	0.184	(0.275)	0.171
182	15.17	0.80	0.355	0.183	(0.275)	0.172
183	15.25	0.80	0.355	0.182	(0.275)	0.173
184	15.33	0.77	0.340	0.181	(0.264)	0.159
185	15.42	0.77	0.340	0.180	(0.264)	0.160
186	15.50	0.77	0.340	0.179	(0.264)	0.161
187	15.58	0.63	0.281	0.178	(0.218)	0.103
188	15.67	0.63	0.281	0.177	(0.218)	0.104
189	15.75	0.63	0.281	0.176	(0.218)	0.105
190	15.83	0.63	0.281	0.175	(0.218)	0.105
191	15.92	0.63	0.281	0.174	(0.218)	0.106
192	16.00	0.63	0.281	0.174	(0.218)	0.107
193	16.08	0.13	0.059	(0.173)	0.046	0.013
194	16.17	0.13	0.059	(0.172)	0.046	0.013
195	16.25	0.13	0.059	(0.171)	0.046	0.013
196	16.33	0.13	0.059	(0.170)	0.046	0.013
197	16.42	0.13	0.059	(0.169)	0.046	0.013
198	16.50	0.13	0.059	(0.168)	0.046	0.013
199	16.58	0.10	0.044	(0.167)	0.034	0.010
200	16.67	0.10	0.044	(0.167)	0.034	0.010
201	16.75	0.10	0.044	(0.166)	0.034	0.010
202	16.83	0.10	0.044	(0.165)	0.034	0.010
203	16.92	0.10	0.044	(0.164)	0.034	0.010
204	17.00	0.10	0.044	(0.163)	0.034	0.010
205	17.08	0.17	0.074	(0.162)	0.057	0.017
206	17.17	0.17	0.074	(0.162)	0.057	0.017
207	17.25	0.17	0.074	(0.161)	0.057	0.017
208	17.33	0.17	0.074	(0.160)	0.057	0.017
209	17.42	0.17	0.074	(0.159)	0.057	0.017
210	17.50	0.17	0.074	(0.158)	0.057	0.017
211	17.58	0.17	0.074	(0.158)	0.057	0.017
212	17.67	0.17	0.074	(0.157)	0.057	0.017
213	17.75	0.17	0.074	(0.156)	0.057	0.017
214	17.83	0.13	0.059	(0.155)	0.046	0.013
215	17.92	0.13	0.059	(0.155)	0.046	0.013
216	18.00	0.13	0.059	(0.154)	0.046	0.013
217	18.08	0.13	0.059	(0.153)	0.046	0.013
218	18.17	0.13	0.059	(0.152)	0.046	0.013
219	18.25	0.13	0.059	(0.151)	0.046	0.013
220	18.33	0.13	0.059	(0.151)	0.046	0.013
221	18.42	0.13	0.059	(0.150)	0.046	0.013
222	18.50	0.13	0.059	(0.149)	0.046	0.013
223	18.58	0.10	0.044	(0.149)	0.034	0.010
224	18.67	0.10	0.044	(0.148)	0.034	0.010
225	18.75	0.10	0.044	(0.147)	0.034	0.010
226	18.83	0.07	0.030	(0.146)	0.023	0.007
227	18.92	0.07	0.030	(0.146)	0.023	0.007
228	19.00	0.07	0.030	(0.145)	0.023	0.007
229	19.08	0.10	0.044	(0.144)	0.034	0.010
230	19.17	0.10	0.044	(0.144)	0.034	0.010
231	19.25	0.10	0.044	(0.143)	0.034	0.010
232	19.33	0.13	0.059	(0.142)	0.046	0.013
233	19.42	0.13	0.059	(0.142)	0.046	0.013
234	19.50	0.13	0.059	(0.141)	0.046	0.013
235	19.58	0.10	0.044	(0.140)	0.034	0.010
236	19.67	0.10	0.044	(0.140)	0.034	0.010
237	19.75	0.10	0.044	(0.139)	0.034	0.010

238	19.83	0.07	0.030	(0.138)	0.023	0.007
239	19.92	0.07	0.030	(0.138)	0.023	0.007
240	20.00	0.07	0.030	(0.137)	0.023	0.007
241	20.08	0.10	0.044	(0.137)	0.034	0.010
242	20.17	0.10	0.044	(0.136)	0.034	0.010
243	20.25	0.10	0.044	(0.135)	0.034	0.010
244	20.33	0.10	0.044	(0.135)	0.034	0.010
245	20.42	0.10	0.044	(0.134)	0.034	0.010
246	20.50	0.10	0.044	(0.134)	0.034	0.010
247	20.58	0.10	0.044	(0.133)	0.034	0.010
248	20.67	0.10	0.044	(0.133)	0.034	0.010
249	20.75	0.10	0.044	(0.132)	0.034	0.010
250	20.83	0.07	0.030	(0.132)	0.023	0.007
251	20.92	0.07	0.030	(0.131)	0.023	0.007
252	21.00	0.07	0.030	(0.130)	0.023	0.007
253	21.08	0.10	0.044	(0.130)	0.034	0.010
254	21.17	0.10	0.044	(0.129)	0.034	0.010
255	21.25	0.10	0.044	(0.129)	0.034	0.010
256	21.33	0.07	0.030	(0.128)	0.023	0.007
257	21.42	0.07	0.030	(0.128)	0.023	0.007
258	21.50	0.07	0.030	(0.127)	0.023	0.007
259	21.58	0.10	0.044	(0.127)	0.034	0.010
260	21.67	0.10	0.044	(0.127)	0.034	0.010
261	21.75	0.10	0.044	(0.126)	0.034	0.010
262	21.83	0.07	0.030	(0.126)	0.023	0.007
263	21.92	0.07	0.030	(0.125)	0.023	0.007
264	22.00	0.07	0.030	(0.125)	0.023	0.007
265	22.08	0.10	0.044	(0.124)	0.034	0.010
266	22.17	0.10	0.044	(0.124)	0.034	0.010
267	22.25	0.10	0.044	(0.124)	0.034	0.010
268	22.33	0.07	0.030	(0.123)	0.023	0.007
269	22.42	0.07	0.030	(0.123)	0.023	0.007
270	22.50	0.07	0.030	(0.122)	0.023	0.007
271	22.58	0.07	0.030	(0.122)	0.023	0.007
272	22.67	0.07	0.030	(0.122)	0.023	0.007
273	22.75	0.07	0.030	(0.121)	0.023	0.007
274	22.83	0.07	0.030	(0.121)	0.023	0.007
275	22.92	0.07	0.030	(0.121)	0.023	0.007
276	23.00	0.07	0.030	(0.121)	0.023	0.007
277	23.08	0.07	0.030	(0.120)	0.023	0.007
278	23.17	0.07	0.030	(0.120)	0.023	0.007
279	23.25	0.07	0.030	(0.120)	0.023	0.007
280	23.33	0.07	0.030	(0.119)	0.023	0.007
281	23.42	0.07	0.030	(0.119)	0.023	0.007
282	23.50	0.07	0.030	(0.119)	0.023	0.007
283	23.58	0.07	0.030	(0.119)	0.023	0.007
284	23.67	0.07	0.030	(0.119)	0.023	0.007
285	23.75	0.07	0.030	(0.119)	0.023	0.007
286	23.83	0.07	0.030	(0.118)	0.023	0.007
287	23.92	0.07	0.030	(0.118)	0.023	0.007
288	24.00	0.07	0.030	(0.118)	0.023	0.007

(Loss Rate Not Used)

Sum = 100.0 Sum = 14.7

Flood volume = Effective rainfall 1.22(In)
times area 120.2(Ac.)/[(In)/(Ft.)] = 12.2(Ac.Ft)
Total soil loss = 2.47(In)
Total soil loss = 24.778(Ac.Ft)
Total rainfall = 3.69(In)
Flood volume = 532861.6 Cubic Feet
Total soil loss = 1079332.5 Cubic Feet

Peak flow rate of this hydrograph = 33.296(CFS)

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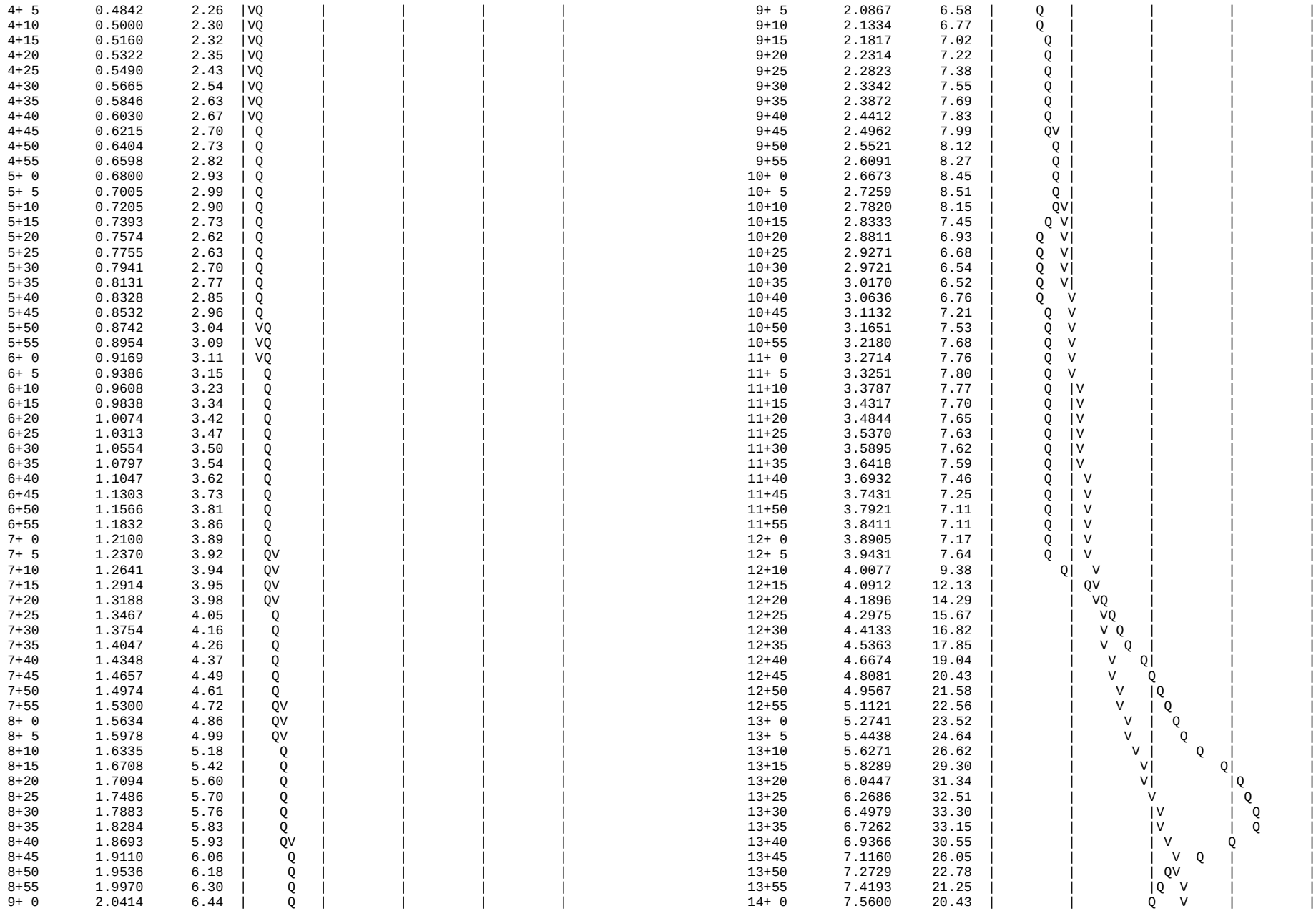
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	10.0	20.0	30.0	40.0
0+ 5	0.0002	0.03	Q				
0+10	0.0013	0.16	Q				
0+15	0.0038	0.36	Q				
0+20	0.0074	0.53	Q				
0+25	0.0120	0.67	Q				
0+30	0.0176	0.81	Q				
0+35	0.0239	0.92	Q				
0+40	0.0307	0.98	Q				
0+45	0.0378	1.03	VQ				
0+50	0.0452	1.08	VQ				
0+55	0.0532	1.17	VQ				
1+ 0	0.0621	1.29	VQ				
1+ 5	0.0715	1.36	VQ				
1+10	0.0808	1.35	VQ				
1+15	0.0897	1.29	VQ				
1+20	0.0982	1.24	VQ				
1+25	0.1067	1.22	VQ				
1+30	0.1150	1.22	VQ				
1+35	0.1234	1.22	VQ				
1+40	0.1318	1.22	VQ				
1+45	0.1402	1.22	VQ				
1+50	0.1487	1.23	VQ				
1+55	0.1576	1.29	VQ				
2+ 0	0.1672	1.40	VQ				
2+ 5	0.1773	1.47	VQ				
2+10	0.1877	1.51	VQ				
2+15	0.1982	1.53	VQ				
2+20	0.2088	1.54	VQ				
2+25	0.2195	1.55	VQ				
2+30	0.2303	1.56	VQ				
2+35	0.2412	1.59	VQ				
2+40	0.2526	1.66	VQ				
2+45	0.2648	1.76	VQ				
2+50	0.2774	1.84	VQ				
2+55	0.2904	1.88	VQ				
3+ 0	0.3035	1.91	VQ				
3+ 5	0.3168	1.93	|Q				
3+10	0.3302	1.94	|Q				
3+15	0.3436	1.95	|Q				
3+20	0.3572	1.96	|Q				
3+25	0.3708	1.97	|Q				
3+30	0.3844	1.98	|Q				
3+35	0.3981	1.99	|Q				
3+40	0.4118	1.99	|Q				
3+45	0.4255	1.99	|Q				
3+50	0.4393	2.01	|VQ				
3+55	0.4537	2.08	|VQ				
4+ 0	0.4687	2.18	|VQ				



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  24+ 5      12.2159      0.77  Q         |         |         |        V|
  24+10      12.2203      0.64  Q         |         |         |        V|
  24+15      12.2234      0.44  Q         |         |         |        V|
  24+20      12.2254      0.29  Q         |         |         |        V|
  24+25      12.2269      0.22  Q         |         |         |        V|
  24+30      12.2280      0.17  Q         |         |         |        V|
  24+35      12.2290      0.14  Q         |         |         |        V|
  24+40      12.2298      0.11  Q         |         |         |        V|
  24+45      12.2304      0.09  Q         |         |         |        V|
  24+50      12.2309      0.07  Q         |         |         |        V|
  24+55      12.2313      0.06  Q         |         |         |        V|
  25+ 0      12.2317      0.05  Q         |         |         |        V|
  25+ 5      12.2320      0.04  Q         |         |         |        V|
  25+10      12.2322      0.03  Q         |         |         |        V|
  25+15      12.2324      0.03  Q         |         |         |        V|
  25+20      12.2325      0.02  Q         |         |         |        V|
  25+25      12.2326      0.02  Q         |         |         |        V|
  25+30      12.2327      0.01  Q         |         |         |        V|
  25+35      12.2328      0.01  Q         |         |         |        V|
  25+40      12.2328      0.01  Q         |         |         |        V|
  25+45      12.2328      0.00  Q         |         |         |         V
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DRAINAGE AREA H

U n i t H y d r o g r a p h A n a l y s i s

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2014, Version 9.0
Study date 10/16/23 File: crph10uh2410.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6406

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

CRESCENT GARDENS
Proposed Conditions
AREA H
10/16/23

Drainage Area = 8.53(Ac.) = 0.013 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 8.53(Ac.) = 0.013 Sq. Mi.
Length along longest watercourse = 2153.90(Ft.)
Length along longest watercourse measured to centroid = 668.00(Ft.)
Length along longest watercourse = 0.408 Mi.
Length along longest watercourse measured to centroid = 0.127 Mi.
Difference in elevation = 59.50(Ft.)
Slope along watercourse = 145.8564 Ft./Mi.
Average Manning's 'N' = 0.020
Lag time = 0.060 Hr.
Lag time = 3.62 Min.
25% of lag time = 0.91 Min.
40% of lag time = 1.45 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
8.53	2.21	18.85

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
8.53	5.82	49.64

STORM EVENT (YEAR) = 10.00
Area Averaged 2-Year Rainfall = 2.210(In)
Area Averaged 100-Year Rainfall = 5.820(In)

Point rain (area averaged) = 3.695(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 3.695(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
1.430	89.00	0.000
5.570	75.00	0.000
1.530	98.00	0.900

Total Area Entered = 8.53(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
89.0	89.0	0.141	0.000	0.141	0.168	0.024
75.0	75.0	0.303	0.000	0.303	0.653	0.198
98.0	98.0	0.026	0.900	0.005	0.179	0.001
					Sum (F) =	0.222

Area averaged mean soil loss (F) (In/Hr) = 0.222
Minimum soil loss rate ((In/Hr)) = 0.111
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.760

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	138.002	30.158	2.593
2	0.167	276.003	47.834	4.112
3	0.250	414.005	11.937	1.026
4	0.333	552.007	5.273	0.453
5	0.417	690.008	2.835	0.244
6	0.500	828.010	1.962	0.169
		Sum = 100.000	Sum=	8.597

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.030	(0.394)	0.022	0.007
2	0.17	0.07	0.030	(0.393)	0.022	0.007
3	0.25	0.07	0.030	(0.391)	0.022	0.007
4	0.33	0.10	0.044	(0.390)	0.034	0.011
5	0.42	0.10	0.044	(0.388)	0.034	0.011
6	0.50	0.10	0.044	(0.387)	0.034	0.011
7	0.58	0.10	0.044	(0.385)	0.034	0.011
8	0.67	0.10	0.044	(0.384)	0.034	0.011
9	0.75	0.10	0.044	(0.382)	0.034	0.011

10	0.83	0.13	0.059	(0.381)	0.045	0.014
11	0.92	0.13	0.059	(0.379)	0.045	0.014
12	1.00	0.13	0.059	(0.378)	0.045	0.014
13	1.08	0.10	0.044	(0.376)	0.034	0.011
14	1.17	0.10	0.044	(0.375)	0.034	0.011
15	1.25	0.10	0.044	(0.373)	0.034	0.011
16	1.33	0.10	0.044	(0.372)	0.034	0.011
17	1.42	0.10	0.044	(0.370)	0.034	0.011
18	1.50	0.10	0.044	(0.369)	0.034	0.011
19	1.58	0.10	0.044	(0.367)	0.034	0.011
20	1.67	0.10	0.044	(0.366)	0.034	0.011
21	1.75	0.10	0.044	(0.364)	0.034	0.011
22	1.83	0.13	0.059	(0.363)	0.045	0.014
23	1.92	0.13	0.059	(0.361)	0.045	0.014
24	2.00	0.13	0.059	(0.360)	0.045	0.014
25	2.08	0.13	0.059	(0.359)	0.045	0.014
26	2.17	0.13	0.059	(0.357)	0.045	0.014
27	2.25	0.13	0.059	(0.356)	0.045	0.014
28	2.33	0.13	0.059	(0.354)	0.045	0.014
29	2.42	0.13	0.059	(0.353)	0.045	0.014
30	2.50	0.13	0.059	(0.351)	0.045	0.014
31	2.58	0.17	0.074	(0.350)	0.056	0.018
32	2.67	0.17	0.074	(0.348)	0.056	0.018
33	2.75	0.17	0.074	(0.347)	0.056	0.018
34	2.83	0.17	0.074	(0.346)	0.056	0.018
35	2.92	0.17	0.074	(0.344)	0.056	0.018
36	3.00	0.17	0.074	(0.343)	0.056	0.018
37	3.08	0.17	0.074	(0.341)	0.056	0.018
38	3.17	0.17	0.074	(0.340)	0.056	0.018
39	3.25	0.17	0.074	(0.338)	0.056	0.018
40	3.33	0.17	0.074	(0.337)	0.056	0.018
41	3.42	0.17	0.074	(0.336)	0.056	0.018
42	3.50	0.17	0.074	(0.334)	0.056	0.018
43	3.58	0.17	0.074	(0.333)	0.056	0.018
44	3.67	0.17	0.074	(0.331)	0.056	0.018
45	3.75	0.17	0.074	(0.330)	0.056	0.018
46	3.83	0.20	0.089	(0.329)	0.067	0.021
47	3.92	0.20	0.089	(0.327)	0.067	0.021
48	4.00	0.20	0.089	(0.326)	0.067	0.021
49	4.08	0.20	0.089	(0.325)	0.067	0.021
50	4.17	0.20	0.089	(0.323)	0.067	0.021
51	4.25	0.20	0.089	(0.322)	0.067	0.021
52	4.33	0.23	0.103	(0.320)	0.079	0.025
53	4.42	0.23	0.103	(0.319)	0.079	0.025
54	4.50	0.23	0.103	(0.318)	0.079	0.025
55	4.58	0.23	0.103	(0.316)	0.079	0.025
56	4.67	0.23	0.103	(0.315)	0.079	0.025
57	4.75	0.23	0.103	(0.314)	0.079	0.025
58	4.83	0.27	0.118	(0.312)	0.090	0.028
59	4.92	0.27	0.118	(0.311)	0.090	0.028
60	5.00	0.27	0.118	(0.310)	0.090	0.028
61	5.08	0.20	0.089	(0.308)	0.067	0.021
62	5.17	0.20	0.089	(0.307)	0.067	0.021
63	5.25	0.20	0.089	(0.306)	0.067	0.021
64	5.33	0.23	0.103	(0.304)	0.079	0.025
65	5.42	0.23	0.103	(0.303)	0.079	0.025
66	5.50	0.23	0.103	(0.302)	0.079	0.025
67	5.58	0.27	0.118	(0.300)	0.090	0.028
68	5.67	0.27	0.118	(0.299)	0.090	0.028
69	5.75	0.27	0.118	(0.298)	0.090	0.028
70	5.83	0.27	0.118	(0.296)	0.090	0.028
71	5.92	0.27	0.118	(0.295)	0.090	0.028
72	6.00	0.27	0.118	(0.294)	0.090	0.028
73	6.08	0.30	0.133	(0.292)	0.101	0.032
74	6.17	0.30	0.133	(0.291)	0.101	0.032
75	6.25	0.30	0.133	(0.290)	0.101	0.032
76	6.33	0.30	0.133	(0.288)	0.101	0.032
77	6.42	0.30	0.133	(0.287)	0.101	0.032
78	6.50	0.30	0.133	(0.286)	0.101	0.032
79	6.58	0.33	0.148	(0.285)	0.112	0.035
80	6.67	0.33	0.148	(0.283)	0.112	0.035
81	6.75	0.33	0.148	(0.282)	0.112	0.035
82	6.83	0.33	0.148	(0.281)	0.112	0.035
83	6.92	0.33	0.148	(0.279)	0.112	0.035
84	7.00	0.33	0.148	(0.278)	0.112	0.035
85	7.08	0.33	0.148	(0.277)	0.112	0.035
86	7.17	0.33	0.148	(0.276)	0.112	0.035
87	7.25	0.33	0.148	(0.274)	0.112	0.035
88	7.33	0.37	0.163	(0.273)	0.124	0.039
89	7.42	0.37	0.163	(0.272)	0.124	0.039
90	7.50	0.37	0.163	(0.271)	0.124	0.039
91	7.58	0.40	0.177	(0.269)	0.135	0.043
92	7.67	0.40	0.177	(0.268)	0.135	0.043
93	7.75	0.40	0.177	(0.267)	0.135	0.043
94	7.83	0.43	0.192	(0.266)	0.146	0.046
95	7.92	0.43	0.192	(0.264)	0.146	0.046
96	8.00	0.43	0.192	(0.263)	0.146	0.046
97	8.08	0.50	0.222	(0.262)	0.168	0.053
98	8.17	0.50	0.222	(0.261)	0.168	0.053
99	8.25	0.50	0.222	(0.260)	0.168	0.053
100	8.33	0.50	0.222	(0.258)	0.168	0.053
101	8.42	0.50	0.222	(0.257)	0.168	0.053
102	8.50	0.50	0.222	(0.256)	0.168	0.053
103	8.58	0.53	0.236	(0.255)	0.180	0.057
104	8.67	0.53	0.236	(0.254)	0.180	0.057
105	8.75	0.53	0.236	(0.252)	0.180	0.057
106	8.83	0.57	0.251	(0.251)	0.191	0.060
107	8.92	0.57	0.251	(0.250)	0.191	0.060
108	9.00	0.57	0.251	(0.249)	0.191	0.060
109	9.08	0.63	0.281	(0.248)	0.213	0.067
110	9.17	0.63	0.281	(0.246)	0.213	0.067
111	9.25	0.63	0.281	(0.245)	0.213	0.067
112	9.33	0.67	0.296	(0.244)	0.225	0.071
113	9.42	0.67	0.296	(0.243)	0.225	0.071
114	9.50	0.67	0.296	(0.242)	0.225	0.071
115	9.58	0.70	0.310	(0.241)	0.236	0.074
116	9.67	0.70	0.310	(0.239)	0.236	0.074
117	9.75	0.70	0.310	(0.238)	0.236	0.074
118	9.83	0.73	0.325	0.237	(0.247)	0.088
119	9.92	0.73	0.325	0.236	(0.247)	0.089
120	10.00	0.73	0.325	0.235	(0.247)	0.090
121	10.08	0.50	0.222	(0.234)	0.168	0.053
122	10.17	0.50	0.222	(0.233)	0.168	0.053
123	10.25	0.50	0.222	(0.232)	0.168	0.053
124	10.33	0.50	0.222	(0.230)	0.168	0.053
125	10.42	0.50	0.222	(0.229)	0.168	0.053
126	10.50	0.50	0.222	(0.228)	0.168	0.053
127	10.58	0.67	0.296	(0.227)	0.225	0.071
128	10.67	0.67	0.296	(0.226)	0.225	0.071
129	10.75	0.67	0.296	(0.225)	0.225	0.071

130	10.83	0.67	0.296	0.224	(0.225)	0.072
131	10.92	0.67	0.296	0.223	(0.225)	0.073
132	11.00	0.67	0.296	0.222	(0.225)	0.074
133	11.08	0.63	0.281	(0.220)	0.213	0.067
134	11.17	0.63	0.281	(0.219)	0.213	0.067
135	11.25	0.63	0.281	(0.218)	0.213	0.067
136	11.33	0.63	0.281	(0.217)	0.213	0.067
137	11.42	0.63	0.281	(0.216)	0.213	0.067
138	11.50	0.63	0.281	(0.215)	0.213	0.067
139	11.58	0.57	0.251	(0.214)	0.191	0.060
140	11.67	0.57	0.251	(0.213)	0.191	0.060
141	11.75	0.57	0.251	(0.212)	0.191	0.060
142	11.83	0.60	0.266	(0.211)	0.202	0.064
143	11.92	0.60	0.266	(0.210)	0.202	0.064
144	12.00	0.60	0.266	(0.209)	0.202	0.064
145	12.08	0.83	0.370	0.208	(0.281)	0.162
146	12.17	0.83	0.370	0.207	(0.281)	0.163
147	12.25	0.83	0.370	0.206	(0.281)	0.164
148	12.33	0.87	0.384	0.205	(0.292)	0.180
149	12.42	0.87	0.384	0.204	(0.292)	0.181
150	12.50	0.87	0.384	0.202	(0.292)	0.182
151	12.58	0.93	0.414	0.201	(0.315)	0.212
152	12.67	0.93	0.414	0.200	(0.315)	0.213
153	12.75	0.93	0.414	0.199	(0.315)	0.214
154	12.83	0.97	0.429	0.198	(0.326)	0.230
155	12.92	0.97	0.429	0.197	(0.326)	0.231
156	13.00	0.97	0.429	0.196	(0.326)	0.232
157	13.08	1.13	0.503	0.195	(0.382)	0.307
158	13.17	1.13	0.503	0.194	(0.382)	0.308
159	13.25	1.13	0.503	0.193	(0.382)	0.309
160	13.33	1.13	0.503	0.192	(0.382)	0.310
161	13.42	1.13	0.503	0.192	(0.382)	0.311
162	13.50	1.13	0.503	0.191	(0.382)	0.312
163	13.58	0.77	0.340	0.190	(0.258)	0.150
164	13.67	0.77	0.340	0.189	(0.258)	0.151
165	13.75	0.77	0.340	0.188	(0.258)	0.152
166	13.83	0.77	0.340	0.187	(0.258)	0.153
167	13.92	0.77	0.340	0.186	(0.258)	0.154
168	14.00	0.77	0.340	0.185	(0.258)	0.155
169	14.08	0.90	0.399	0.184	(0.303)	0.215
170	14.17	0.90	0.399	0.183	(0.303)	0.216
171	14.25	0.90	0.399	0.182	(0.303)	0.217
172	14.33	0.87	0.384	0.181	(0.292)	0.203
173	14.42	0.87	0.384	0.180	(0.292)	0.204
174	14.50	0.87	0.384	0.179	(0.292)	0.205
175	14.58	0.87	0.384	0.178	(0.292)	0.206
176	14.67	0.87	0.384	0.177	(0.292)	0.207
177	14.75	0.87	0.384	0.176	(0.292)	0.208
178	14.83	0.83	0.370	0.176	(0.281)	0.194
179	14.92	0.83	0.370	0.175	(0.281)	0.195
180	15.00	0.83	0.370	0.174	(0.281)	0.196
181	15.08	0.80	0.355	0.173	(0.270)	0.182
182	15.17	0.80	0.355	0.172	(0.270)	0.183
183	15.25	0.80	0.355	0.171	(0.270)	0.184
184	15.33	0.77	0.340	0.170	(0.258)	0.170
185	15.42	0.77	0.340	0.169	(0.258)	0.171
186	15.50	0.77	0.340	0.168	(0.258)	0.171
187	15.58	0.63	0.281	0.168	(0.213)	0.113
188	15.67	0.63	0.281	0.167	(0.213)	0.114
189	15.75	0.63	0.281	0.166	(0.213)	0.115
190	15.83	0.63	0.281	0.165	(0.213)	0.116
191	15.92	0.63	0.281	0.164	(0.213)	0.117
192	16.00	0.63	0.281	0.163	(0.213)	0.117
193	16.08	0.13	0.059	(0.163)	0.045	0.014
194	16.17	0.13	0.059	(0.162)	0.045	0.014
195	16.25	0.13	0.059	(0.161)	0.045	0.014
196	16.33	0.13	0.059	(0.160)	0.045	0.014
197	16.42	0.13	0.059	(0.159)	0.045	0.014
198	16.50	0.13	0.059	(0.158)	0.045	0.014
199	16.58	0.10	0.044	(0.158)	0.034	0.011
200	16.67	0.10	0.044	(0.157)	0.034	0.011
201	16.75	0.10	0.044	(0.156)	0.034	0.011
202	16.83	0.10	0.044	(0.155)	0.034	0.011
203	16.92	0.10	0.044	(0.154)	0.034	0.011
204	17.00	0.10	0.044	(0.154)	0.034	0.011
205	17.08	0.17	0.074	(0.153)	0.056	0.018
206	17.17	0.17	0.074	(0.152)	0.056	0.018
207	17.25	0.17	0.074	(0.151)	0.056	0.018
208	17.33	0.17	0.074	(0.151)	0.056	0.018
209	17.42	0.17	0.074	(0.150)	0.056	0.018
210	17.50	0.17	0.074	(0.149)	0.056	0.018
211	17.58	0.17	0.074	(0.148)	0.056	0.018
212	17.67	0.17	0.074	(0.148)	0.056	0.018
213	17.75	0.17	0.074	(0.147)	0.056	0.018
214	17.83	0.13	0.059	(0.146)	0.045	0.014
215	17.92	0.13	0.059	(0.145)	0.045	0.014
216	18.00	0.13	0.059	(0.145)	0.045	0.014
217	18.08	0.13	0.059	(0.144)	0.045	0.014
218	18.17	0.13	0.059	(0.143)	0.045	0.014
219	18.25	0.13	0.059	(0.143)	0.045	0.014
220	18.33	0.13	0.059	(0.142)	0.045	0.014
221	18.42	0.13	0.059	(0.141)	0.045	0.014
222	18.50	0.13	0.059	(0.140)	0.045	0.014
223	18.58	0.10	0.044	(0.140)	0.034	0.011
224	18.67	0.10	0.044	(0.139)	0.034	0.011
225	18.75	0.10	0.044	(0.138)	0.034	0.011
226	18.83	0.07	0.030	(0.138)	0.022	0.007
227	18.92	0.07	0.030	(0.137)	0.022	0.007
228	19.00	0.07	0.030	(0.137)	0.022	0.007
229	19.08	0.10	0.044	(0.136)	0.034	0.011
230	19.17	0.10	0.044	(0.135)	0.034	0.011
231	19.25	0.10	0.044	(0.135)	0.034	0.011
232	19.33	0.13	0.059	(0.134)	0.045	0.014
233	19.42	0.13	0.059	(0.133)	0.045	0.014
234	19.50	0.13	0.059	(0.133)	0.045	0.014
235	19.58	0.10	0.044	(0.132)	0.034	0.011
236	19.67	0.10	0.044	(0.132)	0.034	0.011
237	19.75	0.10	0.044	(0.131)	0.034	0.011
238	19.83	0.07	0.030	(0.130)	0.022	0.007
239	19.92	0.07	0.030	(0.130)	0.022	0.007
240	20.00	0.07	0.030	(0.129)	0.022	0.007
241	20.08	0.10	0.044	(0.129)	0.034	0.011
242	20.17	0.10	0.044	(0.128)	0.034	0.011
243	20.25	0.10	0.044	(0.127)	0.034	0.011
244	20.33	0.10	0.044	(0.127)	0.034	0.011
245	20.42	0.10	0.044	(0.126)	0.034	0.011
246	20.50	0.10	0.044	(0.126)	0.034	0.011
247	20.58	0.10	0.044	(0.125)	0.034	0.011
248	20.67	0.10	0.044	(0.125)	0.034	0.011
249	20.75	0.10	0.044	(0.124)	0.034	0.011

250	20.83	0.07	0.030	(0.124)	0.022	0.007
251	20.92	0.07	0.030	(0.123)	0.022	0.007
252	21.00	0.07	0.030	(0.123)	0.022	0.007
253	21.08	0.10	0.044	(0.122)	0.034	0.011
254	21.17	0.10	0.044	(0.122)	0.034	0.011
255	21.25	0.10	0.044	(0.121)	0.034	0.011
256	21.33	0.07	0.030	(0.121)	0.022	0.007
257	21.42	0.07	0.030	(0.120)	0.022	0.007
258	21.50	0.07	0.030	(0.120)	0.022	0.007
259	21.58	0.10	0.044	(0.120)	0.034	0.011
260	21.67	0.10	0.044	(0.119)	0.034	0.011
261	21.75	0.10	0.044	(0.119)	0.034	0.011
262	21.83	0.07	0.030	(0.118)	0.022	0.007
263	21.92	0.07	0.030	(0.118)	0.022	0.007
264	22.00	0.07	0.030	(0.117)	0.022	0.007
265	22.08	0.10	0.044	(0.117)	0.034	0.011
266	22.17	0.10	0.044	(0.117)	0.034	0.011
267	22.25	0.10	0.044	(0.116)	0.034	0.011
268	22.33	0.07	0.030	(0.116)	0.022	0.007
269	22.42	0.07	0.030	(0.116)	0.022	0.007
270	22.50	0.07	0.030	(0.115)	0.022	0.007
271	22.58	0.07	0.030	(0.115)	0.022	0.007
272	22.67	0.07	0.030	(0.115)	0.022	0.007
273	22.75	0.07	0.030	(0.114)	0.022	0.007
274	22.83	0.07	0.030	(0.114)	0.022	0.007
275	22.92	0.07	0.030	(0.114)	0.022	0.007
276	23.00	0.07	0.030	(0.113)	0.022	0.007
277	23.08	0.07	0.030	(0.113)	0.022	0.007
278	23.17	0.07	0.030	(0.113)	0.022	0.007
279	23.25	0.07	0.030	(0.113)	0.022	0.007
280	23.33	0.07	0.030	(0.112)	0.022	0.007
281	23.42	0.07	0.030	(0.112)	0.022	0.007
282	23.50	0.07	0.030	(0.112)	0.022	0.007
283	23.58	0.07	0.030	(0.112)	0.022	0.007
284	23.67	0.07	0.030	(0.112)	0.022	0.007
285	23.75	0.07	0.030	(0.112)	0.022	0.007
286	23.83	0.07	0.030	(0.111)	0.022	0.007
287	23.92	0.07	0.030	(0.111)	0.022	0.007
288	24.00	0.07	0.030	(0.111)	0.022	0.007

(Loss Rate Not Used)

Sum = 100.0 Sum = 15.7

Flood volume = Effective rainfall 1.31(In)
times area 8.5(Ac.)/[(In)/(Ft.)] = 0.9(Ac.Ft)
Total soil loss = 2.39(In)
Total soil loss = 1.699(Ac.Ft)
Total rainfall = 3.70(In)
Flood volume = 40421.6 Cubic Feet
Total soil loss = 73993.8 Cubic Feet

Peak flow rate of this hydrograph = 2.674(CFS)

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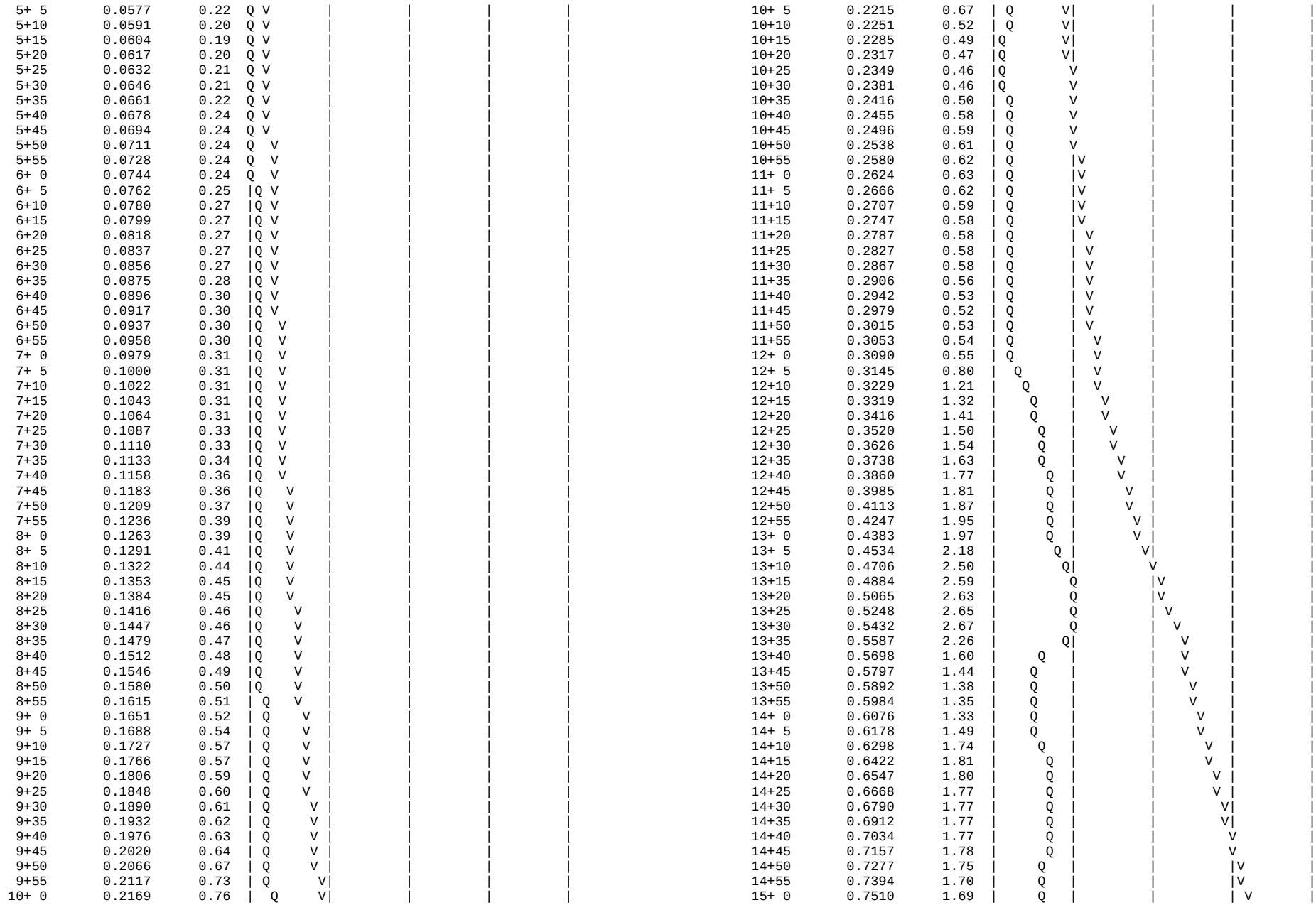
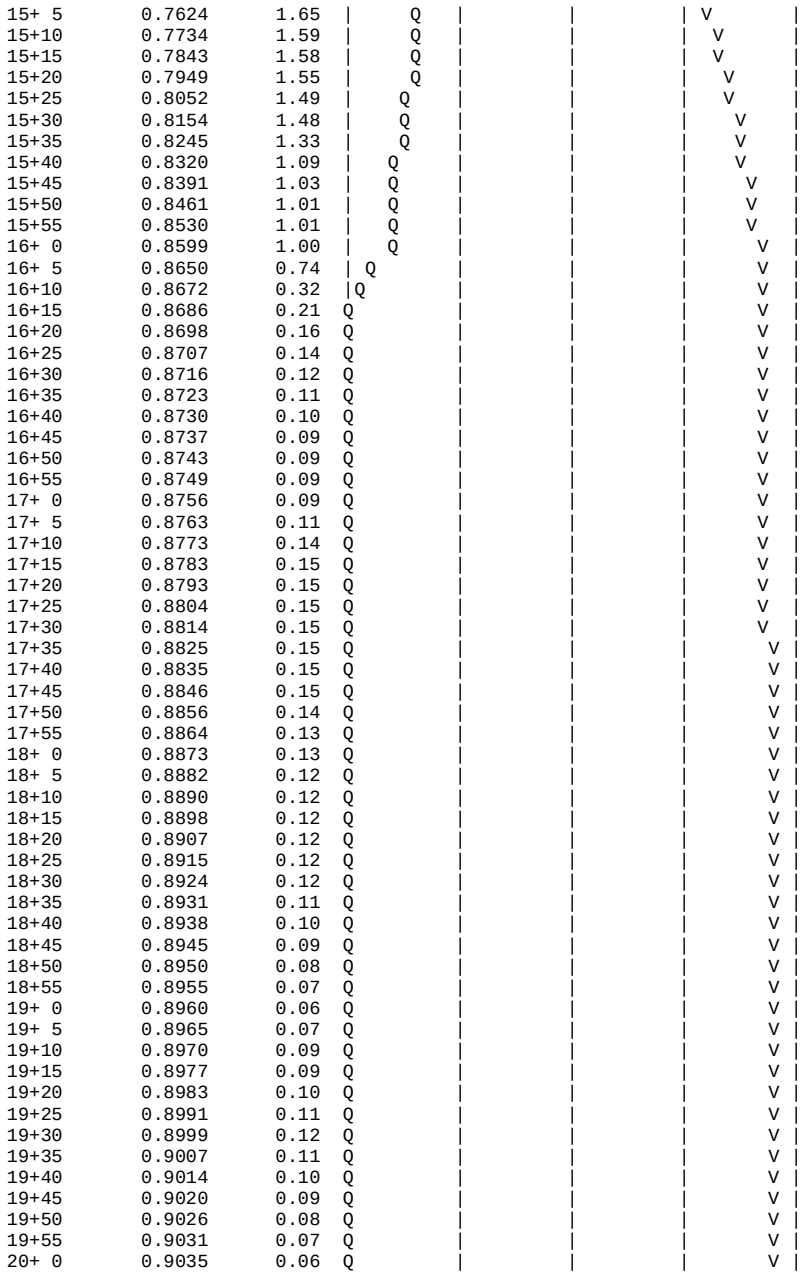
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0001	0.02	Q				
0+10	0.0005	0.05	Q				
0+15	0.0008	0.05	Q				
0+20	0.0013	0.07	Q				
0+25	0.0019	0.08	Q				
0+30	0.0025	0.09	Q				
0+35	0.0031	0.09	Q				
0+40	0.0037	0.09	Q				
0+45	0.0044	0.09	Q				
0+50	0.0051	0.10	Q				
0+55	0.0058	0.12	Q				
1+ 0	0.0067	0.12	Q				
1+ 5	0.0074	0.11	Q				
1+10	0.0081	0.10	Q				
1+15	0.0088	0.09	Q				
1+20	0.0094	0.09	Q				
1+25	0.0100	0.09	Q				
1+30	0.0107	0.09	Q				
1+35	0.0113	0.09	Q				
1+40	0.0119	0.09	Q				
1+45	0.0126	0.09	Q				
1+50	0.0132	0.10	Q				
1+55	0.0140	0.12	Q				
2+ 0	0.0149	0.12	Q				
2+ 5	0.0157	0.12	Q				
2+10	0.0165	0.12	Q				
2+15	0.0174	0.12	Q				
2+20	0.0182	0.12	Q				
2+25	0.0190	0.12	Q				
2+30	0.0199	0.12	Q				
2+35	0.0208	0.13	Q				
2+40	0.0218	0.15	Q				
2+45	0.0228	0.15	Q				
2+50	0.0239	0.15	QV				
2+55	0.0249	0.15	QV				
3+ 0	0.0260	0.15	QV				
3+ 5	0.0270	0.15	QV				
3+10	0.0281	0.15	QV				
3+15	0.0291	0.15	QV				
3+20	0.0302	0.15	QV				
3+25	0.0312	0.15	QV				
3+30	0.0323	0.15	QV				
3+35	0.0333	0.15	QV				
3+40	0.0344	0.15	QV				
3+45	0.0354	0.15	QV				
3+50	0.0365	0.16	QV				
3+55	0.0377	0.18	QV				
4+ 0	0.0390	0.18	QV				
4+ 5	0.0402	0.18	QV				
4+10	0.0415	0.18	QV				
4+15	0.0428	0.18	QV				
4+20	0.0441	0.19	QV				
4+25	0.0455	0.21	QV				
4+30	0.0470	0.21	Q V				
4+35	0.0484	0.21	Q V				
4+40	0.0499	0.21	Q V				
4+45	0.0514	0.21	Q V				
4+50	0.0529	0.22	Q V				
4+55	0.0545	0.24	Q V				
5+ 0	0.0562	0.24	Q V				





15+ 5	0.7624	1.65	Q			V
15+10	0.7734	1.59	Q			V
15+15	0.7843	1.58	Q			V
15+20	0.7949	1.55	Q			V
15+25	0.8052	1.49	Q			V
15+30	0.8154	1.48	Q			V
15+35	0.8245	1.33	Q			V
15+40	0.8320	1.09	Q			V
15+45	0.8391	1.03	Q			V
15+50	0.8461	1.01	Q			V
15+55	0.8530	1.01	Q			V
16+ 0	0.8599	1.00	Q			V
16+ 5	0.8650	0.74	Q			V
16+10	0.8672	0.32	Q			V
16+15	0.8686	0.21	Q			V
16+20	0.8698	0.16	Q			V
16+25	0.8707	0.14	Q			V
16+30	0.8716	0.12	Q			V
16+35	0.8723	0.11	Q			V
16+40	0.8730	0.10	Q			V
16+45	0.8737	0.09	Q			V
16+50	0.8743	0.09	Q			V
16+55	0.8749	0.09	Q			V
17+ 0	0.8756	0.09	Q			V
17+ 5	0.8763	0.11	Q			V
17+10	0.8773	0.14	Q			V
17+15	0.8783	0.15	Q			V
17+20	0.8793	0.15	Q			V
17+25	0.8804	0.15	Q			V
17+30	0.8814	0.15	Q			V
17+35	0.8825	0.15	Q			V
17+40	0.8835	0.15	Q			V
17+45	0.8846	0.15	Q			V
17+50	0.8856	0.14	Q			V
17+55	0.8864	0.13	Q			V
18+ 0	0.8873	0.13	Q			V
18+ 5	0.8882	0.12	Q			V
18+10	0.8890	0.12	Q			V
18+15	0.8898	0.12	Q			V
18+20	0.8907	0.12	Q			V
18+25	0.8915	0.12	Q			V
18+30	0.8924	0.12	Q			V
18+35	0.8931	0.11	Q			V
18+40	0.8938	0.10	Q			V
18+45	0.8945	0.09	Q			V
18+50	0.8950	0.08	Q			V
18+55	0.8955	0.07	Q			V
19+ 0	0.8960	0.06	Q			V
19+ 5	0.8965	0.07	Q			V
19+10	0.8970	0.09	Q			V
19+15	0.8977	0.09	Q			V
19+20	0.8983	0.10	Q			V
19+25	0.8991	0.11	Q			V
19+30	0.8999	0.12	Q			V
19+35	0.9007	0.11	Q			V
19+40	0.9014	0.10	Q			V
19+45	0.9020	0.09	Q			V
19+50	0.9026	0.08	Q			V
19+55	0.9031	0.07	Q			V
20+ 0	0.9035	0.06	Q			V
20+ 5	0.9040	0.07	Q			V
20+10	0.9046	0.09	Q			V
20+15	0.9052	0.09	Q			V
20+20	0.9058	0.09	Q			V
20+25	0.9065	0.09	Q			V
20+30	0.9071	0.09	Q			V
20+35	0.9077	0.09	Q			V
20+40	0.9084	0.09	Q			V
20+45	0.9090	0.09	Q			V
20+50	0.9096	0.08	Q			V
20+55	0.9100	0.07	Q			V
21+ 0	0.9105	0.06	Q			V
21+ 5	0.9110	0.07	Q			V
21+10	0.9115	0.09	Q			V
21+15	0.9122	0.09	Q			V
21+20	0.9127	0.08	Q			V
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21+30	0.9136	0.06	Q			V
21+35	0.9141	0.07	Q			V
21+40	0.9147	0.09	Q			V
21+45	0.9153	0.09	Q			V
21+50	0.9159	0.08	Q			V
21+55	0.9163	0.07	Q			V
22+ 0	0.9168	0.06	Q			V
22+ 5	0.9173	0.07	Q			V
22+10	0.9178	0.09	Q			V
22+15	0.9185	0.09	Q			V
22+20	0.9190	0.08	Q			V
22+25	0.9195	0.07	Q			V
22+30	0.9199	0.06	Q			V
22+35	0.9203	0.06	Q			V
22+40	0.9208	0.06	Q			V
22+45	0.9212	0.06	Q			V
22+50	0.9216	0.06	Q			V
22+55	0.9220	0.06	Q			V
23+ 0	0.9225	0.06	Q			V
23+ 5	0.9229	0.06	Q			V
23+10	0.9233	0.06	Q			V
23+15	0.9237	0.06	Q			V
23+20	0.9241	0.06	Q			V
23+25	0.9246	0.06	Q			V
23+30	0.9250	0.06	Q			V
23+35	0.9254	0.06	Q			V
23+40	0.9258	0.06	Q			V
23+45	0.9262	0.06	Q			V
23+50	0.9267	0.06	Q			V
23+55	0.9271	0.06	Q			V
24+ 0	0.9275	0.06	Q			V
24+ 5	0.9278	0.04	Q			V
24+10	0.9279	0.01	Q			V
24+15	0.9279	0.01	Q			V
24+20	0.9279	0.00	Q			V
24+25	0.9280	0.00	Q			V

Detention Basin Stage-Storage Calculations (Basin A11, A12, & H)

Basin A11 Stage /Storage

Elev	Diff (Ft)	Stage (Ft)	Area (SF)	Average Area (SF)	Incrimental Volume (CF)	Total Volume (CF)	Total Volume (Ac-ft)	
1600.00	0	0	4384.2	0.0	0.0	0	0	
1601.00	1.00	1.00	5450.1	4917.2	4917.2	4917.15	0.113	
1602.00	1.00	2.00	6592.0	6021.1	6021.1	10938.20	0.251	Storage @ 2.5' = 0.33 AC-FT
1603.00	1.00	3.00	7810.1	7201.1	7201.1	18139.25	0.416	1' Freeboard
1604.00	1.00	4.00	9944.2	8877.2	8877.2	27016.40	0.620	
1605.00	1.00	5.00	10142.1	10043.2	10043.2	37059.55	0.851	

Basin A12 Stage /Storage

Elev	Diff (Ft)	Stage (Ft)	Area (SF)	Average Area (SF)	Incrimental Volume (CF)	Total Volume (CF)	Total Volume (Ac-ft)	
1602.00	0	0	4928.1	0.0	0.0	0	0	
1603.00	1.00	1.00	6146.9	5537.5	5537.5	5537.50	0.127	
1604.00	1.00	2.00	7453.5	6800.2	6800.2	12337.70	0.283	
1605.00	1.00	3.00	8847.7	8150.6	8150.6	20488.30	0.470	Storage @ 3.0' = 0.47 AC-FT
1606.00	1.00	4.00	10329.7	9588.7	9588.7	30077.00	0.690	1' Freeboard
1607.00	1.00	5.00	11656.6	10993.2	10993.2	41070.15	0.943	

Basin H Stage /Storage

Elev	Diff (Ft)	Stage (Ft)	Area (SF)	Average Area (SF)	Incrimental Volume (CF)	Total Volume (CF)	Total Volume (Ac-ft)	
1551.00	0	0	1625.0	0.0	0.0	0	0	
1552.00	1.00	1.00	2482.0	2053.5	2053.5	2053.50	0.047	
1553.00	1.00	2.00	3383.0	2932.5	2932.5	4986.00	0.114	
1554.00	1.00	3.00	4389.0	3886.0	3886.0	8872.00	0.204	
1555.00	1.00	4.00	6696.0	5542.5	5542.5	14414.50	0.331	Storage @ 4' = 0.33 AC-FT
1556.00	1.00	5.00	8727.0	7711.5	7711.5	22126.00	0.508	1' Freeboard

SECTION 5
HEC-RAS ANALYSIS

FLOODPLAIN EXHIBIT

SUZAN ST

GARFIELD RD

GARFIELD ROAD (PUBLIC)

10+00.00

11+00.55

12+66.27

14+10.09

15+63.87

16+41.26

17+38.19

19+00.00

20+52.56

21+99.13

23+63.27

25+58.64

26+16.58

8'(W)X2'(H) BOX CULVERT

A ST (PRIVATE)

B ST (PRIVATE)

C ST (PRIVATE)

WATER QUALITY DETENTION BASIN BOTTOM=1600.0

MORTUARY PAD=1611.0 5,863 SF

CHAPEL PAD=1611.5 6,978 SF

CAREMEN'S RESIDENCE 1,366 SF

EQUIPMENT SHED 1,340 SF

LEGEND

- HEC-RAS CROSS SECTION
- PROPERTY BOUNDARY
- 100-YEAR FLOOD PLAIN

FEET 0 30 60 120

INCHES 0 1/2 1 2

REVISION	
DATE	DESCRIPTION

APPLICANT:
CLIENT NAME
CLIENT ADDRESS
CITY, STATE ZIP
PH: (000) 000-0000

PREPARED BY:
HUNSAKER & ASSOCIATES IRVINE, INC.
PLANNING ▪ ENGINEERING ▪ SURVEYING
Three Hughes ▪ Irvine, CA 92618 ▪ PH: (949) 583-1010 ▪ FX: (949) 583-0759

CRESCENT GARDENS, CITY OF LAKE ELSINORE

HEC-RAS ANALYIS
100-YEAR FLOOD PLAIN

DESIGNED BY:
DRAFTED BY: SM
CHECKED BY: MR
DATE: 05/19/2022
SHEET 1

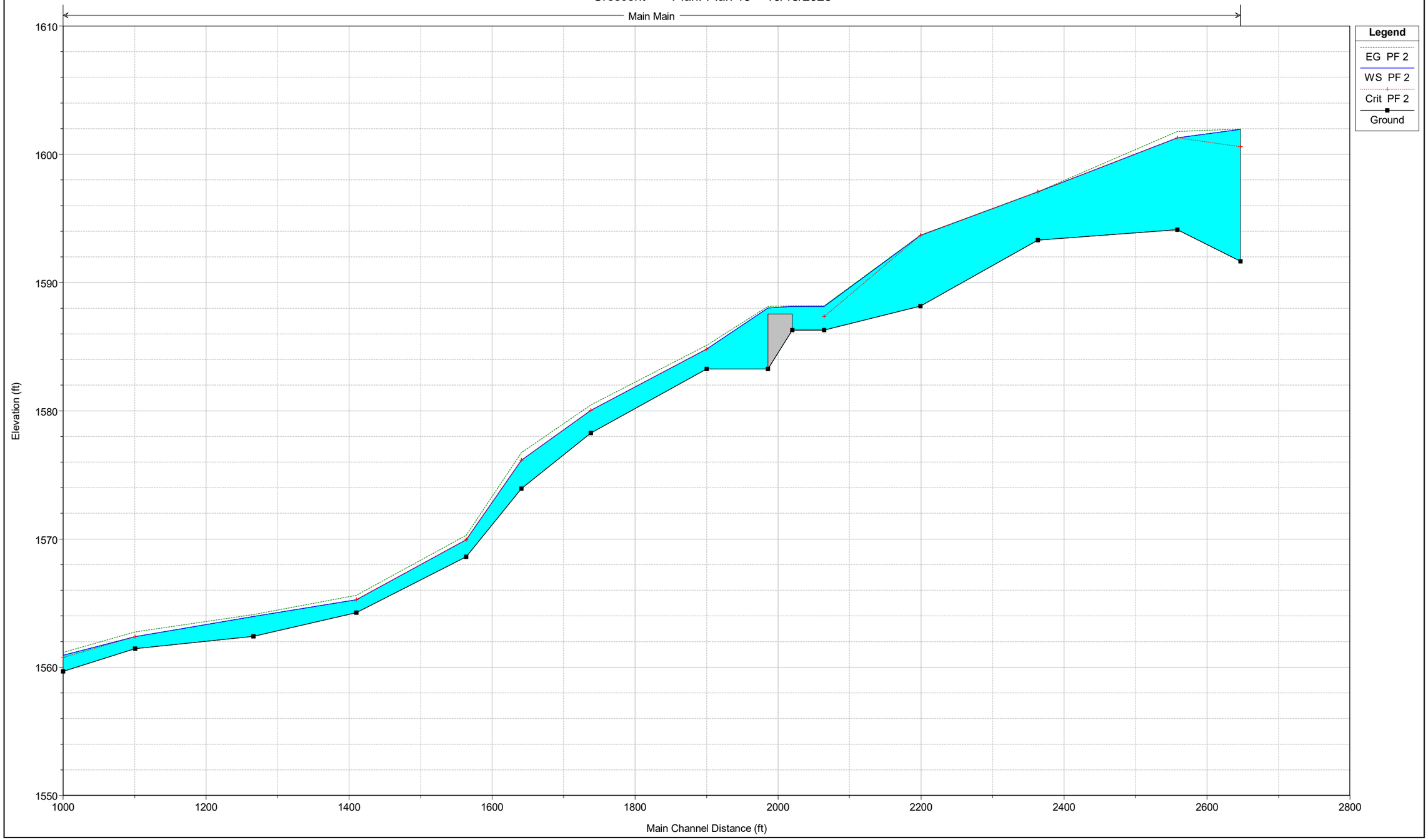
W.O. 4427-1

DATE: Oct. 25, 2023 06:40:26 AM FILE: \\ASHUR\Projects\1167\Engineering\SY_Hydrology\HEC-RAS\Crescent Gardens Hec-Ras Exhibit-R2.dwg

WATER SURFACE PROFILE AND PROFILE SUMMARY TABLE

100-YEAR FLOW

Crescent Plan: Plan 13 10/18/2023



HEC-RAS Plan: Plan 13 River: Main Reach: Main Profile: PF 2

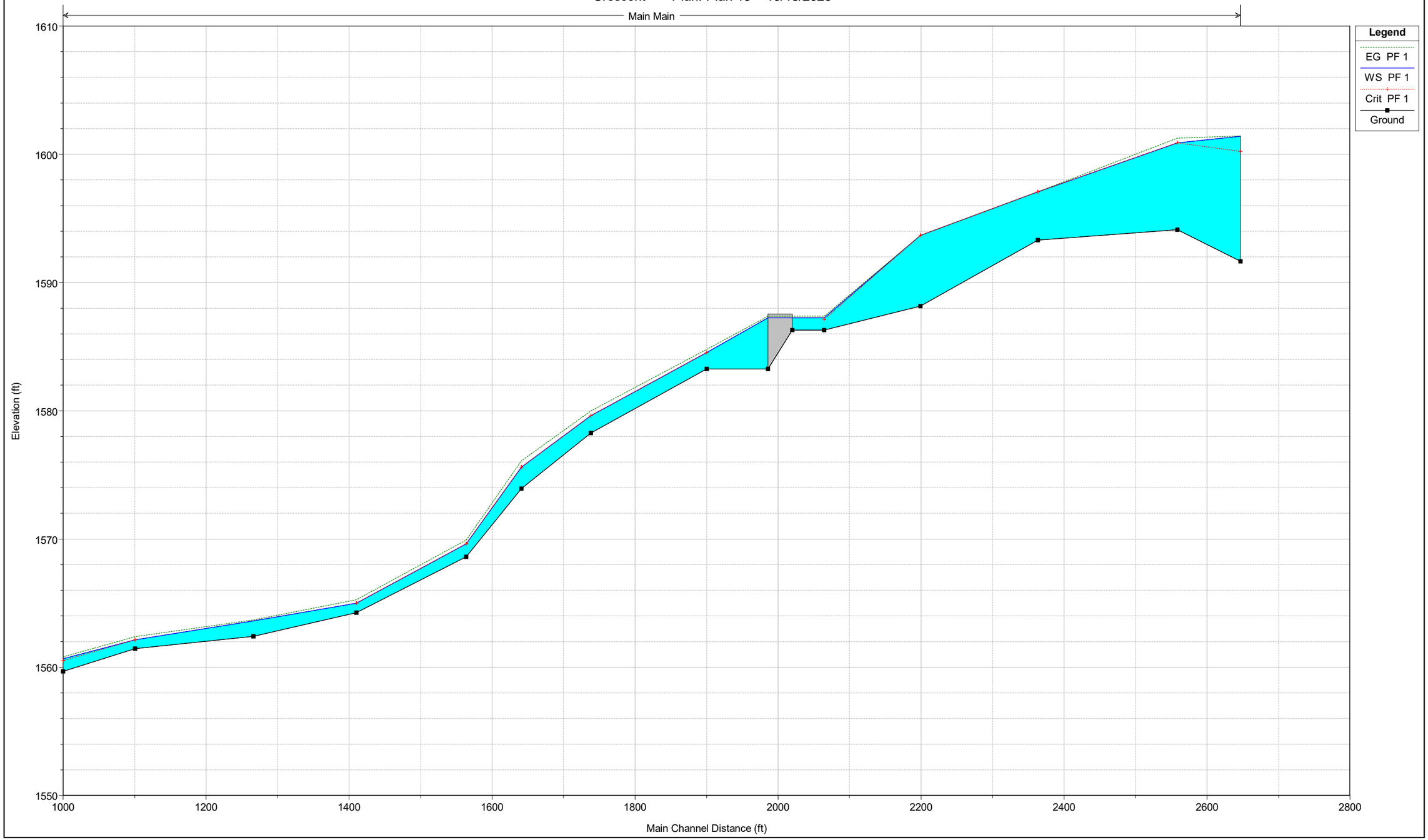
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Main	2646.58	PF 2	200.00	1591.65	1601.95	1600.60	1601.99	0.000597	1.46	137.05	361.43	0.20
Main	2558.64	PF 2	200.00	1594.12	1601.28	1601.28	1601.79	0.017072	5.76	35.28	499.72	0.98
Main	2363.27	PF 2	200.00	1593.30	1597.08	1597.08	1597.08	0.000048	0.49	411.27	191.97	0.06
Main	2199.13	PF 2	200.00	1588.15	1593.69	1593.69	1593.69	0.000013	0.32	622.63	203.72	0.03
Main	2064.66	PF 2	200.00	1586.28	1588.14	1587.34	1588.19	0.001351	1.77	113.17	93.74	0.28
Main	2007		Inl Struct									
Main	1900.00	PF 2	200.00	1583.25	1584.81	1584.81	1585.11	0.021008	4.35	45.99	77.25	0.99
Main	1738.19	PF 2	200.00	1578.26	1580.03	1580.03	1580.45	0.018770	5.20	38.48	45.39	1.00
Main	1641.26	PF 2	200.00	1573.93	1576.15	1576.15	1576.74	0.017564	6.16	32.49	27.98	1.01
Main	1563.87	PF 2	200.00	1568.62	1569.94	1569.94	1570.29	0.019969	4.71	42.46	60.88	0.99
Main	1410.09	PF 2	207.00	1564.26	1565.26	1565.26	1565.62	0.019635	4.79	43.22	59.72	0.99
Main	1266.27	PF 2	222.00	1562.42	1563.96		1564.11	0.004271	3.02	73.55	64.67	0.50
Main	1100.55	PF 2	222.00	1561.45	1562.38	1562.38	1562.75	0.020401	4.86	45.70	63.61	1.01
Main	1000	PF 2	222.00	1559.68	1560.93	1560.75	1561.14	0.010007	3.72	59.65	72.62	0.72

HEC-RAS Plan: Plan 13 River: Main Reach: Main Profile: PF 2

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Q Total	Q Weir	Q Gates	Q Culv	Q Inline RC	Q Outlet TS	Q Breach
			(ft)	(ft)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
Main	2007	PF 2	1588.19	1588.14	200.00	65.61		134.39			

10-YEAR FLOW

Crescent Plan: Plan 13 10/18/2023



HEC-RAS Plan: Plan 13 River: Main Reach: Main Profile: PF 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Main	2646.58	PF 1	111.00	1591.65	1601.41	1600.22	1601.44	0.000505	1.16	95.95	346.96	0.18
Main	2558.64	PF 1	111.00	1594.12	1600.89	1600.89	1601.27	0.019646	4.91	22.60	456.59	1.00
Main	2363.27	PF 1	111.00	1593.30	1597.08	1597.08	1597.08	0.000015	0.27	411.32	191.98	0.03
Main	2199.13	PF 1	111.00	1588.15	1593.69	1593.69	1593.69	0.000004	0.18	622.63	203.72	0.02
Main	2064.66	PF 1	111.00	1586.28	1587.26	1587.14	1587.38	0.010376	2.84	39.12	73.54	0.69
Main	2007		Inl Struct									
Main	1900.00	PF 1	111.00	1583.25	1584.55	1584.55	1584.79	0.022363	3.91	28.40	58.65	0.99
Main	1738.19	PF 1	111.00	1578.26	1579.62	1579.62	1579.99	0.019839	4.84	22.93	31.36	1.00
Main	1641.26	PF 1	111.00	1573.93	1575.60	1575.60	1576.10	0.018794	5.68	19.55	19.96	1.01
Main	1563.87	PF 1	111.00	1568.62	1569.62	1569.62	1569.91	0.022123	4.30	25.80	45.80	1.01
Main	1410.09	PF 1	115.00	1564.26	1565.00	1565.00	1565.26	0.022428	4.08	28.17	54.68	1.00
Main	1266.27	PF 1	123.00	1562.42	1563.61		1563.70	0.003867	2.39	51.43	59.55	0.45
Main	1100.55	PF 1	123.00	1561.45	1562.13	1562.13	1562.39	0.022863	4.05	30.38	60.60	1.01
Main	1000	PF 1	123.00	1559.68	1560.67	1560.52	1560.81	0.010002	3.00	41.01	69.02	0.69

HEC-RAS Plan: Plan 13 River: Main Reach: Main Profile: PF 1

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Q Total	Q Weir	Q Gates	Q Culv	Q Inline RC	Q Outlet TS	Q Breach
			(ft)	(ft)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
Main	2007	PF 1	1587.38	1587.26	111.00			111.00			

CROSS SECTIONS AND CROSS SECTION SUMMERY TABLE

100-YEAR FLOW

Crescent Plan: Plan 13 10/18/2023

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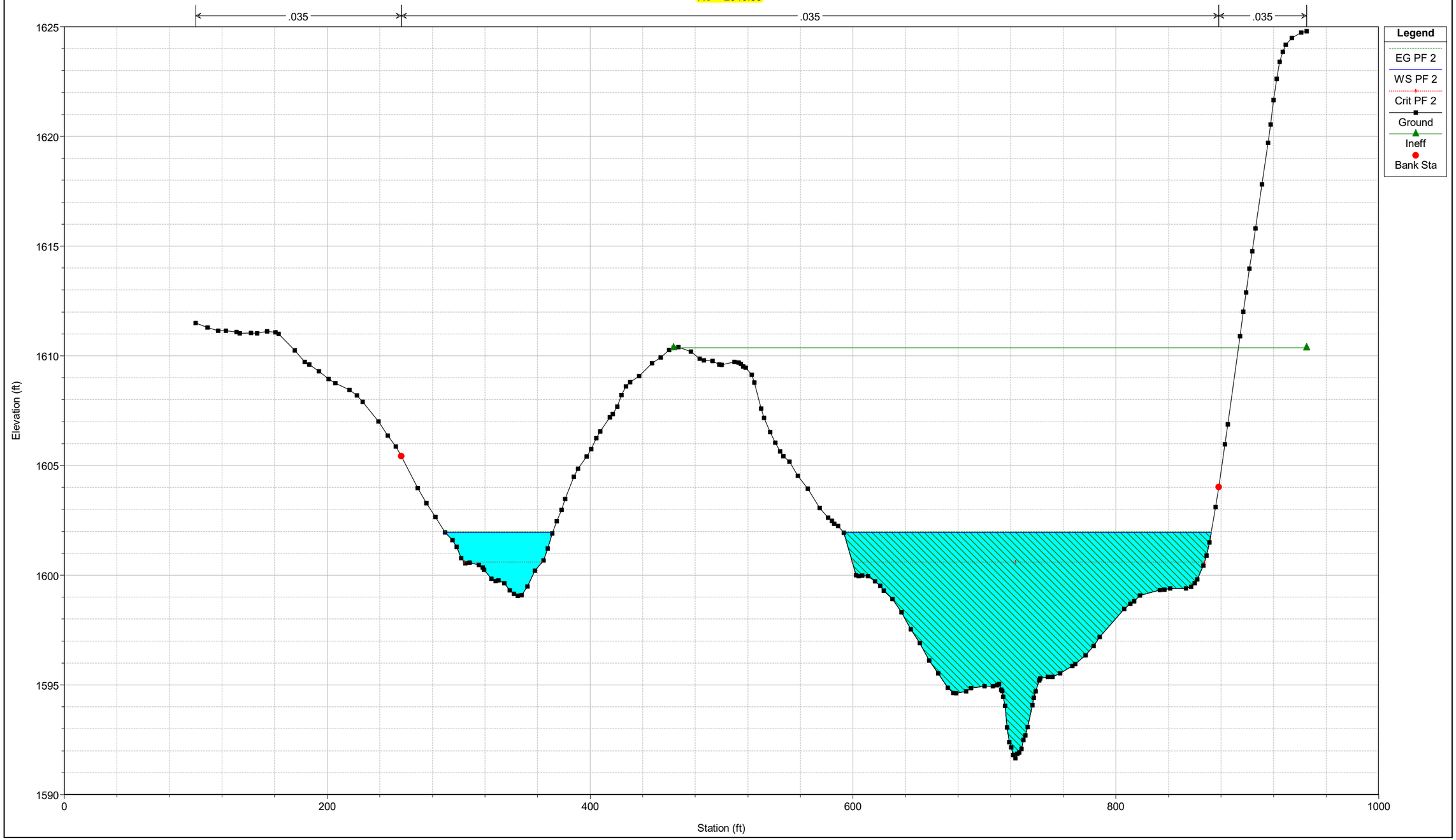

Crescent Plan: Plan 13 10/18/2023

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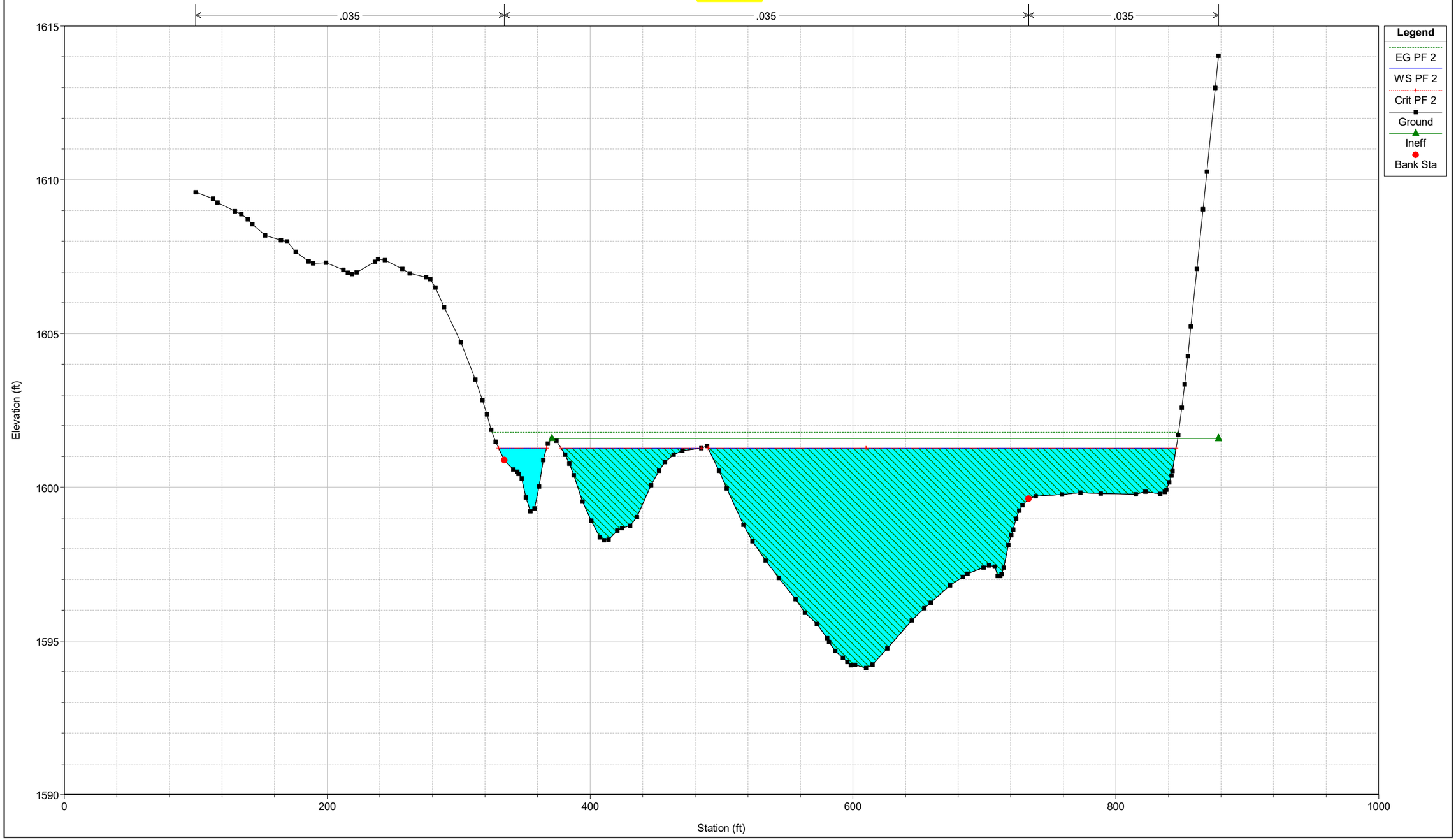

Crescent Plan: Plan 13 10/18/2023

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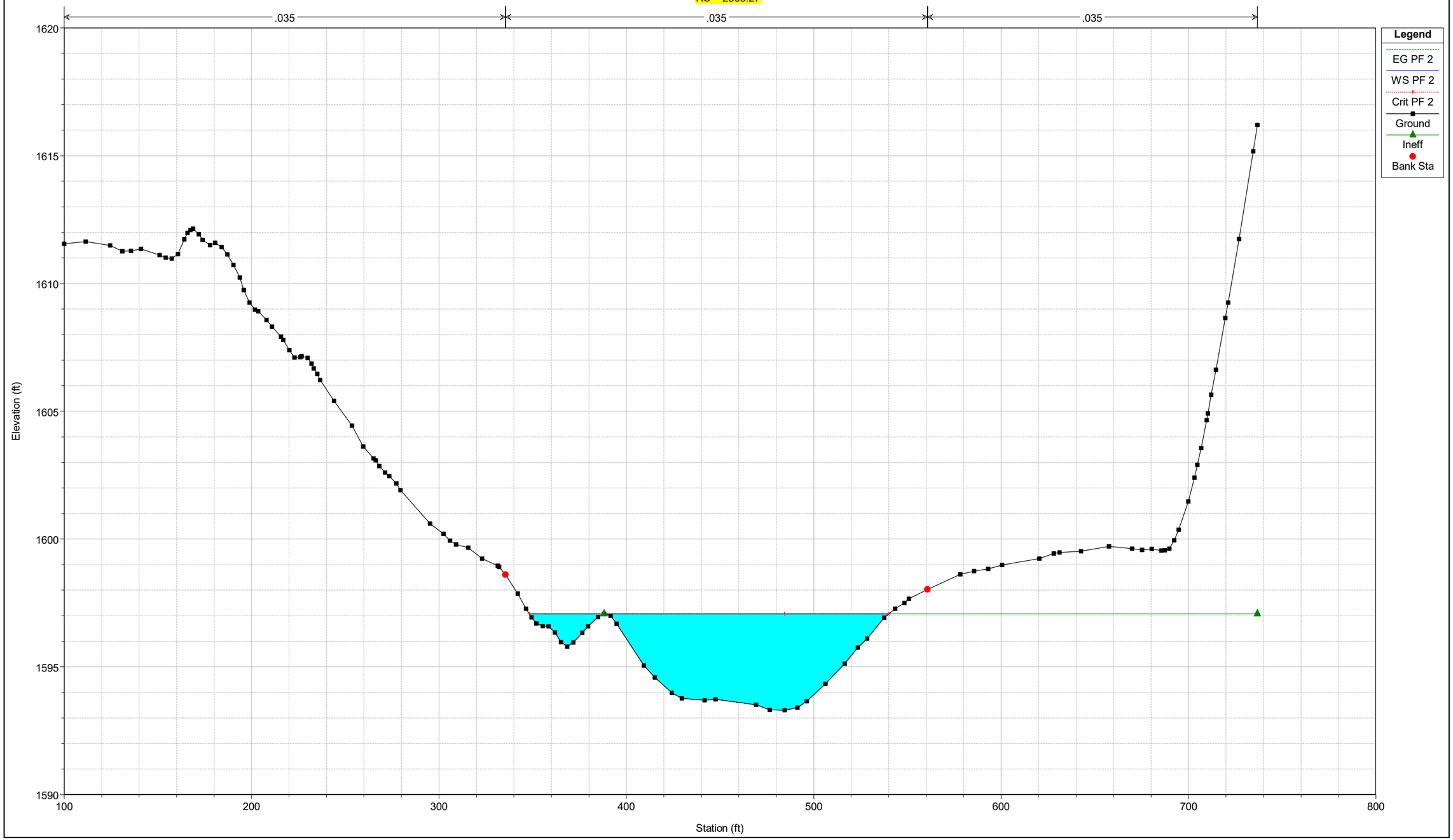

Crescent Plan: Plan 13 10/18/2023

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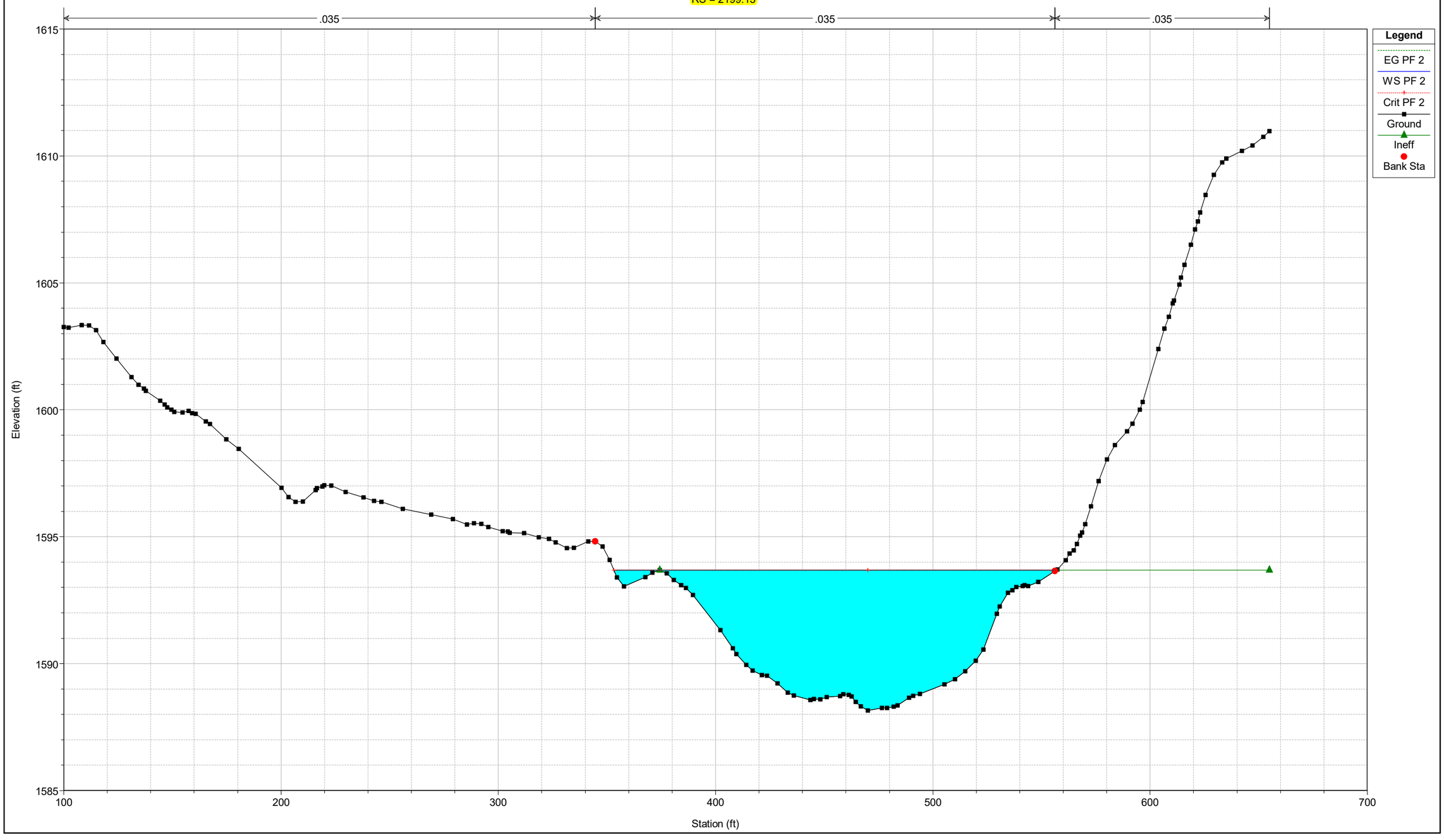

Crescent Plan: Plan 13 10/18/2023

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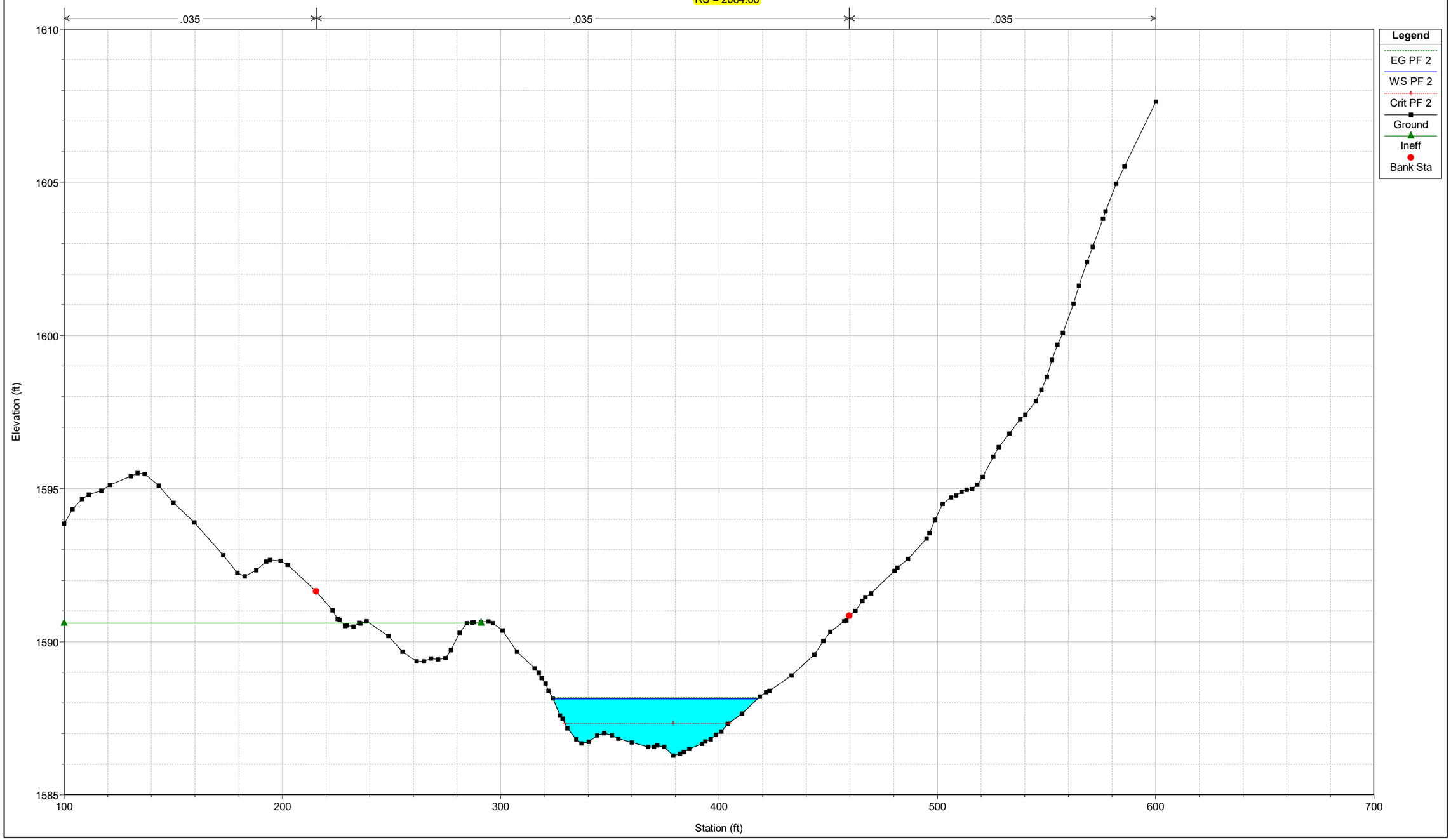
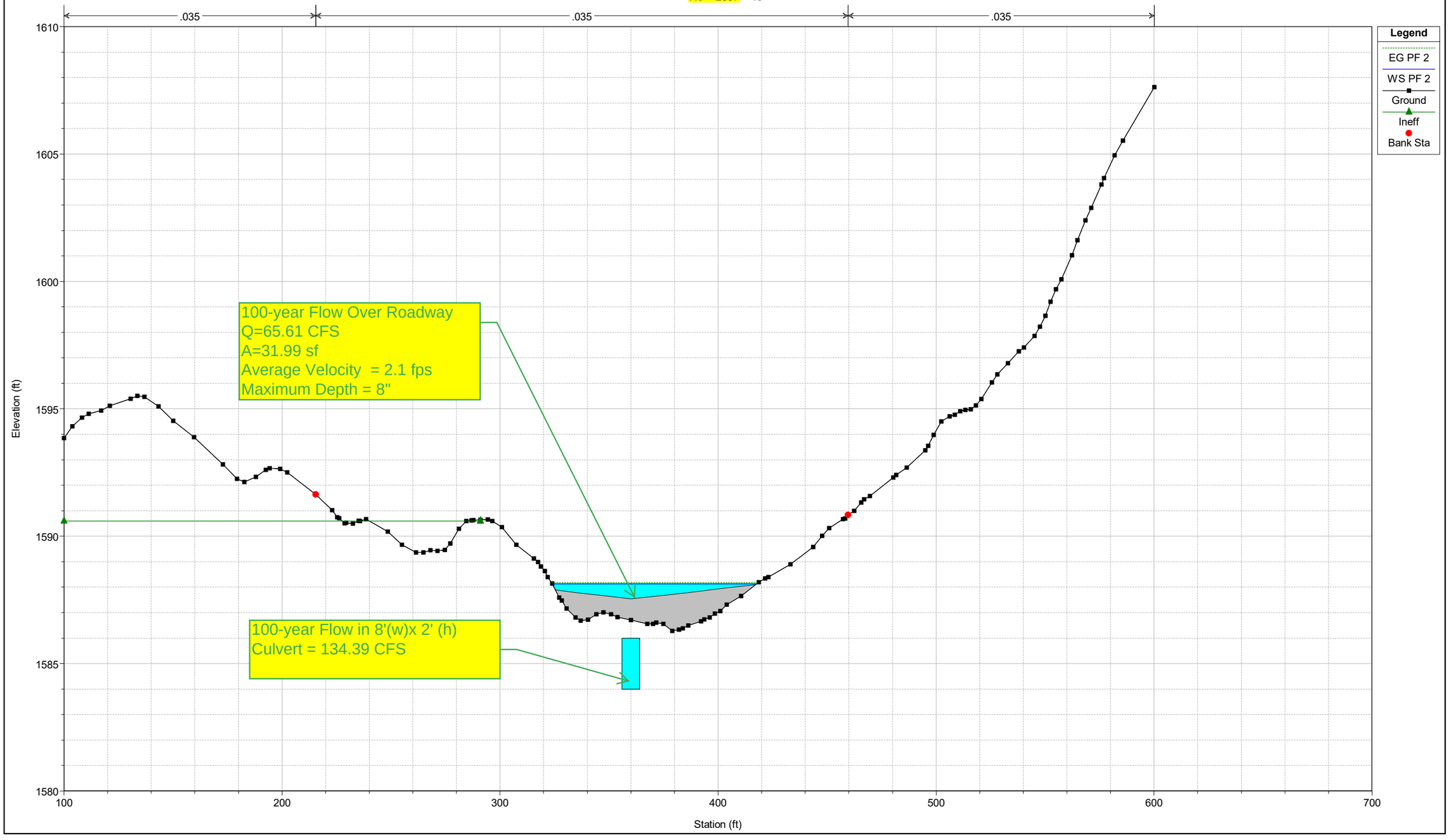


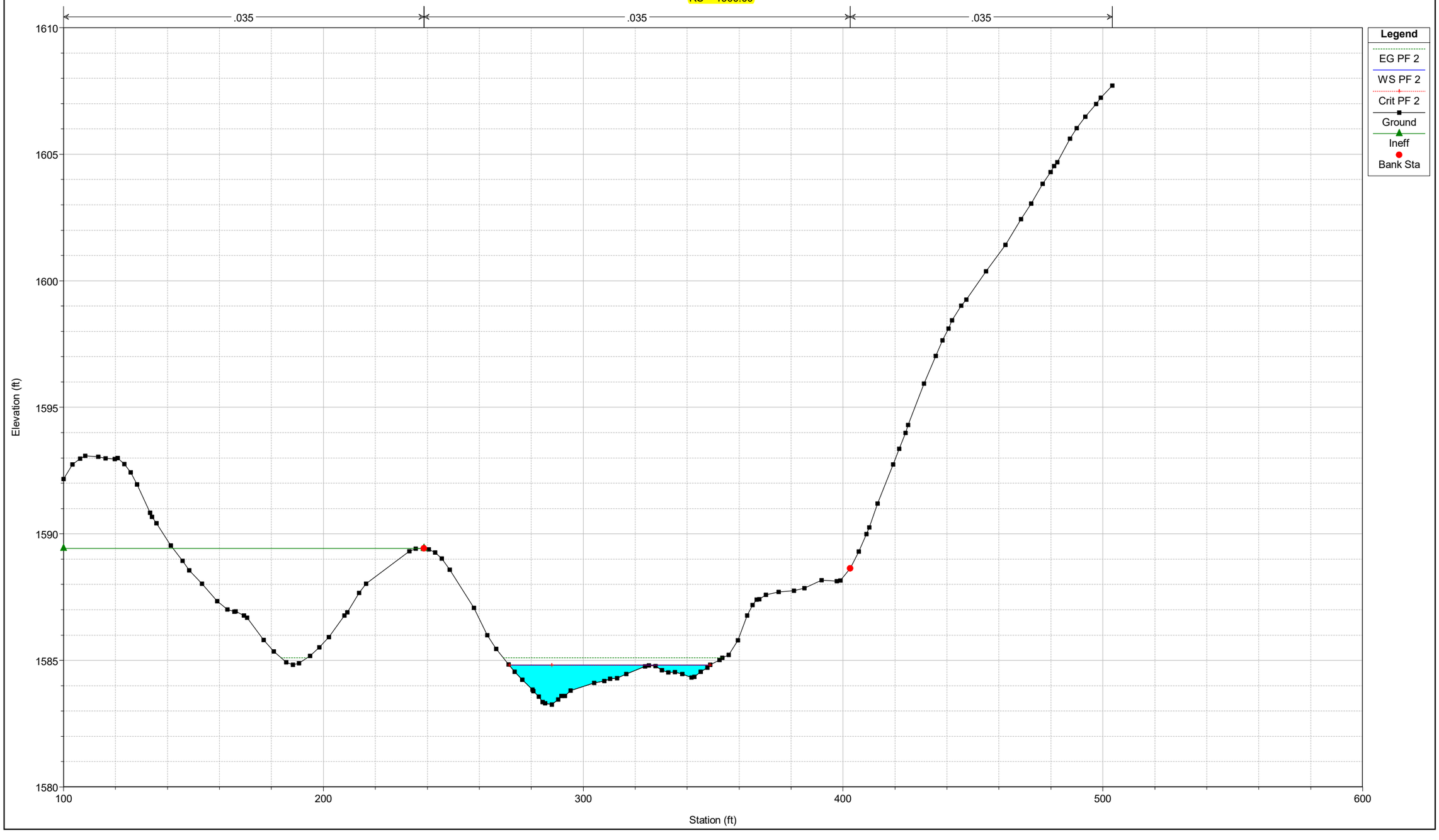
Crescent Plan: Plan 13 10/18/2023

RS = 2007 IS



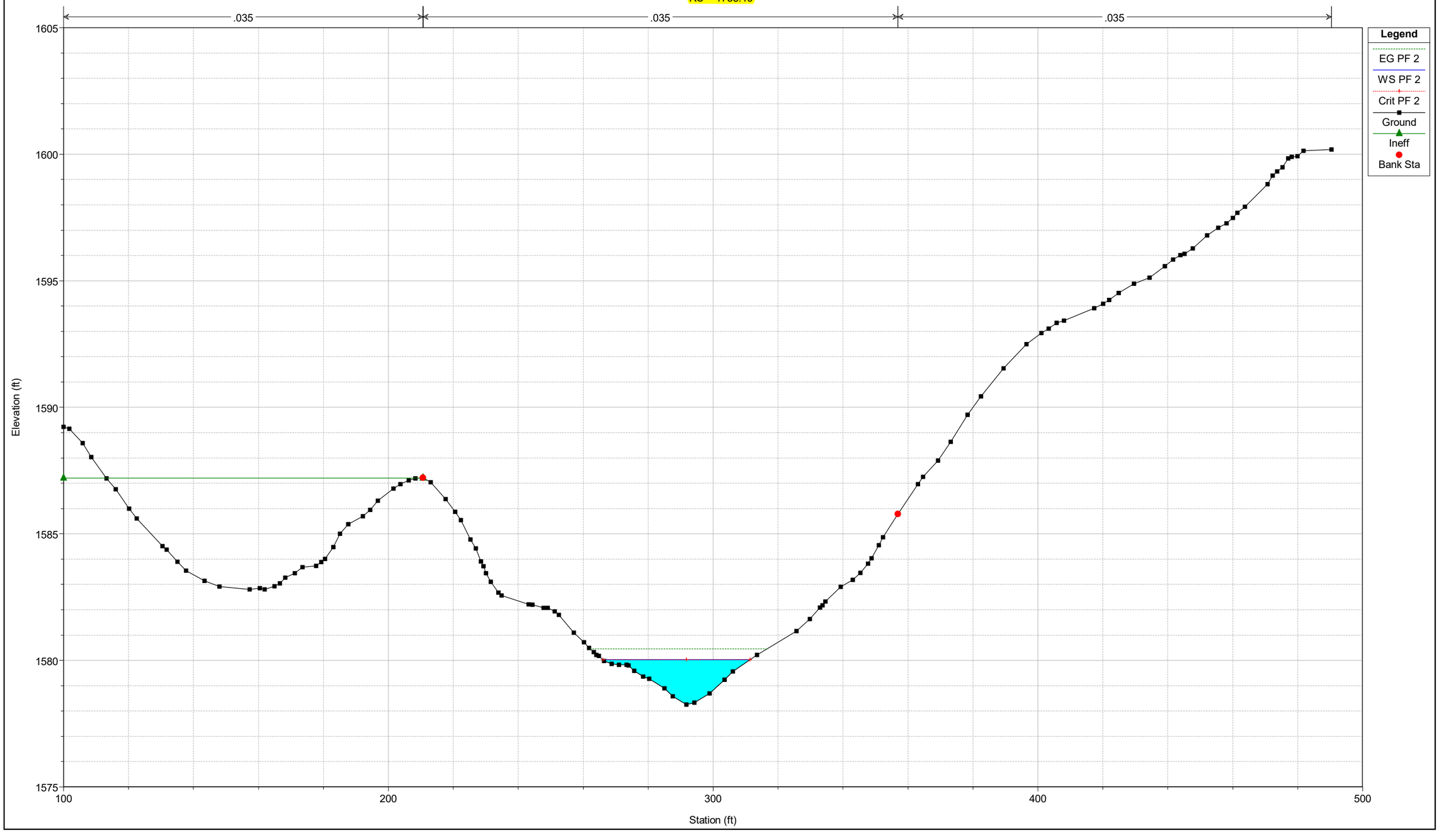
Crescent Plan: Plan 13 10/18/2023

RS = 1900.00



Crescent Plan: Plan 13 10/18/2023

RS = 1738.19



Crescent Plan: Plan 13 10/18/2023

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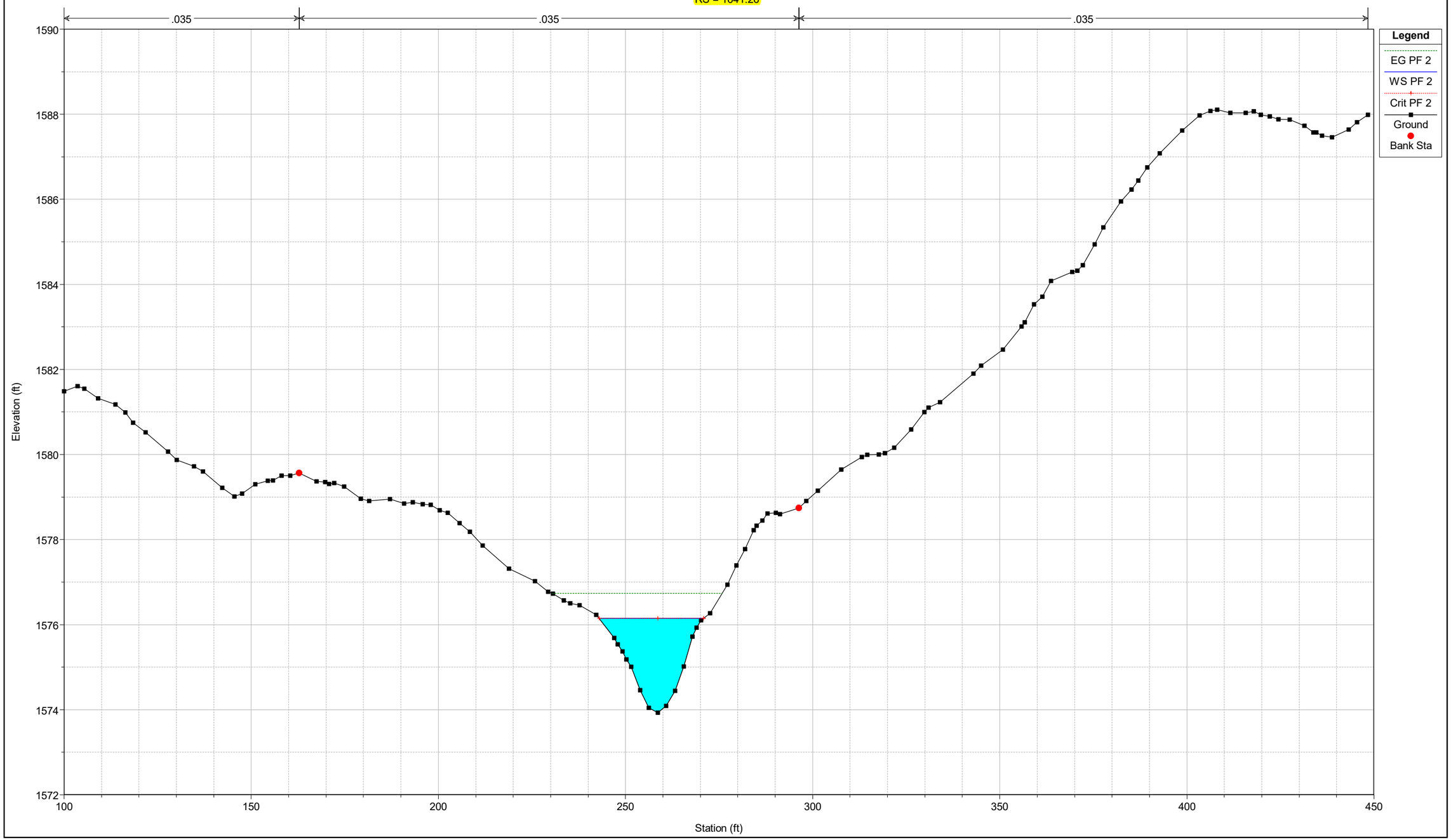
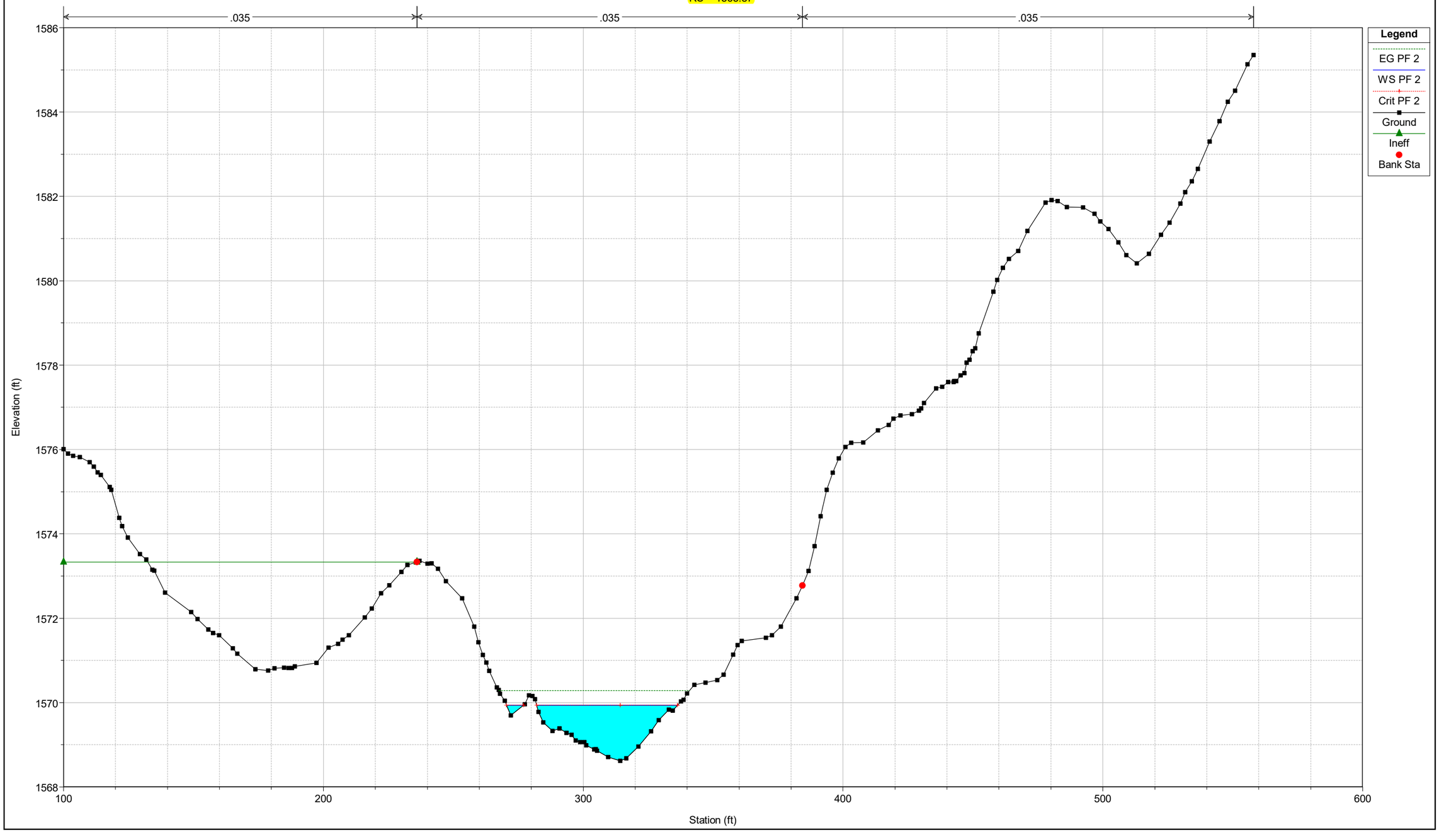


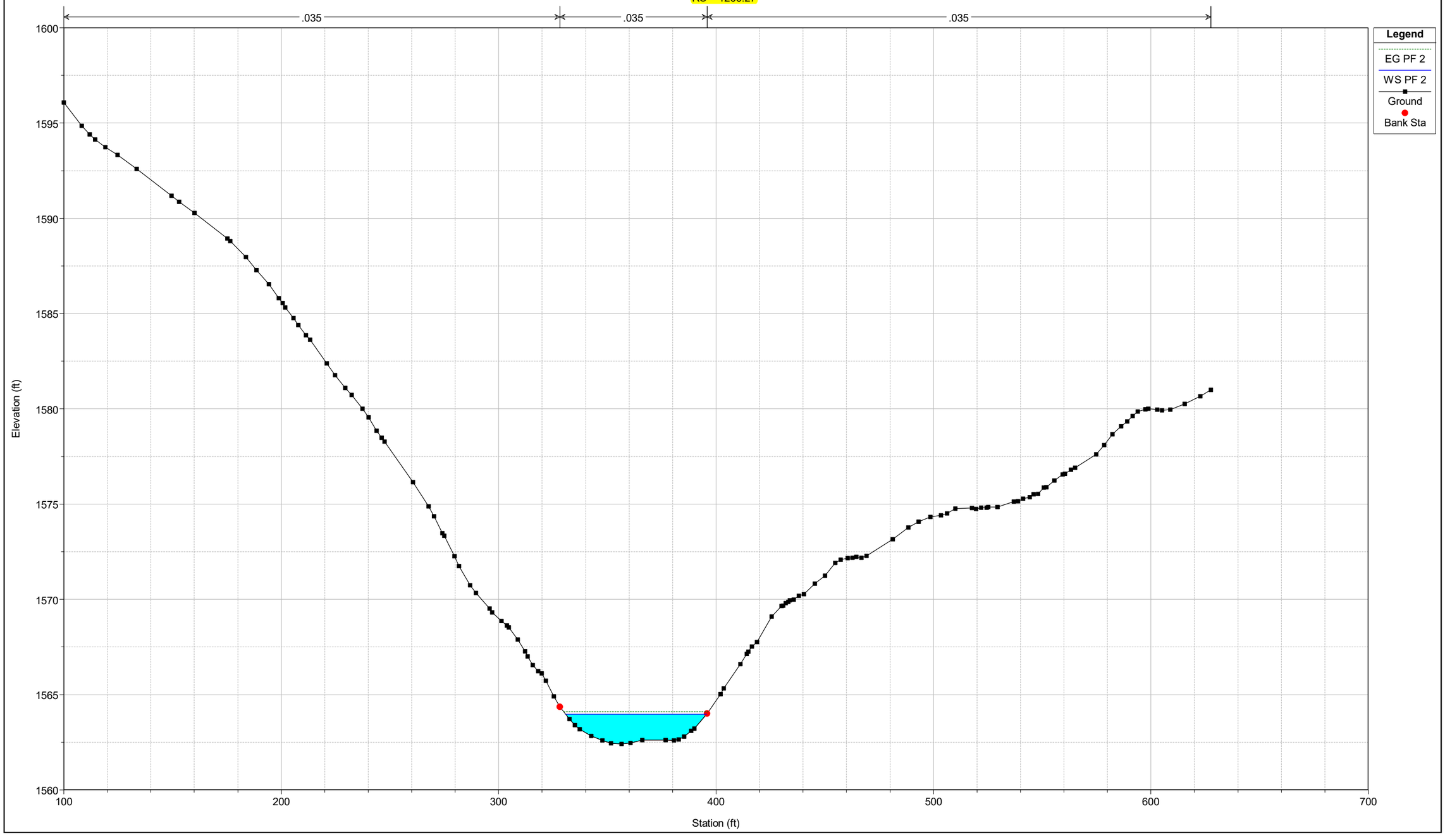
Crescent Plan: Plan 13 10/18/2023

RS = 1563.87



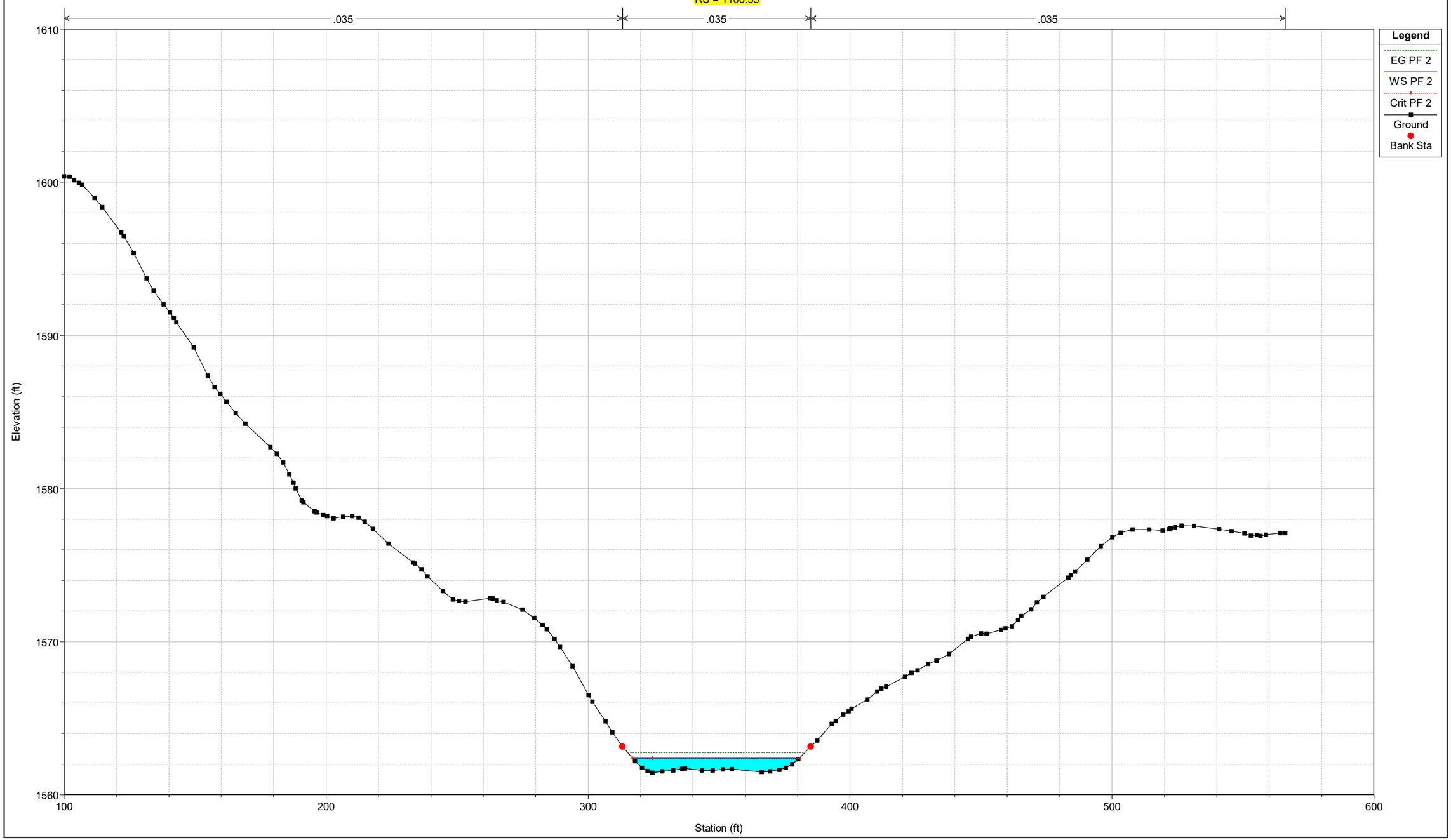
Crescent Plan: Plan 13 10/18/2023

RS = 1266.27



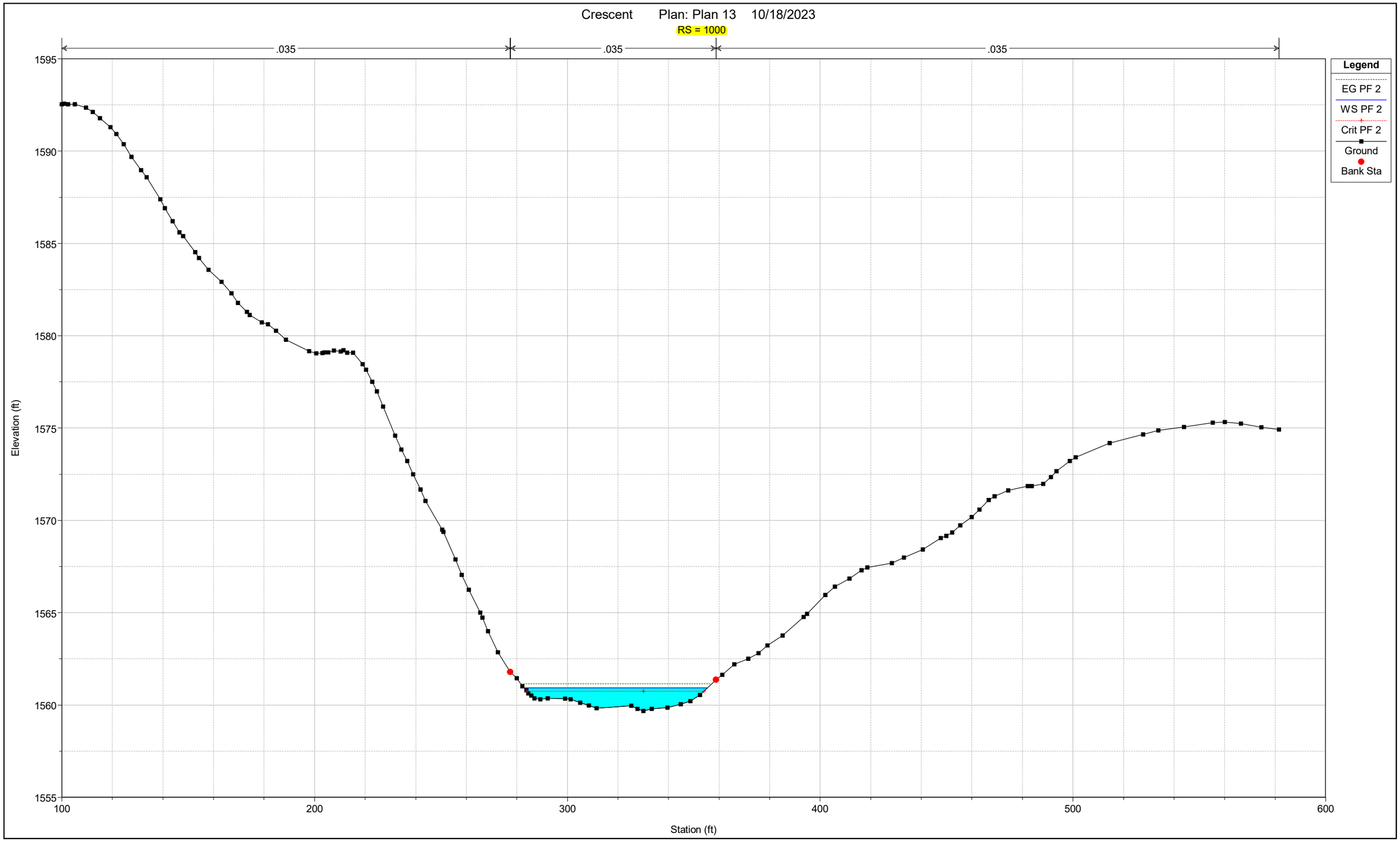
Crescent Plan: Plan 13 10/18/2023

RS = 1100.55



Crescent Plan: Plan 13 10/18/2023

RS = 1000



Plan: Plan 13 Main Main RS: 2646.58 Profile: PF 2

E.G. Elev (ft)	1601.99	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.		0.035	
W.S. Elev (ft)	1601.95	Reach Len. (ft)	114.07	87.94	127.53
Crit W.S. (ft)	1600.60	Flow Area (sq ft)		137.05	
E.G. Slope (ft/ft)	0.000597	Area (sq ft)		1489.38	
Q Total (cfs)	200.00	Flow (cfs)		200.00	
Top Width (ft)	361.43	Top Width (ft)		361.43	
Vel Total (ft/s)	1.46	Avg. Vel. (ft/s)		1.46	
Max Chl Dpth (ft)	10.30	Hydr. Depth (ft)		1.68	
Conv. Total (cfs)	8188.4	Conv. (cfs)		8188.4	
Length Wtd. (ft)	88.05	Wetted Per. (ft)		82.09	
Min Ch El (ft)	1591.65	Shear (lb/sq ft)		0.06	
Alpha	1.00	Stream Power (lb/ft s)		0.09	
Frctn Loss (ft)	0.15	Cum Volume (acre-ft)	0.00	11.34	0.47
C & E Loss (ft)	0.05	Cum SA (acres)	0.02	4.77	0.32

Plan: Plan 13 Main Main RS: 2558.64 Profile: PF 2

E.G. Elev (ft)	1601.79	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.51	Wt. n-Val.	0.035	0.035	
W.S. Elev (ft)	1601.28	Reach Len. (ft)	188.20	195.37	122.16
Crit W.S. (ft)	1601.28	Flow Area (sq ft)	0.86	34.42	
E.G. Slope (ft/ft)	0.017072	Area (sq ft)	0.86	1288.74	162.58
Q Total (cfs)	200.00	Flow (cfs)	1.61	198.39	
Top Width (ft)	499.72	Top Width (ft)	4.35	383.23	112.14
Vel Total (ft/s)	5.67	Avg. Vel. (ft/s)	1.87	5.76	
Max Chl Dpth (ft)	7.15	Hydr. Depth (ft)	0.20	1.07	
Conv. Total (cfs)	1530.7	Conv. (cfs)	12.3	1518.4	
Length Wtd. (ft)	192.30	Wetted Per. (ft)	4.36	32.49	
Min Ch El (ft)	1594.12	Shear (lb/sq ft)	0.21	1.13	
Alpha	1.03	Stream Power (lb/ft s)	0.39	6.51	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	0.00	8.53	0.23
C & E Loss (ft)	0.00	Cum SA (acres)	0.01	4.02	0.16

Plan: Plan 13 Main Main RS: 2363.27 Profile: PF 2

E.G. Elev (ft)	1597.08	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.035	
W.S. Elev (ft)	1597.08	Reach Len. (ft)	165.63	164.14	180.84
Crit W.S. (ft)	1597.08	Flow Area (sq ft)		411.27	
E.G. Slope (ft/ft)	0.000048	Area (sq ft)		411.27	
Q Total (cfs)	200.00	Flow (cfs)		200.00	
Top Width (ft)	191.97	Top Width (ft)		191.97	
Vel Total (ft/s)	0.49	Avg. Vel. (ft/s)		0.49	
Max Chl Dpth (ft)	3.78	Hydr. Depth (ft)		2.14	
Conv. Total (cfs)	28977.1	Conv. (cfs)		28977.1	
Length Wtd. (ft)	164.14	Wetted Per. (ft)		192.37	
Min Ch El (ft)	1593.30	Shear (lb/sq ft)		0.01	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		4.72	0.00
C & E Loss (ft)	0.00	Cum SA (acres)		2.73	0.00

Plan: Plan 13 Main Main RS: 2199.13 Profile: PF 2

E.G. Elev (ft)	1593.69	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.035	0.035
W.S. Elev (ft)	1593.69	Reach Len. (ft)	136.03	134.47	122.13
Crit W.S. (ft)	1593.69	Flow Area (sq ft)		622.62	0.01
E.G. Slope (ft/ft)	0.000013	Area (sq ft)		622.62	0.01
Q Total (cfs)	200.00	Flow (cfs)		200.00	0.00
Top Width (ft)	203.72	Top Width (ft)		202.97	0.76
Vel Total (ft/s)	0.32	Avg. Vel. (ft/s)		0.32	0.01
Max Chl Dpth (ft)	5.54	Hydr. Depth (ft)		3.07	0.02
Conv. Total (cfs)	55686.6	Conv. (cfs)		55686.6	0.0
Length Wtd. (ft)	134.46	Wetted Per. (ft)		203.62	0.76
Min Ch El (ft)	1588.15	Shear (lb/sq ft)		0.00	0.00
Alpha	1.00	Stream Power (lb/ft s)		0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		2.77	0.00
C & E Loss (ft)	0.00	Cum SA (acres)		1.99	0.00

Plan: Plan 13 Main Main RS: 2064.66 Profile: PF 2

E.G. Elev (ft)	1588.19	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.		0.035	
W.S. Elev (ft)	1588.14	Reach Len. (ft)	150.15	164.66	161.54
Crit W.S. (ft)	1587.34	Flow Area (sq ft)		113.17	
E.G. Slope (ft/ft)	0.001351	Area (sq ft)		113.17	
Q Total (cfs)	200.00	Flow (cfs)		200.00	
Top Width (ft)	93.74	Top Width (ft)		93.74	
Vel Total (ft/s)	1.77	Avg. Vel. (ft/s)		1.77	
Max Chl Dpth (ft)	1.86	Hydr. Depth (ft)		1.21	
Conv. Total (cfs)	5441.3	Conv. (cfs)		5441.3	
Length Wtd. (ft)	164.66	Wetted Per. (ft)		93.90	
Min Ch El (ft)	1586.28	Shear (lb/sq ft)		0.10	
Alpha	1.00	Stream Power (lb/ft s)		0.18	
Frctn Loss (ft)		Cum Volume (acre-ft)		1.64	
C & E Loss (ft)		Cum SA (acres)		1.53	

Plan: Plan 13 Main Main RS: 1900.00 Profile: PF 2

E.G. Elev (ft)	1585.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.29	Wt. n-Val.		0.035	
W.S. Elev (ft)	1584.81	Reach Len. (ft)	123.86	161.81	187.22
Crit W.S. (ft)	1584.81	Flow Area (sq ft)		45.99	
E.G. Slope (ft/ft)	0.021008	Area (sq ft)		45.99	
Q Total (cfs)	200.00	Flow (cfs)		200.00	
Top Width (ft)	77.25	Top Width (ft)		77.25	
Vel Total (ft/s)	4.35	Avg. Vel. (ft/s)		4.35	
Max Chl Dpth (ft)	1.56	Hydr. Depth (ft)		0.60	
Conv. Total (cfs)	1379.9	Conv. (cfs)		1379.9	
Length Wtd. (ft)	161.81	Wetted Per. (ft)		77.41	
Min Ch El (ft)	1583.25	Shear (lb/sq ft)		0.78	
Alpha	1.00	Stream Power (lb/ft s)		3.39	
Frctn Loss (ft)	3.21	Cum Volume (acre-ft)		0.99	
C & E Loss (ft)	0.01	Cum SA (acres)		1.21	

Plan: Plan 13 Main Main RS: 1738.19 Profile: PF 2

E.G. Elev (ft)	1580.45	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.42	Wt. n-Val.		0.035	
W.S. Elev (ft)	1580.03	Reach Len. (ft)	89.81	96.93	106.19
Crit W.S. (ft)	1580.03	Flow Area (sq ft)		38.48	
E.G. Slope (ft/ft)	0.018770	Area (sq ft)		38.48	
Q Total (cfs)	200.00	Flow (cfs)		200.00	
Top Width (ft)	45.39	Top Width (ft)		45.39	
Vel Total (ft/s)	5.20	Avg. Vel. (ft/s)		5.20	
Max Chl Dpth (ft)	1.77	Hydr. Depth (ft)		0.85	
Conv. Total (cfs)	1459.8	Conv. (cfs)		1459.8	
Length Wtd. (ft)	96.93	Wetted Per. (ft)		45.56	
Min Ch El (ft)	1578.26	Shear (lb/sq ft)		0.99	
Alpha	1.00	Stream Power (lb/ft s)		5.14	
Frctn Loss (ft)	1.76	Cum Volume (acre-ft)		0.84	
C & E Loss (ft)	0.02	Cum SA (acres)		0.98	

Plan: Plan 13 Main Main RS: 1641.26 Profile: PF 2

E.G. Elev (ft)	1576.74	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.59	Wt. n-Val.		0.035	
W.S. Elev (ft)	1576.15	Reach Len. (ft)	77.02	77.39	73.95
Crit W.S. (ft)	1576.15	Flow Area (sq ft)		32.49	
E.G. Slope (ft/ft)	0.017564	Area (sq ft)		32.49	
Q Total (cfs)	200.00	Flow (cfs)		200.00	
Top Width (ft)	27.98	Top Width (ft)		27.98	
Vel Total (ft/s)	6.16	Avg. Vel. (ft/s)		6.16	
Max Chl Dpth (ft)	2.22	Hydr. Depth (ft)		1.16	
Conv. Total (cfs)	1509.1	Conv. (cfs)		1509.1	
Length Wtd. (ft)	77.39	Wetted Per. (ft)		28.40	
Min Ch El (ft)	1573.93	Shear (lb/sq ft)		1.25	
Alpha	1.00	Stream Power (lb/ft s)		7.72	
Frctn Loss (ft)	1.45	Cum Volume (acre-ft)		0.76	
C & E Loss (ft)	0.07	Cum SA (acres)		0.90	

Plan: Plan 13 Main Main RS: 1563.87 Profile: PF 2

E.G. Elev (ft)	1570.29	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.34	Wt. n-Val.		0.035	
W.S. Elev (ft)	1569.94	Reach Len. (ft)	138.91	153.78	159.49
Crit W.S. (ft)	1569.94	Flow Area (sq ft)		42.46	
E.G. Slope (ft/ft)	0.019969	Area (sq ft)		42.46	
Q Total (cfs)	200.00	Flow (cfs)		200.00	
Top Width (ft)	60.88	Top Width (ft)		60.88	
Vel Total (ft/s)	4.71	Avg. Vel. (ft/s)		4.71	
Max Chl Dpth (ft)	1.32	Hydr. Depth (ft)		0.70	
Conv. Total (cfs)	1415.3	Conv. (cfs)		1415.3	
Length Wtd. (ft)	153.78	Wetted Per. (ft)		61.02	
Min Ch El (ft)	1568.62	Shear (lb/sq ft)		0.87	
Alpha	1.00	Stream Power (lb/ft s)		4.09	
Frctn Loss (ft)	3.04	Cum Volume (acre-ft)		0.69	
C & E Loss (ft)	0.00	Cum SA (acres)		0.82	

Plan: Plan 13 Main Main RS: 1410.09 Profile: PF 2

E.G. Elev (ft)	1565.62	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.36	Wt. n-Val.		0.035	
W.S. Elev (ft)	1565.26	Reach Len. (ft)	135.80	143.82	136.89
Crit W.S. (ft)	1565.26	Flow Area (sq ft)		43.22	
E.G. Slope (ft/ft)	0.019635	Area (sq ft)		43.22	
Q Total (cfs)	207.00	Flow (cfs)		207.00	
Top Width (ft)	59.72	Top Width (ft)		59.72	
Vel Total (ft/s)	4.79	Avg. Vel. (ft/s)		4.79	
Max Chl Dpth (ft)	1.00	Hydr. Depth (ft)		0.72	
Conv. Total (cfs)	1477.3	Conv. (cfs)		1477.3	
Length Wtd. (ft)	143.82	Wetted Per. (ft)		59.83	
Min Ch El (ft)	1564.26	Shear (lb/sq ft)		0.89	
Alpha	1.00	Stream Power (lb/ft s)		4.24	
Frctn Loss (ft)	1.11	Cum Volume (acre-ft)		0.54	
C & E Loss (ft)	0.06	Cum SA (acres)		0.61	

Plan: Plan 13 Main Main RS: 1266.27 Profile: PF 2

E.G. Elev (ft)	1564.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.		0.035	
W.S. Elev (ft)	1563.96	Reach Len. (ft)	165.76	165.72	165.70
Crit W.S. (ft)		Flow Area (sq ft)		73.55	
E.G. Slope (ft/ft)	0.004271	Area (sq ft)		73.55	
Q Total (cfs)	222.00	Flow (cfs)		222.00	
Top Width (ft)	64.67	Top Width (ft)		64.67	
Vel Total (ft/s)	3.02	Avg. Vel. (ft/s)		3.02	
Max Chl Dpth (ft)	1.54	Hydr. Depth (ft)		1.14	
Conv. Total (cfs)	3396.9	Conv. (cfs)		3396.9	
Length Wtd. (ft)	165.72	Wetted Per. (ft)		64.82	
Min Ch El (ft)	1562.42	Shear (lb/sq ft)		0.30	
Alpha	1.00	Stream Power (lb/ft s)		0.91	
Frctn Loss (ft)	1.33	Cum Volume (acre-ft)		0.35	
C & E Loss (ft)	0.02	Cum SA (acres)		0.40	

Plan: Plan 13 Main Main RS: 1100.55 Profile: PF 2

E.G. Elev (ft)	1562.75	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.37	Wt. n-Val.		0.035	
W.S. Elev (ft)	1562.38	Reach Len. (ft)	105.49	100.55	102.81
Crit W.S. (ft)	1562.38	Flow Area (sq ft)		45.70	
E.G. Slope (ft/ft)	0.020401	Area (sq ft)		45.70	
Q Total (cfs)	222.00	Flow (cfs)		222.00	
Top Width (ft)	63.61	Top Width (ft)		63.61	
Vel Total (ft/s)	4.86	Avg. Vel. (ft/s)		4.86	
Max Chl Dpth (ft)	0.93	Hydr. Depth (ft)		0.72	
Conv. Total (cfs)	1554.3	Conv. (cfs)		1554.3	
Length Wtd. (ft)	100.55	Wetted Per. (ft)		63.73	
Min Ch El (ft)	1561.45	Shear (lb/sq ft)		0.91	
Alpha	1.00	Stream Power (lb/ft s)		4.44	
Frctn Loss (ft)	1.39	Cum Volume (acre-ft)		0.12	
C & E Loss (ft)	0.05	Cum SA (acres)		0.16	

Plan: Plan 13 Main Main RS: 1000 Profile: PF 2

E.G. Elev (ft)	1561.14	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.22	Wt. n-Val.		0.035	
W.S. Elev (ft)	1560.93	Reach Len. (ft)			
Crit W.S. (ft)	1560.75	Flow Area (sq ft)		59.65	
E.G. Slope (ft/ft)	0.010007	Area (sq ft)		59.65	
Q Total (cfs)	222.00	Flow (cfs)		222.00	
Top Width (ft)	72.62	Top Width (ft)		72.62	
Vel Total (ft/s)	3.72	Avg. Vel. (ft/s)		3.72	
Max Chl Dpth (ft)	1.25	Hydr. Depth (ft)		0.82	
Conv. Total (cfs)	2219.2	Conv. (cfs)		2219.2	
Length Wtd. (ft)		Wetted Per. (ft)		72.73	
Min Ch El (ft)	1559.68	Shear (lb/sq ft)		0.51	
Alpha	1.00	Stream Power (lb/ft s)		1.91	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

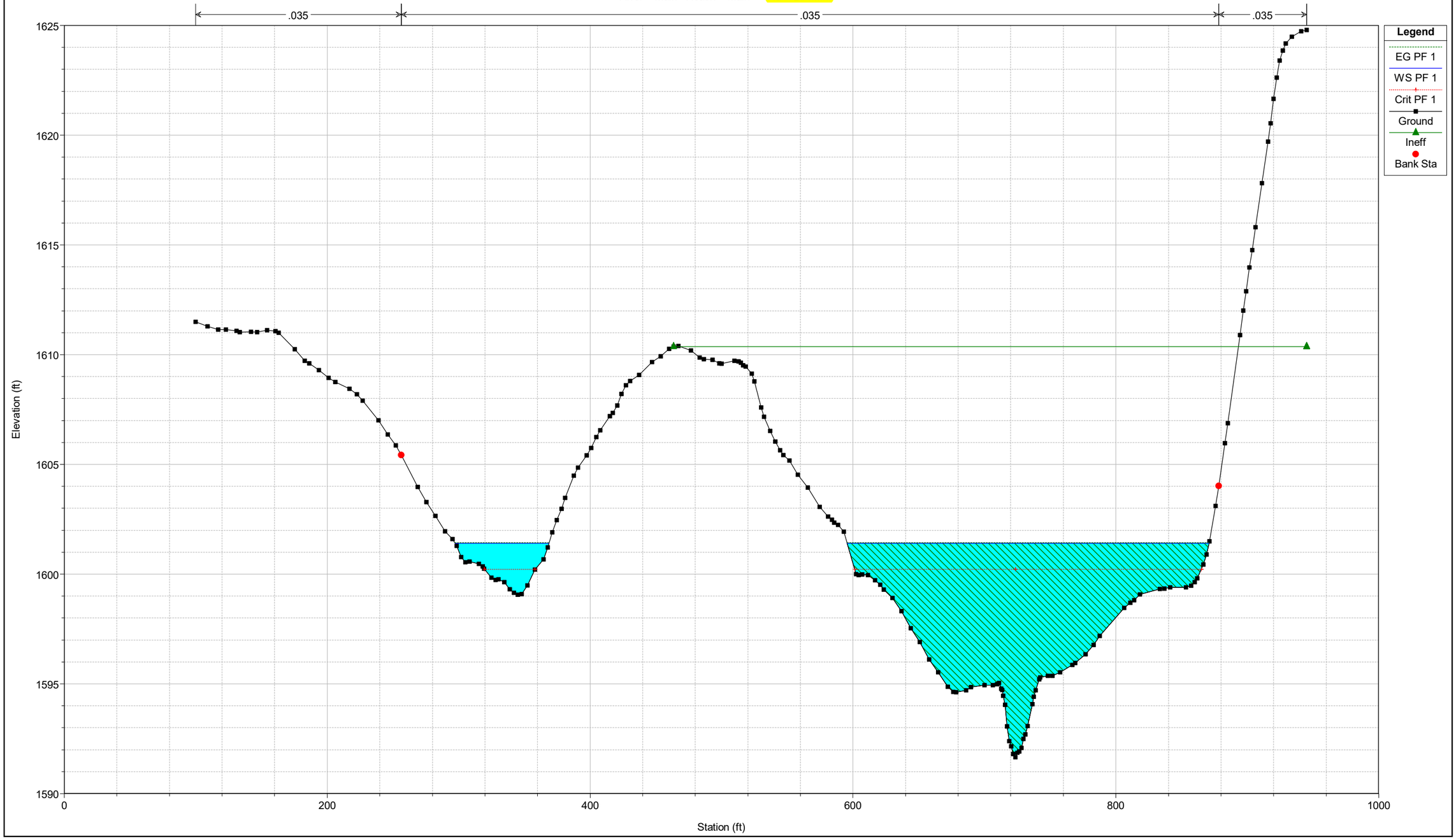
Plan: Plan 13 Main Main RS: 2007 Culv Group: Culvert #1 Profile: PF 2

E.G. Elev (ft)	1588.19	Weir Sta Lft (ft)	323.58
W.S. Elev (ft)	1588.14	Weir Sta Rgt (ft)	418.40
Q Total (cfs)	200.00	Min El Weir Flow (ft)	1587.55
Q Weir (cfs)	65.61	Wr Top Wdth (ft)	94.82
Q Gates (cfs)		Weir Max Depth (ft)	0.65
Q Culv (cfs)	134.39	Weir Avg Depth (ft)	0.40
Q Inline RC (cfs)		Weir Flow Area (sq ft)	37.88
Q Outlet TS (cfs)		Weir Coef (ft^1/2)	2.600
Q Breach (cfs)		Weir Submerg	0.00
Breach Avg Velocity (ft/s)			
Breach Flow Area (sq ft)		Q Culv Group (cfs)	134.39
Breach WD (ft)		# Barrels	1
Breach Top El (ft)		Culv Length (ft)	41.60
Breach Bottom El (ft)		Culv Depth Blocked (ft)	0.00
Breach SSL (ft)		Culv Inv El Up (ft)	1584.00
Breach SSR (ft)		Culv Inv El Dn (ft)	1583.60

10-YEAR FLOW

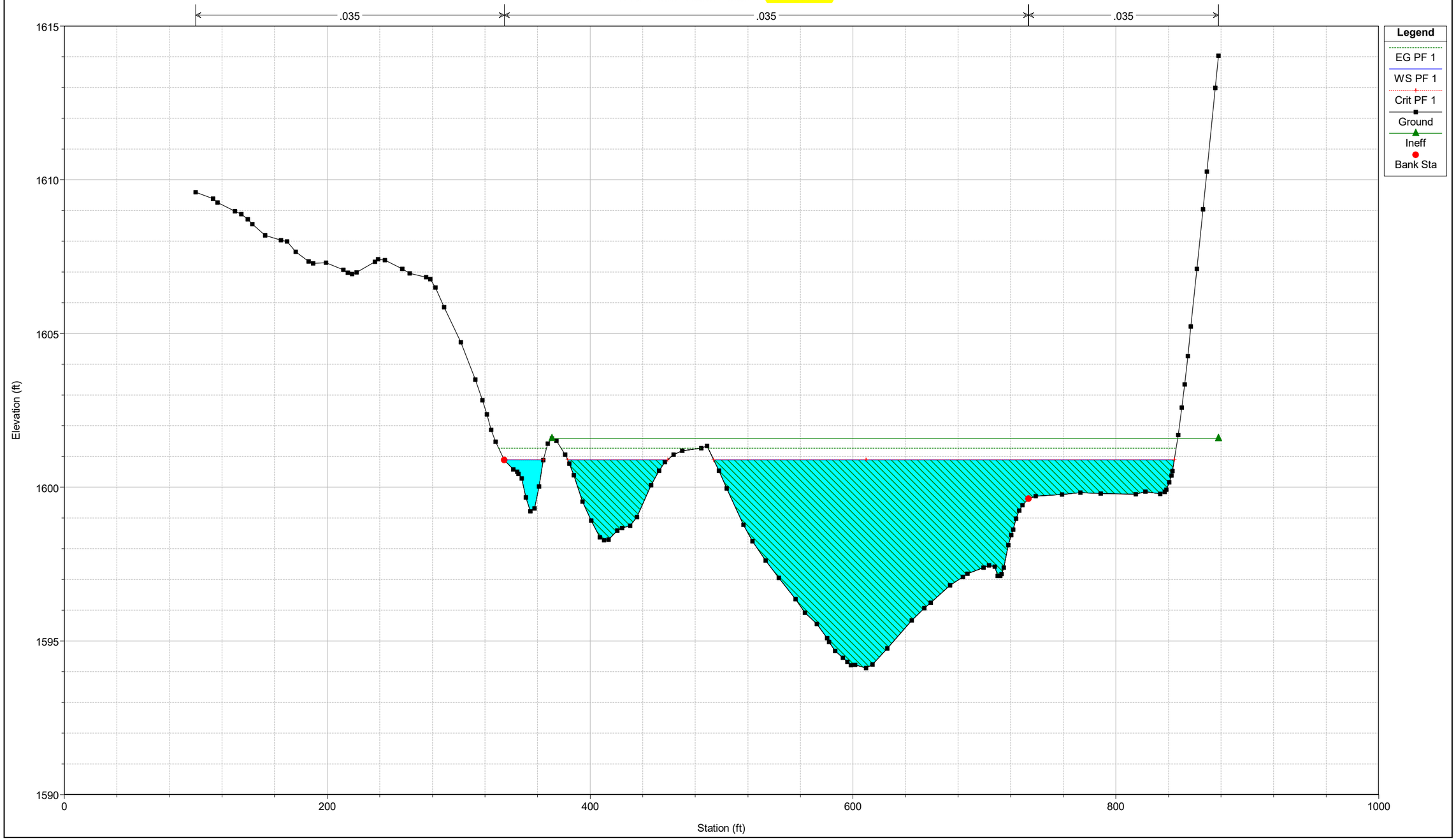
Crescent Plan: Plan 13 10/18/2023

River = Main Reach = Main RS = 2646.58



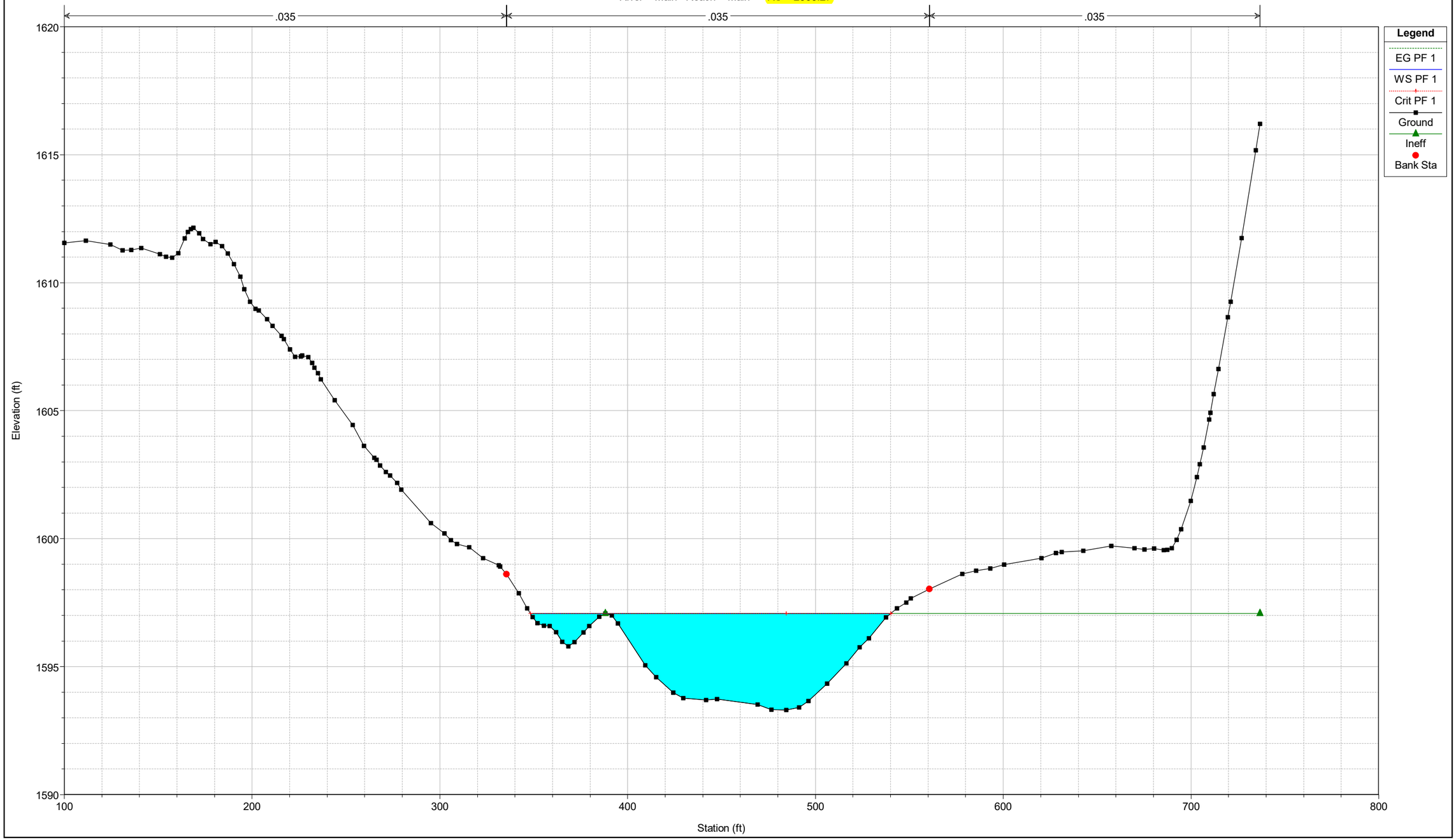
Crescent Plan: Plan 13 10/18/2023

River = Main Reach = Main RS = 2558.64



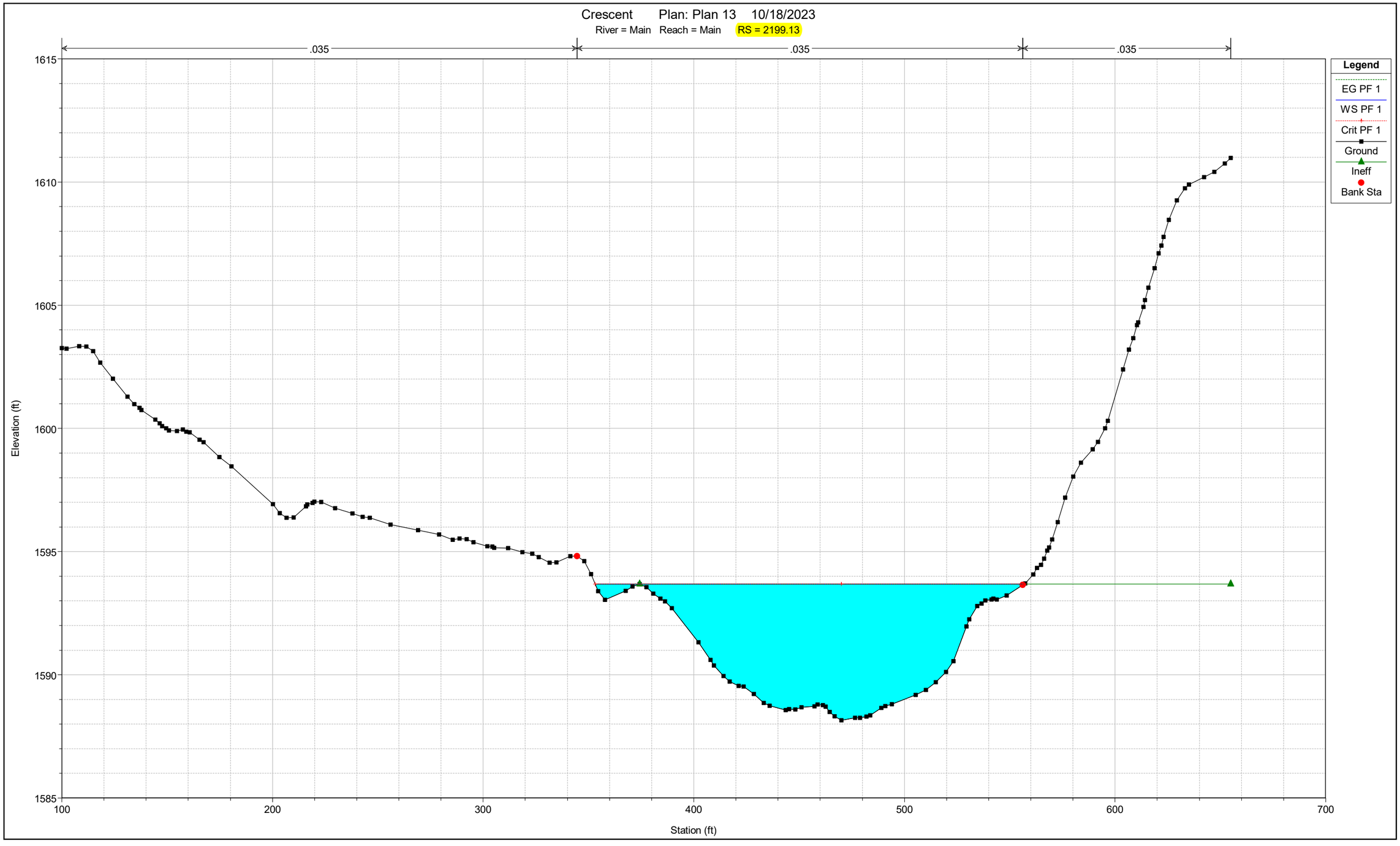
Crescent Plan: Plan 13 10/18/2023

River = Main Reach = Main RS = 2363.27



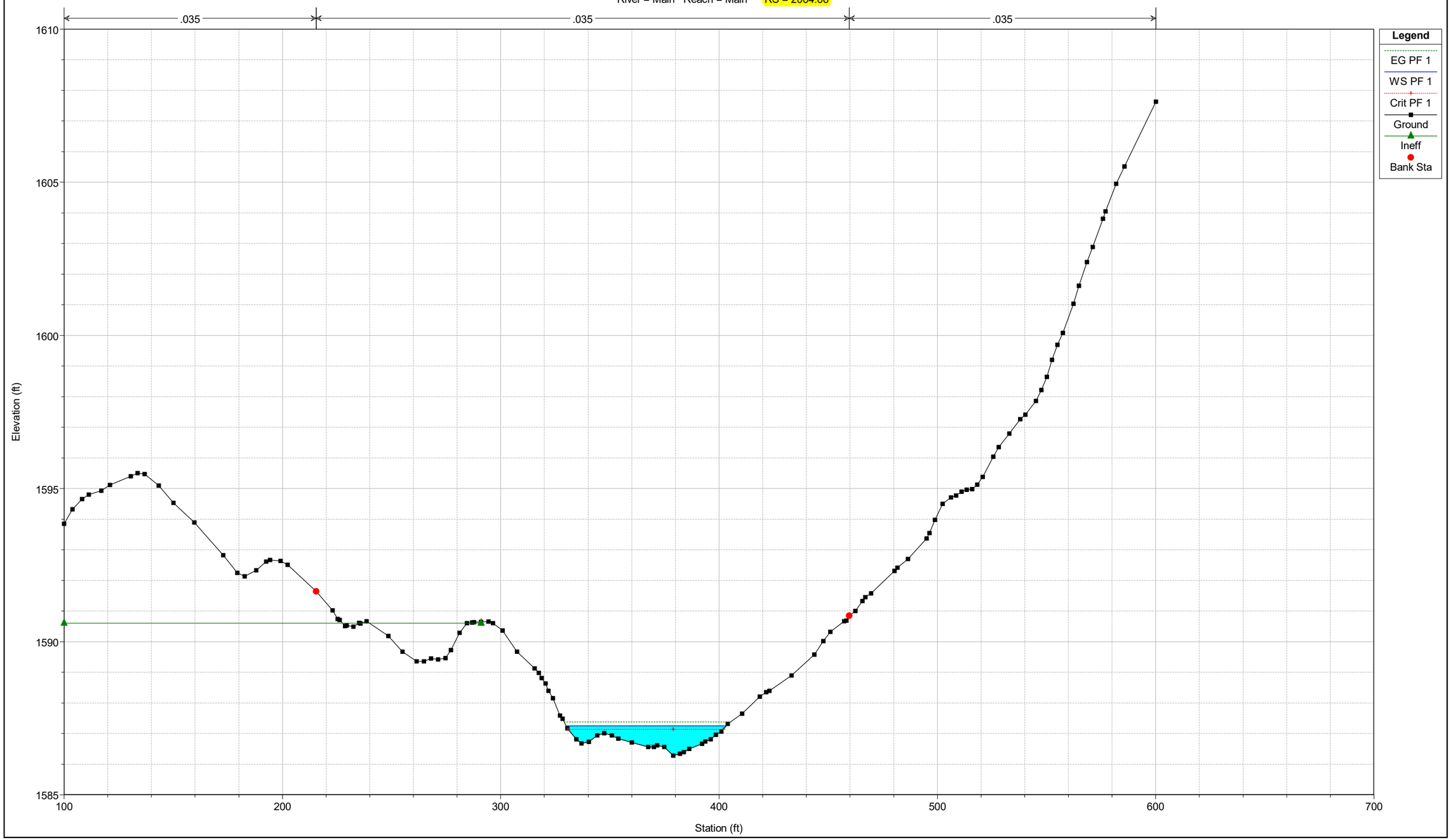
Crescent Plan: Plan 13 10/18/2023

River = Main Reach = Main RS = 2199.13



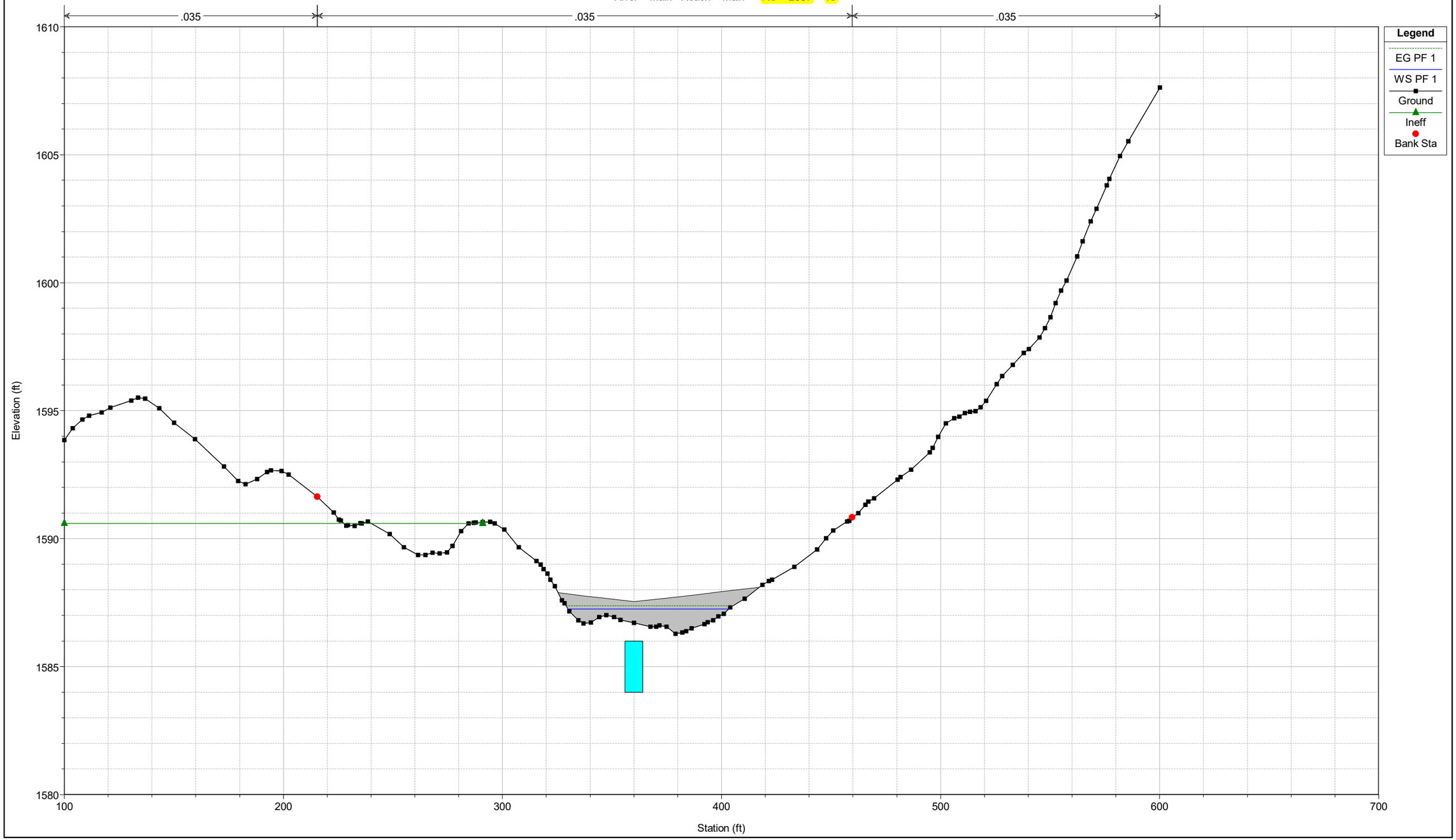
Crescent Plan: Plan 13 10/18/2023

River = Main Reach = Main RS = 2064.66



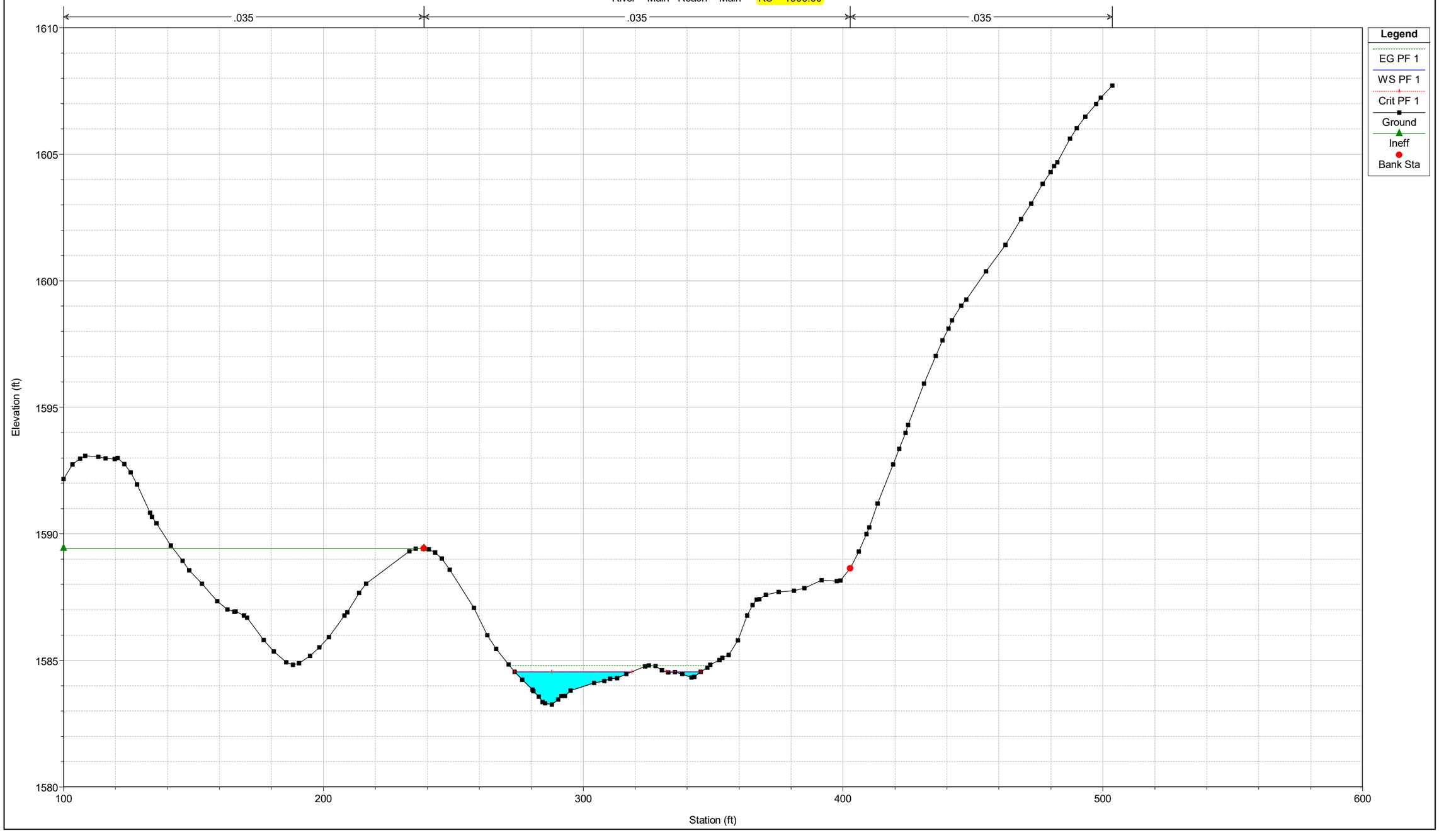
Crescent Plan: Plan 13 10/18/2023

River = Main Reach = Main RS = 2007 IS



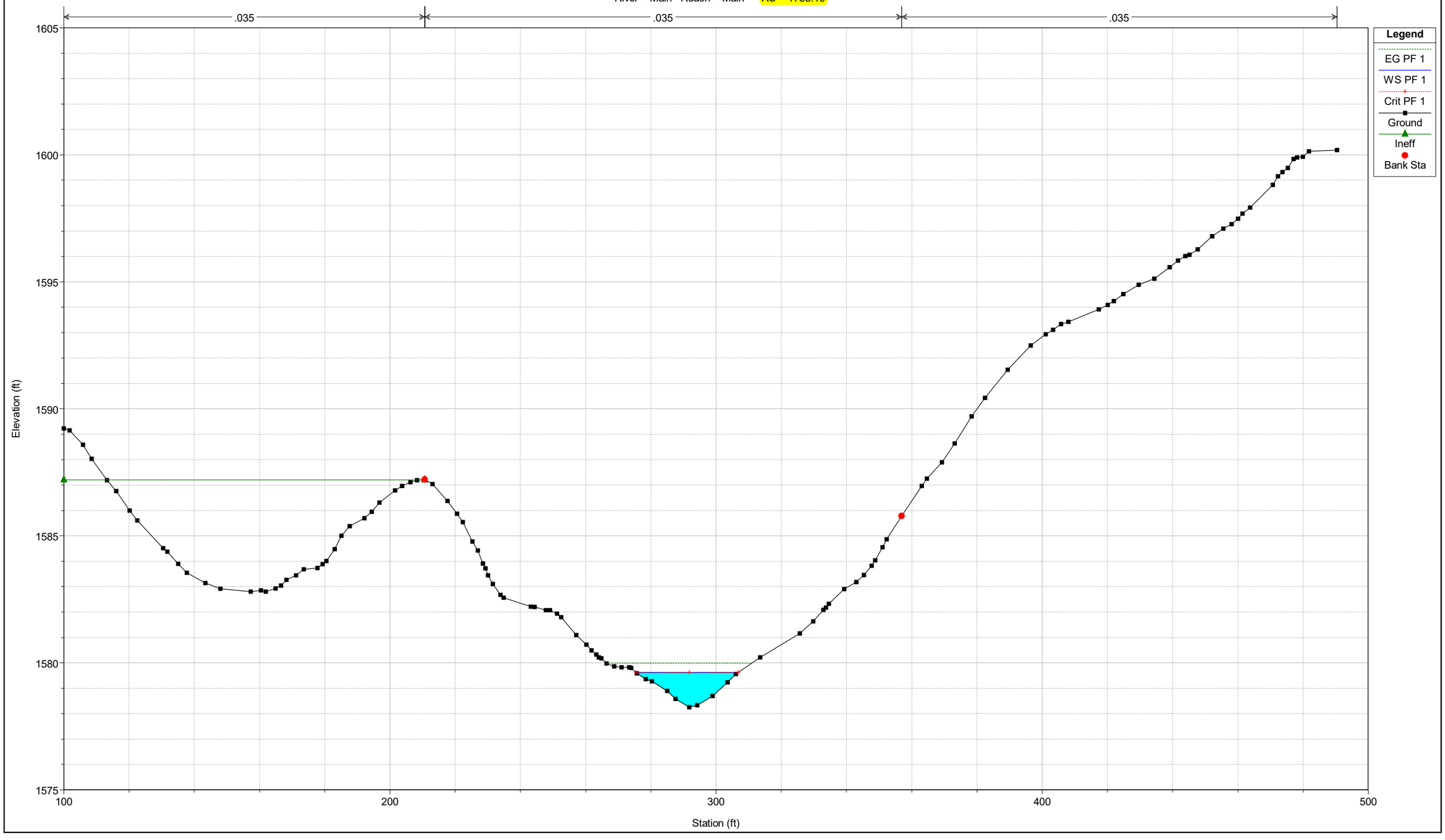
Crescent Plan: Plan 13 10/18/2023

River = Main Reach = Main RS = 1900.00



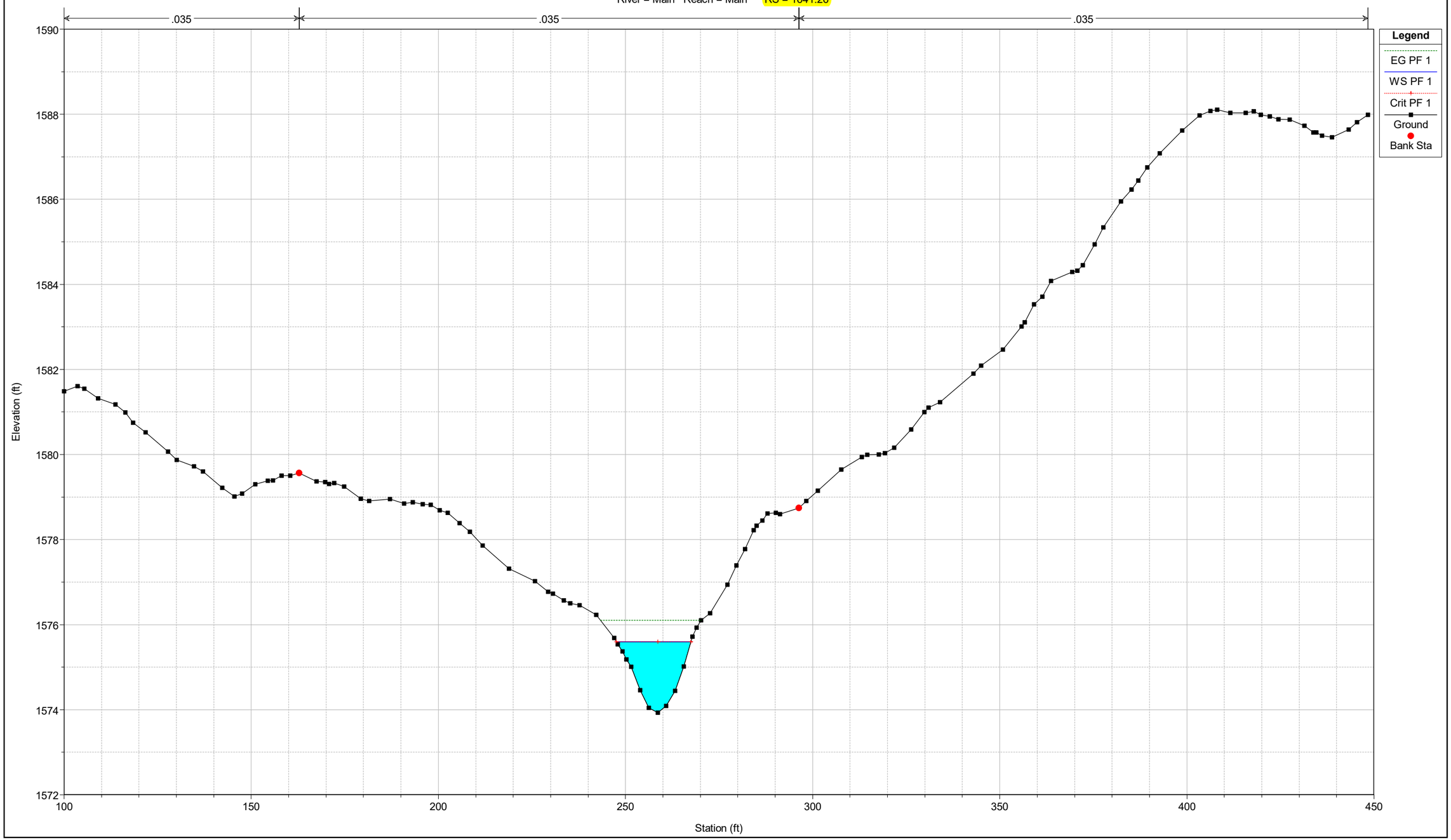
Crescent Plan: Plan 13 10/18/2023

River = Main Reach = Main RS = 1738.19



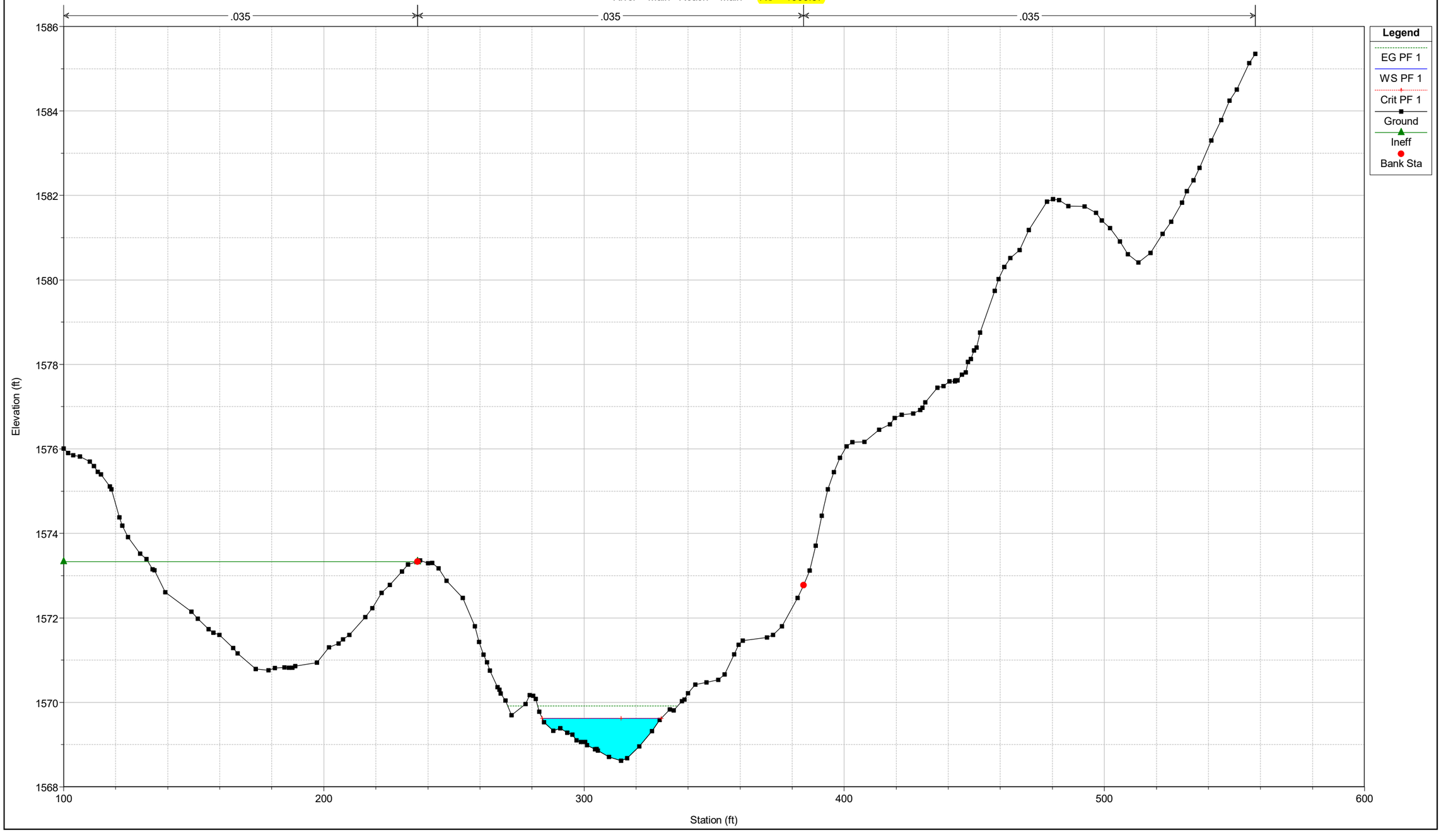
Crescent Plan: Plan 13 10/18/2023

River = Main Reach = Main RS = 1641.26



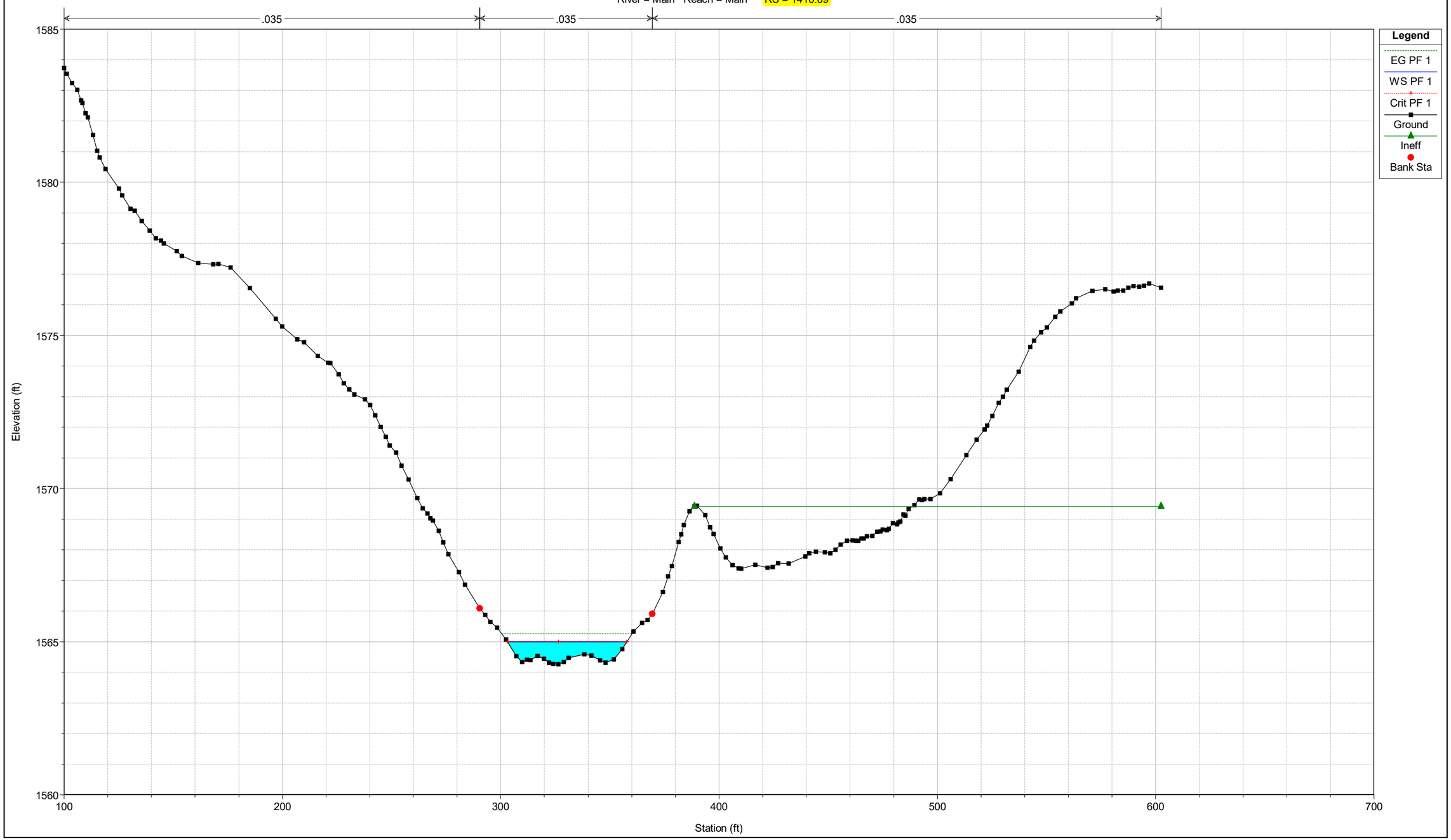
Crescent Plan: Plan 13 10/18/2023

River = Main Reach = Main RS = 1563.87



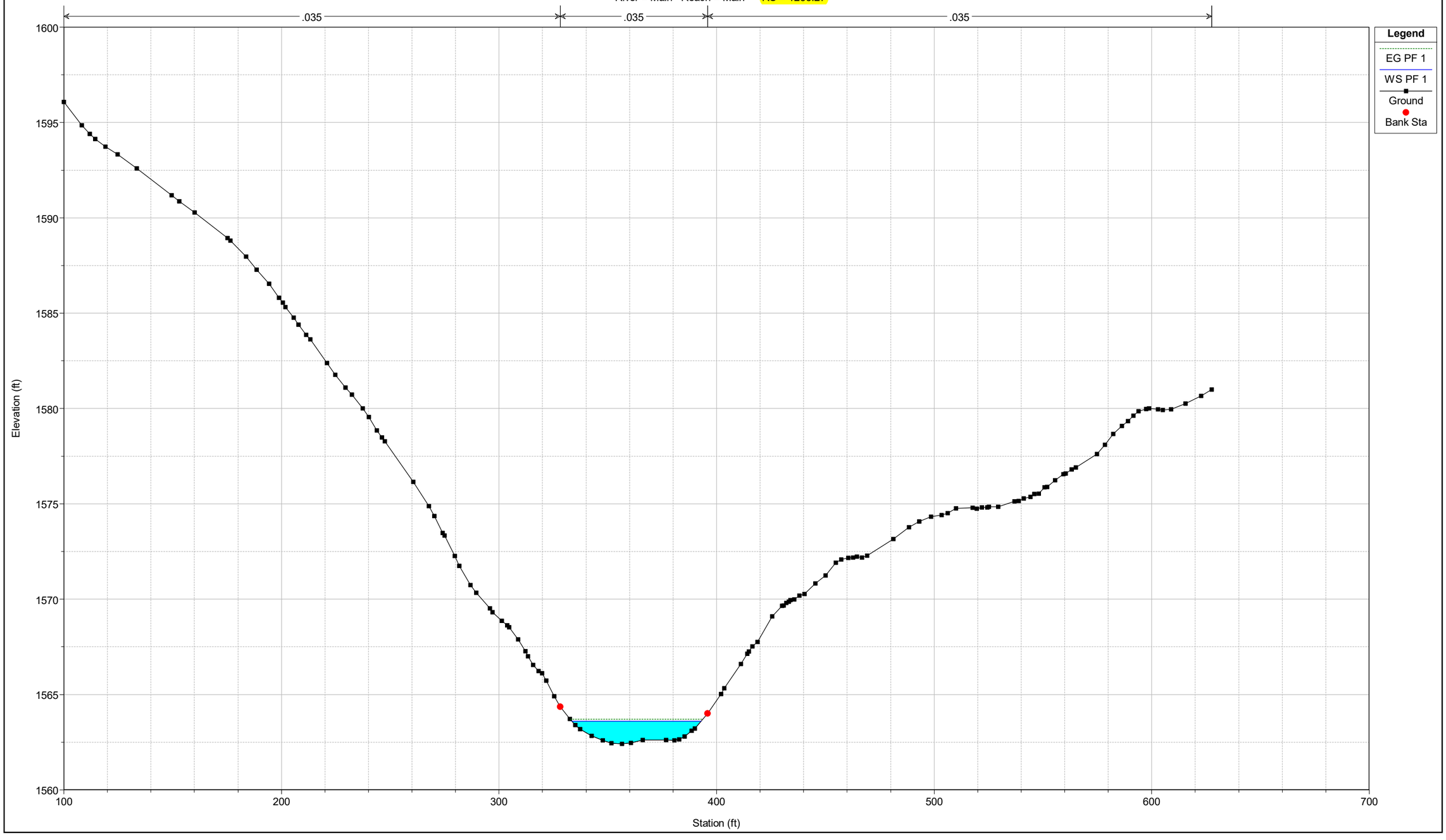
Crescent Plan: Plan 13 10/18/2023

River = Main Reach = Main RS = 1410.09



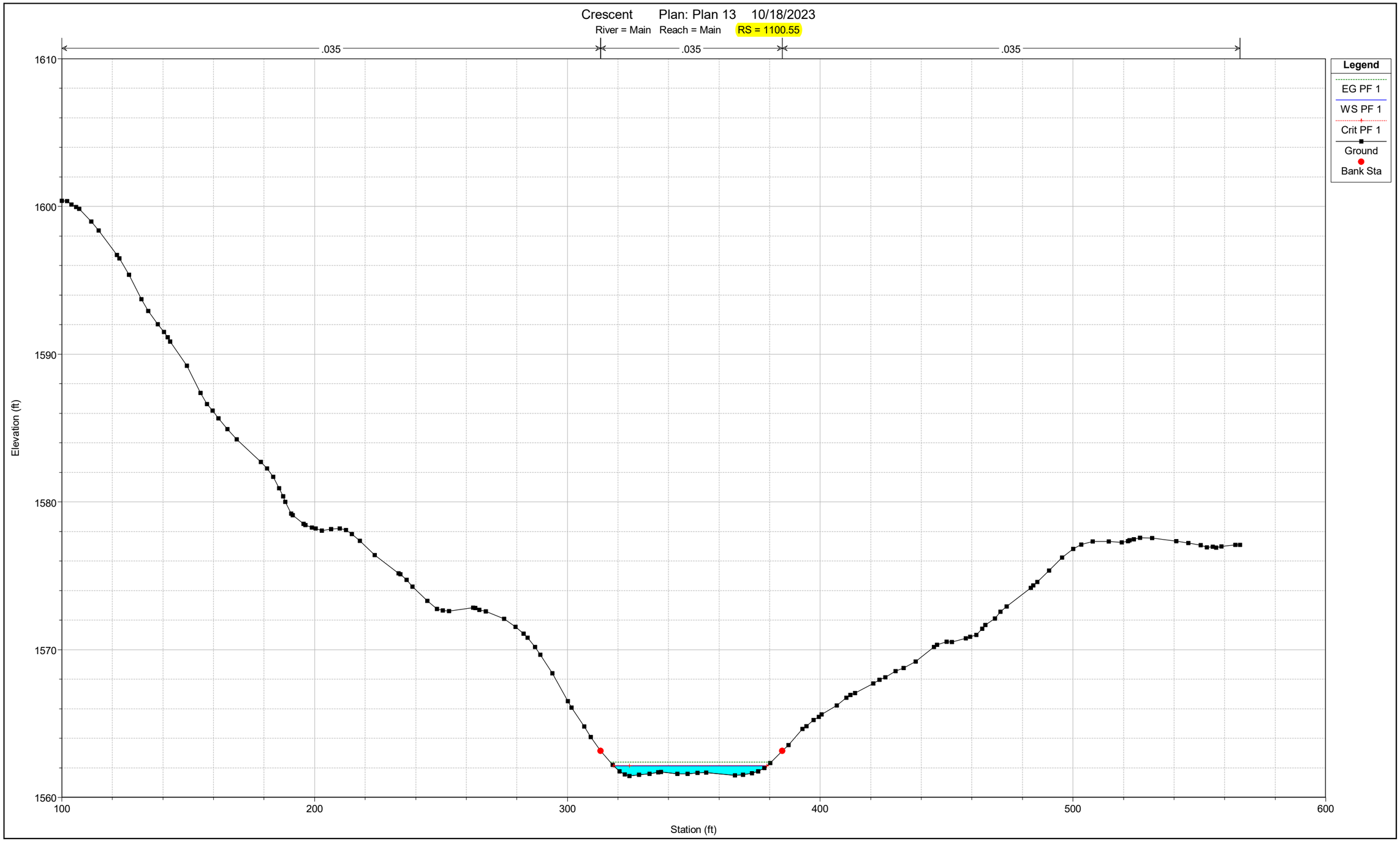
Crescent Plan: Plan 13 10/18/2023

River = Main Reach = Main RS = 1266.27



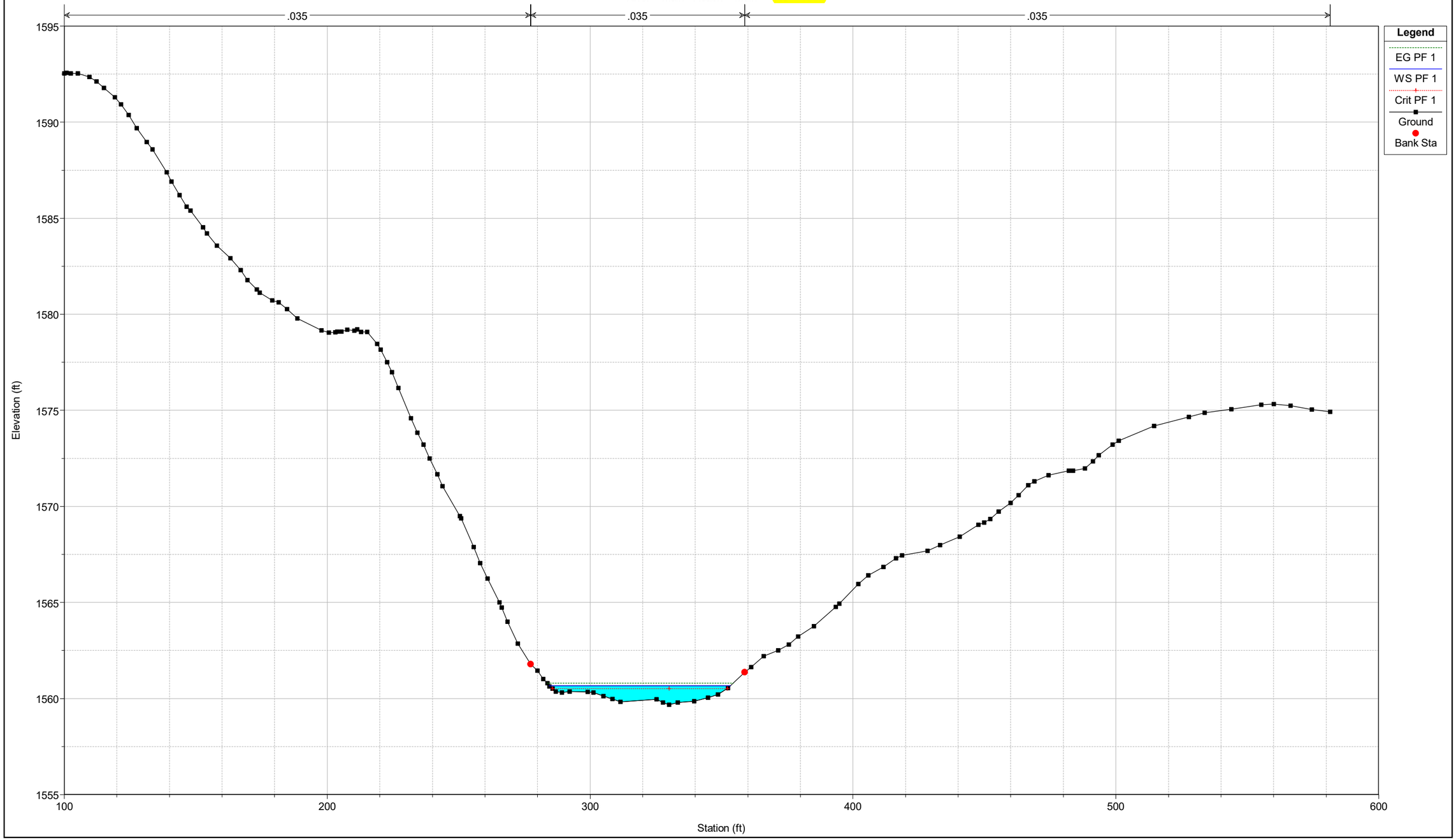
Crescent Plan: Plan 13 10/18/2023

River = Main Reach = Main RS = 1100.55



Crescent Plan: Plan 13 10/18/2023

River = Main Reach = Main RS = 1000



Plan: Plan 13 Main Main RS: 2646.58 Profile: PF 1

E.G. Elev (ft)	1601.44	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.		0.035	
W.S. Elev (ft)	1601.41	Reach Len. (ft)	114.07	87.94	127.53
Crit W.S. (ft)	1600.22	Flow Area (sq ft)		95.95	
E.G. Slope (ft/ft)	0.000505	Area (sq ft)		1298.91	
Q Total (cfs)	111.00	Flow (cfs)		111.00	
Top Width (ft)	346.96	Top Width (ft)		346.96	
Vel Total (ft/s)	1.16	Avg. Vel. (ft/s)		1.16	
Max Chl Dpth (ft)	9.76	Hydr. Depth (ft)		1.34	
Conv. Total (cfs)	4940.1	Conv. (cfs)		4940.1	
Length Wtd. (ft)	87.94	Wetted Per. (ft)		71.84	
Min Ch El (ft)	1591.65	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)		0.05	
Frctn Loss (ft)	0.13	Cum Volume (acre-ft)	0.00	9.96	0.34
C & E Loss (ft)	0.04	Cum SA (acres)	0.00	4.35	0.32

Plan: Plan 13 Main Main RS: 2558.64 Profile: PF 1

E.G. Elev (ft)	1601.27	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.37	Wt. n-Val.	0.000	0.035	
W.S. Elev (ft)	1600.89	Reach Len. (ft)	188.20	195.37	122.16
Crit W.S. (ft)	1600.89	Flow Area (sq ft)	0.00	22.60	
E.G. Slope (ft/ft)	0.019646	Area (sq ft)	0.00	1151.78	120.10
Q Total (cfs)	111.00	Flow (cfs)	0.00	111.00	
Top Width (ft)	456.59	Top Width (ft)	0.15	345.74	110.70
Vel Total (ft/s)	4.91	Avg. Vel. (ft/s)	0.21	4.91	
Max Chl Dpth (ft)	6.77	Hydr. Depth (ft)	0.01	0.76	
Conv. Total (cfs)	791.9	Conv. (cfs)	0.0	791.9	
Length Wtd. (ft)	195.32	Wetted Per. (ft)	0.15	30.13	
Min Ch El (ft)	1594.12	Shear (lb/sq ft)		0.92	
Alpha	1.00	Stream Power (lb/ft s)		4.52	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	0.00	7.48	0.17
C & E Loss (ft)	0.04	Cum SA (acres)	0.00	3.65	0.16

Plan: Plan 13 Main Main RS: 2363.27 Profile: PF 1

E.G. Elev (ft)	1597.08	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.035	
W.S. Elev (ft)	1597.08	Reach Len. (ft)	165.63	164.14	180.84
Crit W.S. (ft)	1597.08	Flow Area (sq ft)		411.32	
E.G. Slope (ft/ft)	0.000015	Area (sq ft)		411.32	
Q Total (cfs)	111.00	Flow (cfs)		111.00	
Top Width (ft)	191.98	Top Width (ft)		191.98	
Vel Total (ft/s)	0.27	Avg. Vel. (ft/s)		0.27	
Max Chl Dpth (ft)	3.78	Hydr. Depth (ft)		2.14	
Conv. Total (cfs)	28982.0	Conv. (cfs)		28982.0	
Length Wtd. (ft)	164.14	Wetted Per. (ft)		192.38	
Min Ch El (ft)	1593.30	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		3.98	0.00
C & E Loss (ft)	0.00	Cum SA (acres)		2.45	0.00

Plan: Plan 13 Main Main RS: 2199.13 Profile: PF 1

E.G. Elev (ft)	1593.69	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.035	0.035
W.S. Elev (ft)	1593.69	Reach Len. (ft)	136.03	134.47	122.13
Crit W.S. (ft)	1593.69	Flow Area (sq ft)		622.62	0.01
E.G. Slope (ft/ft)	0.000004	Area (sq ft)		622.62	0.01
Q Total (cfs)	111.00	Flow (cfs)		111.00	0.00
Top Width (ft)	203.72	Top Width (ft)		202.97	0.76
Vel Total (ft/s)	0.18	Avg. Vel. (ft/s)		0.18	0.01
Max Chl Dpth (ft)	5.54	Hydr. Depth (ft)		3.07	0.02
Conv. Total (cfs)	55686.6	Conv. (cfs)		55686.6	0.0
Length Wtd. (ft)	134.46	Wetted Per. (ft)		203.62	0.76
Min Ch El (ft)	1588.15	Shear (lb/sq ft)		0.00	0.00
Alpha	1.00	Stream Power (lb/ft s)		0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		2.03	0.00
C & E Loss (ft)	0.01	Cum SA (acres)		1.70	0.00

Plan: Plan 13 Main Main RS: 2064.66 Profile: PF 1

E.G. Elev (ft)	1587.38	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.13	Wt. n-Val.		0.035	
W.S. Elev (ft)	1587.26	Reach Len. (ft)	150.15	164.66	161.54
Crit W.S. (ft)	1587.14	Flow Area (sq ft)		39.12	
E.G. Slope (ft/ft)	0.010376	Area (sq ft)		39.12	
Q Total (cfs)	111.00	Flow (cfs)		111.00	
Top Width (ft)	73.54	Top Width (ft)		73.54	
Vel Total (ft/s)	2.84	Avg. Vel. (ft/s)		2.84	
Max Chl Dpth (ft)	0.98	Hydr. Depth (ft)		0.53	
Conv. Total (cfs)	1089.7	Conv. (cfs)		1089.7	
Length Wtd. (ft)	164.66	Wetted Per. (ft)		73.61	
Min Ch El (ft)	1586.28	Shear (lb/sq ft)		0.34	
Alpha	1.00	Stream Power (lb/ft s)		0.98	
Frctn Loss (ft)		Cum Volume (acre-ft)		1.01	
C & E Loss (ft)		Cum SA (acres)		1.28	

Plan: Plan 13 Main Main RS: 1900.00 Profile: PF 1

E.G. Elev (ft)	1584.79	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.24	Wt. n-Val.		0.035	
W.S. Elev (ft)	1584.55	Reach Len. (ft)	123.86	161.81	187.22
Crit W.S. (ft)	1584.55	Flow Area (sq ft)		28.40	
E.G. Slope (ft/ft)	0.022363	Area (sq ft)		28.40	
Q Total (cfs)	111.00	Flow (cfs)		111.00	
Top Width (ft)	58.65	Top Width (ft)		58.65	
Vel Total (ft/s)	3.91	Avg. Vel. (ft/s)		3.91	
Max Chl Dpth (ft)	1.30	Hydr. Depth (ft)		0.48	
Conv. Total (cfs)	742.3	Conv. (cfs)		742.3	
Length Wtd. (ft)	161.81	Wetted Per. (ft)		58.77	
Min Ch El (ft)	1583.25	Shear (lb/sq ft)		0.67	
Alpha	1.00	Stream Power (lb/ft s)		2.64	
Frctn Loss (ft)	3.41	Cum Volume (acre-ft)		0.65	
C & E Loss (ft)	0.01	Cum SA (acres)		1.03	

Plan: Plan 13 Main Main RS: 1738.19 Profile: PF 1

E.G. Elev (ft)	1579.99	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.36	Wt. n-Val.		0.035	
W.S. Elev (ft)	1579.62	Reach Len. (ft)	89.81	96.93	106.19
Crit W.S. (ft)	1579.62	Flow Area (sq ft)		22.93	
E.G. Slope (ft/ft)	0.019839	Area (sq ft)		22.93	
Q Total (cfs)	111.00	Flow (cfs)		111.00	
Top Width (ft)	31.36	Top Width (ft)		31.36	
Vel Total (ft/s)	4.84	Avg. Vel. (ft/s)		4.84	
Max Chl Dpth (ft)	1.36	Hydr. Depth (ft)		0.73	
Conv. Total (cfs)	788.1	Conv. (cfs)		788.1	
Length Wtd. (ft)	96.93	Wetted Per. (ft)		31.49	
Min Ch El (ft)	1578.26	Shear (lb/sq ft)		0.90	
Alpha	1.00	Stream Power (lb/ft s)		4.37	
Frctn Loss (ft)	1.87	Cum Volume (acre-ft)		0.55	
C & E Loss (ft)	0.01	Cum SA (acres)		0.86	

Plan: Plan 13 Main Main RS: 1641.26 Profile: PF 1

E.G. Elev (ft)	1576.10	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.50	Wt. n-Val.		0.035	
W.S. Elev (ft)	1575.60	Reach Len. (ft)	77.02	77.39	73.95
Crit W.S. (ft)	1575.60	Flow Area (sq ft)		19.55	
E.G. Slope (ft/ft)	0.018794	Area (sq ft)		19.55	
Q Total (cfs)	111.00	Flow (cfs)		111.00	
Top Width (ft)	19.96	Top Width (ft)		19.96	
Vel Total (ft/s)	5.68	Avg. Vel. (ft/s)		5.68	
Max Chl Dpth (ft)	1.67	Hydr. Depth (ft)		0.98	
Conv. Total (cfs)	809.7	Conv. (cfs)		809.7	
Length Wtd. (ft)	77.39	Wetted Per. (ft)		20.30	
Min Ch El (ft)	1573.93	Shear (lb/sq ft)		1.13	
Alpha	1.00	Stream Power (lb/ft s)		6.42	
Frctn Loss (ft)	1.58	Cum Volume (acre-ft)		0.50	
C & E Loss (ft)	0.06	Cum SA (acres)		0.80	

Plan: Plan 13 Main Main RS: 1563.87 Profile: PF 1

E.G. Elev (ft)	1569.91	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.29	Wt. n-Val.		0.035	
W.S. Elev (ft)	1569.62	Reach Len. (ft)	138.91	153.78	159.49
Crit W.S. (ft)	1569.62	Flow Area (sq ft)		25.80	
E.G. Slope (ft/ft)	0.022123	Area (sq ft)		25.80	
Q Total (cfs)	111.00	Flow (cfs)		111.00	
Top Width (ft)	45.80	Top Width (ft)		45.80	
Vel Total (ft/s)	4.30	Avg. Vel. (ft/s)		4.30	
Max Chl Dpth (ft)	1.00	Hydr. Depth (ft)		0.56	
Conv. Total (cfs)	746.3	Conv. (cfs)		746.3	
Length Wtd. (ft)	153.78	Wetted Per. (ft)		45.86	
Min Ch El (ft)	1568.62	Shear (lb/sq ft)		0.78	
Alpha	1.00	Stream Power (lb/ft s)		3.34	
Frctn Loss (ft)	3.43	Cum Volume (acre-ft)		0.46	
C & E Loss (ft)	0.01	Cum SA (acres)		0.74	

Plan: Plan 13 Main Main RS: 1410.09 Profile: PF 1

E.G. Elev (ft)	1565.26	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.26	Wt. n-Val.		0.035	
W.S. Elev (ft)	1565.00	Reach Len. (ft)	135.80	143.82	136.89
Crit W.S. (ft)	1565.00	Flow Area (sq ft)		28.17	
E.G. Slope (ft/ft)	0.022428	Area (sq ft)		28.17	
Q Total (cfs)	115.00	Flow (cfs)		115.00	
Top Width (ft)	54.68	Top Width (ft)		54.68	
Vel Total (ft/s)	4.08	Avg. Vel. (ft/s)		4.08	
Max Chl Dpth (ft)	0.74	Hydr. Depth (ft)		0.52	
Conv. Total (cfs)	767.9	Conv. (cfs)		767.9	
Length Wtd. (ft)	143.82	Wetted Per. (ft)		54.76	
Min Ch El (ft)	1564.26	Shear (lb/sq ft)		0.72	
Alpha	1.00	Stream Power (lb/ft s)		2.94	
Frctn Loss (ft)	1.08	Cum Volume (acre-ft)		0.37	
C & E Loss (ft)	0.05	Cum SA (acres)		0.57	

Plan: Plan 13 Main Main RS: 1266.27 Profile: PF 1

E.G. Elev (ft)	1563.70	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.		0.035	
W.S. Elev (ft)	1563.61	Reach Len. (ft)	165.76	165.72	165.70
Crit W.S. (ft)		Flow Area (sq ft)		51.43	
E.G. Slope (ft/ft)	0.003867	Area (sq ft)		51.43	
Q Total (cfs)	123.00	Flow (cfs)		123.00	
Top Width (ft)	59.55	Top Width (ft)		59.55	
Vel Total (ft/s)	2.39	Avg. Vel. (ft/s)		2.39	
Max Chl Dpth (ft)	1.19	Hydr. Depth (ft)		0.86	
Conv. Total (cfs)	1977.9	Conv. (cfs)		1977.9	
Length Wtd. (ft)	165.72	Wetted Per. (ft)		59.65	
Min Ch El (ft)	1562.42	Shear (lb/sq ft)		0.21	
Alpha	1.00	Stream Power (lb/ft s)		0.50	
Frctn Loss (ft)	1.29	Cum Volume (acre-ft)		0.24	
C & E Loss (ft)	0.02	Cum SA (acres)		0.38	

Plan: Plan 13 Main Main RS: 1100.55 Profile: PF 1

E.G. Elev (ft)	1562.39	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.25	Wt. n-Val.		0.035	
W.S. Elev (ft)	1562.13	Reach Len. (ft)	105.49	100.55	102.81
Crit W.S. (ft)	1562.13	Flow Area (sq ft)		30.38	
E.G. Slope (ft/ft)	0.022863	Area (sq ft)		30.38	
Q Total (cfs)	123.00	Flow (cfs)		123.00	
Top Width (ft)	60.60	Top Width (ft)		60.60	
Vel Total (ft/s)	4.05	Avg. Vel. (ft/s)		4.05	
Max Chl Dpth (ft)	0.68	Hydr. Depth (ft)		0.50	
Conv. Total (cfs)	813.5	Conv. (cfs)		813.5	
Length Wtd. (ft)	100.55	Wetted Per. (ft)		60.68	
Min Ch El (ft)	1561.45	Shear (lb/sq ft)		0.71	
Alpha	1.00	Stream Power (lb/ft s)		2.89	
Frctn Loss (ft)	1.46	Cum Volume (acre-ft)		0.08	
C & E Loss (ft)	0.03	Cum SA (acres)		0.15	

Plan: Plan 13 Main Main RS: 1000 Profile: PF 1

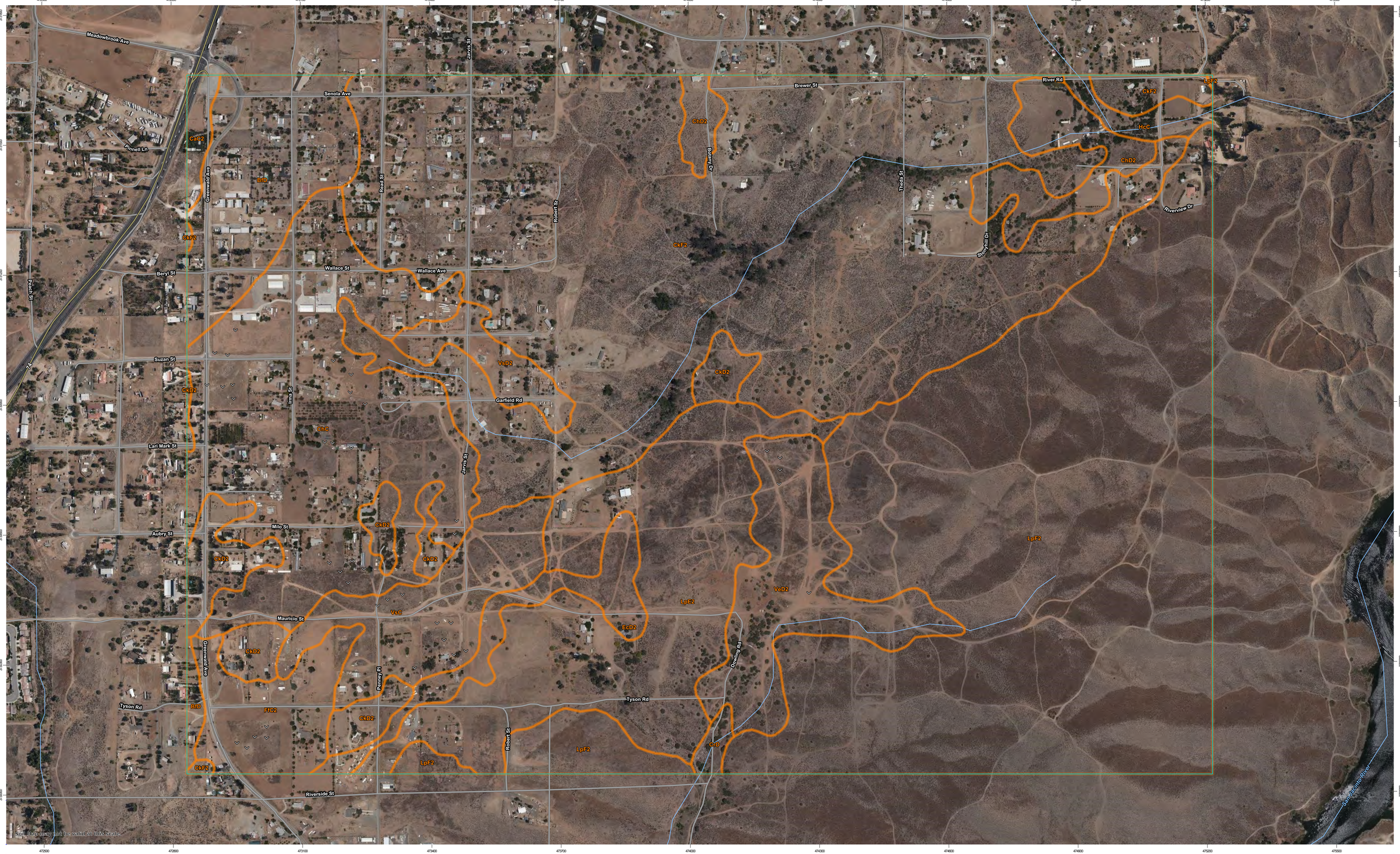
E.G. Elev (ft)	1560.81	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.		0.035	
W.S. Elev (ft)	1560.67	Reach Len. (ft)			
Crit W.S. (ft)	1560.52	Flow Area (sq ft)		41.01	
E.G. Slope (ft/ft)	0.010002	Area (sq ft)		41.01	
Q Total (cfs)	123.00	Flow (cfs)		123.00	
Top Width (ft)	69.02	Top Width (ft)		69.02	
Vel Total (ft/s)	3.00	Avg. Vel. (ft/s)		3.00	
Max Chl Dpth (ft)	0.98	Hydr. Depth (ft)		0.59	
Conv. Total (cfs)	1229.9	Conv. (cfs)		1229.9	
Length Wtd. (ft)		Wetted Per. (ft)		69.10	
Min Ch El (ft)	1559.68	Shear (lb/sq ft)		0.37	
Alpha	1.00	Stream Power (lb/ft s)		1.11	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Plan: Plan 13 Main Main RS: 2007 Culv Group: Culvert #1 Profile: PF 1

E.G. Elev (ft)	1587.38	Weir Sta Lft (ft)	
W.S. Elev (ft)	1587.26	Weir Sta Rgt (ft)	
Q Total (cfs)	111.00	Min El Weir Flow (ft)	1587.55
Q Weir (cfs)		Wr Top Wdth (ft)	
Q Gates (cfs)		Weir Max Depth (ft)	
Q Culv (cfs)	111.00	Weir Avg Depth (ft)	
Q Inline RC (cfs)		Weir Flow Area (sq ft)	
Q Outlet TS (cfs)		Weir Coef (ft^1/2)	
Q Breach (cfs)		Weir Submerg	
Breach Avg Velocity (ft/s)			
Breach Flow Area (sq ft)		Q Culv Group (cfs)	111.00
Breach WD (ft)		# Barrels	1
Breach Top El (ft)		Culv Length (ft)	41.60
Breach Bottom El (ft)		Culv Depth Blocked (ft)	0.00
Breach SSL (ft)		Culv Inv El Up (ft)	1584.00
Breach SSR (ft)		Culv Inv El Dn (ft)	1583.60

SECTION 6
REFERENCES

HYDROLOGIC SOILS GROUP MAP
(NRCS MAP)



Map Scale: 1:4,010 if printed on D landscape (34" x 22") sheet.

Meters: 0 50 100 200 300

Feet: 0 150 300 600 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Western Riverside Area, California
Survey Area Data: Version 14, Sep 13, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 25, 2019—Jun 25, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BfD	Bosanko clay, 9 to 15 percent slopes	38.7	4.1%
CaC2	Cajalco fine sandy loam, 2 to 8 percent slopes, eroded	3.8	0.4%
ChC	Cieneba sandy loam, 5 to 8 percent slopes	102.7	10.8%
ChD2	Cieneba sandy loam, 8 to 15 percent slopes, eroded	21.4	2.2%
CkD2	Cieneba rocky sandy loam, 8 to 15 percent slopes, eroded	26.9	2.8%
CkF2	Cieneba rocky sandy loam, 15 to 50 percent slopes, eroded	296.8	31.2%
CrD	Cortina cobbly sandy loam, 2 to 12 percent slopes	2.2	0.2%
EcD2	Escondido fine sandy loam, 8 to 15 percent slopes, eroded	14.5	1.5%
FfC2	Fallbrook fine sandy loam, 2 to 8 percent slopes, eroded	20.4	2.1%
HcC	Hanford coarse sandy loam, 2 to 8 percent slopes	5.3	0.6%
LpE2	Lodo rocky loam, 8 to 25 percent slopes, eroded	85.1	9.0%
LpF2	Lodo rocky loam, 25 to 50 percent slopes, eroded	255.2	26.8%
VeD2	Vallecitos loam, thick solum variant, 8 to 15 percent slopes, eroded	37.8	4.0%
VsC	Vista coarse sandy loam, 2 to 8 percent slopes	29.7	3.1%
VsD2	Vista coarse sandy loam, 8 to 15 percent slopes, eroded	10.1	1.1%
Totals for Area of Interest		**950.8**	**100.0%**

Western Riverside Area, California

BfD—Bosanko clay, 9 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2xm61
Elevation: 100 to 2,040 feet
Mean annual precipitation: 9 to 16 inches
Mean annual air temperature: 63 to 65 degrees F
Frost-free period: 321 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Bosanko and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bosanko

Setting

Landform: Hillslopes, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from granite

Typical profile

Ap - 0 to 5 inches: clay
Bss - 5 to 25 inches: clay
Bk - 25 to 37 inches: clay
Cr - 37 to 79 inches: bedrock

Properties and qualities

Slope: 9 to 15 percent
Depth to restrictive feature: 26 to 38 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Available water supply, 0 to 60 inches: Low (about 5.8 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Ecological site: R019XD001CA - CLAYEY (1975)

Hydric soil rating: No

Minor Components

Vista

Percent of map unit: 3 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Bonsall

Percent of map unit: 3 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Fallbrook

Percent of map unit: 3 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Alo

Percent of map unit: 3 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Balcom

Percent of map unit: 3 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Data Source Information

Soil Survey Area: Western Riverside Area, California
Survey Area Data: Version 14, Sep 13, 2021

Western Riverside Area, California

CaC2—Cajalco fine sandy loam, 2 to 8 percent slopes, eroded

Map Unit Setting

National map unit symbol: hcry
Elevation: 900 to 3,500 feet
Mean annual precipitation: 12 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 230 to 300 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Cajalco and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cajalco

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from gabbro

Typical profile

H1 - 0 to 13 inches: fine sandy loam
H2 - 13 to 30 inches: loam
H3 - 30 to 62 inches: weathered bedrock

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R019XD029CA - LOAMY

Hydric soil rating: No

Minor Components

Las posas
Percent of map unit: 5 percent
Hydric soil rating: No

Honcut
Percent of map unit: 5 percent
Hydric soil rating: No

Wyman
Percent of map unit: 5 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: Western Riverside Area, California
Survey Area Data: Version 14, Sep 13, 2021

Western Riverside Area, California

ChC—Cieneba sandy loam, 5 to 8 percent slopes

Map Unit Setting

National map unit symbol: hcs9
Elevation: 500 to 4,000 feet
Mean annual precipitation: 12 to 35 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 200 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Cieneba and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cieneba

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from igneous rock

Typical profile

H1 - 0 to 14 inches: sandy loam
H2 - 14 to 22 inches: weathered bedrock

Properties and qualities

Slope: 5 to 8 percent
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.4 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: R019XD060CA - SHALLOW LOAMY (1975)
Hydric soil rating: No

Minor Components

Fallbrook
Percent of map unit: 5 percent
Hydric soil rating: No

Vista
Percent of map unit: 5 percent
Hydric soil rating: No

Friant
Percent of map unit: 5 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: Western Riverside Area, California
Survey Area Data: Version 14, Sep 13, 2021

Western Riverside Area, California

ChD2—Cieneba sandy loam, 8 to 15 percent slopes, eroded

Map Unit Setting

National map unit symbol: hcsb
Elevation: 500 to 4,000 feet
Mean annual precipitation: 12 to 35 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 200 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Cieneba and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cieneba

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Residuum weathered from igneous rock

Typical profile

H1 - 0 to 14 inches: sandy loam
H2 - 14 to 22 inches: weathered bedrock

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: R019XD060CA - SHALLOW LOAMY (1975)
Hydric soil rating: No

Minor Components

Friant
Percent of map unit: 5 percent
Hydric soil rating: No

Vista
Percent of map unit: 5 percent
Hydric soil rating: No

Fallbrook
Percent of map unit: 5 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: Western Riverside Area, California
Survey Area Data: Version 14, Sep 13, 2021

Western Riverside Area, California

CkD2—Cieneba rocky sandy loam, 8 to 15 percent slopes, eroded

Map Unit Setting

National map unit symbol: hcsd
Elevation: 500 to 4,000 feet
Mean annual precipitation: 12 to 35 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 200 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Cieneba and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cieneba

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Residuum weathered from igneous rock

Typical profile

H1 - 0 to 14 inches: sandy loam
H2 - 14 to 22 inches: weathered bedrock

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: R019XD060CA - SHALLOW LOAMY (1975)
Hydric soil rating: No

Minor Components

Rock outcrop
Percent of map unit: 10 percent
Hydric soil rating: No

Friant
Percent of map unit: 5 percent
Hydric soil rating: No

Fallbrook
Percent of map unit: 5 percent
Hydric soil rating: No

Vista
Percent of map unit: 5 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: Western Riverside Area, California
Survey Area Data: Version 14, Sep 13, 2021

Western Riverside Area, California

CkF2—Cieneba rocky sandy loam, 15 to 50 percent slopes, eroded

Map Unit Setting

National map unit symbol: hcsf
Elevation: 500 to 4,000 feet
Mean annual precipitation: 12 to 35 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 200 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Cieneba and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cieneba

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from igneous rock

Typical profile

H1 - 0 to 14 inches: sandy loam
H2 - 14 to 22 inches: weathered bedrock

Properties and qualities

Slope: 15 to 50 percent
Depth to restrictive feature: 14 to 22 inches to paralithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: R019XD060CA - SHALLOW LOAMY (1975)
Hydric soil rating: No

Minor Components

Rock outcrop
Percent of map unit: 10 percent
Hydric soil rating: No

Vista
Percent of map unit: 3 percent
Hydric soil rating: No

Fallbrook
Percent of map unit: 3 percent
Hydric soil rating: No

Escondido
Percent of map unit: 3 percent
Hydric soil rating: No

Friant
Percent of map unit: 3 percent
Hydric soil rating: No

Unnamed
Percent of map unit: 3 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: Western Riverside Area, California
Survey Area Data: Version 14, Sep 13, 2021

Western Riverside Area, California

CrD—Cortina cobbly sandy loam, 2 to 12 percent slopes

Map Unit Setting

National map unit symbol: hcsm
Elevation: 30 to 2,400 feet
Mean annual precipitation: 12 to 40 inches
Mean annual air temperature: 61 to 63 degrees F
Frost-free period: 240 to 270 days
Farmland classification: Not prime farmland

Map Unit Composition

Cortina and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cortina

Setting

Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from metasedimentary rock

Typical profile

H1 - 0 to 23 inches: cobbly sandy loam
H2 - 23 to 38 inches: stratified very cobbly loamy sand to very cobbly loam
H3 - 38 to 60 inches: stratified very gravelly sand to very gravelly loamy sand

Properties and qualities

Slope: 2 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Ecological site: R019XD035CA - SANDY (1975)
Hydric soil rating: No

Minor Components

Garretson
Percent of map unit: 10 percent
Hydric soil rating: No

Arbuckle
Percent of map unit: 5 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: Western Riverside Area, California
Survey Area Data: Version 14, Sep 13, 2021

Western Riverside Area, California

EcD2—Escondido fine sandy loam, 8 to 15 percent slopes, eroded

Map Unit Setting

National map unit symbol: hctc
Elevation: 400 to 2,800 feet
Mean annual precipitation: 10 to 20 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 230 to 280 days
Farmland classification: Not prime farmland

Map Unit Composition

Escondido and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Escondido

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from metamorphic rock

Typical profile

H1 - 0 to 5 inches: fine sandy loam
H2 - 5 to 34 inches: silt loam
H3 - 34 to 38 inches: unweathered bedrock

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.0 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: R019XD029CA - LOAMY
Hydric soil rating: No

Minor Components

Friant
Percent of map unit: 3 percent
Hydric soil rating: No

Vallecitos
Percent of map unit: 3 percent
Hydric soil rating: No

Vista
Percent of map unit: 3 percent
Hydric soil rating: No

Fallbrook
Percent of map unit: 3 percent
Hydric soil rating: No

Lodo
Percent of map unit: 3 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: Western Riverside Area, California
Survey Area Data: Version 14, Sep 13, 2021

Western Riverside Area, California

FfC2—Fallbrook fine sandy loam, 2 to 8 percent slopes, eroded

Map Unit Setting

National map unit symbol: hctw
Elevation: 300 to 2,000 feet
Mean annual precipitation: 12 to 25 inches
Mean annual air temperature: 59 to 64 degrees F
Frost-free period: 200 to 280 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Fallbrook and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Fallbrook

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from granodiorite and/or residuum weathered from tonalite

Typical profile

H1 - 0 to 14 inches: fine sandy loam
H2 - 14 to 24 inches: sandy clay loam
H3 - 24 to 28 inches: bedrock

Properties and qualities

Slope: 5 to 8 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.3 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R019XD029CA - LOAMY

Hydric soil rating: No

Minor Components

Bonsall
Percent of map unit: 5 percent
Hydric soil rating: No

Cieneba
Percent of map unit: 5 percent
Hydric soil rating: No

Vista
Percent of map unit: 5 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: Western Riverside Area, California
Survey Area Data: Version 14, Sep 13, 2021

Western Riverside Area, California

HcC—Hanford coarse sandy loam, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2y8tk
Elevation: 680 to 2,930 feet
Mean annual precipitation: 9 to 17 inches
Mean annual air temperature: 63 to 65 degrees F
Frost-free period: 290 to 365 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Hanford and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hanford

Setting

Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

A - 0 to 8 inches: coarse sandy loam
C1 - 8 to 40 inches: fine sandy loam
C2 - 40 to 60 inches: stratified loamy sand to coarse sandy loam

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 7.0 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: A
Ecological site: R020XD012CA - SANDY

Hydric soil rating: No

Minor Components

Greenfield
Percent of map unit: 5 percent
Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Ramona
Percent of map unit: 5 percent
Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Tujunga
Percent of map unit: 2 percent
Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Unnamed
Percent of map unit: 2 percent
Hydric soil rating: No

Unnamed
Percent of map unit: 1 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: Western Riverside Area, California
Survey Area Data: Version 14, Sep 13, 2021

Western Riverside Area, California

LpE2—Lodo rocky loam, 8 to 25 percent slopes, eroded

Map Unit Setting

National map unit symbol: hcwr
Elevation: 300 to 4,000 feet
Mean annual precipitation: 8 to 35 inches
Mean annual air temperature: 45 to 64 degrees F
Frost-free period: 110 to 250 days
Farmland classification: Not prime farmland

Map Unit Composition

Lodo and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lodo

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Metamorphosed residuum weathered from sandstone

Typical profile

H1 - 0 to 8 inches: gravelly loam
H2 - 8 to 19 inches: unweathered bedrock

Properties and qualities

Slope: 8 to 25 percent
Depth to restrictive feature: 8 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: R019XD060CA - SHALLOW LOAMY (1975)
Hydric soil rating: No

Minor Components

Rock outcrop
Percent of map unit: 10 percent
Hydric soil rating: No

Unnamed
Percent of map unit: 3 percent
Hydric soil rating: No

Vallecitos
Percent of map unit: 3 percent
Hydric soil rating: No

Escondido
Percent of map unit: 3 percent
Hydric soil rating: No

Temescal
Percent of map unit: 3 percent
Hydric soil rating: No

Cajalco
Percent of map unit: 3 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: Western Riverside Area, California
Survey Area Data: Version 14, Sep 13, 2021

Western Riverside Area, California

LpF2—Lodo rocky loam, 25 to 50 percent slopes, eroded

Map Unit Setting

National map unit symbol: hcws
Elevation: 300 to 3,500 feet
Mean annual precipitation: 12 to 35 inches
Mean annual air temperature: 59 to 64 degrees F
Frost-free period: 230 to 250 days
Farmland classification: Not prime farmland

Map Unit Composition

Lodo and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lodo

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Metamorphosed residuum weathered from sandstone

Typical profile

H1 - 0 to 8 inches: gravelly loam
H2 - 8 to 19 inches: unweathered bedrock

Properties and qualities

Slope: 25 to 50 percent
Depth to restrictive feature: 8 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: R019XD060CA - SHALLOW LOAMY (1975)
Hydric soil rating: No

Minor Components

Tumescal
Percent of map unit: 5 percent
Hydric soil rating: No

Escondido
Percent of map unit: 5 percent
Hydric soil rating: No

Vallecitos
Percent of map unit: 5 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: Western Riverside Area, California
Survey Area Data: Version 14, Sep 13, 2021

Western Riverside Area, California

VeD2—Vallecitos loam, thick solum variant, 8 to 15 percent slopes, eroded

Map Unit Setting

National map unit symbol: hczr
Elevation: 600 to 2,500 feet
Mean annual precipitation: 12 inches
Mean annual air temperature: 63 to 64 degrees F
Frost-free period: 250 days
Farmland classification: Not prime farmland

Map Unit Composition

Vallecitos and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Vallecitos

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Residuum weathered from metamorphosed sedimentary rock

Typical profile

H1 - 0 to 8 inches: loam
H2 - 8 to 27 inches: clay loam
H3 - 27 to 48 inches: loam
H4 - 48 to 52 inches: unweathered bedrock

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 40 to 60 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.4 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: R019XD029CA - LOAMY
Hydric soil rating: No

Minor Components

Fallbrook

Percent of map unit: 5 percent
Hydric soil rating: No

Friant

Percent of map unit: 5 percent
Hydric soil rating: No

Lodo

Percent of map unit: 5 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: Western Riverside Area, California
Survey Area Data: Version 14, Sep 13, 2021

Western Riverside Area, California

VsC—Vista coarse sandy loam, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: hczx
Elevation: 400 to 3,900 feet
Mean annual precipitation: 10 to 18 inches
Mean annual air temperature: 59 to 64 degrees F
Frost-free period: 210 to 300 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Vista and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Vista

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from granite and/or residuum weathered from granodiorite

Typical profile

H1 - 0 to 15 inches: coarse sandy loam
H2 - 15 to 24 inches: coarse sandy loam
H3 - 24 to 30 inches: weathered bedrock

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: R019XD029CA - LOAMY
Hydric soil rating: No

Minor Components

Bonsall
Percent of map unit: 5 percent
Hydric soil rating: No

Fallbrook
Percent of map unit: 5 percent
Hydric soil rating: No

Cieneba
Percent of map unit: 5 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: Western Riverside Area, California
Survey Area Data: Version 14, Sep 13, 2021

Western Riverside Area, California

VsD2—Vista coarse sandy loam, 8 to 15 percent slopes, eroded

Map Unit Setting

National map unit symbol: hczy
Elevation: 400 to 3,900 feet
Mean annual precipitation: 10 to 18 inches
Mean annual air temperature: 59 to 64 degrees F
Frost-free period: 210 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Vista and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Vista

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from granite and/or residuum weathered from granodiorite

Typical profile

H1 - 0 to 15 inches: coarse sandy loam
H2 - 15 to 24 inches: coarse sandy loam
H3 - 24 to 28 inches: weathered bedrock

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: R019XD029CA - LOAMY

Hydric soil rating: No

Minor Components

Fallbrook
Percent of map unit: 5 percent
Hydric soil rating: No

Bonsall
Percent of map unit: 5 percent
Hydric soil rating: No

Cieneba
Percent of map unit: 5 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: Western Riverside Area, California
Survey Area Data: Version 14, Sep 13, 2021

LAND USE/IMPERVIOUSNESS DATA TABLE (PLATE D-5.5 & D-5.6)

RUNOFF INDEX NUMBERS OF HYDROLOGIC SOIL-COVER COMPLEXES FOR PERVIOUS AREAS-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group A	B	C	D
NATURAL COVERS -					
Barren (Rockland, eroded and graded land)		78	86	91	93
Chaparrel, Broadleaf (Manzonita, ceanothus and scrub oak)	Poor	53	70	80	85
	Fair	40	63	75	81
	Good	31	57	71	78
Chaparrel, Narrowleaf (Chamise and redshank)	Poor	71	82	88	91
	Fair	55	72	81	86
Grass, Annual or Perennial	Poor	67	78	86	89
	Fair	50	69	79	84
	Good	38	61	74	80
Meadows or Cienegas (Areas with seasonally high water table, principal vegetation is sod forming grass)	Poor	63	77	85	88
	Fair	51	70	80	84
	Good	30	58	72	78
Open Brush (Soft wood shrubs - buckwheat, sage, etc.)	Poor	62	76	84	88
	Fair	46	66	77	83
	Good	41	63	75	81
Woodland (Coniferous or broadleaf trees predominate. Canopy density is at least 50 percent)	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	28	55	70	77
Woodland, Grass (Coniferous or broadleaf trees with canopy density from 20 to 50 percent)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
URBAN COVERS -					
Residential or Commercial Landscaping (Lawn, shrubs, etc.)	Good	32	56	69	75
Turf (Irrigated and mowed grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
AGRICULTURAL COVERS -					
Fallow (Land plowed but not tilled or seeded)		76	85	90	92

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RUNOFF INDEX NUMBERS FOR PERVIOUS AREA

RUNOFF INDEX NUMBERS OF HYDROLOGIC SOIL-COVER COMPLEXES FOR PERVIOUS AREAS-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group A	B	C	D
AGRICULTURAL COVERS (cont.) -					
Legumes, Close Seeded (Alfalfa, sweetclover, timothy, etc.)	Poor	66	77	85	89
	Good	58	72	81	85
Orchards, Deciduous (Apples, apricots, pears, walnuts, etc.)		See Note 4			
Orchards, Evergreen (Citrus, avocados, etc.)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
Pasture, Dryland (Annual grasses)	Poor	67	78	86	89
	Fair	50	69	79	84
	Good	38	61	74	80
Pasture, Irrigated (Legumes and perennial grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
Row Crops (Field crops - tomatoes, sugar beets, etc.)	Poor	72	81	88	91
	Good	67	78	85	89
Small Grain (Wheat, oats, barley, etc.)	Poor	65	76	84	88
	Good	63	75	83	87
Vineyard		See Note 4			

Notes:

1. All runoff index (RI) numbers are for Antecedent Moisture Condition (AMC) II.

2. Quality of cover definitions:
   Poor-Heavily grazed or regularly burned areas. Less than 50 percent of the ground surface is protected by plant cover or brush and tree canopy.
   Fair-Moderate cover with 50 percent to 75 percent of the ground surface protected.
   Good-Heavy or dense cover with more than 75 percent of the ground surface protected.

3. See Plate C-2 for a detailed description of cover types.

4. Use runoff index numbers based on ground cover type. See discussion under "Cover Type Descriptions" on Plate C-2.

5. Reference Bibliography item 17.

ACTUAL IMPERVIOUS COVER

Land Use (1)	Range-Percent	Recommended Value For Average Conditions-Percent(2)
Natural or Agriculture	0 - 10	0
Single Family Residential: (3)		
40,000 S. F. (1 Acre) Lots	10 - 25	20
20,000 S. F. (½ Acre) Lots	30 - 45	40
7,200 - 10,000 S. F. Lots	45 - 55	50
Multiple Family Residential:		
Condominiums	45 - 70	65
Apartments	65 - 90	80
Mobile Home Park	60 - 85	75
Commercial, Downtown Business or Industrial	80 -100	90

Notes:

1. Land use should be based on ultimate development of the watershed. Long range master plans for the County and incorporated cities should be reviewed to insure reasonable land use assumptions.

2. Recommended values are based on average conditions which may not apply to a particular study area. The percentage impervious may vary greatly even on comparable sized lots due to differences in dwelling size, improvements, etc. Landscape practices should also be considered as it is common in some areas to use ornamental gravels underlain by impervious plastic materials in place of lawns and shrubs. A field investigation of a study area should always be made, and a review of aerial photos, where available may assist in estimating the percentage of impervious cover in developed areas.

3. For typical horse ranch subdivisions increase impervious area 5 percent over the values recommended in the table above.

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IMPERVIOUS COVER FOR DEVELOPED AREAS

PLATE D-5.6

PRECIPITATION
(NOAA ATLAS 14, VOLUME 6, VERSION 2)

NOAA Atlas 14, Volume 6, Version 2
Location name: Perris, California, USA*
Latitude: 33.7196°, Longitude: -117.2792°
Elevation: 1562.72 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.086 (0.072-0.104)	0.120 (0.100-0.145)	0.167 (0.139-0.202)	0.206 (0.171-0.252)	0.262 (0.209-0.332)	0.307 (0.240-0.398)	0.355 (0.270-0.471)	0.406 (0.300-0.555)	0.478 (0.338-0.683)	0.536 (0.366-0.795)
10-min	0.123 (0.103-0.148)	0.172 (0.144-0.208)	0.239 (0.199-0.289)	0.296 (0.244-0.361)	0.376 (0.300-0.476)	0.441 (0.344-0.570)	0.509 (0.387-0.675)	0.582 (0.430-0.795)	0.685 (0.484-0.978)	0.769 (0.525-1.14)
15-min	0.149 (0.125-0.179)	0.208 (0.174-0.251)	0.289 (0.241-0.350)	0.357 (0.296-0.437)	0.455 (0.363-0.575)	0.533 (0.416-0.689)	0.615 (0.468-0.817)	0.703 (0.520-0.962)	0.828 (0.586-1.18)	0.930 (0.634-1.38)
30-min	0.235 (0.197-0.283)	0.328 (0.275-0.396)	0.456 (0.380-0.552)	0.564 (0.466-0.689)	0.718 (0.573-0.908)	0.841 (0.657-1.09)	0.971 (0.739-1.29)	1.11 (0.820-1.52)	1.31 (0.924-1.87)	1.47 (1.00-2.17)
60-min	0.348 (0.291-0.419)	0.486 (0.406-0.587)	0.675 (0.563-0.817)	0.835 (0.690-1.02)	1.06 (0.848-1.34)	1.24 (0.972-1.61)	1.44 (1.09-1.91)	1.64 (1.21-2.25)	1.94 (1.37-2.76)	2.17 (1.48-3.22)
2-hr	0.525 (0.439-0.633)	0.699 (0.584-0.844)	0.934 (0.779-1.13)	1.13 (0.936-1.38)	1.41 (1.13-1.78)	1.63 (1.27-2.11)	1.86 (1.42-2.47)	2.10 (1.55-2.88)	2.45 (1.73-3.49)	2.72 (1.86-4.03)
3-hr	0.650 (0.544-0.784)	0.853 (0.713-1.03)	1.13 (0.939-1.36)	1.35 (1.12-1.65)	1.67 (1.34-2.12)	1.92 (1.50-2.49)	2.19 (1.66-2.90)	2.46 (1.82-3.36)	2.84 (2.01-4.06)	3.15 (2.15-4.67)
6-hr	0.927 (0.776-1.12)	1.21 (1.01-1.46)	1.58 (1.32-1.91)	1.89 (1.56-2.31)	2.31 (1.85-2.93)	2.65 (2.07-3.42)	2.99 (2.28-3.97)	3.35 (2.48-4.58)	3.85 (2.72-5.49)	4.24 (2.89-6.27)
12-hr	1.22 (1.02-1.47)	1.62 (1.36-1.96)	2.15 (1.79-2.60)	2.58 (2.13-3.15)	3.17 (2.53-4.01)	3.62 (2.83-4.68)	4.08 (3.10-5.42)	4.55 (3.37-6.23)	5.20 (3.68-7.43)	5.70 (3.89-8.45)
24-hr	1.60 (1.42-1.85)	2.21 (1.95-2.55)	3.00 (2.64-3.47)	3.64 (3.18-4.25)	4.50 (3.81-5.42)	5.16 (4.28-6.34)	5.82 (4.72-7.33)	6.50 (5.13-8.41)	7.42 (5.62-10.0)	8.14 (5.96-11.3)
2-day	1.90 (1.68-2.19)	2.69 (2.38-3.11)	3.73 (3.28-4.32)	4.57 (3.99-5.33)	5.71 (4.83-6.88)	6.59 (5.46-8.10)	7.48 (6.06-9.42)	8.40 (6.62-10.9)	9.65 (7.31-13.0)	10.6 (7.79-14.8)
3-day	2.04 (1.80-2.35)	2.93 (2.59-3.39)	4.11 (3.62-4.76)	5.07 (4.43-5.92)	6.39 (5.41-7.71)	7.41 (6.15-9.12)	8.46 (6.85-10.7)	9.55 (7.53-12.4)	11.0 (8.36-14.9)	12.2 (8.95-17.0)
4-day	2.19 (1.94-2.53)	3.18 (2.81-3.68)	4.49 (3.96-5.21)	5.57 (4.87-6.51)	7.06 (5.97-8.51)	8.22 (6.81-10.1)	9.41 (7.62-11.8)	10.7 (8.40-13.8)	12.4 (9.37-16.7)	13.7 (10.1-19.1)
7-day	2.47 (2.19-2.86)	3.62 (3.19-4.18)	5.15 (4.54-5.97)	6.44 (5.62-7.51)	8.23 (6.96-9.92)	9.64 (8.00-11.9)	11.1 (9.01-14.0)	12.7 (10.00-16.4)	14.9 (11.3-20.0)	16.6 (12.2-23.1)
10-day	2.61 (2.31-3.02)	3.83 (3.38-4.43)	5.49 (4.83-6.36)	6.89 (6.02-8.04)	8.86 (7.50-10.7)	10.4 (8.65-12.8)	12.1 (9.79-15.2)	13.9 (10.9-17.9)	16.3 (12.4-22.0)	18.4 (13.4-25.6)
20-day	3.10 (2.74-3.58)	4.56 (4.03-5.27)	6.60 (5.81-7.64)	8.35 (7.30-9.75)	10.9 (9.21-13.1)	12.9 (10.7-15.9)	15.1 (12.3-19.1)	17.5 (13.8-22.7)	21.0 (15.9-28.3)	23.8 (17.5-33.2)
30-day	3.65 (3.23-4.22)	5.35 (4.72-6.18)	7.74 (6.82-8.97)	9.82 (8.58-11.5)	12.9 (10.9-15.5)	15.4 (12.8-18.9)	18.1 (14.7-22.8)	21.1 (16.7-27.4)	25.5 (19.3-34.4)	29.2 (21.4-40.7)
45-day	4.28 (3.79-4.94)	6.18 (5.46-7.14)	8.89 (7.83-10.3)	11.3 (9.86-13.2)	14.9 (12.6-17.9)	17.9 (14.8-22.0)	21.1 (17.1-26.6)	24.8 (19.6-32.1)	30.2 (22.9-40.7)	34.9 (25.5-48.6)
60-day	4.95 (4.38-5.72)	7.02 (6.20-8.11)	10.0 (8.81-11.6)	12.7 (11.1-14.8)	16.7 (14.1-20.1)	20.1 (16.7-24.7)	23.9 (19.4-30.1)	28.2 (22.2-36.4)	34.6 (26.2-46.6)	40.1 (29.4-55.8)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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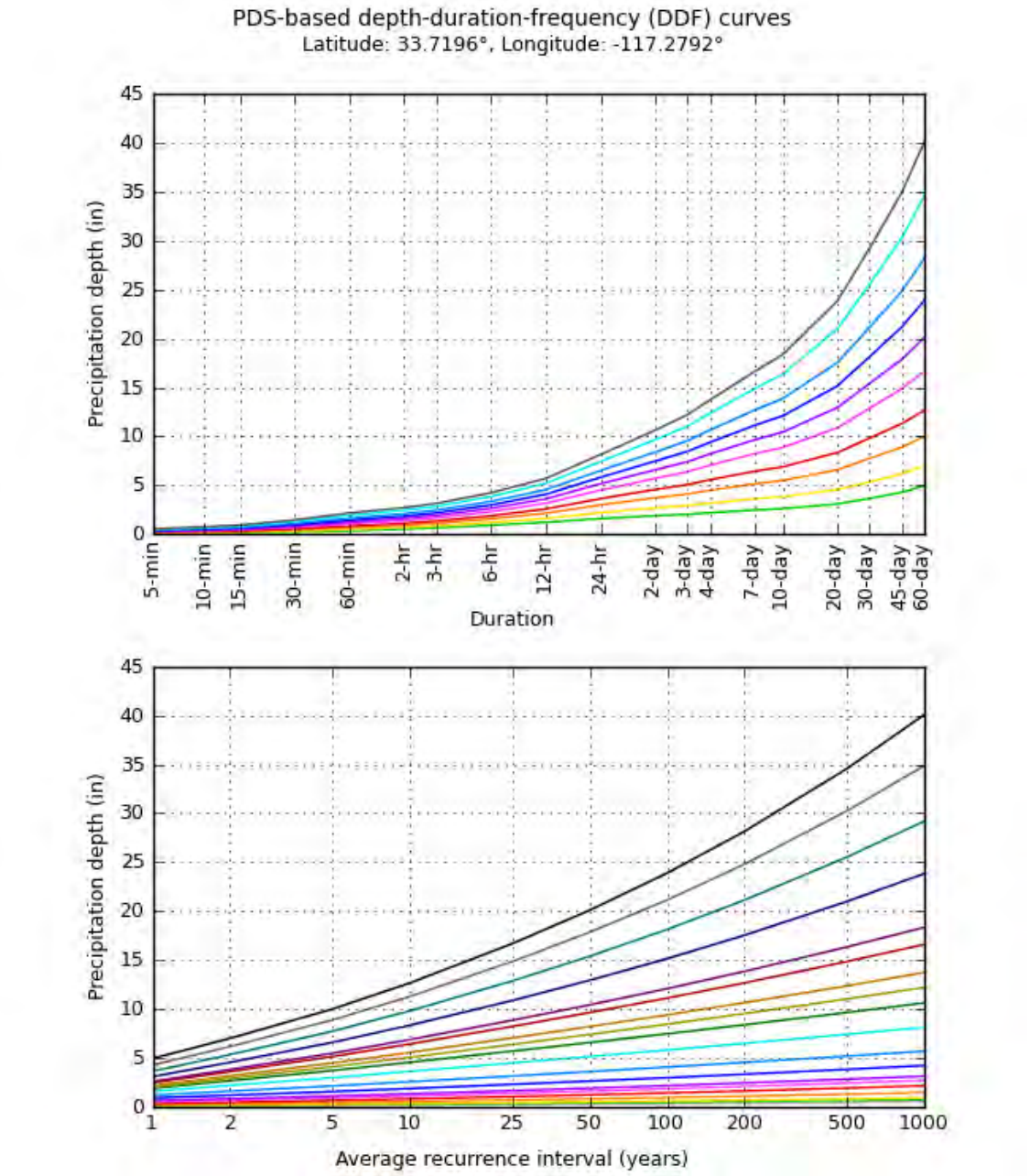
PF graphical



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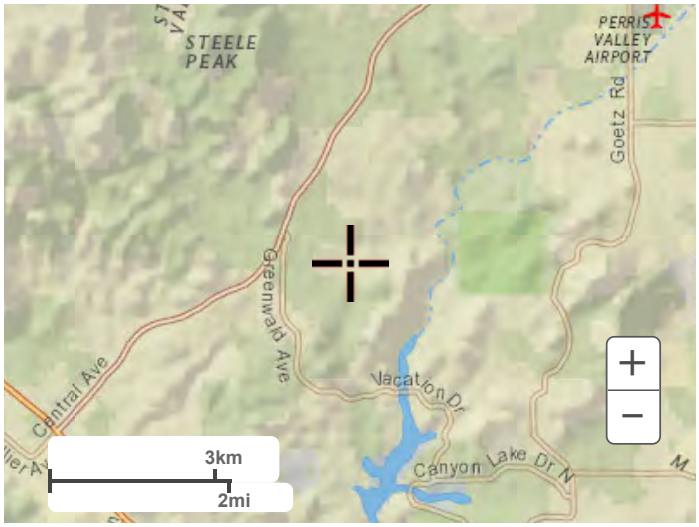
Maps & aerials

Small scale terrain



Large scale terrain



Large scale map



Large scale aerial



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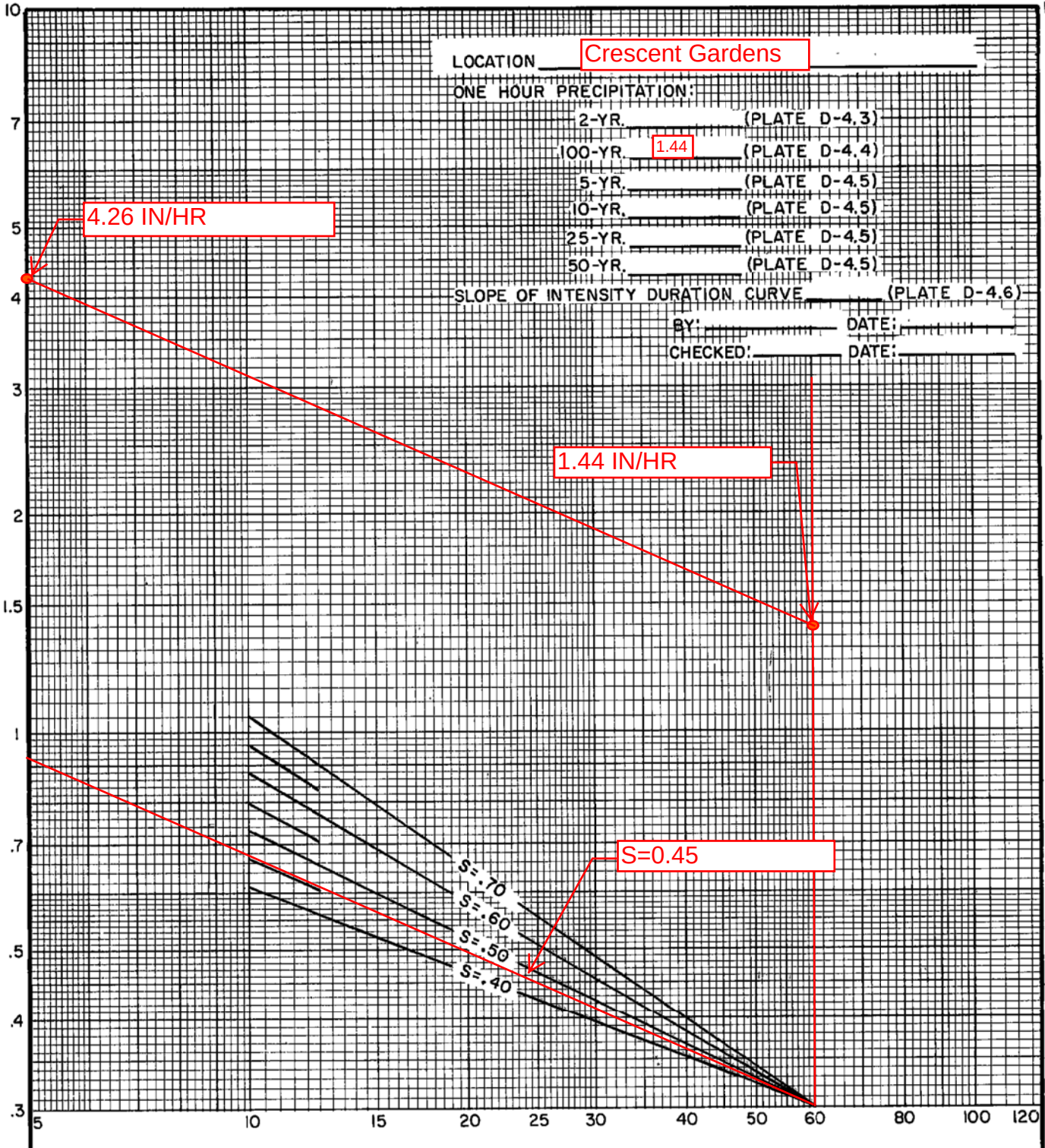

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HYDROLOGY MANUAL

INTENSITY—DURATION CURVES CALCULATION SHEET

PLATE D-4.7

November 2023

PRELIMINARY HYDROLOGY REPORT

For

CRESCENT GARDENS CEMETERY

Meadowbrook Community

County of Riverside, CA

HUNSAKER & ASSOCIATES IRVINE, INC.Ā