Delineation of Waters of the United States and Department of Fish and Wildlife Jurisdictional Habitats for

APN 786-601-01

In

City of Mission Viejo, Orange County, CA

USGS 7.5-minute topographic quadrangle map San Juan Capistrano in Section 32 of Township 6 South, Range 7 West

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Report Date: November 3, 2019

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1. TITLE PAGE

A. Date report prepared: November 3, 2019

B. Report Title: Delineation of Waters of the United States and Department of Fish and Wildlife Jurisdictional Habitats for APN 786-601-01 in City of Mission Viejo, Orange County, CA

C. Project site location: USGS 7.5-minute San Juan Capistrano topographic quadrangle map in Section 32 of Township 6 South, Range 7 West

D. Location(s): Curtis Park

E. Owner/Applicant:
City of Mission Viejo

F. Principal Investigator(s): Gonzales Environmental Consulting, LLC
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San Jacinto, CA 92583
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G. Name and phone number of person preparing report and of all persons who performed fieldwork on the site

Name of Person	Role on project
Teresa Gonzales	Prepared report and performed fieldwork
Paul Gonzales	Performed fieldwork

CERTIFICATION: I hereby certify that the statements furnished above and in the attached exhibits present data and information required for this biological evaluation, and that the facts, statements, and information presented are true and correct to the best of my knowledge and belief.

Date: 11-3-19

Acronyms and Abbreviations

USACE	U.S. Army Corps of Engineers
CDFG	California Department of Fish and Game
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CWA	Clean Water Act
DEIS	Draft Environmental Impact Statement
EIS	Environmental Impact Statement
FEIS	Final Environmental Impact Statement
GIS	Geographic Information System
GPS	Global Positioning System
HA	Hydrologic Area
HR	Hydrologic Region
HU	Hydrologic Unit
HUC	Hydrologic Unit Codes
HUC 8	Hydrologic Unit Codes the finest level of examination
LSAA	Lake or Streambed Alteration Agreement
NEPA	National Environmental Policy Act
NRCS	National Resource Conservation Society
NWP	Nationwide Permit
OHWM	ordinary high water mark
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UTM	Universal Transverse Mercator
RWQCB	State Water Resources Control Board, Santa Ana Region

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2. INTRODUCTION

This report contains the results of a streambed/wetland delineation conducted for U.S. Army Corps of Engineers (USACE), California Regional Water Quality Control Board (RWQCB), and California Department of Fish and Wildlife (DFW) jurisdiction for APN 786-601-01 City of Mission Viejo, Orange County, California. [1]

This report presents the findings of a delineation of wetlands and waters of the United States and California Department of Fish and Wildlife (CDFW) for the proposed project. The information presented in this report is intended to assist the U.S. Army Corps of Engineers (USACE) determine the extent of jurisdictional Waters of the U.S. within the proposed project area. Data have been collected in accordance with the 1987 Corps of Engineers Wetlands Delineation Manual and additional supplemental manuals (USACE 1987, 2008a, and 2008b). This report is also intended to aid the California Department of Fish and Wildlife (CDFW) with determination of the extent of jurisdictional habitats in the project and City of Mission Viejo with determination of the extend of jurisdictional habitats.

[1] This report presents the best effort at estimating the subject jurisdictional boundaries using the most up-to-date regulations and written policy and guidance from the ACOE, RWQCB, and DFG. Only ACOE, RWQCB, and DFG can make a final determination of jurisdictional boundaries.

3. PROJECT AND PROPERTY DESCRIPTION

3. 1 Project Description

The project site (site) discussed in this report is located east of Felipe Road/Olympiad Road, north and south of what would be the continuation of La Paz Road, and south of what would be the continuation of Escaltron (Figures 1, 2, 3).

The site is located within San Bernardino Meridian in portions of Section 32 in Township 6 South, Range 7 West in Orange County, California (Figures 1, 2 and 3). This location is shown on the San Juan Capistrano, California 7.5-minute U.S. Geological Survey (USGS) quadrangle (San Juan Capistrano Photorevised 1981). The approximate center of the site is located at -117.631663˚west and latitude 33.631663˚north.

The western portion of the site (Robert A. Curtis Park) is slightly sloping to the east. The eastern portion of the site is steeply sloping to slightly sloping towards the project's eastern boundary. The site occurs at an elevation between 652 and 797 feet above mean sea level (msl). The developed portion of the site (Robert A. Curtis Park) (Park) includes baseball fields, parking, restrooms, maintenance buildings and landscaping. A landscape storage area is located in the northern portion of the site, east of the entrance to the Park. West of the Park is single-family residential housing.

The non-improved portion of the site is covered with 6-7 foot tall vegetation consisting of native wreath plant (*Stephanomeria diegensis*) and Canada horseweed (*Erigeron canadensis*) and non-native black mustard (*Brassica nigra*). A stand of Menzies goldenbush (*Isocoma menziesii*) Alliance is located above Drainage 2. Pockets of native vegetation mixed with non-native exotics are found throughout the site.

Drainage 1 is located in the northern portion of the project site and begins with an over the side drainage inlet from Olympiad Road near the entrance to the Park. This drainage has native plants California fan palm (*Washingtonia filifera*), coast live oak (*Quercus agrifolia*), arroyo willow (*Salix lasiolepis*), and coyote bush (*Baccharis pilularis*) dominated by non-native species Mexican fan palm (*Washingtonia robusta*), and pampas grass (*Cortaderia jubata*). The drainage hydrologically connects to Arroyo Trabuco. Soils are consistent with mapping and contain clay loam.

Drainage 2 is a forked drainage with both forks starting at the edge of the park (one at the southeastern edge (T-1) and the other at the eastern edge of the landscape/maintenance area. This drainage contains primarily non-natives Artichoke thistle (*Cynara cardunculus*), Castor bean (*Ricinus communis*) and Black mustard (*Brassica nigra*) until reaching their confluence. Smaller sized Coast live oak trees are located in scattered areas in and around T-1. Once merged coast live oak, arroyo willow, lemonade berry (*Rhus integrifolia*) and stinging nettle (*Urtica dioica*) are the dominant species. The drainage hydrologically connects to Arroyo Trabuco. Soils in both forks of Drainage 2 consist of clay soils and are consistent with what is mapped.

Drainage 3 starts with an over the side inlet from Olympiad Road across from La Paz Road. D-3 splits into two channels midway down slope. One channel merges with D-2 and the other hydrologically connects directly to Arroyo Trabuco. Both forks of Drainage 3 contain primarily non-native Artichoke thistle until midway down slope. Smaller sized Coast live oak trees and Blue elderberry (*Sambucus nigra* ssp. *caerulea*) are located in scattered areas in and around both forks of D-3. Once merged coast live oak, arroyo willow, lemonade berry (*Rhus integrifolia*) and stinging nettle (*Urtica dioica*) are the dominant species. Soils in both forks of Drainage 3 consist of clay soils and are consistent with what is mapped.

The locations of the native plant communities within the project footprint have been impacted by anthropogenic activities in the area.
Potential rare, and/or endangered or otherwise sensitive habitats associated with the proposed project site include Southern Coast Live Oak Riparian Forest, western spadefoot (*Spea hammondii*), coastal California gnatcatcher (*Polioptila californica californica*), coastal cactus wren (*Campylorhynchus brunneicapillus sandiegensis*), Dulzura pocket mouse (*Chaetodipus californicus femoralis*), southern California legless lizard (*Anniella stebbinsi*), California glossy snake (*Arizona elegans occidentalis*), San Bernardino ringneck snake (*Diadophis punctatus modestus*), two-striped gartersnake (*Thamnophis hammondii*), coast horned lizard (*Phrynosoma blainvillii*), orange-throated whiptail (*Aspidoscelis hyperythra*), coastal whiptail (*Aspidoscelis tigris stejnegeri*), and red-diamond rattlesnake (*Crotalus ruber*).

Source: National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.

Regional Map

FIGURE 3.1

CURTIS PARK

Gonzales Environmental Consulting, LLC

N 0 4 Miles

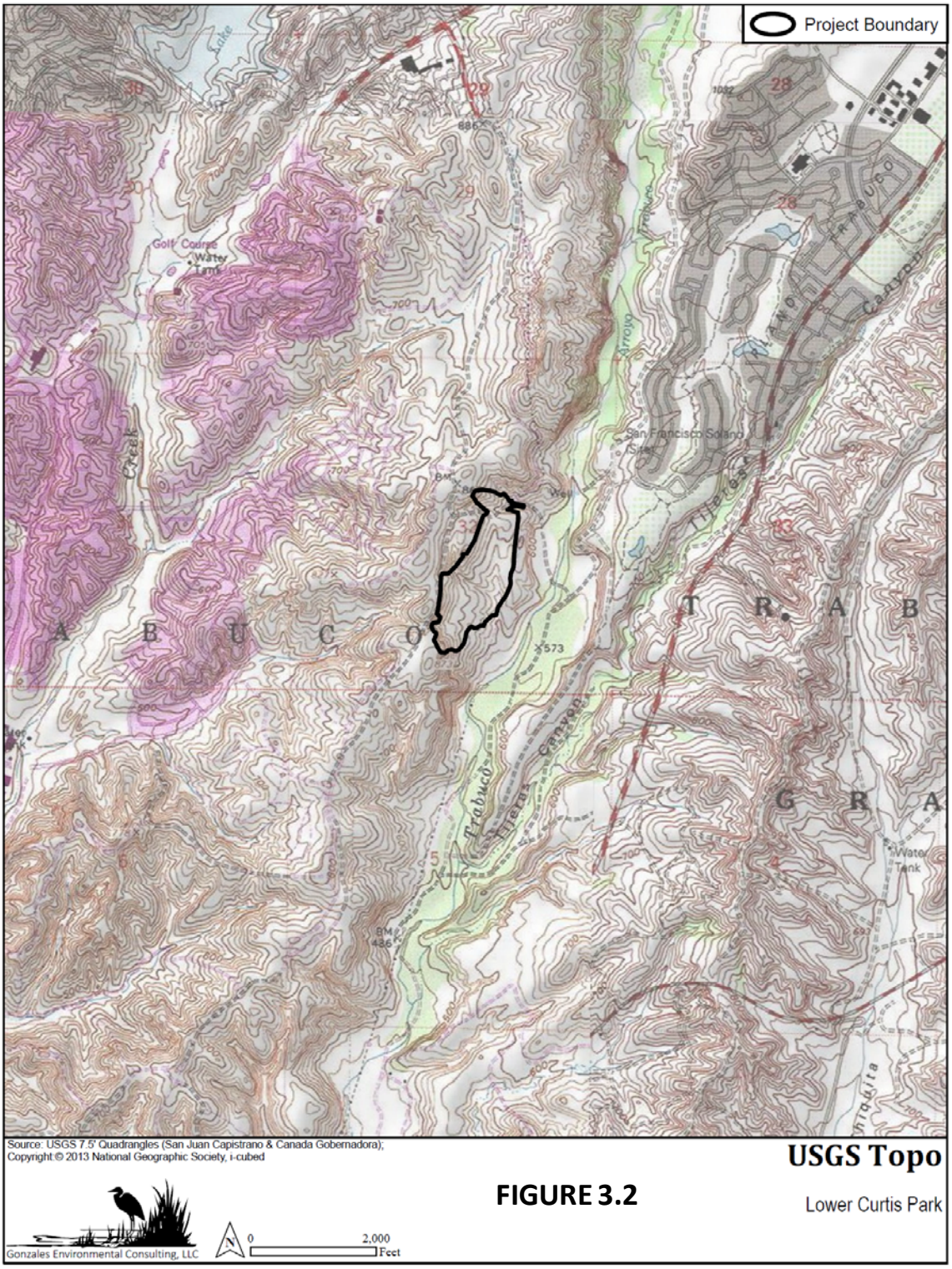

Project Boundary
Golf Course
Water Tank
San Francisco Solano
Trabuco Canyon
Trabuco Creek
Arroyo
Tijera
A B U C O
T R A B
G R A
Water Tank
Source: USGS 7.5' Quadrangles (San Juan Capistrano & Canada Gobernadora);
Copyright © 2013 National Geographic Society, i-cubed
USGS Topo
Lower Curtis Park
Gonzales Environmental Consulting, LLC
0
2,000
Feet

FIGURE 3.2

FIGURE 3.3

Aerial Photograph

Lower Curtis Park

3. 2 Environmental Setting

The project area is in the coastal foothills of eastern Orange County. To the west are the coastal terraces in the San Clemente to Corona Del Mar areas; east are the Santa Ana Mountains. Slopes range from 9-50%. The soils formed in material weathered from calcareous sandstone and shale. The average annual rainfall for the area ranges from 12-20 inches. The average annual temperature is 59-62 degrees, with 300-350 frost-free days.[2]

The project site is east of FelipeRoad/Olympiad Road, north and south of what would be the continuation of La Paz Road and south of what would be the continuation of Escaltron. Unnamed Drainage 1 is located in the northern portion of the project site and flows west to east until leaving the project site. Unnamed Drainage 2 is a forked drainage with both forks starting at the edge of the park (one at the southeastern edge (T-1) and the other at the eastern edge of the landscape/maintenance area. Unnamed Drainage 3 starts with an over the side inlet from Olympiad Road across from La Paz Road. D-3 splits into two channels midway down slope. One channel merges with D-2 and the other hydrologically connects directly to Arroyo Trabuco. Access to the project site is uncontrolled, except for a locked gate going to the landscape/maintenance area (which controls automobile traffic only). The majority of the project site has been disturbed by various anthropogenic disturbances. Drainages and vegetation have been disturbed by access and adjacent land uses. During our site visits we personally observed walkers, dog walkers, and mountain bikers accessing the site. Tracks and trails traverse the site, degrading plant and animal habitat.

Land immediately adjacent to the site's western boundary is developed with single family housing. Land to the north includes Bebee Park and Mission Viejo Skatepark. Land use to the east is open space (O'Neill Regional Park) and part of the Arroyo Trabuco trail. The land to the south consists of water tower and James G. Gilleran Park. The project will impact public/quasi-public (PQP) land (Robert A. Curtis Park).

3. 3 Hydrology

The entire project site falls within the Arroyo Trabuco San Juan Capistrano watershed (HUC 18070301). The waters of the U.S. found on the project site are eventually tributary to the Pacific Ocean. The hydrology in the project area has been altered. The three unnamed drainages and tributaries are ephemeral streams (have less flow than intermittent streams, are typically shallow, and have flowing water for brief periods in response to rainfall. Ephemeral streams and ditches are normally dry for most of the year).

3. 4 Vegetation

The site consists of vegetation communities, characterized as *Baccharis pilularis* Alliance, *Baccharis salicifolia*, *Isocoma menziesii* Alliance, *Nicotiana glauca*,

2 United States Department of Agriculture Soil Conservation Service. 1978. Soil Survey Orange County and Western Riverside Area California. 158 pp.,illus.

Quercus agrifolia Alliance, Non-native *Cynara cardunculus* Alliance, Non-native grassland, disturbed habitat, and developed/landscape. The locations of the native plant communities within the project footprint have been impacted by anthropogenic activities in the area. The existing plant communities are described in more detail below.

Baccharis pilularis Alliance

Plants occur as a dominant or co-dominant in a number of shrubland alliances in California and make up the *Baccharis pilularis* shrubland alliance when they are > 50% of the shrubland's absolute cover (Sawyer et al. 2009). The shrubs tend to be in the more early seral stages of forest vegetation development in the north than in the south. In northern CA and OR, plants can be a dominant in various scrub plant communities on coastal bluffs, in coastal prairies, and oak woodlands, but less frequent on coastal dunes. In southern CA, plants tend to be less dominant members of coastal sage scrub and grassland communities but can dominate patches of vegetation in particular microsites (Steinberg 2002). In southern CA shrublands, plants may sometimes be co-dominant with *Artemisia californica*, *Salvia mellifera* , or *Lotus scoparius* var. *scoparius*.

Baccharis salicifolia

Baccharis salicifolia is a flowering shrub native to the desert southwest of the United States and northern Mexico, as well as parts of South America. Its usual common name is mule fat; it is also called seepwillow or water-wally. This is a large bush with sticky foliage which bears plentiful small, fuzzy, pink or red-tinged white flowers. The long pointed leaves may be toothed. It is most common near water sources. On the project site *Baccharis salicifolia* exists as monotypic patches. Monotypic patches were mapped separately.

Isocoma menziesii Alliance

Menzies' goldenbush scrub (Gray and Bramlett 1992) is a plant association which is dominated by coastal goldenbush *(Isocoma menziesii* var. *menziesii*). It is not a plant community identified in Holland (1986) and would typically be included in the California sage scrub community for mapping purposes. It has been separated from California sage scrub in this report because it supports nearly monotypic patches of coastal goldenbush and appears on the slope above part of Drainage 2. In this instance, it intergrades with non-native grasslands. The *Isocoma menziesii* var. *menziesii* (Menzies goldenbush scrub) alliance has a rank of G4-S4-1 in CDFW (2019), meaning that it is apparently secure both globally and within the state but that more data is needed to confirm. Because this alliance is considered a sub-association of California sagebrush scrub, which is the obligate habitat type for the federally listed threatened California gnatcatcher, it is considered a special-status vegetation community.

Nicotiana glauca

Nicotiana glauca (tree tobacco) is a tree/shrub (family Solanaceae), which stands 10-20 feet tall and is short-lived. Tree tobacco was introduced to California about 100 years ago and is found growing up to 5,000 feet in

disturbed soils, vacant lots, along roadsides, streamsides, and other riparian areas. On the project site *Nicotiana glauca* exists as monotypic patches and on edges of *Quercus agrifolia* Alliance. Monotypic patches were mapped separately.

Quercus agrifolia Alliance

Habitat dominated by one tree, coast live oak (*Quercus agrifolia*), which is evergreen and reaches 10-25 meters in height. The shrub layer is poorly developed, but may include poison oak, elderberry, and sugar bush. The herb component is continuous and dominated by introduced taxa. Typically found on north facing slopes and shaded ravines in the south (Holland). This habitat dominates the lower aspects of Drainage 1, 2 and 3.

Non-native *Cynara cardunculus* Alliance

Cynara cardunculus (artichoke thistle) is a large perennial thistle (family Asteraceae) found below 500 meter elevations throughout California, except in the Great Basin and Desert Regions. Artichoke thistle prefers disturbed open sites, including grassland, chaparral, coastal scrub, and riparian areas. This habitat dominates the upper aspects of Drainage 2 and 3 and aspects below developed park area.

Non-native grassland

California annual grassland is characterized by a mixture of weedy, introduced annuals, primarily grasses. It may occur where disturbance by maintenance (mowing, scraping, discing, spraying, etc.), repetitive fire, agriculture, or other mechanical disruptions have altered soils and removed native seed sources from areas formerly supporting native vegetation. Holland (1986) states that California annual grasslands have a sparse to dense cover of annual grasses that is typically 0.2–0.5 meter (0.7–1.6 feet) tall and can be up to 1 meter (3 feet) tall. Wildflowers are often associated with California annual grasslands, especially in years with favorable precipitation (Holland 1986). According to Holland (1986) and the List of Terrestrial Natural Communities (CDFG 2003), grasses that occur in California annual (non-native) grasslands include oats (*Avena* spp.), bromes(*Bromus* spp.), fescue (*Vulpia* spp.), and Italian ryegrass (*Lolium perenne* ssp. *multiflorum*). Forbs that occur with these grasses include California poppy (*Eschscholzia californica*), filaree (*Erodium* spp.), goldfields (*Lasthenia* spp.), phacelia (*Phacelia* spp.), gilias (*Gilia* spp.), and baby blue-eyes (*Nemophila menziesii*). California annual (non-native) grassland also includes land that is used as pasture for grazing purposes. Grasses such as barley (*Hordeum* spp.) and wild oats (*Avena* sp.) may grow in these areas. This land has very few native species. In his description of California annual (non-native) grassland, Holland (1986) states that this habitat type typically occurs on fine-textured clay soils. Sites are often moist or waterlogged during the winter rainy season and very dry during the summer and fall months. Adjacent areas with moister, better-drained soils often support oak woodland. According to Sawyer and Keeler-Wolf (1995), California annual (non-native) grasslands occur in uplands of all topographic orientation. On the project site it is the dominant habitat.

Disturbed

Disturbed land includes areas that experience or have experienced high levels of human disturbance unpaved roads, trails, and graded areas. Vegetation in these areas, if present at all, is usually sparse and dominated by non-native weedy herbaceous species. Within the study area, disturbed land includes trails and bare, open areas with less than 20% vegetative cover. Disturbed land is not included in the List of California Vegetation Alliances and Associations (CDFW 2019). This community is not considered a special-status vegetation community. The disturbed area on the project site encompasses the existing park, roads and utility areas.

Developed/Landscaped

Areas mapped as developed/landscaped include planted areas where ornamental landscaping has been installed as part of a recreational park, development, or roadway landscaping. Developed/landscaped is not included in the List of California Vegetation Alliances and Associations (CDFW 2019). Since it is dominated by non-native ornamental plantings, developed/landscaped land has limited value and is not considered a special-status vegetation community.

TABLE 3.1
SUMMARY OF HABITAT TYPE AND PROJECT ACREAGE

Vegetation	Boundary
Baccharis pilularis Alliance	0.009
Baccharis salicifolia	0.068
Developed/Landscape	2.078
Disturbed Habitat	1.250
Isocoma menziesii Alliance	0.261
Nicotiana glauca	0.226
Non-native *Cynara cardunculus* Alliance	2.465
Non-native Grassland	31.678
Quercus agrifolia Alliance	5.124
TOTAL (acres)	**43.159**

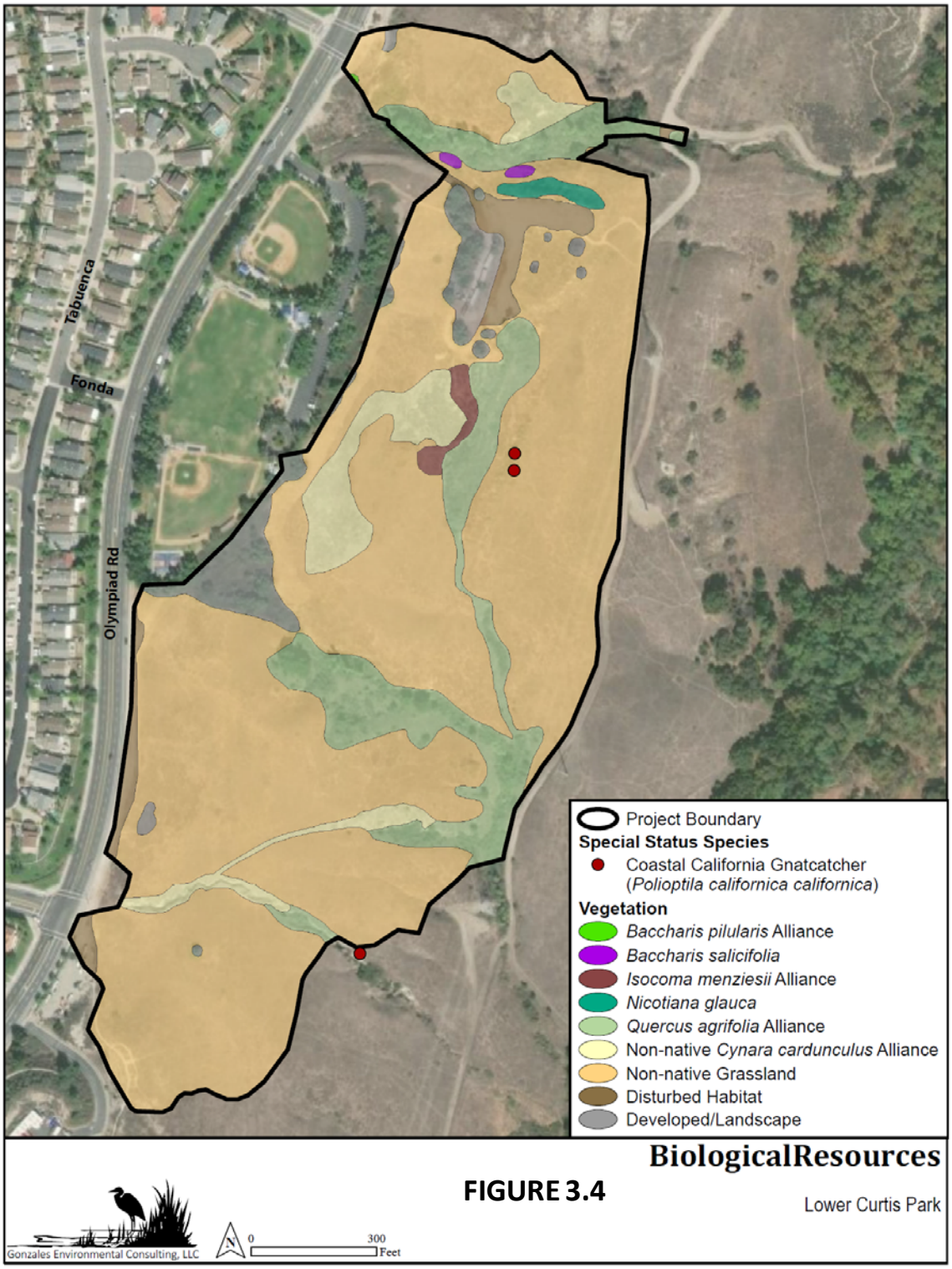

Tabuenca
Fonda
Olympiad Rd
Project Boundary
Special Status Species
Coastal California Gnatcatcher
(Polioptila californica californica)
Vegetation
Baccharis pilularis Alliance
Baccharis salicifolia
Isocoma menziesii Alliance
Nicotiana glauca
Quercus agrifolia Alliance
Non-native Cynara cardunculus Alliance
Non-native Grassland
Disturbed Habitat
Developed/Landscape
BiologicalResources
Lower Curtis Park
Gonzales Environmental Consulting, LLC
0
300
Feet

FIGURE 3.4

3.5 Soils

The soil series mapped for the area are shown in Figure3.5. The soil associations mapped for the area are Alo-Bosanko association. Alo-Bosanko association soils are strongly sloping to steep, well drained clays on coastal foothills. The soils formed in material weathered from calcareous sandstone and shale. Slopes are 9-50%. The plant cover consists of annual grasses, mustard, and other forbs. Elevation ranges from 200-2,500 feet. The average annual rainfall is 12-20 inches, and the average annual air temperature is 59-62 degrees F. The frost-free season is 300 to 350 days. The soil series mapped for the area are described in Table 3.2. The soils found are similar in texture and color to those mapped. The soils were compacted and unstratified over portions of the project site.

TABLE 3.2

SOIL SERIES MAPPED FOR THE AREA

Symbol	Name	Description
126	Bosanko clay, 9 to 15 percent slopes	Consists of well drained soils on foothills. These soils formed in material weathered from calcareous shale, sandstone, or weakly consolidated sediments. Slopes range 9-15%. Elevation ranges from 200-2,500 feet. The vegetation is annual grasses, mustard, and other forbs. Precipitation is 12-20 inches and the mean annual air temperature is about 61 degrees F. The frost free season is 300-350 days.
127	Bosanko clay, 15 to 30 percent slopes	Consists of well drained soils on foothills. These soils formed in material weathered from calcareous shale, sandstone, or weakly consolidated sediments. Slopes range 15-30%. Elevation ranges from 200-2,500 feet. The vegetation is annual grasses, mustard, and other forbs. Precipitation is 12-20 inches and the mean annual air temperature is about 61 degrees F. The frost free season is 300-350 days.
128	Bosanko clay, 30 to 50 percent slopes	Consists of well drained soils on foothills. These soils formed in material weathered from calcareous shale, sandstone, or weakly consolidated sediments. Slopes range 30-50%. Elevation ranges from 200-2,500 feet. The vegetation is annual grasses, mustard, and other forbs. Precipitation is 12-20 inches and the mean annual air temperature is about 61 degrees F. The frost free season is 300-350 days.

Symbol	Name	Description
129	Bosanko-Balcom complex, 15 to 30 percent slopes	Bosanko-Balcom complex is about 45% Bosanko clay and about 40% Balcom clay loam. The Bosanko clay is on north-and east-facing side slopes and in swales. The Balcom clay loam is on hill ridgetops and on south-and west-facing side slopes. These soils formed in material weathered from calcareous shale, sandstone, or weakly consolidated sediments. Slopes range 15-30%. Elevation ranges from 200-2,500 feet. The vegetation is annual grasses, mustard, and other forbs. Precipitation is 12-20 inches and the mean annual air temperature is about 61 degrees F. The frost free season is 300-350 days.
133	Botella clay loam, 9 to 15 percent slopes	Consists of well drained soils on alluvial fans. These soils formed in sedimentary alluvium. Slopes are 2-15%. Elevation ranges from 25-1,500 feet. The vegetation is mainly annual grasses and forbs and some oak trees and brush. Precipitation is 12-20 inches, and the average annual air temperature is about 62 degrees F. The frost free season is 260-350 days.
134	Calleguas clay loam, 50 to 75 percent slopes, eroded	Consists of well drained soils on uplands. These soils formed in material weathered from lime coasted shale or lime coated sandstone, or both. Slopes are 50-75%. Elevation ranges from 200-2,500 feet. The vegetation is annual grasses and forbs, mostly mustard and brush. Precipitation is 13-20 inches, and the average annual air temperature is about 61 degrees F. The frost free season is 300-350 days.
141	Cieneba sandy loam, 15 to 30 percent slopes	Consists of somewhat excessively drained soils. These soils formed in material weathered from granitic rocks of the Santa Ana Mountains and from the sandstone of the coastal foothills. Slopes are 9-75%. Elevation ranges from 200-4,000 feet. The vegetation is mostly brush. Precipitation is 14-25 inches, and the average annual air temperature is 59-62 degrees F. The frost free season is 200-340 days.
146	Corralitos loamy sand	Consists of somewhat excessively drained soils on fans in long, narrow valleys. These soils formed in mixed coarse textured alluvium. Slopes are 0-5%. Elevation ranges from 50-1,500 feet. The vegetation is mainly annual grasses and forbs and some trees and brush generally near stream channels. Precipitation is 12-20 inches, and the mean annual air temperature is about 62 degrees F. The frost free season is 200-300 days.

Symbol	Name	Description
149	Cropley clay, 2 to 9 percent slopes, warm MAAT, MLRA 19	Consists of well drained soils on fans and valley fill. These soils formed in fine textured alluvium derived from sedimentary rocks. Slopes are 0-9%. Elevation ranges from 50-1,000 feet. The vegetation is annual grasses and forbs. Precipitation is 10-20 inches, and the mean annual air temperature is about 62 degrees F. The frost free season is 280-340 days.
179	Myford sandy loam, thick surface, 2 to 9 percent slopes	Consists of moderately well drained soils on marine terraces. These soils formed in sandy sediments. Slopes are 0-30%. Elevation ranges from 50-1,500 feet. The vegetation generally is annual grasses and forbs and scattered low growing brush. Precipitation is 12-20 inches, and the mean annual air temperature is about 62 degrees F. The frost free season is 270-350 days.
198	Soboba cobbly loamy sand, 0 to 15 percent slopes	Consists of excessively drained soils on flood plains and alluvial fans. These soils formed in mixed alluvium. Slopes are 0-15%. Elevation ranges from 50-2,500 feet. The vegetation is annual grasses, forbs, cactus, brush, and some trees. Precipitation is 12-20 inches, and the mean annual air temperature is about 62 degrees F. The frost free season is 250-300 days.

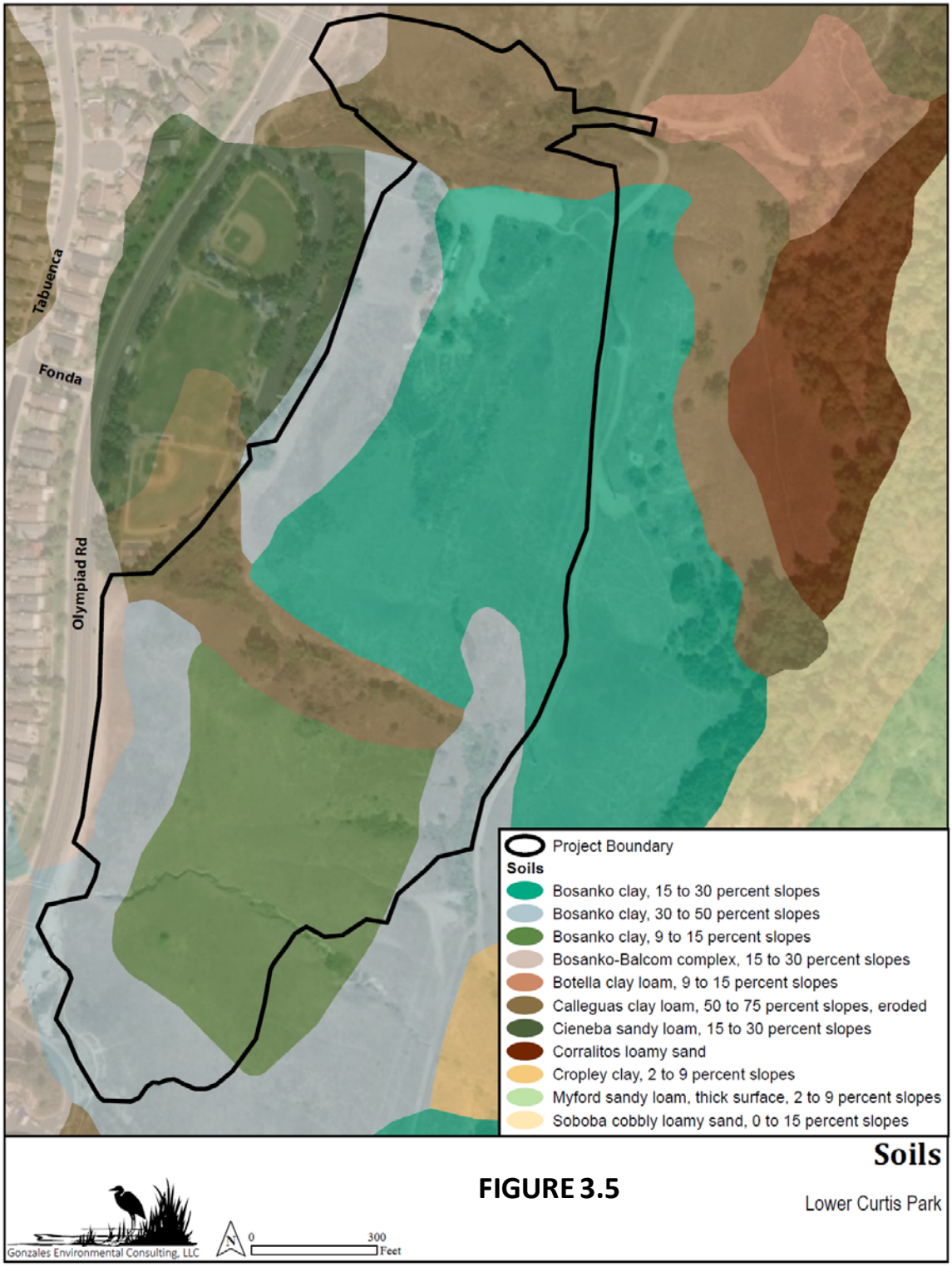

Tabuenca
Fonda
Olympiad Rd
Project Boundary
Soils
Bosanko clay, 15 to 30 percent slopes
Bosanko clay, 30 to 50 percent slopes
Bosanko clay, 9 to 15 percent slopes
Bosanko-Balcom complex, 15 to 30 percent slopes
Botella clay loam, 9 to 15 percent slopes
Calleguas clay loam, 50 to 75 percent slopes, eroded
Cieneba sandy loam, 15 to 30 percent slopes
Corralitos loamy sand
Cropley clay, 2 to 9 percent slopes
Myford sandy loam, thick surface, 2 to 9 percent slopes
Soboba cobbly loamy sand, 0 to 15 percent slopes
Soils
Lower Curtis Park
Gonzales Environmental Consulting, LLC
0
300
Feet

FIGURE 3.5

4. DELINEATION OF WATERS OF THE UNITED STATES

4.1 Regulatory Background

On May 27, 2015, the U.S. Environmental Protection Agency and Army Corps of Engineers issued their Clean Water Rule, defining the term "waters of the United States" (WOTUS) for purposes of Clean Water Act jurisdiction (Docket No. EPA-HQ-OW-2011-0880). The Agencies indicate that the rule defining WOTUS clarifies their jurisdiction to implement the Clean Water Act in the context of several US Supreme Court decisions. The final rule can be found in the June 29, 2015 issue of the Federal Register (Vol. 80, No. 24, pp. 37054-37127; http://www.regulations.gov/#%21documentDetail;D=EPA-HQ-OW-2011-0880-20862) and became effective on August 28, 2015. A stay was issued on the rule and it is not currently in effect.

The Rule creates three classifications of waters: (1) waters that are jurisdictional in all instances by rule (categorical WOTUS); (2) waters that are subject to case-specific analysis to determine jurisdiction; and, (3) waters that are excluded from jurisdiction by rule.

Six categories of waters are designated as jurisdictional by rule:

1. Traditional navigable waters ("All waters which are currently used, 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")
2. All interstate waters, including interstate wetlands
3. The territorial seas
4. All impoundments of waters otherwise identified as WOTUS
5. All tributaries, as defined in the final rule
6. All waters adjacent to one of the above water features, including wetlands, ponds, lakes, oxbows, impoundments, and similar waters

The Rule acknowledges that the great majority of tributaries as defined by the Rule are headwater streams. Ditches also will be jurisdictional if they meet the definition of "tributary" and are not excluded.
"Adjacent" waters includes those "bordering, contiguous, or neighboring" categories 1 through 4 above, even if separated from those waters by "constructed dikes or barriers, natural river berms, beach dunes and the like."

"Neighboring" waters include those located in whole or part within the 100-year floodplain and that are within 1500 feet of the ordinary high water mark of traditional navigable water, interstate water, territorial sea, impoundment, or a tributary.

The preamble of the Rule states that "adjacent waters" do not include waters subject to established normal farming, silviculture, and ranching activities as those terms are used in Section 404(f) of the Clean Water Act.

"Other waters" determined on a case-specific basis to have a "significant nexus" to traditional navigable water, interstate water, or territorial sea also will be jurisdictional. The Rule identifies five specific types of other waters for which there is no need for a case-specific finding and,

therefore, they should be analyzed "in combination" (as a group, rather than individually) when determining if they are jurisdictional:

- Prairie potholes
- Carolina bays and Delmarva bays
- Pocosins
- Western vernal pools
- Texas coastal prairie wetlands

The Clean Water Rule also indicates that waters within the 100-year floodplain of traditional navigable water, interstate water, or the territorial seas, or within 4,000 feet of an ordinary high water mark may have a significant effect on downstream waters. These waters should be evaluated individually or in combination to determine if they are jurisdictional.

Several waters and features are excluded from jurisdiction in the Clean Water Rule, even if they otherwise qualify for jurisdiction under the tributary, adjacent, or other waters categories discussed above. Examples include prior converted cropland, waste treatment systems, and log ponds. The Rule states that it retains existing exclusions from the definition of WOTUS, and that "several exclusions reflecting longstanding agency practice are added to the regulation for the first time."

Definitions:

> (4) Wetlands. The term wetlands means those areas that are inundated or saturated by surface or groundwater 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.
>
> (1) Adjacent. The term adjacent means bordering, contiguous, or neighboring a water identified in paragraphs (a)(1) through (5) of this section, including waters separated by constructed dikes or barriers, natural river berms, beach dunes, and the like. For purposes of adjacency, an open water such as a pond or lake includes any wetlands within or abutting its ordinary high water mark. Adjacency is not limited to waters located laterally to a water identified in paragraphs (a)(1) through (5) of this section. Adjacent waters also include all waters that connect segments of a water identified in paragraphs (a)(1) through (5) or are located at the head of a water identified in paragraphs (a)(1) through (5) of this section and are bordering, contiguous, or neighboring such waters. Waters being used for established normal farming, ranching, and silviculture activities (33 U.S.C. 1344(f)) are not adjacent. (The rule includes wetlands and other waters that meet the definition of adjacent, including "neighboring," which is defined separately. Only waters, not land, are adjacent. Within the definition of "adjacent," the terms bordering and contiguous are well understood, and the agencies will continue to interpret and implement those terms consistent with current policy and practice.)
>
> (7) High tide line. The term 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.

(6) Ordinary high water mark. The term ordinary high water mark means 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 area. ("Ordinary high water mark" sets the boundary of adjacent non-wetland waters (e.g., open waters such as lakes and ponds). Physical indicators of ordinary high water mark can be created by perennial, intermittent, and ephemeral flows.)

(2) Neighboring. The term neighboring means: (i) All waters located within 100 feet of the ordinary high water mark of a water identified in paragraphs (a)(1) through (5) of this section. The entire water is neighboring if a portion is located within 100 feet of the ordinary high water mark; (ii) All waters located within the 100- year floodplain of a water identified in paragraphs (a)(1) through (5) of this section and not more than 1,500 feet from the ordinary high water mark of such water. The entire water is neighboring if a portion is located within 1,500 feet of the ordinary high water mark and within the 100-year floodplain; (iii) All waters located within 1,500 feet of the high tide line of a water identified in paragraphs (a)(1) or (a)(3) of this section, and all waters within 1,500 feet of the ordinary high water mark of the Great Lakes. The entire water is neighboring if a portion is located within 1,500 feet of the high tide line or within 1,500 feet of the ordinary high water mark of the Great Lakes. ("Neighboring" is the key determinant of whether a water is "adjacent," and thus jurisdictional by rule. Where the 100-year floodplain is greater than 1,500 feet, all wetlands within 1,500 feet of the tributary's ordinary high water mark are jurisdictional because they are "neighboring" to the tributary, regardless of the wetlands position relative to each other. Waters within the 100-year floodplain that are located more than 1,500 feet and up to 4,000 feet from the ordinary high water mark, or high tide line, are subject to case-specific significant nexus analysis under paragraph (a)(8).)

Riparian area omitted in the final rule because the agencies determined that the use of the riparian area was unnecessarily complicated and that as a general matter, waters within the riparian area will be within the 100-year floodplain.

(3) Tributary and tributaries. The terms tributary and tributaries each mean a water that contributes flow, either directly or through another water (including an impoundment identified in paragraph (a)(4) of this section), to a water identified in paragraphs (a)(1) through (3) of this section that is characterized by the presence of the physical indicators of a bed and banks and an ordinary high water mark. These physical indicators demonstrate there is volume, frequency, and duration of flow sufficient to create a bed and banks and an ordinary high water mark, and thus to qualify as a tributary. A tributary can be a natural, man-altered, or man-made water and includes waters such as rivers, streams, canals, and ditches not excluded under paragraph (b) of this section. A water that otherwise qualifies as a tributary under this definition does not lose its status as a tributary if, for any length, there

are one or more constructed breaks (such as bridges, culverts, pipes, or dams), or one or more natural breaks (such as wetlands along the run of a stream, debris piles, boulder fields, or a stream that flows underground) so long as a bed and banks and an ordinary high water mark can be identified upstream of the break. A water that otherwise qualifies as a tributary under this definition does not lose its status as a tributary if it contributes flow through a water of the United States that does not meet the definition of tributary or through a nonjurisdictional water to a water identified in paragraphs (a)(1) through (3) of this section. (This term has not previously been defined in any regulation or preamble. Bed and banks and ordinary high water mark (OHWM) are features that generally are physical indicators of flow. OHWM generally defines the lateral limits of a water. In many tributaries, the bed is that part of the channel below the OHWM, and the banks often extend above the OHWM. Man-altered and man-made tributaries perform many of the same functions as natural tributaries and provide connectivity between streams and downstream rivers.)

(8) Significant nexus. The term significant nexus means that a water, including wetlands, either alone or in combination with other similarly situated waters in the region, significantly affects the chemical, physical, or biological integrity of a water identified in paragraphs (a)(1) through (3) of this section. The term "in the region" means the watershed that drains to the nearest water identified in paragraphs (a)(1) through (3) of this section. For an effect to be significant, it must be more than speculative or insubstantial. Waters are similarly situated when they function alike and are sufficiently close to function together in affecting downstream waters. For purposes of determining whether or not a water has a significant nexus, the water's effect on downstream (a)(1) through (3) waters shall be assessed by evaluating the aquatic functions identified in paragraphs (A) through (I) of this paragraph. A water has a significant nexus when any single function or combination of functions performed by the water, alone or together with similarly situated waters in the region, contributes significantly to the chemical, physical, or biological integrity of the nearest water identified in paragraphs (a)(1) through (3) of this section. Functions relevant to the significant nexus evaluation are the following: (i) Sediment trapping, (ii) Nutrient recycling, (iii) Pollutant trapping, transformation, filtering, and transport, (iv) Retention and attenuation of flood waters, (v) Runoff storage, (vi) Contribution of flow, (vii) Export of organic matter, (viii) Export of food resources, and (ix) Provision of life cycle-dependent aquatic habitat (such as foraging, feeding, nesting, breeding, spawning, or use as a nursery area) for species located in a water identified in paragraphs (a)(1) through (3) of this section. (In the final rule, the agencies list specific functions relevant to significant nexus evaluation to add clarity and transparency. A water does not need to perform all functions. If a water performs a single function that has significant impact on a downstream water, that is a significant nexus. Under the final rule, only waters covered by subparagraph (a)(7) or (a)(8) require case-specific analysis.)

Notes: The proposed rule that was announced on March 25, 2014, was published in the Federal Register on April 21, 2014 (79 Federal Register 22188-22274). The final revised rule was announced jointly by EPA and the Army Corps on May 27, 2015, and was published in the Federal Register on June 29: Department of the Army, Corps of Engineers, and Environmental Protection Agency, "Clean Water Rule: Definition of 'Waters of the United States,' Final Rule," 80 Federal Register 37054-37127, June 29, 2015. a. 33 C.F.R. 328.3, 40 C.F.R. 122.2, 40 C.F.R. 230.3, and 40 C.F.R. 232.2 (definition of "waters of the United States"). The term "navigable waters" is defined

at 40 C.F.R. 110.1 (Discharge of Oil); 40 C.F.R. 112.2 (Oil Pollution Prevention); 40 C.F.R. 116.3 (Designation of Hazardous Substance); 40 C.F.R. 117.1(i) (Determination of Reportable Quantities for Hazardous Substances); 40 C.F.R. 300.5 and Appendix E 1.5 to Part 300 (National Oil and Hazardous Substances Pollution Contingency Plan); and 40 C.F.R. 302.3 (Designation, Reportable Quantities, and Notification). b. Comments in this table are drawn from the preamble and text of the final rule. c. The term "prior converted cropland" is included in the U.S. Department of Agriculture's administrative definition of the term "wetland" (see 7 C.F.R. 12.2). d. A definition of "waste treatment system" is found in EPA regulations (35 C.F.R. 35.905): "Complete waste treatment system. A complete waste treatment system consists of all of the treatment works necessary to meet the requirements of title III of the Act, involved in (a) The transport of waste waters from individual homes or buildings to a plant or facility where treatment of the waste water is accomplished; (b) the treatment of the waste waters to remove pollutants; and (c) the ultimate disposal, including recycling or reuse, of the treated waste waters and residues which result from the treatment process. One complete waste treatment system would, normally, include one treatment plant or facility, but also includes two or more connected or integrated treatment plants or facilities." e. Probably should be "(i) through (ix) of this paragraph."

4.2 Methods

The starting point for this study was a field trip to the project site in 2019. For this study the "Routine Onsite Determination Method" data forms were used, onto which recorded information or otherwise compiled notes regarding the descriptive physical and biological attributes from the area. From a combination of field experience, references, assistance from others, and reconnaissance trips information resources were compiled from which the jurisdictional determinations have been made. Photographs were taken on each visit, some of which are included in this document. Field notes and photographs were arranged by date.

The routine approach (potential problem area) was utilized on this project, with on-site determination based on the three parameters of dominant plant species, soil characteristics, and hydrologic characteristics of the area.

Data sources used:
a. USGS quadrangle maps
b. Soil Surveys
c. Aerial photos
d. State list of hydric soils
e. National Wetland Plant List 2017
f. Munsell Soil Charts

The following steps were performed:

1. Project area was identified and mapped on USGS quadrangle map.

2. Vegetation for the project area was summarized and identified utilizing transects and observation points.

3. Area soils were characterized and identified.

4. Hydrology data was gathered utilizing field hydrologic indicators and available

data.

In order to be considered a wetland, an area must exhibit at least minimal hydric characteristics within these three parameters. Non-wetland waters of the U.S. are delineated based on the limits of the OHWM as determined by erosion, the deposition of vegetation or debris, and changes in the vegetation. RWQCB shares USACE jurisdiction, unless isolated conditions are present. In the presence of isolated conditions, RWQCB takes jurisdiction from the OHWM and/or the 3—parameter wetland methodology utilized by the USACE. CDFW takes jurisdiction defined to the top of the bank of the stream/channel or to the extreme limits of the adjacent riparian vegetation (drip line).

GEC wetland/streambed biologists Teresa Gonzales and Paul Gonzales visited the site during September, October and November 2019 to conduct a delineation of potentially jurisdictional waters utilizing the methodology described below.

4.2.1 Federal Delineation Methods-Non-Wetland Waters of the U.S.

Potential jurisdictional features were evaluated prior to conducting the field assessment by using a series of current aerial photographs, detailed topographic maps, the available soils information, and the local and state hydric soil list (NRCS 2011a, 2011b). Additionally, prior to conducting the field assessment, transects (ranging from 0.15 to 0.5 miles in length) were drawn on a one-meter resolution aerial photograph. During the field assessment, points where these transects intercepted potentially jurisdictional waters were mapped on the aerial photographs or with a Garmin GPS unit. Field maps were digitized using Geographic Information System (GIS) technology and the total area of jurisdictional features was calculated.

Jurisdictional non-wetland "waters of the U.S." were delineated based on the limits of the ordinary high water mark (OHWM) as determined by changes in physical and biological features, such as bank erosion, deposited vegetation or debris, and vegetation characteristics. Criteria used to aid in the determination of the limit and/or presence of the/an OHWM are presented below in Tables 4-1 and 4-2.

TABLE 4-1
POTENTIAL GEOMORPHIC INDICATORS OF ORDINARY HIGH WATER MARKS FOR THE ARID WEST

Potential Geomorphic OHWM Indicators		
(A) Below OHWM	**(B) At OHWM**	**(C) Above OHWM**
1. In-stream dunes	1. Valley flat	1. Desert pavement
2. Crested ripples	2. Active floodplain	2. Rock varnish
3. Flaser bedding	3. Benches: low, mid, most prominent	3. Clast weathering
4. Harrow marks	4. Highest surface of channel bars	4. Salt splitting
5. Gravel sheets to rippled sands	5. Top of point bars	5. Carbonate etching
6. Meander bars	6. Break in bank slope	6. Depositional topography
7. Sand tongues	7. Upper limit of sand-sized particles	7. Caliche rubble
8. Muddy point bars	8. Change in particle size distribution	8. Soil development
9. Long gravel bars	9. Staining of rocks	9. Surface color/tone
10. Cobble bars behind obstructions	10. Exposed root hairs below intact soil layer	10. Drainage development
11. Scour holes downstream of obstructions	11. Silt deposits	11. Surface relief
12. Obstacle marks	12. Litter (organic debris, small twigs and leaves)	12. Surface rounding
13. Stepped-bed morphology in gravel	13. Drift (organic debris, larger than twigs)	
14. Narrow berms and levees		
15. Streaming lineations		
16. Dessication/mud cracks		
17. Armored mud balls		
18. Knick Points		

TABLE 4-2
POTENTIAL VEGETATION INDICATORS OF ORDINARY HIGH WATER MARKS FOR THE ARID WEST

Potential Vegetation OHWM Indicators			
	(D) Below OHWM	**(E) At OHWM**	**(F) Above OHWM**
Hydroriparian indicators	1. Herbaceous marsh species 2. Pioneer tree seedlings 3. Sparse, low vegetation 4. Annual herbs, hydromesic ruderals 5. Perennial herbs, hydromesic clonals	1. Annual herbs, hydromesic ruderals 2. Perennial herbs, hydromesic clonals 3. Pioneer tree seedlings 4. Pioneer tree saplings	1. Annual herbs, xeric ruderals 2. Perennial herbs, non-clonal 3. Perennial herbs, clonal and non-clonal co-dominant 4. Mature pioneer trees, no young trees 5. Mature pioneer trees w/upland species 6. Late-successional species
Mesoriparian indicators	6. Pioneer tree seedlings 7. Sparse, low vegetation 8. Pioneer tree saplings 9. Xeroriparian species	5. Sparse, low vegetation Annual herbs, hydromesic 6. ruderals 7. Perennial herbs, hydromesic clonals 8. Pioneer tree seedlings 9. Pioneer tree saplings 10. Xeroriparian species 11. Annual herbs, xeric ruderals	7. Xeroriparian species 8. Annual herbs, xeric ruderals 9. Perennial herbs, non-clonal 10. Perennial herbs, clonal and non-clonal codominent 11. Mature pioneer trees, no young trees 12. Mature pioneer trees, xeric understory 13. Mature pioneer trees w/upland species 14. Late-successional species 15. Upland species
Xeroriparian indicators	10. Sparse, low vegetation 11. Xeroriparian species 12. Annual herbs, xeric Ruderals	12. Sparse, low vegetation 13. Xeroriparian species 14. Annual herbs, xeric ruderals	16. Annual herbs, xeric ruderals 17. Mature pioneer trees w/upland species 18. Upland species

4.2.2 Federal Delineation Methods- Wetlands

This jurisdictional wetland delineation used a routine determination according to the methods outlined in the USACE Wetland Delineation Manual (1987) and the Arid West Supplement (2008) based on three wetland parameters: dominant hydrophytic vegetation, wetland hydrology, and hydric soils. Data on vegetation, hydrology, and soils were collected using the methods described below and, recorded on Wetland Determination Data Forms.

4.2.2.1 Vegetation

Plant species in each stratum (tree, sapling/shrub, herb, and woody vine) were ranked according to their canopy dominance (USACE 2008). Beginning with the species with the highest coverage, species that contributed to a cumulative coverage total of at least 50 percent and any species that comprised at least 20 percent of the total coverage for each stratum were recorded on the Field Data Sheets (50/20 Rule). The wetland indicator status was assigned to each dominant species using the *National Wetland Plant List* (National Wetlands Inventory, 2012). If greater than 50 percent of the dominant species from all strata were Obligate, Facultative-wetland, or Facultative species, the criteria for

wetland vegetation was considered to be met. The following indicator plant status categories were used:

- Obligate Wetland (OBL): Plants that occur almost always (estimated >99%) in wetlands under natural conditions, but which may also occur rarely (estimated <1% in non- wetlands (i.e., cat—tails or pickleweed).
- Facultative Wetland (FACW): Plants that occur usually (estimated 67-99%) in wetlands, but also occur (estimated 1-33%) in none—wetlands (i.e., mulefat or willow).
- Facultative (FAC): Plants with similar likelihood (estimated 33-67%) of occurring in both wetlands and none—wetlands.
- Facultative Upland (FACU): Plants that occur sometimes (estimated 1-32%) in wetlands, but occur more often (estimated 67-99%) in non-wetlands.
- Obligate Upland (UPL): Plants that occur rarely (estimated <1%) in wetlands, but occur almost always (estimated >99%) in none—wetlands under natural conditions.

4.2.2.2 Hydrology

The potential presence of wetland hydrology was evaluated by recording the extent of observed primary and secondary indicators (USACE, 2008). Indicators such as, but not limited to, surface water or saturated soils (both Group A indicators) were recorded if observed. The Arid West Supplement includes two additional indicator groups that can be used during dry conditions or in areas where surface water/saturated soils are not present including Group B (evidence of recent inundation) and Group C (evidence of recent soil saturation) (USACE, 2008). The indicators are divided into two categories (primary and secondary indicators) and the presence of one primary indicator from any of the groups is considered evidence of wetland hydrology. These indicators are intended to be one-time observations of site conditions representing evidence of wetland hydrology when hydrophytic vegetation and hydric soils are present (USACE, 2008).

TABLE 4-3
WETLAND HYDROLOGY INDICATORS *

Primary Indicators	Secondary Indicators
Watermarks	Oxidized Rhizospheres Associated with Living Roots
Water-Borne Sediment Deposits	FAC-Neutral Test
Drift Lines	Water-Stained Leaves
Drainage Patterns Within Wetlands	

* Based on 1987 USACE Manual and Related Guidance Documents

TABLE 4-4
WETLAND HYDROLOGY INDICATORS FOR THE ARID WEST*

	Primary Indicator (*any one indicator is sufficient to make a determination that wetland hydrology is present*)	**Secondary Indicator** (*two or more indicators are required to make a determination that wetland hydrology is present*)
Group A – Observation of Surface Water or Saturated Soils		
A2 - High Water Table		
Group B – Evidence of Recent Inundation		
81 - Water Marks		**X** (Riverine)
82 - Sediment Deposits		**X** (Riverine)
83 - Drift Deposits		**X** (Riverine)
86 - Surface Soil Cracks	**X**	
87 - Inundation Visible on Aerial Imagery	**X**	
89 - Water-Stained Leaves	**X**	
810 - Drainage	**X**	**X**
811 - Salt Crust		
812 - Biotic Crust		
Group C – Evidence of Current or Recent Soil Saturation		
C2 - Dry-Season Water Table		
C9 - Saturation Visible on Aerial Imagery		**X**
Group D – Evidence from other Site Conditions or Data		
D3 - Shallow Aquitard		
D5 - FAC-Neutral Test		**X**

4.2.2.3 Soils

Soils are Alo-Bosanko association. Alo-Bosanko association soils are strongly sloping to steep, well drained clays on coastal foothills. Data from observations of on-site soil characteristics were used as the basis for evaluating whether hydric/wetland soils are present on the site.

TABLE 4-5
FIELD INDICATORS OF HYDRIC SOIL CONDITIONS*

a. Terrace Escarpments
b. Histic Epipedon
c. Stripped Matrix
d. Loamy Mucky Mineral

* Based on 1987 USACE Manual and Related Guidance Documents

Conditions Assessed from the Literature

Prior to onsite fieldwork, USGS topographic maps [San Juan Capistrano, California 7.5' USGS topographic Quadrangle], National Resource Conservation Service Hydric Soils List for California (2018), local precipitation data, hydrological information and relevant literature (complete listing is found under References for this report) were reviewed.

USGS 7.5' Topographic Quadrangle - San Juan Capistrano, California: Elevation of the assessment area ranges from a from a low of 652± feet above mean sea level (msl) in the eastern portion of the assessment area to a high of 797± feet above msl in the western portion of the assessment area. This represents an elevational change across the assessment area of 145± feet. The entire site consists of undulating, sloping land. The project site has been impacted by anthropogenic activities. Land use in the surrounding area varies between natural, park and single family residential. The project will impact public/quasi-public (PQP) land and is on PQP lands.

Recent Aerial Photography: Aerial photography is from Google 2019.

Soil Survey: Natural Resources Conservation Service

Hydric Soils List of California: Natural Resources Conservation Service

All of the mapped features w ere further analyzed using Geographic Information Systems (GIS) software and high resolution aerial imagery. The total acreage of all potentially jurisdictional features occurring in the surrounding buffer was calculated using GIS software.

4.3 Results

GEC found federal waters of the U.S. Refer to Table 4-6 and Figure 4-1 for the locations and acreages of jurisdictional features.

Delineation studies found waters of the U.S. (WOUS) on the project site. 0.301 acre of WOUS is found on the project site.

TABLE 4-6
SUMMARY OF POTENTIAL USACE JURISDICTION BY HABITAT AND DRAINAGE

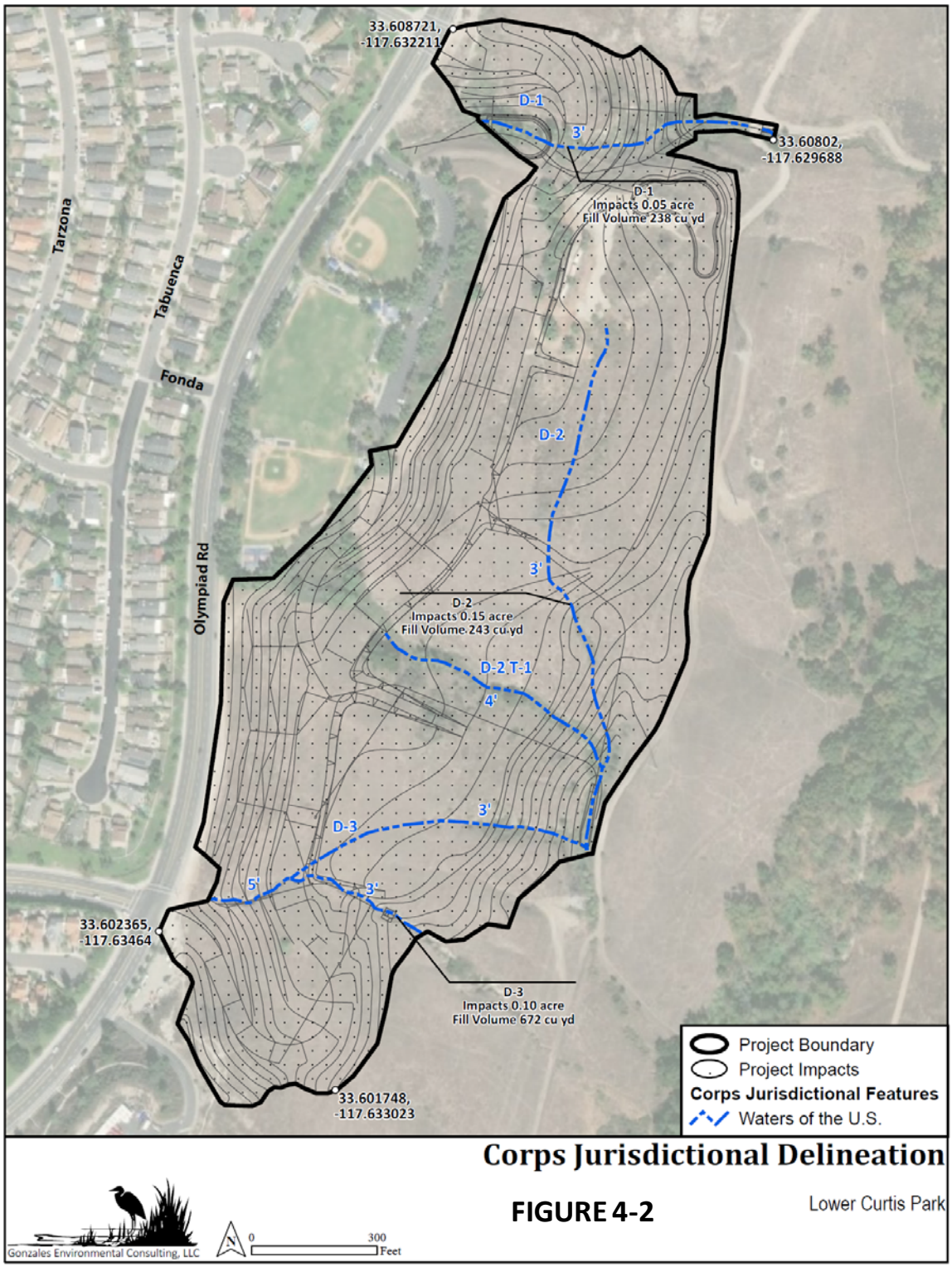
USACE Jurisdictional Delineation	Existing On-site	Linear Feet	Impacts	Impacts Linear feet
WOUS	0.301 acre	4017 feet	0.301 acre	4017 feet

33.608721,
-117.632211
D-1
3'
33.60802,
-117.629688
Tarzona
Tabuenca
Fonda
Olympiad Rd
D-2
3'
D-2 T-1
4'
3'
D-3
5'
3'
33.602365,
-117.63464
33.601748,
-117.633023
Project Boundary
Corps Jurisdictional Features
Waters of the U.S.
Corps Jurisdictional Delineation
Lower Curtis Park
Gonzales Environmental Consulting, LLC
0
300
Feet

FIGURE 4-1

4.3.1 Summary of Potentially Federal Jurisdictional Impacts

Impacts were calculated and is shown in Table 4-6 and Figure 4-2.



5. DELINEATION OF CDFW JURISDICTIONAL HABITATS

5.1 Regulatory Background

Fish and Game Code Chapter 6, Fish and Wildlife Protection and Conservation, Section 1600 *et seq.* was enacted to provide for the conservation of fish and wildlife resources associated with stream ecosystems. The FGC further defines fish and wildlife to include: all wild animals, birds, plants, fish, amphibians, invertebrates, reptiles, and related ecological communities, including the habitat upon which they depend for continued viability (FGC Division 5, Chapter 1, section 45, and Division 2, Chapter 1, section 71 l.2(a), respectively). Fish means wild fish, mollusks, crustaceans, invertebrates, or amphibians, including any part, spawn or ova thereof (FGC, Division 5, Chapter 1, section 45).

For the purposes of implementing sections 1601 and 1603 of the FGC, California Code of Regulations Title 14, section 720 requires submission to the Department of general plans sufficient to indicate the nature of a project for construction by or on behalf of any person, government agency, state or local, and any public utility, of any project which will divert, obstruct or change the natural flow or bed of any river, stream or lake designated by the Department, or will use material from the streambeds designated by the Department, all rivers, streams, lakes, and streambeds in the State of California, including all rivers, streams and streambeds which may have intermittent flows of water, are hereby designated for such purpose.

Division 2, Chapter 5, Article 6, Section 1600 *et seq.* of the California Fish and Game Code does not limit jurisdiction to areas defined by specific flow events or seasonal changes in water flow. Accordingly, it has been the practice of the Department to define the stream channel as that area where water uniformly or habitually flows over a given course, and where the width of the watercourse can reasonably be defined. Thus, a channel is not defined by a specific flow event, nor by the path of surface water as this path might vary seasonally. Rather, it is the Departments practice to define the channel based on the topography or elevations of land that confine the water to a definite course when the waters of a creek rise to their highest point. To define jurisdictional boundaries otherwise would result in a morass of jurisdictional boundaries that differed from stream to stream, changed with variations in channel morphology along the same stream, or that shifted seasonally on any given stream along with seasonal changes in flow.

The Department's website has additional information regarding dryland streams in "A review of Stream Processes and Forms in Dryland Watersheds" at this location:http://www.dfg. ca.gov/habcon/1600/ 1600resources.html.

CDFG's definition of "lake" includes "natural lakes or man-made reservoirs."

Diversions, obstructions, or changes to the natural flow or bed, channel, or bank of any river, stream, or lake which supports fish or wildlife, require authorization

from CDFG by means of entering into an agreement pursuant to Section 1601 or 1603 of the Fish and Game Code.

5.2 CDFG Jurisdictional Waters

State-jurisdictional streambeds were delineated in the field concurrently with the delineation of non-wetland federal waters (Section 4.2.1, above). Prior to conducting field assessments, transects (ranging from 0.15 to 0.5 miles in length) were drawn on a one-meter resolution aerial photograph. During the field assessment, points where these transects intercepted potentially jurisdictional waters were mapped on the aerial photographs or with a Trimble GeoXT GPS unit. Field maps were digitized using GIS technology and the total area of jurisdictional features was calculated.

CDFW jurisdictional areas were calculated based on mapping episodic stream activity boundaries (MESA) or dripline of riparian vegetation, whichever was greater.

5.3 Results

GEC found CDFW jurisdictional streambed on the project site. Refer to Table 5-1 and Figure 5-1 for the locations and acreages of jurisdictional features.

Delineation studies found 1.018 acres of streambed and 5.124 acres of riparian on the project site.

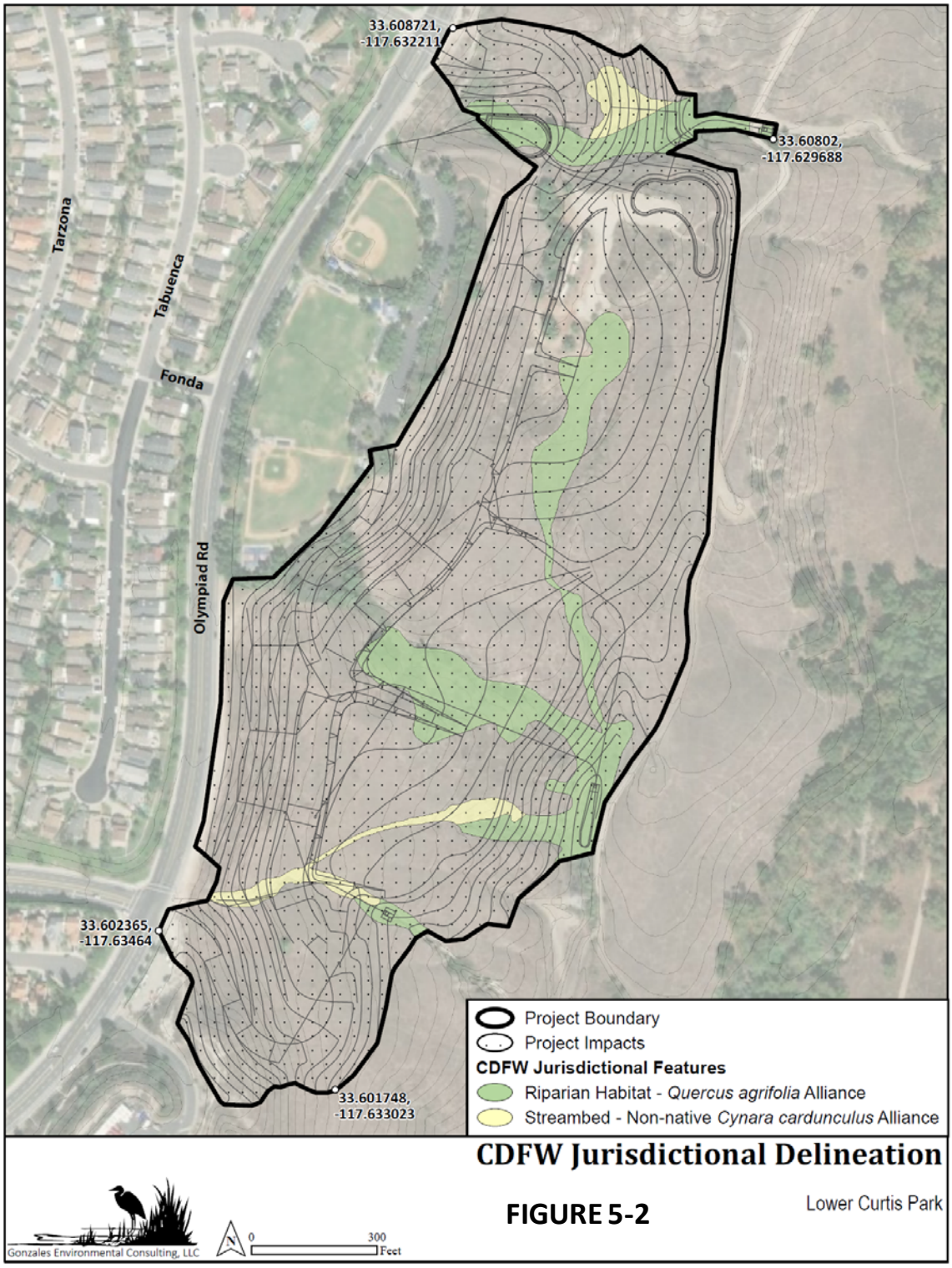
TABLE 5-1
SUMMARY OF POTENTIAL CDFW JURISDICTION BY HABITAT

	Existing			
CDFW Jurisdictional Delineation	**Existing On-site**	**Existing On-site (length in feet)**	**Impacts On-site**	**Length in feet**
Streambed	1.018	906	1.018	906
Riparian Habitat	5.124	3111	5.124	3111
TOTAL	**6.142**	**4017**	**6.142**	**4017**

33.608721,
-117.632211
33.60802,
-117.629688
Tarzona
Tabuenca
Fonda
Olympiad Rd
33.602365,
-117.63464
33.601748,
-117.633023
Project Boundary
CDFW Jurisdictional Features
Riparian Habitat - Quercus agrifolia Alliance
Streambed - Non-native Cynara cardunculus Alliance
CDFW Jurisdictional Delineation
FIGURE 5-1
Lower Curtis Park
Gonzales Environmental Consulting, LLC
0
300
Feet

5.3.1 Summary of Potentially CDFW Jurisdictional Impacts

Impacts were calculated and are shown in Table 5-1 and Figure 5-2.



6. PERMITS/AGREEMENTS

Permits/agreements needed

The area is under the jurisdiction of the California Department of Fish and Wildlife, U.S. Army Corps of Engineers and California Regional Water Quality Control Board. Permits/Agreements for activities within the streambed will be required by the California Department of Fish and Wildlife, U. S. Army Corps of Engineers and California Regional Water Quality Control Board. Final authority over the area rests with the appropriate agencies. U.S. Army Corps of Engineers has requested that the following statement be added to all delineations:

"This delineation/determination has been conducted to identify the limits of the Corps Clean Water Act jurisdiction for the particular site identified in this request. This delineation/determination may not be valid for the wetland conservation provisions of the Food Security Act of 1985, as amended. If you or your tenant are USDA program participants, or anticipate participation in USDA programs, you should request a certified wetland determination from the local office of the Natural Resources Conservation Service prior to starting work."

Mitigation Recommendations

This section describes the mitigation measures (MMs) required for impacts to special-status vegetation communities, including jurisdictional areas. These MMs will reduce identified and potential significant impacts to a level which is less than significant pursuant to CEQA, and to comply with conditions of the Orange County Southern Subregion Habitat Conservation Plan (HCP) Biological Opinion.

Impact BIO-1: (Impacts to special-status vegetation communities.) There will be direct impacts to 5.214 acres of *Quercus agrifolia* alliance, a special-status vegetation communities as a result of the proposed project.
MM BIO-1.1: Mitigation for temporary impacts to this community will be through on- site or off-site restoration at a 1:1 ratio to restore impacted special-status vegetation communities to pre-construction conditions. A revegetation plan will be developed, and all revegetation efforts will be consistent with the management plan developed for the HCP for this particular subarea. The revegetation plan shall include a monitoring program, clearly defined success criteria, and contingency measures.

Impact BIO-2: (Impacts to special-status vegetation communities outside of the impact area.)

MM BIO-2.1: To prevent inadvertent disturbance to special-status vegetation communities outside the limits of work, vegetation removal shall be monitored by a biologist and standard best management practices (BMPs) will be implemented. A biologist shall be contracted to perform biological monitoring during all clearing activities.

The following duties shall be carried out by the biological monitor:

1. Review and/or designate the vegetation removal area in the field with the contractor in accordance with the final plan.
2. Be present during initial vegetation clearing, grubbing, and grading
3. Record any advertent impacts to vegetation communities outside the designated construction zone in daily monitoring reports.

Special-Status Wildlife

This section describes the mitigation measures (MMs) required for impacts to special-status wildlife. These MMs will reduce identified and potential significant impacts to a level which is less than significant pursuant to CEQA, and to comply with conditions of the Orange County Southern Subregion Habitat Conservation Plan (HCP) Biological Opinion.

Impact BIO-3: Project construction could result in both direct and indirect impacts to nesting special-status birds (including migratory species), causing injury, or mortality and other adverse effects such as increased stress and nest abandonment. For special-status bird species known or with potential to nest in the study area, direct impacts could include the loss of nests, eggs, and fledglings if vegetation clearing and ground-disturbing activities occur during the nesting season (generally between February 1 and September 30). Indirect impacts such as noise could disrupt breeding activity and potentially result in effects such as nest abandonment, reduced foraging, and increased stress, potentially resulting in reduced reproductive success.

MM BIO-3.1: To prevent inadvertent direct and indirect impacts to special-status birds, the following avoidance measures will be implemented:
1. Pre-construction nest surveys will be conducted within 1 week prior to vegetation clearing if construction occurs during the nesting season of species known or with potential to nest in the study area. Locations of nesting birds will be mapped and appropriate no-work buffers will be established including 500-foot buffers for listed species such as California gnatcatcher, 500 feet for special-status raptors, and 50-foot buffers for non-listed passerine species.
2. Discuss procedures for minimizing harm to or harassment of wildlife encountered during construction with the contractor and other key construction personnel prior to clearing, grubbing, or grading.
3. Flush special-status species (i.e., avian or other mobile species) from occupied habitat areas during the non-breeding season immediately prior to brush-clearing and earth-moving activities.

Jurisdictional Waters/Streambed

This section describes the mitigation measure (MM) required to reduce impacts to jurisdictional waters/streambed to a level which is less than significant pursuant to CEQA, and to comply with conditions of the HCP Biological Opinion. Additional or more specific mitigation requirements may be required to obtain the required Clean Water Act (CWA) Section 401 Water Quality Certification from the Regional Water Quality Control Board (RWQCB), to obtain a Section

404 Permit from U.S. Army Corps of Engineers (ACOE)*[3], and to obtain a California Fish and Game Code Section 1602 Streambed Alteration Agreement (SAA) from CDFW.

Impact BIO-4: (Impacts to jurisdictional streambed and waters.) Impacts to jurisdictional streambed and waters habitats will be mitigated as described under MM BIO-1.1 above. In addition, the following MM is required.

MM BIO-4.1: To comply with the state and federal regulations for impacts to "waters of the United States and state," the following agency permits are required, or verification that they are not required shall be obtained.
The following permit and agreement shall be obtained:

- A CWA, Section 401/404 permit issued by the California RWQCB and the ACOE for all project-related disturbances of waters of the United States and/or associated wetlands.
- A Section 1600 SAA issued by the CDFW for all project-related disturbances of any streambed.

Impact BIO-5: (Impacts to jurisdictional waters outside of impact area.) This impact will be mitigated through MM BIO- 2.1 described above.

MM BIO-5.1: This impact will be mitigated through MM BIO- 2.1 described above.

[3] Project is in a Special Area Management Plan for ACOE. There are no nationwide permits authorized for the area.

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USGS 11047300 ARROYO TRABUCO A SAN JUAN CAPISTRANO CA

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APPENDIX A

Regional, USGS, Vegetation Mapping

Source: National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.

Regional Map

CURTIS PARK

Gonzales Environmental Consulting, LLC

N 0 4 Miles

Site Plan

CURTIS PARK

Gonzales Environmental Consulting, LLC

N 0 300 Feet

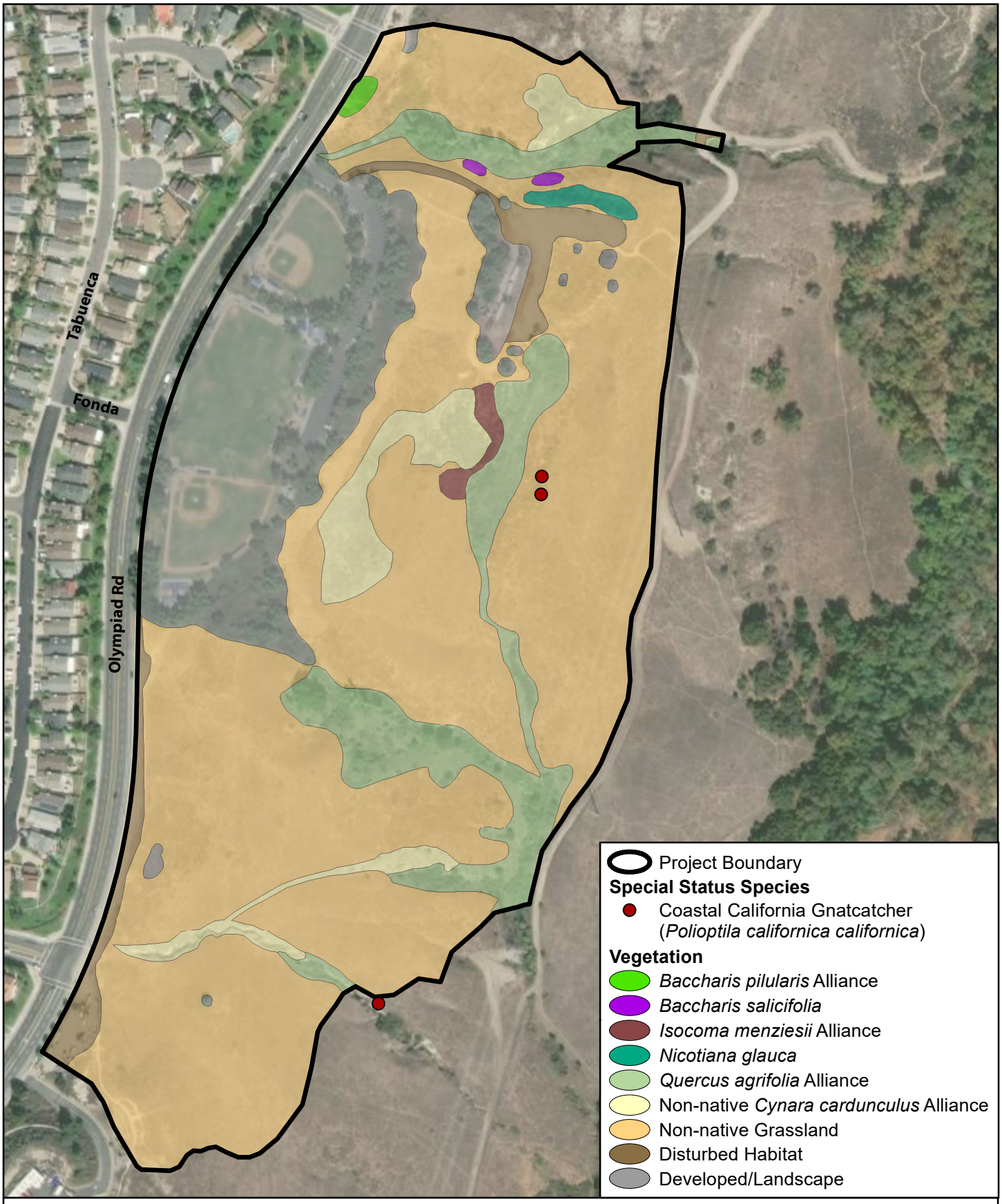
Source: USGS 7.5' Quadrangles (San Juan Capistrano & Canada Gobernadora);
Copyright:© 2013 National Geographic Society, i-cubed

USGS Topo

CURTIS PARK

Gonzales Environmental Consulting, LLC

N 0 2,000 Feet



Biological Resources

CURTIS PARK

Gonzales Environmental Consulting, LLC

N 0 300 Feet

APPENDIX B

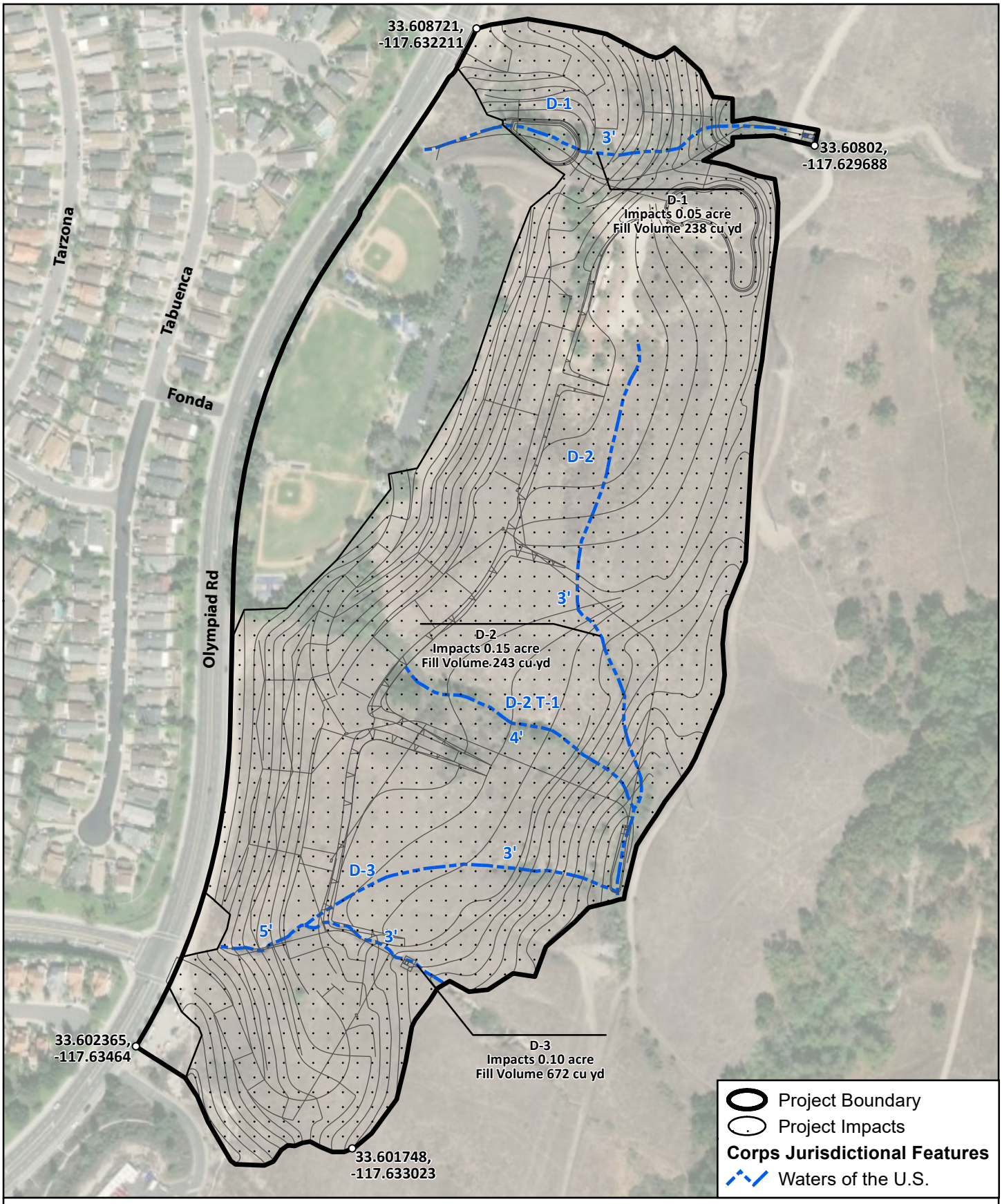
USACE & CDFW MAPPING

Corps Jurisdictional Delineation

CURTIS PARK

Gonzales Environmental Consulting, LLC

N 0 300 Feet



Corps Jurisdictional Delineation

CURTIS PARK

Gonzales Environmental Consulting, LLC

N 0 300 Feet

CDFW Jurisdictional Delineation

CURTIS PARK

Gonzales Environmental Consulting, LLC

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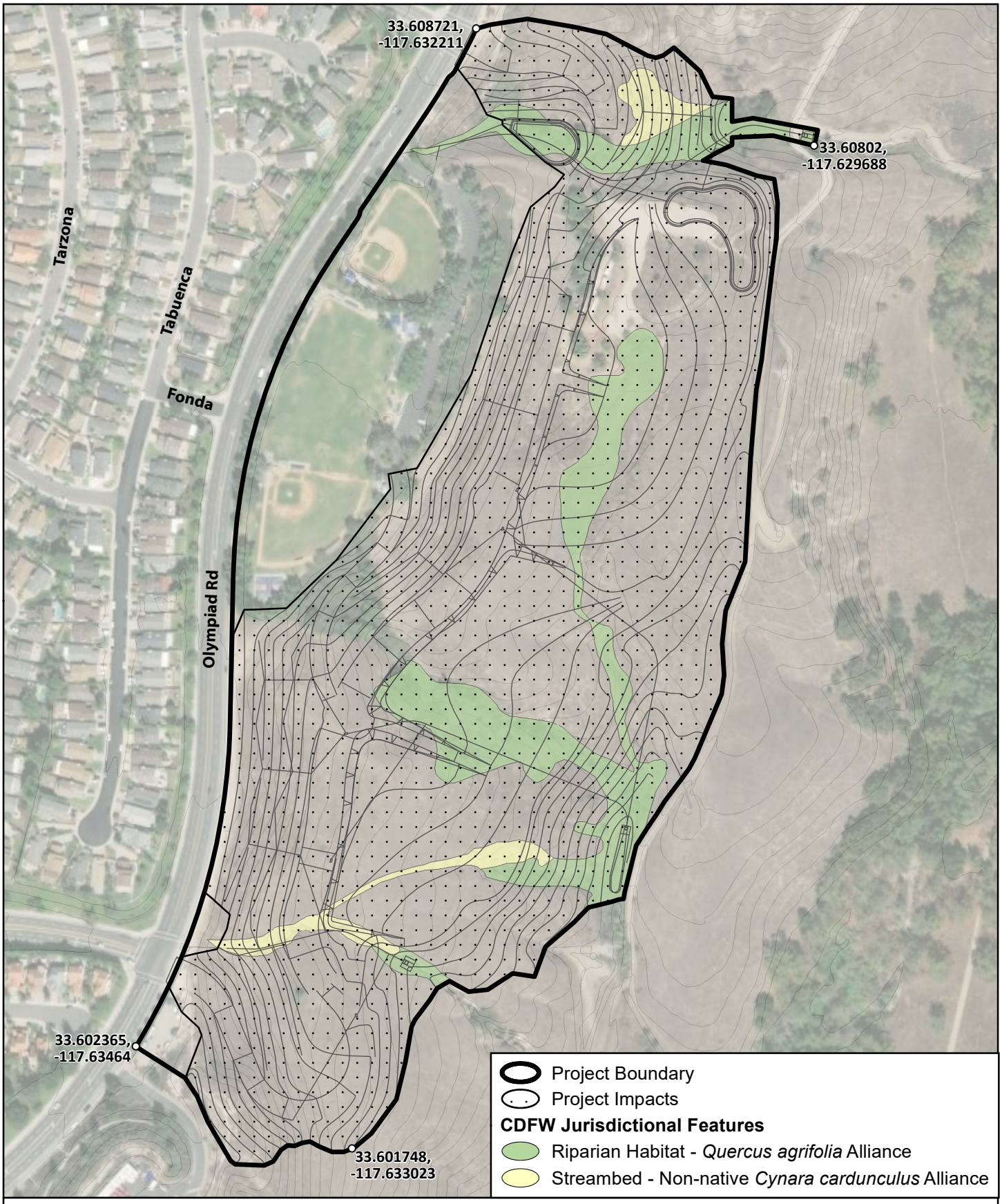


CDFW Jurisdictional Delineation

CURTIS PARK

Gonzales Environmental Consulting, LLC

N 0 300 Feet

APPENDIX C

DATA SHEETS

WETLAND DETERMINATION DATA FORM-Arid West Region

Project/Site :Mission Viejo Curtis Park		City/County: Mission Viejo/Orange	Sampling Date: 9-15-19
Applicant / Owner : City of Mission Viejo		State: CA	Sampling Point: Unnamed Drainage 1-1
Investigators: Teresa Gonzales and Paul Gonzales		Section, Township, Range: San Juan Capistrano quadrangle Township 6 South, Range 7 West, Section 32	
Landform (hilltop,terrace.etc.) hilltop to terrace		Local relief (concave, convex, none): Concave	Slope (%): 11%
Subregion (LRR): LRR D	Lat: 33.631663˚ N	Long: -117.631663˚ W	Datum:
Soil Map Unit Name: Alo-Bosanko association		NWI classification: 137.256.28.1.182.5811, 137.256.28.1.182.7000 Riverine Lower intermittent. Subclass vegetated streambeds, nonpersistent intermittently-flooded regime, freshwater, coastal canyon drainages, woodland tree types (Q. agrifolia) and *mixed vascular plant dominance*	
Are climatic/hydrologic conditions on the site typical for this time of year?	Yes: √	No:	If no, explain in Remarks.
Are Vegetation , Soil , or Hydrology significantly disturbed?	Are "Normal Circumstances" present?	Yes: √	No:
Are Vegetation , Soil , or Hydrology naturally problematic?	(If needed, explain any answers in Remarks)		

SUMMARY OF FINDINGS-(Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	No √	Is the Sampled Area within a Wetland? Yes No √
Hydric Soil Present?	Yes√	No	
Wetland Hydrology Present?	Yes√	No	
Remarks:			

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Species
1. *Washingtonia robusta*	30	√	NI
2. *Quercus agrifolia*	20		NI
3.			
4.			
Total Cover:	50%		

Dominance Test worksheet:	
Number of Dominant Species That are OBL, FACW, or FAC:	0 (A)
Number of Dominant Species Across All Strata:	0 (B)
Percent of Dominant Species That Are OBL,FACW, or FAC:	0% (A/B)

Sampling/Shrub Stratum			
1. *Cortaderia jubata*	10		FACU
2. *Baccharis pilularis*	30		NI
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:	40 %		

Prevalence Index worksheet:	
Total % Cover of:	Multiply by:
OBL species 0	X1=
FACW species 0	X2=
FAC species 10	X3=30
FACU species 10	X4=40
UPL species 0	X5=0
Column Totals: 20 (A)	70 (B)
Prevalence Index=B/A=	3.5

Herb Stratum			
1. *Urtica dioica*	10		FAC
2.			
3.			
4.			
Total Cover:	10%		

Hydrophytic Vegetation Indicators:
Dominance Test is >50%
Prevalence Index is <3.0[1]
Morphological Adaptations[1](Provide supporting data in Remarks or on a separate sheet)
Problematic Hydrophytic Vegetation[1] (Explain)
[1]Indicators of hydric soil and wetland hydrology must be present.

Woody Vine Stratum			
Total Cover:			

Hydrophytic Vegetation Present:	
Yes	No√

%Bare Ground in Herb Stratum: %	% Cover of Biotic Crust

Hydrophytic Vegetation Present:	
Yes	No√

Remarks: In Drainage channel

SOIL

Sampling Point: Unnamed Drainage-1-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of Indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color(moist)	%	Type[1]	Loc[2]	Texture	Remarks
22"	10 YR 6/3						Shaly clayey loam	Sticky and plastic

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

Indicators for Problematic Hydric Soils[3]:

	Histosol (A1)		Sandy Redox (S5)		1 cm Muck (A9) (LRR C)
	Histic Epipedon (A2)	√	Stripped Matrix (S6)		2 cm Muck (A10) (LRR B)
	Black Histic (A3)	√	Loamy Mucky Mineral (F1)		Reduced Vertic (F18)
	Hydrogen Sulfide (A4)		Loamy Gleyed Matrix (F 2)		Red Parent Material (TF 2)
	Stratified Layers (A5) (LRR C)		Depleted Matrix (F3)		Other (Explain in Remarks)
	1 cm Muck (A9) (LRR D)		Redox Dark Surface (F6)		
	Depleted Below Dark Surface (A 11)		Depleted Dark Surface (F7)		
	Thick Dark Surface (A 12)		Redox Depressions (F8)		
	Sandy Mucky Mineral (S1)		Vernal Pools (F9)		
	Sandy Gleyed Matrix (S4)				[3] Indicators of hydrophytic vegetation and wetland hydrology must be present

Restrictive Layer (If present):

Type: Depth (inches):	Hydric Soil Present? Yes No Fluvial soils √

Remarks: Drainage soils with redox features

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

Secondary Indicators (2 or more required)

	Surface Water (A1)		Salt Crust (B11)	√	Water Marks (B1) (Riverine)
	High Water Table (A2)		Biotic Crust (B12)	√	Sediment Deposits (B2) (Riverine)
	Saturation(A3)		Aquatic Invertebrates (B13)	√	Drift Deposits (B3) (Riverine)
	Water Marks (B1) (Nonriverine)		Hydrogen Sulfide Odor (C1)	√	Drainage Patterns (B10)
	Sediment Deposits (B2) (Nonriverine)		Oxidized Rhizospheres along Living Roots (C3)		Dry-Season Water Table (C2)
	Drift Deposits (B3) (Nonriverine)		Presence of Reduced Iron (C4)		Thin Muck Surface (C7)
	Surface Soil Cracks (B6)		Recent Iron Reduction in Plowed Soils (C6)		Crayfish Burrows (C8)
	Inundation Visible on Aerial Imagery (B7)		Other (Explain in Remarks)		Saturation Visible on Aerial Imagery (C90
	Water-Stained Leaves (B9)				Shallow Aquitard (D3)
					FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes		No√		Depth (inches):		Wetland Hydrology Present:
Water Table Present?	Yes		No√		Depth (inches):		Yes No√
Saturation Present? (includes capillary fringe)	Yes		No√		Depth (inches):		

Describe Recorded Data (stream gauge, monitoring well, aerial photos), if available:
Orange County Hydrology Manual
Local Rain Gage
2019 Aerial Photos

Remarks: waters of US –Unnamed Drainage 1

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Mission Viejo-Curtis **Date:** 9-15-19
Project Number: **Town:** Mission Viejo **State:** CA
Stream: Unnamed Drainage 1
Investigator(s): Teresa Gonzales and Paul Gonzales
Y x/ N □Do normal circumstances exist on the site? **Location Details:** Unnamed Drainage 1with surface runoff and storm runoff

Y □/ N x Is the site significantly disturbed? **Projection:** **Datum:**
Coordinates: 33.631663˚n /-117.631663˚w

Potential anthropogenic influences on the channel system: Unnamed Drainage 1 receives surface flow from storm events from overside drain off of Olympiad Road.

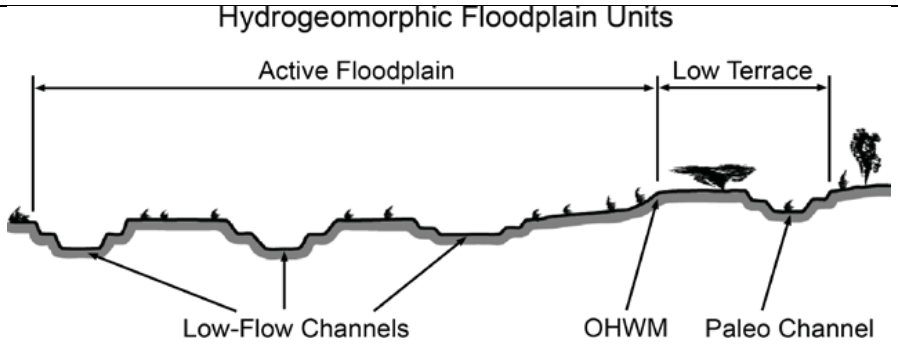
Brief site description: Unnamed Drainage 1 begins at overside drain off of Olympiad Road north of the existing and traverses the project site from the west to east before flowing offsite. There are signs of hydrology (i.e. Drift lines, sediment deposits, and shelving) throughout the length of Unnamed Drainage 1 on the project site.

Checklist of resources (if available):

x Aerial photography
Dates: 2019
xTopographic maps
□Geologic maps
x Vegetation maps
x Soils maps
x Rainfall/precipitation maps
Existing delineation(s) for site

xGlobal positioning system (GPS)
xOther studies

XStream gage data
Gage number: 21CAOCSD-DCC
Period of record:
XHistory of recent effective discharges
□History of recent effective discharges
□Results of flood frequency analysis
□Most recent shift-adjusted rating
□Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

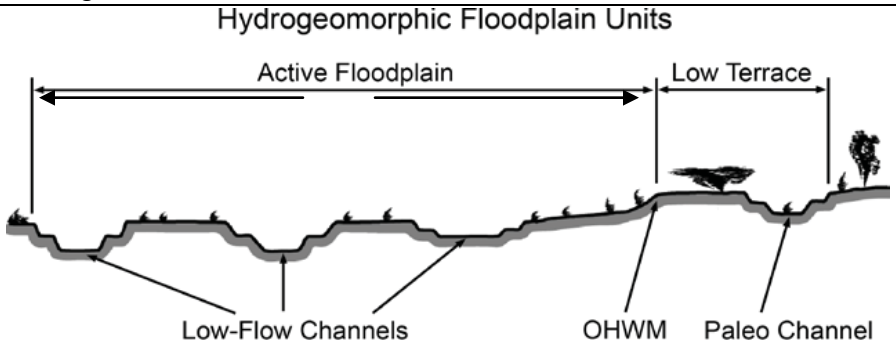


Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:
1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:

x Mapping on aerial photograph
□Digitized on computer
xGPS
□Other:

Project ID: Unnamed Drainage 1-1 **Cross section ID: OHWM** **Date:** 9-15-19

Cross section drawing:



OHWM

GPS point: gps

Indicators:

xChange in average sediment texture
xChange in vegetation species
xChange in vegetation cover
x Break in bank slope
□Other: _____
□Other: _____

Comments:

Floodplain unit: □Low-Flow Channel xActive Floodplain □Low Terrace

GPS point:

Characteristics of the floodplain unit:

Average sediment texture: silt/clay

Total veg cover: 100% Tree: 50%Shrub: 40 % Herb: 10%

Community successional stage:

□NA
□Early (herbaceous & seedlings)
□Mid (herbaceous, shrubs, saplings)
xLate (herbaceous, shrubs, mature trees)

Indicators:

□Mudcracks
□Ripples
x Drift and/or debris
x Presence of bed and bank
x Benches
xSoil development
xSurface relief
□Other: _____
□Other: _____
□Other: _____

Comments: Waters of US

WETLAND DETERMINATION DATA FORM-Arid West Region

Project/Site :Mission Viejo Curtis Park		City/County: Mission Viejo/Orange	Sampling Date: 9-15-19
Applicant / Owner : City of Mission Viejo		State: CA	Sampling Point: Unnamed Drainage 1-2
Investigators: Teresa Gonzales and Paul Gonzales		Section, Township, Range: San Juan Capistrano quadrangle Township 6 South, Range 7 West, Section 32	
Landform (hilltop,terrace.etc.) hilltop to terrace		Local relief (concave, convex, none): Concave	Slope (%): 11%
Subregion (LRR): LRR D	Lat: 33.631663˚ N	Long: -117.631663˚ W	Datum:
Soil Map Unit Name: Alo-Bosanko association		NWI classification: 137.256.28.1.182.5811, 137.256.28.1.182.7000 Riverine Lower intermittent. Subclass vegetated streambeds, nonpersistent intermittently-flooded regime, freshwater, coastal canyon drainages, woodland tree types (Q. agrifolia) and *mixed vascular plant dominance*	
Are climatic/hydrologic conditions on the site typical for this time of year?	Yes: √	No:	If no, explain in Remarks.
Are Vegetation , Soil , or Hydrology significantly disturbed?	Are "Normal Circumstances" present?	Yes: √	No:
Are Vegetation , Soil , or Hydrology naturally problematic?	(If needed, explain any answers in Remarks)		

SUMMARY OF FINDINGS-(Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	No √	Is the Sampled Area within a Wetland? Yes No √
Hydric Soil Present?	Yes√	No	
Wetland Hydrology Present?	Yes√	No	
Remarks:			

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Species
1. *Washingtonia robusta*	20		NI
2. *Quercus agrifolia*	40		NI
3. *Salix lasiolepis*	30		FACW
4.			
Total Cover:	90%		

Dominance Test worksheet:
Number of Dominant Species That are OBL, FACW, or FAC: 0 (A)
Number of Dominant Species Across All Strata: 0 (B)
Percent of Dominant Species That Are OBL,FACW, or FAC: 0% (A/B)

Sampling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:	%		

Prevalence Index worksheet:	
Total % Cover of:	Multiply by:
OBL species 0	X1=
FACW species 30	X2=60
FAC species	X3=0
FACU species	X4=0
UPL species 0	X5=0
Column Totals: 30 (A)	60 (B)
Prevalence Index=B/A=	2.0

Herb Stratum			
1.			
2.			
3.			
4.			
Total Cover:	%		

Hydrophytic Vegetation Indicators:
Dominance Test is >50%
Prevalence Index is <3.0[1]
Morphological Adaptations[1](Provide supporting data in Remarks or on a separate sheet)
Problematic Hydrophytic Vegetation[1] (Explain)
[1]Indicators of hydric soil and wetland hydrology must be present.

Woody Vine Stratum			
Total Cover:			

Hydrophytic Vegetation Present:	
Yes	No√

%Bare Ground in Herb Stratum: %	30% Cover of Biotic Crust

Hydrophytic Vegetation Present:	
Yes	No√

Remarks: In Drainage channel

SOIL

Sampling Point: Unnamed Drainage-1-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of Indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color(moist)	%	Type[1]	Loc[2]	Texture	Remarks
22"	10 YR 6/3						Shaly clayey loam	Sticky and plastic

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

Indicators for Problematic Hydric Soils[3]:

	Histosol (A1)		Sandy Redox (S5)		1 cm Muck (A9) (LRR C)
	Histic Epipedon (A2)	√	Stripped Matrix (S6)		2 cm Muck (A10) (LRR B)
	Black Histic (A3)	√	Loamy Mucky Mineral (F1)		Reduced Vertic (F18)
	Hydrogen Sulfide (A4)		Loamy Gleyed Matrix (F 2)		Red Parent Material (TF 2)
	Stratified Layers (A5) (LRR C)		Depleted Matrix (F3)		Other (Explain in Remarks)
	1 cm Muck (A9) (LRR D)		Redox Dark Surface (F6)		
	Depleted Below Dark Surface (A 11)		Depleted Dark Surface (F7)		
	Thick Dark Surface (A 12)		Redox Depressions (F8)		
	Sandy Mucky Mineral (S1)		Vernal Pools (F9)		
	Sandy Gleyed Matrix (S4)				[3] Indicators of hydrophytic vegetation and wetland hydrology must be present

Restrictive Layer (If present):

Type: Depth (inches):	Hydric Soil Present? Yes No Fluvial soils √

Remarks: Drainage soils with redox features

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

Secondary Indicators (2 or more required)

	Surface Water (A1)		Salt Crust (B11)	√	Water Marks (B1) (Riverine)
	High Water Table (A2)		Biotic Crust (B12)	√	Sediment Deposits (B2) (Riverine)
	Saturation(A3)		Aquatic Invertebrates (B13)	√	Drift Deposits (B3) (Riverine)
	Water Marks (B1) (Nonriverine)		Hydrogen Sulfide Odor (C1)	√	Drainage Patterns (B10)
	Sediment Deposits (B2) (Nonriverine)		Oxidized Rhizospheres along Living Roots (C3)		Dry-Season Water Table (C2)
	Drift Deposits (B3) (Nonriverine)		Presence of Reduced Iron (C4)		Thin Muck Surface (C7)
	Surface Soil Cracks (B6)		Recent Iron Reduction in Plowed Soils (C6)		Crayfish Burrows (C8)
	Inundation Visible on Aerial Imagery (B7)		Other (Explain in Remarks)		Saturation Visible on Aerial Imagery (C90
	Water-Stained Leaves (B9)				Shallow Aquitard (D3)
					FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes		No√		Depth (inches):		Wetland Hydrology Present:
Water Table Present?	Yes		No√		Depth (inches):		Yes No√
Saturation Present? (includes capillary fringe)	Yes		No√		Depth (inches):		

Describe Recorded Data (stream gauge, monitoring well, aerial photos), if available:
Orange County Hydrology Manual
Local Rain Gage
2019 Aerial Photos

Remarks: waters of US –Unnamed Drainage 1

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Mission Viejo-Curtis **Date:** 9-15-19
Project Number: **Town:** Mission Viejo **State:** CA
Stream: Unnamed Drainage 1
Investigator(s): Teresa Gonzales and Paul Gonzales
Y x/ N □Do normal circumstances exist on the site? **Location Details:** Unnamed Drainage 1with surface runoff and storm runoff

Y □/ N x Is the site significantly disturbed? **Projection:** **Datum:**
Coordinates: 33.631663˚n /-117.631663˚w

Potential anthropogenic influences on the channel system: Unnamed Drainage 1 receives surface flow from storm events from overside drain off of Olympiad Road.

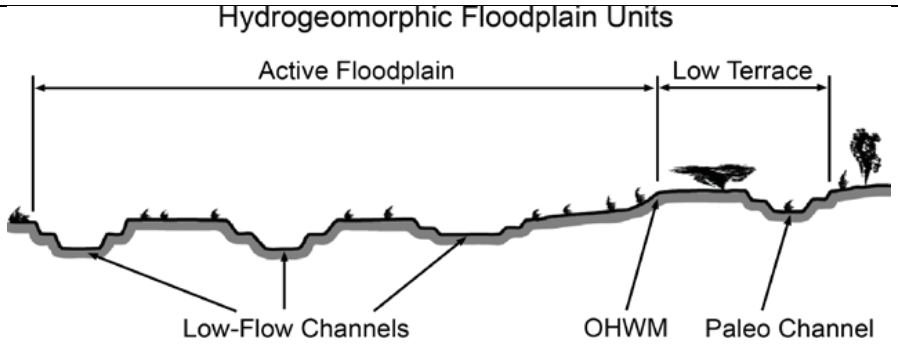
Brief site description: Unnamed Drainage 1 begins at overside drain off of Olympiad Road north of the existing and traverses the project site from the west to east before flowing offsite. There are signs of hydrology (i.e. Drift lines, sediment deposits, and shelving) throughout the length of Unnamed Drainage 1 on the project site.

Checklist of resources (if available):

x Aerial photography
Dates: 2019
xTopographic maps
□Geologic maps
x Vegetation maps
x Soils maps
x Rainfall/precipitation maps
Existing delineation(s) for site

xGlobal positioning system (GPS)
xOther studies

XStream gage data
Gage number: 21CAOCSD-DCC
Period of record:
XHistory of recent effective discharges
□History of recent effective discharges
□Results of flood frequency analysis
□Most recent shift-adjusted rating
□Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

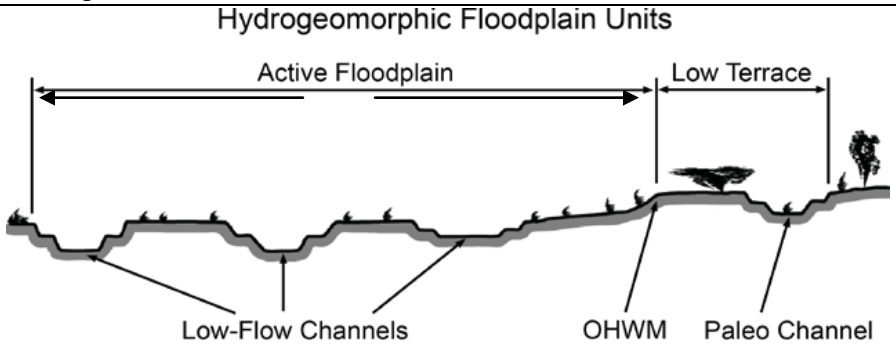


Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:
1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:

x Mapping on aerial photograph
□Digitized on computer
xGPS
□Other:

Project ID: Unnamed Drainage 1-2 **Cross section ID: OHWM** **Date:** 9-15-19

Cross section drawing:



OHWM

GPS point: gps

Indicators:

xChange in average sediment texture
xChange in vegetation species
xChange in vegetation cover
x Break in bank slope
□Other: _____
□Other: _____

Comments:

Floodplain unit: □Low-Flow Channel xActive Floodplain □Low Terrace

GPS point:

Characteristics of the floodplain unit:

Average sediment texture: silt/clay

Total veg cover: 90% Tree: 90%Shrub: 0 % Herb: 0%

Community successional stage:

□NA
□Early (herbaceous & seedlings)
□Mid (herbaceous, shrubs, saplings)
xLate (herbaceous, shrubs, mature trees)

Indicators:

□Mudcracks
□Ripples
x Drift and/or debris
x Presence of bed and bank
x Benches
xSoil development
xSurface relief
□Other: _____
□Other: _____
□Other: _____

Comments: Waters of US

WETLAND DETERMINATION DATA FORM-Arid West Region

Project/Site :Mission Viejo Curtis Park		City/County: Mission Viejo/Orange	Sampling Date: 9-15-19
Applicant / Owner : City of Mission Viejo		State: CA	Sampling Point: Unnamed Drainage 2-1
Investigators: Teresa Gonzales and Paul Gonzales		Section, Township, Range: San Juan Capistrano quadrangle Township 6 South, Range 7 West, Section 32	
Landform (hilltop,terrace.etc.) hilltop to terrace		Local relief (concave, convex, none): Concave	Slope (%): 11%
Subregion (LRR): LRR D	Lat: 33.631663˚ N	Long: -117.631663˚ W	Datum:
Soil Map Unit Name: Alo-Bosanko association		NWI classification: 137.256.28.1.182.5811, 137.256.28.1.182.7000 Riverine Lower intermittent. Subclass vegetated streambeds, nonpersistent intermittently-flooded regime, freshwater, coastal canyon drainages, woodland tree types (Q. agrifolia) and *mixed vascular plant dominance*	
Are climatic/hydrologic conditions on the site typical for this time of year?	Yes: √	No:	If no, explain in Remarks.
Are Vegetation , Soil , or Hydrology significantly disturbed?	Are "Normal Circumstances" present?	Yes: √	No:
Are Vegetation , Soil , or Hydrology naturally problematic?	(If needed, explain any answers in Remarks)		

SUMMARY OF FINDINGS-(Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	No √	Is the Sampled Area within a Wetland? Yes No √
Hydric Soil Present?	Yes√	No	
Wetland Hydrology Present?	Yes√	No	
Remarks:			

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Species
1.			
2.			
3.			
4.			
Total Cover: %			

Dominance Test worksheet:
Number of Dominant Species That are OBL, FACW, or FAC: 0 (A)
Number of Dominant Species Across All Strata: 0 (B)
Percent of Dominant Species That Are OBL,FACW, or FAC: 0% (A/B)

Sampling/Shrub Stratum			
1. *Stephanomeria diegensis*	80		NI
2. *Erigeron canadensis*	10		NI
3. *Brassica nigra*	10		NI
4.			
5.			
6.			
7.			
8.			
Total Cover: 100%			

Prevalence Index worksheet:	
Total % Cover of:	Multiply by:
OBL species 0	X1=
FACW species 0	X2=0
FAC species	X3=0
FACU species	X4=0
UPL species 0	X5=0
Column Totals: 0 (A)	0 (B)
Prevalence Index=B/A=	0

Herb Stratum			
1.			
2.			
3.			
4.			
Total Cover: %			

Hydrophytic Vegetation Indicators:
Dominance Test is >50%
Prevalence Index is <3.0[1]
Morphological Adaptations[1](Provide supporting data in Remarks or on a separate sheet)
Problematic Hydrophytic Vegetation[1] (Explain)
[1]Indicators of hydric soil and wetland hydrology must be present.

Woody Vine Stratum			
Total Cover:			

Hydrophytic Vegetation Present:	
Yes	No√

%Bare Ground in Herb Stratum: %	0% Cover of Biotic Crust

Hydrophytic Vegetation Present:	
Yes	No√

Remarks: In Drainage channel

SOIL

Sampling Point: Unnamed Drainage-2-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of Indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color(moist)	%	Type[1]	Loc[2]	Texture	Remarks
22"	10 YR 4/1						Dark gray clayey loam	Sticky and plastic

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

Indicators for Problematic Hydric Soils[3]:

	Histosol (A1)		Sandy Redox (S5)		1 cm Muck (A9) (LRR C)
	Histic Epipedon (A2)	√	Stripped Matrix (S6)		2 cm Muck (A10) (LRR B)
	Black Histic (A3)	√	Loamy Mucky Mineral (F1)		Reduced Vertic (F18)
	Hydrogen Sulfide (A4)		Loamy Gleyed Matrix (F 2)		Red Parent Material (TF 2)
	Stratified Layers (A5) (LRR C)		Depleted Matrix (F3)		Other (Explain in Remarks)
	1 cm Muck (A9) (LRR D)		Redox Dark Surface (F6)		
	Depleted Below Dark Surface (A 11)		Depleted Dark Surface (F7)		
	Thick Dark Surface (A 12)		Redox Depressions (F8)		
	Sandy Mucky Mineral (S1)		Vernal Pools (F9)		
	Sandy Gleyed Matrix (S4)				[3] Indicators of hydrophytic vegetation and wetland hydrology must be present

Restrictive Layer (If present):

Type: Depth (inches):	Hydric Soil Present? Yes No Fluvial soils √

Remarks: Drainage soils with redox features

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

Secondary Indicators (2 or more required)

	Surface Water (A1)		Salt Crust (B11)	√	Water Marks (B1) (Riverine)
	High Water Table (A2)		Biotic Crust (B12)	√	Sediment Deposits (B2) (Riverine)
	Saturation(A3)		Aquatic Invertebrates (B13)	√	Drift Deposits (B3) (Riverine)
	Water Marks (B1) (Nonriverine)		Hydrogen Sulfide Odor (C1)	√	Drainage Patterns (B10)
	Sediment Deposits (B2) (Nonriverine)		Oxidized Rhizospheres along Living Roots (C3)		Dry-Season Water Table (C2)
	Drift Deposits (B3) (Nonriverine)		Presence of Reduced Iron (C4)		Thin Muck Surface (C7)
	Surface Soil Cracks (B6)		Recent Iron Reduction in Plowed Soils (C6)		Crayfish Burrows (C8)
	Inundation Visible on Aerial Imagery (B7)		Other (Explain in Remarks)		Saturation Visible on Aerial Imagery (C90
	Water-Stained Leaves (B9)				Shallow Aquitard (D3)
					FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes		No√		Depth (inches):		Wetland Hydrology Present:
Water Table Present?	Yes		No√		Depth (inches):		Yes No√
Saturation Present? (includes capillary fringe)	Yes		No√		Depth (inches):		

Describe Recorded Data (stream gauge, monitoring well, aerial photos), if available:
Orange County Hydrology Manual
Local Rain Gage
2019 Aerial Photos

Remarks: waters of US –Unnamed Drainage 2

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Mission Viejo-Curtis
Date: 9-15-19
Project Number:
Town: Mission Viejo **State:** CA
Stream: Unnamed Drainage 2
Investigator(s): Teresa Gonzales and Paul Gonzales
Y x/ N □Do normal circumstances exist on the site?
Location Details: Unnamed Drainage 2with surface runoff and storm runoff

Y □/ N x Is the site significantly disturbed?
Projection: **Datum:**
Coordinates: 33.631663˚n /-117.631663˚w

Potential anthropogenic influences on the channel system: Unnamed Drainage 2 receives surface flow from storm events from landscape maintenance area.

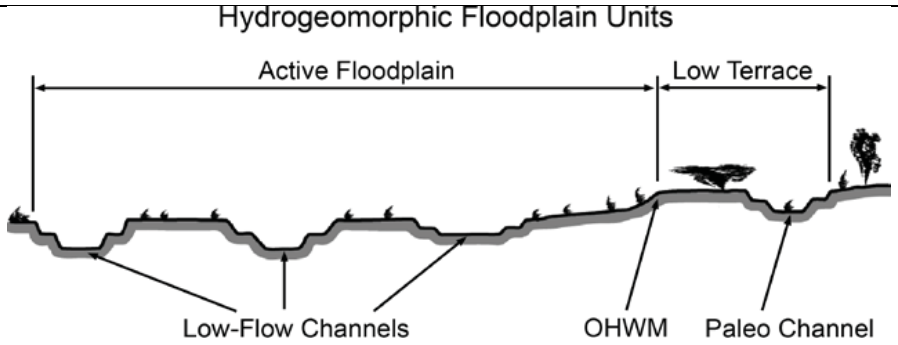
Brief site description: Unnamed Drainage 2 begins at edge of landscape maintenance area and traverses the project site from the north to south before joining a west to east tributary continuing south and then joining with Drainage 3 and then flowing offsite. There are signs of hydrology (i.e. Drift lines, sediment deposits, and shelving) throughout the length of Unnamed Drainage 2 on the project site.

Checklist of resources (if available):

x Aerial photography
Dates: 2019
xTopographic maps
□Geologic maps
x Vegetation maps
x Soils maps
x Rainfall/precipitation maps
Existing delineation(s) for site

xGlobal positioning system (GPS)
xOther studies

XStream gage data
Gage number: 21CAOCSD-DCC
Period of record:
XHistory of recent effective discharges
□History of recent effective discharges
□Results of flood frequency analysis
□Most recent shift-adjusted rating
□Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

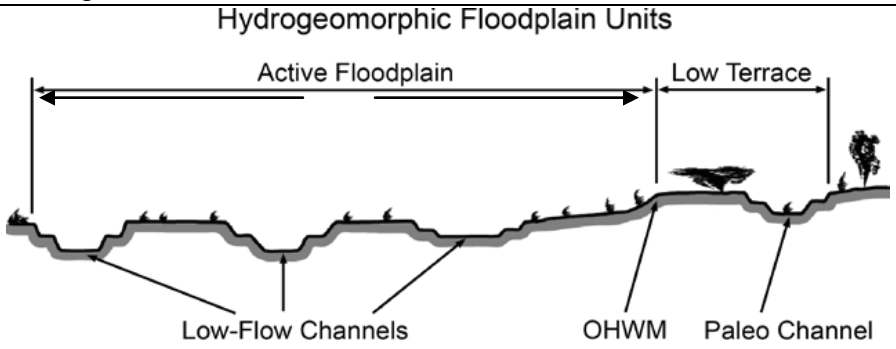


Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:
1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:

x Mapping on aerial photograph
□Digitized on computer
xGPS
□Other:

Project ID: Unnamed Drainage 2-1 **Cross section ID: OHWM** **Date:** 9-15-19

Cross section drawing:



OHWM

GPS point: gps

Indicators:

xChange in average sediment texture
xChange in vegetation species
xChange in vegetation cover
x Break in bank slope
□Other: _____
□Other: _____

Comments:

Floodplain unit: □Low-Flow Channel xActive Floodplain □Low Terrace

GPS point:

Characteristics of the floodplain unit:

Average sediment texture: silt/clay

Total veg cover: 100% Tree: 0%Shrub: 100 % Herb: 0%

Community successional stage:

□NA
xMid (herbaceous, shrubs, saplings)
□Early (herbaceous & seedlings)
□Late (herbaceous, shrubs, mature trees)

Indicators:

□Mudcracks
xSoil development
□Ripples
xSurface relief
x Drift and/or debris
□Other: _____
x Presence of bed and bank
□Other: _____
x Benches
□Other: _____

Comments: Waters of US

WETLAND DETERMINATION DATA FORM-Arid West Region

Project/Site :Mission Viejo Curtis Park		City/County: Mission Viejo/Orange	Sampling Date: 9-15-19
Applicant / Owner : City of Mission Viejo		State: CA	Sampling Point: Unnamed Drainage 2-2
Investigators: Teresa Gonzales and Paul Gonzales		Section, Township, Range: San Juan Capistrano quadrangle Township 6 South, Range 7 West, Section 32	
Landform (hilltop,terrace.etc.) hilltop to terrace		Local relief (concave, convex, none): Concave	Slope (%): 11%
Subregion (LRR): LRR D	Lat: 33.631663˚ N	Long: -117.631663˚ W	Datum:
Soil Map Unit Name: Alo-Bosanko association		NWI classification: 137.256.28.1.182.5811, 137.256.28.1.182.7000 Riverine Lower intermittent. Subclass vegetated streambeds, nonpersistent intermittently-flooded regime, freshwater, coastal canyon drainages, woodland tree types (Q. agrifolia) and *mixed vascular plant dominance*	
Are climatic/hydrologic conditions on the site typical for this time of year?	Yes: √	No:	If no, explain in Remarks.
Are Vegetation , Soil , or Hydrology significantly disturbed?	Are "Normal Circumstances" present?	Yes: √	No:
Are Vegetation , Soil , or Hydrology naturally problematic?	(If needed, explain any answers in Remarks)		

SUMMARY OF FINDINGS-(Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	No √	Is the Sampled Area within a Wetland? Yes No √
Hydric Soil Present?	Yes√	No	
Wetland Hydrology Present?	Yes√	No	
Remarks:			

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Species
1. *Salix lasiolepis*	50		FACW
2.			
3.			
4.			
Total Cover:	50%		

Dominance Test worksheet:
Number of Dominant Species That are OBL, FACW, or FAC: 0 (A)
Number of Dominant Species Across All Strata: 0 (B)
Percent of Dominant Species That Are OBL,FACW, or FAC: 0% (A/B)

Sampling/Shrub Stratum			
1. *Frangula californica*	20		NI
2. *Baccharis pilularis*	20		NI
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:	40%		

Prevalence Index worksheet:	
Total % Cover of:	Multiply by:
OBL species 0	X1=
FACW species 50	X2=100
FAC species 10	X3=30
FACU species	X4=0
UPL species 0	X5=0
Column Totals: 60 (A)	130 (B)
Prevalence Index=B/A=	2.17

Herb Stratum			
1. *Urtica dioica*	10		FAC
2.			
3.			
4.			
Total Cover:	10%		

Hydrophytic Vegetation Indicators:
Dominance Test is >50%
Prevalence Index is <3.0[1]
Morphological Adaptations[1](Provide supporting data in Remarks or on a separate sheet)
Problematic Hydrophytic Vegetation[1] (Explain)
[1]Indicators of hydric soil and wetland hydrology must be present.

Woody Vine Stratum			
Total Cover:			

Hydrophytic Vegetation Present:	
Yes	No√

%Bare Ground in Herb Stratum: %	0% Cover of Biotic Crust

Hydrophytic Vegetation Present:	
Yes	No√

Remarks: In Drainage channel

SOIL

Sampling Point: Unnamed Drainage-2-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of Indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color(moist)	%	Type[1]	Loc[2]	Texture	Remarks
22"	10 YR 4/1						Dark gray clayey loam	Sticky and plastic

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

Indicators for Problematic Hydric Soils[3]:

	Histosol (A1)		Sandy Redox (S5)		1 cm Muck (A9) (LRR C)
	Histic Epipedon (A2)	√	Stripped Matrix (S6)		2 cm Muck (A10) (LRR B)
	Black Histic (A3)	√	Loamy Mucky Mineral (F1)		Reduced Vertic (F18)
	Hydrogen Sulfide (A4)		Loamy Gleyed Matrix (F 2)		Red Parent Material (TF 2)
	Stratified Layers (A5) (LRR C)		Depleted Matrix (F3)		Other (Explain in Remarks)
	1 cm Muck (A9) (LRR D)		Redox Dark Surface (F6)		
	Depleted Below Dark Surface (A 11)		Depleted Dark Surface (F7)		
	Thick Dark Surface (A 12)		Redox Depressions (F8)		
	Sandy Mucky Mineral (S1)		Vernal Pools (F9)		
	Sandy Gleyed Matrix (S4)				[3] Indicators of hydrophytic vegetation and wetland hydrology must be present

Restrictive Layer (If present):

Type: Depth (inches):	Hydric Soil Present? Yes No Fluvial soils √

Remarks: Drainage soils with redox features

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

Secondary Indicators (2 or more required)

	Surface Water (A1)		Salt Crust (B11)	√	Water Marks (B1) (Riverine)
	High Water Table (A2)		Biotic Crust (B12)	√	Sediment Deposits (B2) (Riverine)
	Saturation(A3)		Aquatic Invertebrates (B13)	√	Drift Deposits (B3) (Riverine)
	Water Marks (B1) (Nonriverine)		Hydrogen Sulfide Odor (C1)	√	Drainage Patterns (B10)
	Sediment Deposits (B2) (Nonriverine)		Oxidized Rhizospheres along Living Roots (C3)		Dry-Season Water Table (C2)
	Drift Deposits (B3) (Nonriverine)		Presence of Reduced Iron (C4)		Thin Muck Surface (C7)
	Surface Soil Cracks (B6)		Recent Iron Reduction in Plowed Soils (C6)		Crayfish Burrows (C8)
	Inundation Visible on Aerial Imagery (B7)		Other (Explain in Remarks)		Saturation Visible on Aerial Imagery (C90
	Water-Stained Leaves (B9)				Shallow Aquitard (D3)
					FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes		No√		Depth (inches):		Wetland Hydrology Present:
Water Table Present?	Yes		No√		Depth (inches):		Yes No√
Saturation Present? (includes capillary fringe)	Yes		No√		Depth (inches):		

Describe Recorded Data (stream gauge, monitoring well, aerial photos), if available:
Orange County Hydrology Manual
Local Rain Gage
2019 Aerial Photos

Remarks: waters of US –Unnamed Drainage 2

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Mission Viejo-Curtis **Date:** 9-15-19
Project Number: **Town:** Mission Viejo **State:** CA
Stream: Unnamed Drainage 2
Investigator(s): Teresa Gonzales and Paul Gonzales
Y x/ N □Do normal circumstances exist on the site? **Location Details:** Unnamed Drainage 2with surface runoff and storm runoff

Y □/ N x Is the site significantly disturbed? **Projection:** **Datum:**
Coordinates: 33.631663˚n /-117.631663˚w

Potential anthropogenic influences on the channel system: Unnamed Drainage 2 receives surface flow from storm events from landscape maintenance area.

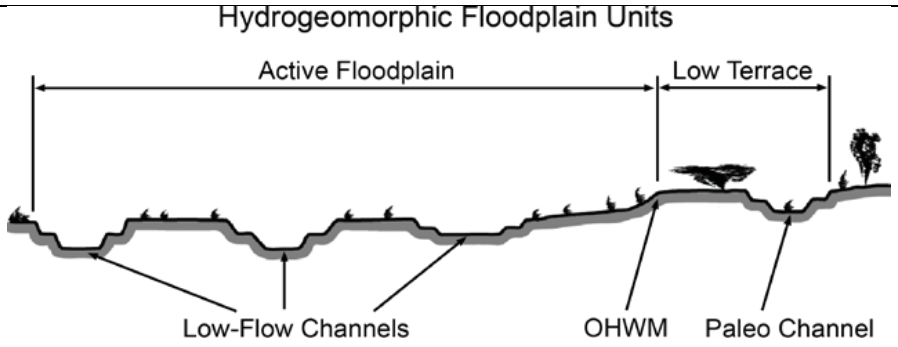
Brief site description: Unnamed Drainage 2 begins at edge of landscape maintenance area and traverses the project site from the north to south before joining a west to east tributary continuing south and then joining with Drainage 3 and then flowing offsite. There are signs of hydrology (i.e. Drift lines, sediment deposits, and shelving) throughout the length of Unnamed Drainage 2 on the project site.

Checklist of resources (if available):

x Aerial photography
Dates: 2019
xTopographic maps
□Geologic maps
x Vegetation maps
x Soils maps
x Rainfall/precipitation maps
Existing delineation(s) for site

xGlobal positioning system (GPS)
xOther studies

XStream gage data
Gage number: 21CAOCSD-DCC
Period of record:
XHistory of recent effective discharges
□History of recent effective discharges
□Results of flood frequency analysis
□Most recent shift-adjusted rating
□Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

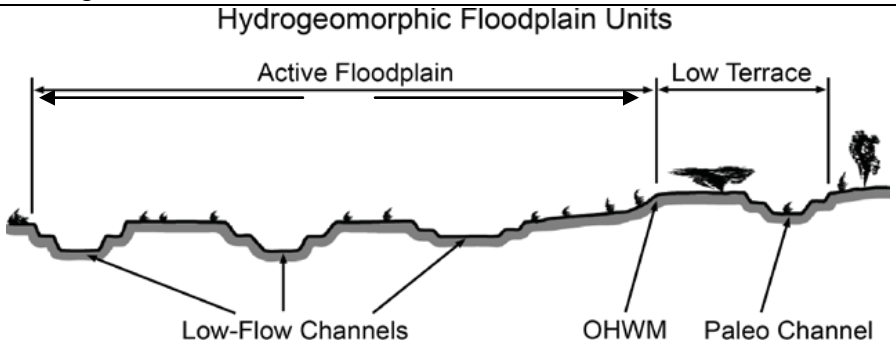


Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:
1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:

x Mapping on aerial photograph
□Digitized on computer
xGPS
□Other:

Project ID: Unnamed Drainage 2-2 **Cross section ID: OHWM** **Date:** 9-15-19

Cross section drawing:



OHWM

GPS point: gps

Indicators:

xChange in average sediment texture
xChange in vegetation species
xChange in vegetation cover
x Break in bank slope
□Other: _____
□Other: _____

Comments:

Floodplain unit: □Low-Flow Channel xActive Floodplain □Low Terrace

GPS point:

Characteristics of the floodplain unit:

Average sediment texture: silt/clay

Total veg cover: 100% Tree: 0%Shrub: 100 % Herb: 0%

Community successional stage:

□NA
xMid (herbaceous, shrubs, saplings)
□Early (herbaceous & seedlings)
□Late (herbaceous, shrubs, mature trees)

Indicators:

□Mudcracks
xSoil development
□Ripples
xSurface relief
x Drift and/or debris
□Other: _____
x Presence of bed and bank
□Other: _____
x Benches
□Other: _____

Comments: Waters of US

WETLAND DETERMINATION DATA FORM-Arid West Region

Project/Site :Mission Viejo Curtis Park		City/County: Mission Viejo/Orange	Sampling Date: 9-15-19
Applicant / Owner : City of Mission Viejo		State: CA	Sampling Point: Unnamed Drainage 2-3
Investigators: Teresa Gonzales and Paul Gonzales		Section, Township, Range: San Juan Capistrano quadrangle Township 6 South, Range 7 West, Section 32	
Landform (hilltop,terrace.etc.) hilltop to terrace		Local relief (concave, convex, none): Concave	Slope (%): 11%
Subregion (LRR): LRR D	Lat: 33.631663˚ N	Long: -117.631663˚ W	Datum:
Soil Map Unit Name: Alo-Bosanko association		NWI classification: 137.256.28.1.182.5811, 137.256.28.1.182.7000 Riverine Lower intermittent. Subclass vegetated streambeds, nonpersistent intermittently-flooded regime, freshwater, coastal canyon drainages, woodland tree types (Q. agrifolia) and *mixed vascular plant dominance*	
Are climatic/hydrologic conditions on the site typical for this time of year?	Yes: √	No:	If no, explain in Remarks.
Are Vegetation , Soil , or Hydrology significantly disturbed?	Are "Normal Circumstances" present?	Yes: √	No:
Are Vegetation , Soil , or Hydrology naturally problematic?	(If needed, explain any answers in Remarks)		

SUMMARY OF FINDINGS-(Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	No √	Is the Sampled Area within a Wetland? Yes No √
Hydric Soil Present?	Yes√	No	
Wetland Hydrology Present?	Yes√	No	
Remarks:			

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Species
1. *Quercus agrifolia*	40		NI
2. *Sambucus nigra ssp. caerulea*	20		FAC
3.			
4.			
Total Cover:	60%		

Dominance Test worksheet:
Number of Dominant Species That are OBL, FACW, or FAC: 0 (A)
Number of Dominant Species Across All Strata: 0 (B)
Percent of Dominant Species That Are OBL,FACW, or FAC: 0% (A/B)

Sampling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:	0%		

Prevalence Index worksheet:	
Total % Cover of:	Multiply by:
OBL species 0	X1=
FACW species	X2=0
FAC species 20	X3=60
FACU species 20	X4=80
UPL species 0	X5=0
Column Totals: 50 (A)	140 (B)
Prevalence Index=B/A=	2.8

Herb Stratum			
1. *Avena barbata*	20		NI
2. *Bromus hordeaceus*	20		FACU
3.			
4.			
Total Cover:	40%		

Hydrophytic Vegetation Indicators:
Dominance Test is >50%
Prevalence Index is <3.0[1]
Morphological Adaptations[1](Provide supporting data in Remarks or on a separate sheet)
Problematic Hydrophytic Vegetation[1] (Explain)
[1]Indicators of hydric soil and wetland hydrology must be present.

Woody Vine Stratum			
Total Cover:			

Hydrophytic Vegetation Present:	
Yes	No√

%Bare Ground in Herb Stratum: %	0% Cover of Biotic Crust

Hydrophytic Vegetation Present:	
Yes	No√

Remarks: In Drainage channel

SOIL

Sampling Point: Unnamed Drainage-2-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of Indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color(moist)	%	Type[1]	Loc[2]	Texture	Remarks
22"	10 YR 4/1						Dark gray clayey loam	Sticky and plastic

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

Indicators for Problematic Hydric Soils[3]:

	Histosol (A1)		Sandy Redox (S5)		1 cm Muck (A9) (LRR C)
	Histic Epipedon (A2)	√	Stripped Matrix (S6)		2 cm Muck (A10) (LRR B)
	Black Histic (A3)	√	Loamy Mucky Mineral (F1)		Reduced Vertic (F18)
	Hydrogen Sulfide (A4)		Loamy Gleyed Matrix (F 2)		Red Parent Material (TF 2)
	Stratified Layers (A5) (LRR C)		Depleted Matrix (F3)		Other (Explain in Remarks)
	1 cm Muck (A9) (LRR D)		Redox Dark Surface (F6)		
	Depleted Below Dark Surface (A 11)		Depleted Dark Surface (F7)		
	Thick Dark Surface (A 12)		Redox Depressions (F8)		
	Sandy Mucky Mineral (S1)		Vernal Pools (F9)		
	Sandy Gleyed Matrix (S4)				[3] Indicators of hydrophytic vegetation and wetland hydrology must be present

Restrictive Layer (If present):

Type: Depth (inches):	Hydric Soil Present? Yes No Fluvial soils √

Remarks: Drainage soils with redox features

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

Secondary Indicators (2 or more required)

	Surface Water (A1)		Salt Crust (B11)	√	Water Marks (B1) (Riverine)
	High Water Table (A2)		Biotic Crust (B12)	√	Sediment Deposits (B2) (Riverine)
	Saturation(A3)		Aquatic Invertebrates (B13)	√	Drift Deposits (B3) (Riverine)
	Water Marks (B1) (Nonriverine)		Hydrogen Sulfide Odor (C1)	√	Drainage Patterns (B10)
	Sediment Deposits (B2) (Nonriverine)		Oxidized Rhizospheres along Living Roots (C3)		Dry-Season Water Table (C2)
	Drift Deposits (B3) (Nonriverine)		Presence of Reduced Iron (C4)		Thin Muck Surface (C7)
	Surface Soil Cracks (B6)		Recent Iron Reduction in Plowed Soils (C6)		Crayfish Burrows (C8)
	Inundation Visible on Aerial Imagery (B7)		Other (Explain in Remarks)		Saturation Visible on Aerial Imagery (C90
	Water-Stained Leaves (B9)				Shallow Aquitard (D3)
					FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes		No√		Depth (inches):		Wetland Hydrology Present:
Water Table Present?	Yes		No√		Depth (inches):		Yes No√
Saturation Present? (includes capillary fringe)	Yes		No√		Depth (inches):		

Describe Recorded Data (stream gauge, monitoring well, aerial photos), if available:
Orange County Hydrology Manual
Local Rain Gage
2019 Aerial Photos

Remarks: waters of US –Unnamed Drainage 2

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Mission Viejo-Curtis **Date:** 9-15-19
Project Number: **Town:** Mission Viejo **State:** CA
Stream: Unnamed Drainage 2
Investigator(s): Teresa Gonzales and Paul Gonzales
Y x/ N □Do normal circumstances exist on the site? **Location Details:** Unnamed Drainage 2with surface runoff and storm runoff

Y □/ N x Is the site significantly disturbed? **Projection:** **Datum:**
Coordinates: 33.631663˚n /-117.631663˚w

Potential anthropogenic influences on the channel system: Unnamed Drainage 2 receives surface flow from storm events from landscape maintenance area.

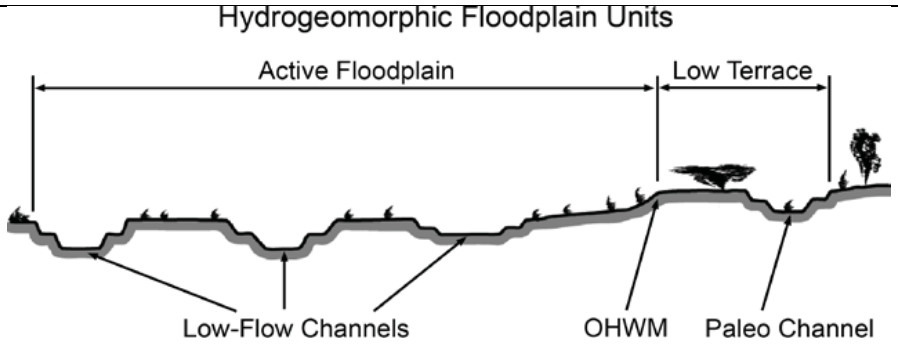
Brief site description: Unnamed Drainage 2 begins at edge of landscape maintenance area and traverses the project site from the north to south before joining a west to east tributary continuing south and then joining with Drainage 3 and then flowing offsite. There are signs of hydrology (i.e. Drift lines, sediment deposits, and shelving) throughout the length of Unnamed Drainage 2 on the project site.

Checklist of resources (if available):

x Aerial photography
Dates: 2019
xTopographic maps
□Geologic maps
x Vegetation maps
x Soils maps
x Rainfall/precipitation maps
Existing delineation(s) for site

xGlobal positioning system (GPS)
xOther studies

XStream gage data
Gage number: 21CAOCSD-DCC
Period of record:
XHistory of recent effective discharges
□History of recent effective discharges
□Results of flood frequency analysis
□Most recent shift-adjusted rating
□Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

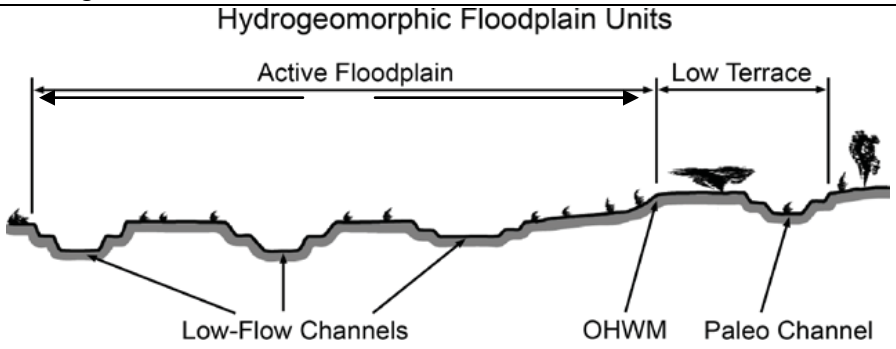


Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:
1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:

x Mapping on aerial photograph
□Digitized on computer
xGPS
□Other:

Project ID: Unnamed Drainage 2-3 **Cross section ID: OHWM** **Date:** 9-15-19

Cross section drawing:



OHWM

GPS point: gps

Indicators:

xChange in average sediment texture
xChange in vegetation species
xChange in vegetation cover
x Break in bank slope
□Other: _____
□Other: _____

Comments:

Floodplain unit: □Low-Flow Channel xActive Floodplain □Low Terrace

GPS point:

Characteristics of the floodplain unit:

Average sediment texture: silt/clay

Total veg cover: 100% Tree: 60%Shrub: 40 % Herb: 0%

Community successional stage:

□NA
xMid (herbaceous, shrubs, saplings)
□Early (herbaceous & seedlings)
□Late (herbaceous, shrubs, mature trees)

Indicators:

□Mudcracks
xSoil development
□Ripples
xSurface relief
x Drift and/or debris
□Other: _____
x Presence of bed and bank
□Other: _____
x Benches
□Other: _____

Comments: Waters of US

WETLAND DETERMINATION DATA FORM-Arid West Region

Project/Site :Mission Viejo Curtis Park		City/County: Mission Viejo/Orange	Sampling Date: 9-15-19
Applicant / Owner : City of Mission Viejo		State: CA	Sampling Point: Unnamed Drainage 2-4
Investigators: Teresa Gonzales and Paul Gonzales		Section, Township, Range: San Juan Capistrano quadrangle Township 6 South, Range 7 West, Section 32	
Landform (hilltop,terrace.etc.) hilltop to terrace		Local relief (concave, convex, none): Concave	Slope (%): 11%
Subregion (LRR): LRR D	Lat: 33.631663˚ N	Long: -117.631663˚ W	Datum:
Soil Map Unit Name: Alo-Bosanko association		NWI classification: 137.256.28.1.182.5811, 137.256.28.1.182.7000 Riverine Lower intermittent. Subclass vegetated streambeds, nonpersistent intermittently-flooded regime, freshwater, coastal canyon drainages, woodland tree types (Q. agrifolia) and *mixed vascular plant dominance*	
Are climatic/hydrologic conditions on the site typical for this time of year?	Yes: √	No:	If no, explain in Remarks.
Are Vegetation , Soil , or Hydrology significantly disturbed?	Are "Normal Circumstances" present?	Yes: √	No:
Are Vegetation , Soil , or Hydrology naturally problematic?	(If needed, explain any answers in Remarks)		

SUMMARY OF FINDINGS-(Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	No √	Is the Sampled Area within a Wetland? Yes No √
Hydric Soil Present?	Yes√	No	
Wetland Hydrology Present?	Yes√	No	
Remarks:			

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Species
1. *Quercus agrifolia*	20		NI
2.			
3.			
4.			
Total Cover:	20%		

Dominance Test worksheet:
Number of Dominant Species That are OBL, FACW, or FAC: 0 (A)
Number of Dominant Species Across All Strata: 0 (B)
Percent of Dominant Species That Are OBL,FACW, or FAC: 0% (A/B)

Sampling/Shrub Stratum			
1. *Salix lasiolepis*	20		FACW
2. *Baccharis pilularis*	30		NI
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:	50%		

Prevalence Index worksheet:	
Total % Cover of:	Multiply by:
OBL species 0	X1=
FACW species 20	X2=40
FAC species 0	X3=0
FACU species 0	X4=0
UPL species 0	X5=0
Column Totals: 20 (A)	40 (B)
Prevalence Index=B/A=	2.0

Herb Stratum			
1. *Stephanomeria diegensis*	30		NI
2.			
3.			
4.			
Total Cover:	30%		

Hydrophytic Vegetation Indicators:
Dominance Test is >50%
Prevalence Index is <3.0[1]
Morphological Adaptations[1](Provide supporting data in Remarks or on a separate sheet)
Problematic Hydrophytic Vegetation[1] (Explain)
[1]Indicators of hydric soil and wetland hydrology must be present.

Woody Vine Stratum			
Total Cover:			

Hydrophytic Vegetation Present:	
Yes	No√

%Bare Ground in Herb Stratum: %	0% Cover of Biotic Crust

Hydrophytic Vegetation Present:	
Yes	No√

Remarks: In Drainage channel

SOIL

Sampling Point: Unnamed Drainage-2-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of Indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color(moist)	%	Type[1]	Loc[2]	Texture	Remarks
22"	10 YR 4/1						Dark gray clayey loam	Sticky and plastic

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

Indicators for Problematic Hydric Soils[3]:

	Histosol (A1)		Sandy Redox (S5)		1 cm Muck (A9) (LRR C)
	Histic Epipedon (A2)	√	Stripped Matrix (S6)		2 cm Muck (A10) (LRR B)
	Black Histic (A3)	√	Loamy Mucky Mineral (F1)		Reduced Vertic (F18)
	Hydrogen Sulfide (A4)		Loamy Gleyed Matrix (F 2)		Red Parent Material (TF 2)
	Stratified Layers (A5) (LRR C)		Depleted Matrix (F3)		Other (Explain in Remarks)
	1 cm Muck (A9) (LRR D)		Redox Dark Surface (F6)		
	Depleted Below Dark Surface (A 11)		Depleted Dark Surface (F7)		
	Thick Dark Surface (A 12)		Redox Depressions (F8)		
	Sandy Mucky Mineral (S1)		Vernal Pools (F9)		
	Sandy Gleyed Matrix (S4)				[3] Indicators of hydrophytic vegetation and wetland hydrology must be present

Restrictive Layer (If present):

Type: Depth (inches):	Hydric Soil Present? Yes No Fluvial soils √

Remarks: Drainage soils with redox features

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

Secondary Indicators (2 or more required)

	Surface Water (A1)		Salt Crust (B11)	√	Water Marks (B1) (Riverine)
	High Water Table (A2)		Biotic Crust (B12)	√	Sediment Deposits (B2) (Riverine)
	Saturation(A3)		Aquatic Invertebrates (B13)	√	Drift Deposits (B3) (Riverine)
	Water Marks (B1) (Nonriverine)		Hydrogen Sulfide Odor (C1)	√	Drainage Patterns (B10)
	Sediment Deposits (B2) (Nonriverine)		Oxidized Rhizospheres along Living Roots (C3)		Dry-Season Water Table (C2)
	Drift Deposits (B3) (Nonriverine)		Presence of Reduced Iron (C4)		Thin Muck Surface (C7)
	Surface Soil Cracks (B6)		Recent Iron Reduction in Plowed Soils (C6)		Crayfish Burrows (C8)
	Inundation Visible on Aerial Imagery (B7)		Other (Explain in Remarks)		Saturation Visible on Aerial Imagery (C90
	Water-Stained Leaves (B9)				Shallow Aquitard (D3)
					FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes		No√		Depth (inches):		Wetland Hydrology Present:
Water Table Present?	Yes		No√		Depth (inches):		Yes No√
Saturation Present? (includes capillary fringe)	Yes		No√		Depth (inches):		

Describe Recorded Data (stream gauge, monitoring well, aerial photos), if available:
Orange County Hydrology Manual
Local Rain Gage
2019 Aerial Photos

Remarks: waters of US –Unnamed Drainage 2

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Mission Viejo-Curtis **Date:** 9-15-19
Project Number: **Town:** Mission Viejo **State:** CA
Stream: Unnamed Drainage 2
Investigator(s): Teresa Gonzales and Paul Gonzales
Y x/ N □Do normal circumstances exist on the site? **Location Details:** Unnamed Drainage 2with surface runoff and storm runoff

Y □/ N x Is the site significantly disturbed? **Projection:** **Datum:**
Coordinates: 33.631663˚n /-117.631663˚w

Potential anthropogenic influences on the channel system: Unnamed Drainage 2 receives surface flow from storm events from landscape maintenance area.

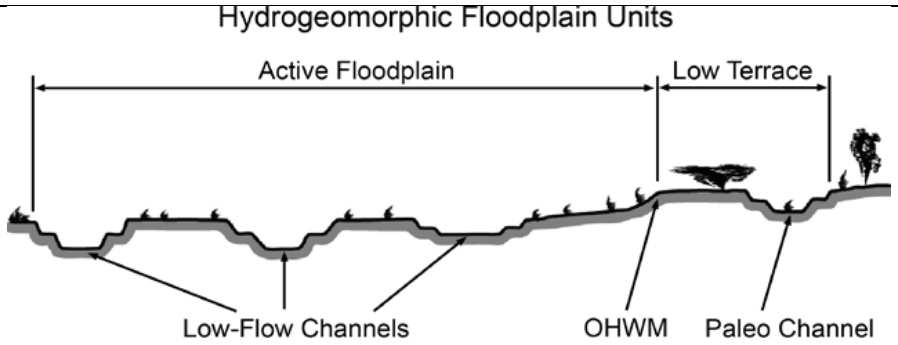
Brief site description: Unnamed Drainage 2 begins at edge of landscape maintenance area and traverses the project site from the north to south before joining a west to east tributary continuing south and then joining with Drainage 3 and then flowing offsite. There are signs of hydrology (i.e. Drift lines, sediment deposits, and shelving) throughout the length of Unnamed Drainage 2 on the project site.

Checklist of resources (if available):

x Aerial photography
Dates: 2019
xTopographic maps
□Geologic maps
x Vegetation maps
x Soils maps
x Rainfall/precipitation maps
Existing delineation(s) for site

xGlobal positioning system (GPS)
xOther studies

XStream gage data
Gage number: 21CAOCSD-DCC
Period of record:
XHistory of recent effective discharges
□History of recent effective discharges
□Results of flood frequency analysis
□Most recent shift-adjusted rating
□Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

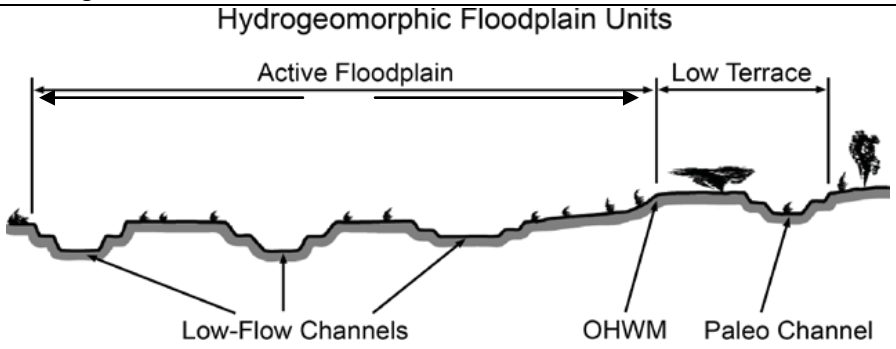


Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:
1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:

x Mapping on aerial photograph
□Digitized on computer
xGPS
□Other:

Project ID: Unnamed Drainage 2-4 **Cross section ID: OHWM** **Date:** 9-15-19

Cross section drawing:



OHWM

GPS point: gps

Indicators:

xChange in average sediment texture
xChange in vegetation species
xChange in vegetation cover
x Break in bank slope
□Other: _____
□Other: _____

Comments:

Floodplain unit: □Low-Flow Channel xActive Floodplain □Low Terrace

GPS point:

Characteristics of the floodplain unit:

Average sediment texture: silt/clay

Total veg cover: 100% Tree: 20%Shrub: 50 % Herb: 30%

Community successional stage:

□NA
xMid (herbaceous, shrubs, saplings)
□Early (herbaceous & seedlings)
□Late (herbaceous, shrubs, mature trees)

Indicators:

□Mudcracks
xSoil development
□Ripples
xSurface relief
x Drift and/or debris
□Other: _____
x Presence of bed and bank
□Other: _____
x Benches
□Other: _____

Comments: Waters of US

WETLAND DETERMINATION DATA FORM-Arid West Region

Project/Site :Mission Viejo Curtis Park		City/County: Mission Viejo/Orange	Sampling Date: 9-15-19
Applicant / Owner : City of Mission Viejo		State: CA	Sampling Point: Unnamed Drainage 3-1
Investigators: Teresa Gonzales and Paul Gonzales		Section, Township, Range: San Juan Capistrano quadrangle Township 6 South, Range 7 West, Section 32	
Landform (hilltop,terrace.etc.) hilltop to terrace		Local relief (concave, convex, none): Concave	Slope (%): 11%
Subregion (LRR): LRR D	Lat: 33.631663˚ N	Long: -117.631663˚ W	Datum:
Soil Map Unit Name: Alo-Bosanko association		NWI classification: 137.256.28.1.182.5811, 137.256.28.1.182.7000 Riverine Lower intermittent. Subclass vegetated streambeds, nonpersistent intermittently-flooded regime, freshwater, coastal canyon drainages, woodland tree types (Q. agrifolia) and *mixed vascular plant dominance*	
Are climatic/hydrologic conditions on the site typical for this time of year?	Yes: √	No:	If no, explain in Remarks.
Are Vegetation , Soil , or Hydrology significantly disturbed?	Are "Normal Circumstances" present?	Yes: √	No:
Are Vegetation , Soil , or Hydrology naturally problematic?	(If needed, explain any answers in Remarks)		

SUMMARY OF FINDINGS-(Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	No √	Is the Sampled Area within a Wetland? Yes No √
Hydric Soil Present?	Yes√	No	
Wetland Hydrology Present?	Yes√	No	
Remarks:			

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Species
1. *Quercus agrifolia*	10		NI
2.			
3.			
4.			
Total Cover:	10 %		

Dominance Test worksheet:
Number of Dominant Species That are OBL, FACW, or FAC: 0 (A)
Number of Dominant Species Across All Strata: 0 (B)
Percent of Dominant Species That Are OBL,FACW, or FAC: 0% (A/B)

Sampling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:	0%		

Prevalence Index worksheet:	
Total % Cover of:	Multiply by:
OBL species 0	X1=
FACW species 0	X2=0
FAC species 0	X3=0
FACU species 0	X4=0
UPL species 0	X5=0
Column Totals: 0 (A)	0 (B)
Prevalence Index=B/A=	0

Herb Stratum			
1. *Cynara cardunculus*	100		NI
2.			
3.			
4.			
Total Cover:	100%		

Hydrophytic Vegetation Indicators:
Dominance Test is >50%
Prevalence Index is <3.0[1]
Morphological Adaptations[1](Provide supporting data in Remarks or on a separate sheet)
Problematic Hydrophytic Vegetation[1] (Explain)
[1]Indicators of hydric soil and wetland hydrology must be present.

Woody Vine Stratum			
Total Cover:			

Hydrophytic Vegetation Present:	
Yes	No√

%Bare Ground in Herb Stratum: %	0% Cover of Biotic Crust

Hydrophytic Vegetation Present:	
Yes	No√

Remarks: In Drainage channel

SOIL

Sampling Point: Unnamed Drainage-3-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of Indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color(moist)	%	Type[1]	Loc[2]	Texture	Remarks
22"	10 YR 4/1						Dark gray clayey loam	Sticky and plastic

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

Indicators for Problematic Hydric Soils[3]:

	Histosol (A1)		Sandy Redox (S5)		1 cm Muck (A9) (LRR C)
	Histic Epipedon (A2)	√	Stripped Matrix (S6)		2 cm Muck (A10) (LRR B)
	Black Histic (A3)	√	Loamy Mucky Mineral (F1)		Reduced Vertic (F18)
	Hydrogen Sulfide (A4)		Loamy Gleyed Matrix (F 2)		Red Parent Material (TF 2)
	Stratified Layers (A5) (LRR C)		Depleted Matrix (F3)		Other (Explain in Remarks)
	1 cm Muck (A9) (LRR D)		Redox Dark Surface (F6)		
	Depleted Below Dark Surface (A 11)		Depleted Dark Surface (F7)		
	Thick Dark Surface (A 12)		Redox Depressions (F8)		
	Sandy Mucky Mineral (S1)		Vernal Pools (F9)		
	Sandy Gleyed Matrix (S4)				[3] Indicators of hydrophytic vegetation and wetland hydrology must be present

Restrictive Layer (If present):

Type: Depth (inches):	Hydric Soil Present? Yes No Fluvial soils √

Remarks: Drainage soils with redox features

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

Secondary Indicators (2 or more required)

	Surface Water (A1)		Salt Crust (B11)	√	Water Marks (B1) (Riverine)
	High Water Table (A2)		Biotic Crust (B12)	√	Sediment Deposits (B2) (Riverine)
	Saturation(A3)		Aquatic Invertebrates (B13)	√	Drift Deposits (B3) (Riverine)
	Water Marks (B1) (Nonriverine)		Hydrogen Sulfide Odor (C1)	√	Drainage Patterns (B10)
	Sediment Deposits (B2) (Nonriverine)		Oxidized Rhizospheres along Living Roots (C3)		Dry-Season Water Table (C2)
	Drift Deposits (B3) (Nonriverine)		Presence of Reduced Iron (C4)		Thin Muck Surface (C7)
	Surface Soil Cracks (B6)		Recent Iron Reduction in Plowed Soils (C6)		Crayfish Burrows (C8)
	Inundation Visible on Aerial Imagery (B7)		Other (Explain in Remarks)		Saturation Visible on Aerial Imagery (C90
	Water-Stained Leaves (B9)				Shallow Aquitard (D3)
					FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes		No√		Depth (inches):		Wetland Hydrology Present:
Water Table Present?	Yes		No√		Depth (inches):		Yes No√
Saturation Present? (includes capillary fringe)	Yes		No√		Depth (inches):		

Describe Recorded Data (stream gauge, monitoring well, aerial photos), if available:
Orange County Hydrology Manual
Local Rain Gage
2019 Aerial Photos

Remarks: waters of US –Unnamed Drainage 3

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Mission Viejo-Curtis **Date:** 9-15-19
Project Number: **Town:** Mission Viejo **State:** CA
Stream: Unnamed Drainage 3
Investigator(s): Teresa Gonzales and Paul Gonzales
Y x/ N □Do normal circumstances exist on the site? **Location Details:** Unnamed Drainage 3 with surface runoff and storm runoff

Y □/ N x Is the site significantly disturbed? **Projection:** **Datum:**
Coordinates: 33.631663˚n /-117.631663˚w

Potential anthropogenic influences on the channel system: Unnamed Drainage 3 receives surface flow from storm events from overside drain off of Olympiad Road.

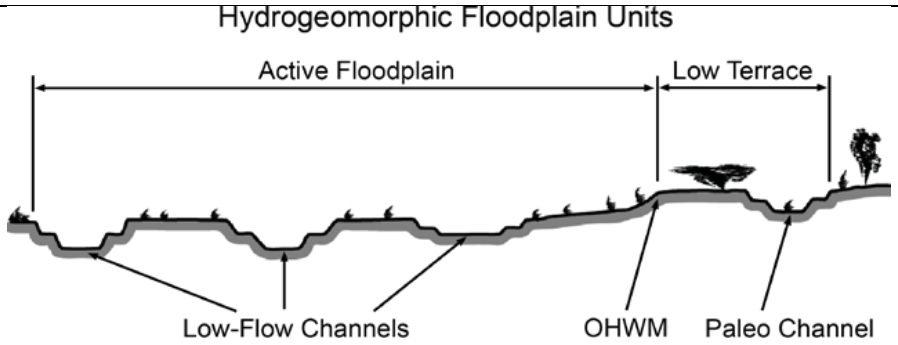
Brief site description: Unnamed Drainage 3 begins at overside drainage off of Olympiad Road and traverses the project site from the west to east before dividing. One fork joins Drainage 2 and another flows offsite. There are signs of hydrology (i.e. Drift lines, sediment deposits, and shelving) throughout the length of Unnamed Drainage 3 on the project site.

Checklist of resources (if available):

x Aerial photography
Dates: 2019
xTopographic maps
□Geologic maps
x Vegetation maps
x Soils maps
x Rainfall/precipitation maps
Existing delineation(s) for site

xGlobal positioning system (GPS)
xOther studies

XStream gage data
Gage number: 21CAOCSD-DCC
Period of record:
XHistory of recent effective discharges
□History of recent effective discharges
□Results of flood frequency analysis
□Most recent shift-adjusted rating
□Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

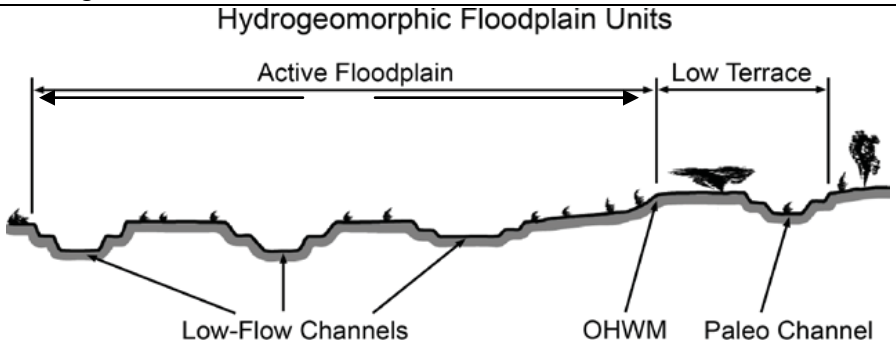


Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:
1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:

x Mapping on aerial photograph
□Digitized on computer
xGPS
□Other:

Project ID: Unnamed Drainage 3-1 **Cross section ID: OHWM** **Date:** 9-15-19

Cross section drawing:



OHWM

GPS point: gps

Indicators:

xChange in average sediment texture
xChange in vegetation species
xChange in vegetation cover
x Break in bank slope
□Other: _____
□Other: _____

Comments:

Floodplain unit: □Low-Flow Channel xActive Floodplain □Low Terrace

GPS point:

Characteristics of the floodplain unit:

Average sediment texture: silt/clay

Total veg cover: 100% Tree: 0%Shrub: 0 % Herb: 100%

Community successional stage:

□NA
XEarly (herbaceous & seedlings)
□Mid (herbaceous, shrubs, saplings)
□Late (herbaceous, shrubs, mature trees)

Indicators:

□Mudcracks
□Ripples
x Drift and/or debris
x Presence of bed and bank
x Benches
xSoil development
xSurface relief
□Other: _____
□Other: _____
□Other: _____

Comments: Waters of US

WETLAND DETERMINATION DATA FORM-Arid West Region

Project/Site :Mission Viejo Curtis Park		City/County: Mission Viejo/Orange	Sampling Date: 9-15-19
Applicant / Owner : City of Mission Viejo		State: CA	Sampling Point: Unnamed Drainage 3-2
Investigators: Teresa Gonzales and Paul Gonzales		Section, Township, Range: San Juan Capistrano quadrangle Township 6 South, Range 7 West, Section 32	
Landform (hilltop,terrace.etc.) hilltop to terrace		Local relief (concave, convex, none): Concave	Slope (%): 11%
Subregion (LRR): LRR D	Lat: 33.631663˚ N	Long: -117.631663˚ W	Datum:
Soil Map Unit Name: Alo-Bosanko association		NWI classification: 137.256.28.1.182.5811, 137.256.28.1.182.7000 Riverine Lower intermittent. Subclass vegetated streambeds, nonpersistent intermittently-flooded regime, freshwater, coastal canyon drainages, woodland tree types (Q. agrifolia) and *mixed vascular plant dominance*	
Are climatic/hydrologic conditions on the site typical for this time of year?	Yes: √	No:	If no, explain in Remarks.
Are Vegetation , Soil , or Hydrology significantly disturbed?	Are "Normal Circumstances" present?	Yes: √	No:
Are Vegetation , Soil , or Hydrology naturally problematic?	(If needed, explain any answers in Remarks)		

SUMMARY OF FINDINGS-(Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	No √	Is the Sampled Area within a Wetland? Yes No √
Hydric Soil Present?	Yes√	No	
Wetland Hydrology Present?	Yes√	No	
Remarks:			

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Species
1. *Quercus agrifolia*	10		NI
2.			
3.			
4.			
Total Cover:	10 %		

Dominance Test worksheet:
Number of Dominant Species That are OBL, FACW, or FAC: 0 (A)
Number of Dominant Species Across All Strata: 0 (B)
Percent of Dominant Species That Are OBL,FACW, or FAC: 0% (A/B)

Sampling/Shrub Stratum			
1. *Stephanomeria diegensis*	50		NI
2.			
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:	50%		

Prevalence Index worksheet:	
Total % Cover of:	Multiply by:
OBL species 0	X1=
FACW species 0	X2=0
FAC species 0	X3=0
FACU species 0	X4=0
UPL species 0	X5=0
Column Totals: 0 (A)	0 (B)
Prevalence Index=B/A=	0

Herb Stratum			
1. *Hirschfeldia incana*	20		NI
2. *Bromus madritensis ssp. rubens*	10		NI
3. *Bromus diandrus*	10		NI
4.			
Total Cover:	40%		

Hydrophytic Vegetation Indicators:
Dominance Test is >50%
Prevalence Index is <3.0[1]
Morphological Adaptations[1](Provide supporting data in Remarks or on a separate sheet)
Problematic Hydrophytic Vegetation[1] (Explain)
[1]Indicators of hydric soil and wetland hydrology must be present.

Woody Vine Stratum			
Total Cover:			

Hydrophytic Vegetation Present:	
Yes	No√

%Bare Ground in Herb Stratum: %	0% Cover of Biotic Crust

Hydrophytic Vegetation Present:	
Yes	No√

Remarks: In Drainage channel

SOIL

Sampling Point: Unnamed Drainage-3-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of Indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color(moist)	%	Type[1]	Loc[2]	Texture	Remarks
22"	10 YR 4/1						Dark gray clayey loam	Sticky and plastic

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

Indicators for Problematic Hydric Soils[3]:

	Histosol (A1)		Sandy Redox (S5)		1 cm Muck (A9) (LRR C)
	Histic Epipedon (A2)	√	Stripped Matrix (S6)		2 cm Muck (A10) (LRR B)
	Black Histic (A3)	√	Loamy Mucky Mineral (F1)		Reduced Vertic (F18)
	Hydrogen Sulfide (A4)		Loamy Gleyed Matrix (F 2)		Red Parent Material (TF 2)
	Stratified Layers (A5) (LRR C)		Depleted Matrix (F3)		Other (Explain in Remarks)
	1 cm Muck (A9) (LRR D)		Redox Dark Surface (F6)		
	Depleted Below Dark Surface (A 11)		Depleted Dark Surface (F7)		
	Thick Dark Surface (A 12)		Redox Depressions (F8)		
	Sandy Mucky Mineral (S1)		Vernal Pools (F9)		
	Sandy Gleyed Matrix (S4)				[3] Indicators of hydrophytic vegetation and wetland hydrology must be present

Restrictive Layer (If present):

Type: Depth (inches):	Hydric Soil Present? Yes No Fluvial soils √

Remarks: Drainage soils with redox features

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

Secondary Indicators (2 or more required)

	Surface Water (A1)		Salt Crust (B11)	√	Water Marks (B1) (Riverine)
	High Water Table (A2)		Biotic Crust (B12)	√	Sediment Deposits (B2) (Riverine)
	Saturation(A3)		Aquatic Invertebrates (B13)	√	Drift Deposits (B3) (Riverine)
	Water Marks (B1) (Nonriverine)		Hydrogen Sulfide Odor (C1)	√	Drainage Patterns (B10)
	Sediment Deposits (B2) (Nonriverine)		Oxidized Rhizospheres along Living Roots (C3)		Dry-Season Water Table (C2)
	Drift Deposits (B3) (Nonriverine)		Presence of Reduced Iron (C4)		Thin Muck Surface (C7)
	Surface Soil Cracks (B6)		Recent Iron Reduction in Plowed Soils (C6)		Crayfish Burrows (C8)
	Inundation Visible on Aerial Imagery (B7)		Other (Explain in Remarks)		Saturation Visible on Aerial Imagery (C90
	Water-Stained Leaves (B9)				Shallow Aquitard (D3)
					FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes		No√		Depth (inches):		Wetland Hydrology Present:
Water Table Present?	Yes		No√		Depth (inches):		Yes No√
Saturation Present? (includes capillary fringe)	Yes		No√		Depth (inches):		

Describe Recorded Data (stream gauge, monitoring well, aerial photos), if available:
Orange County Hydrology Manual
Local Rain Gage
2019 Aerial Photos

Remarks: waters of US –Unnamed Drainage 3

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Mission Viejo-Curtis **Date:** 9-15-19
Project Number: **Town:** Mission Viejo **State:** CA
Stream: Unnamed Drainage 3
Investigator(s): Teresa Gonzales and Paul Gonzales
Y x/ N □Do normal circumstances exist on the site? **Location Details:** Unnamed Drainage 3 with surface runoff and storm runoff

Y □/ N x Is the site significantly disturbed? **Projection:** **Datum:**
Coordinates: 33.631663˚n /-117.631663˚w

Potential anthropogenic influences on the channel system: Unnamed Drainage 3 receives surface flow from storm events from overside drain off of Olympiad Road.

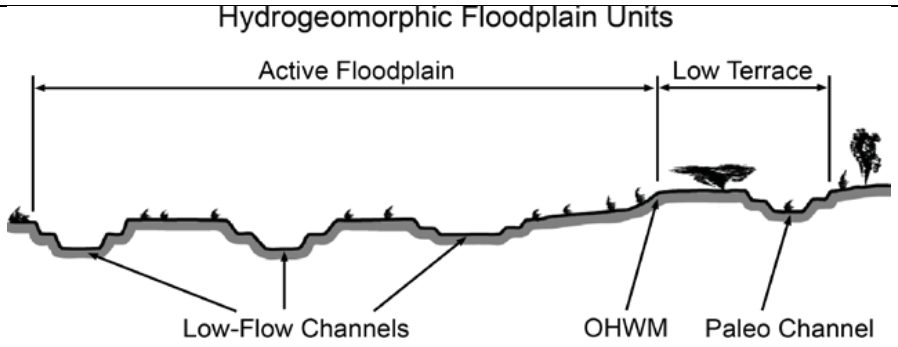
Brief site description: Unnamed Drainage 3 begins at overside drainage off of Olympiad Road and traverses the project site from the west to east before dividing. One fork joins Drainage 2 and another flows offsite. There are signs of hydrology (i.e. Drift lines, sediment deposits, and shelving) throughout the length of Unnamed Drainage 3 on the project site.

Checklist of resources (if available):

x Aerial photography
Dates: 2019
xTopographic maps
□Geologic maps
x Vegetation maps
x Soils maps
x Rainfall/precipitation maps
Existing delineation(s) for site

xGlobal positioning system (GPS)
xOther studies

XStream gage data
Gage number: 21CAOCSD-DCC
Period of record:
XHistory of recent effective discharges
□History of recent effective discharges
□Results of flood frequency analysis
□Most recent shift-adjusted rating
□Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

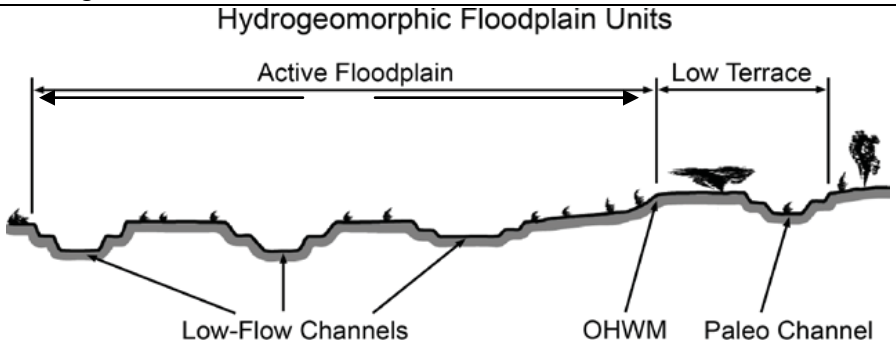


Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:
1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:

x Mapping on aerial photograph
□Digitized on computer
xGPS
□Other:

Project ID: Unnamed Drainage 3-2 **Cross section ID: OHWM** **Date:** 9-15-19

Cross section drawing:



OHWM

GPS point: gps

Indicators:

xChange in average sediment texture
xChange in vegetation species
xChange in vegetation cover
x Break in bank slope
□Other: _____
□Other: _____

Comments:

Floodplain unit: □Low-Flow Channel xActive Floodplain □Low Terrace

GPS point:

Characteristics of the floodplain unit:

Average sediment texture: silt/clay

Total veg cover: 100% Tree: 10%Shrub: 50 % Herb: 40%

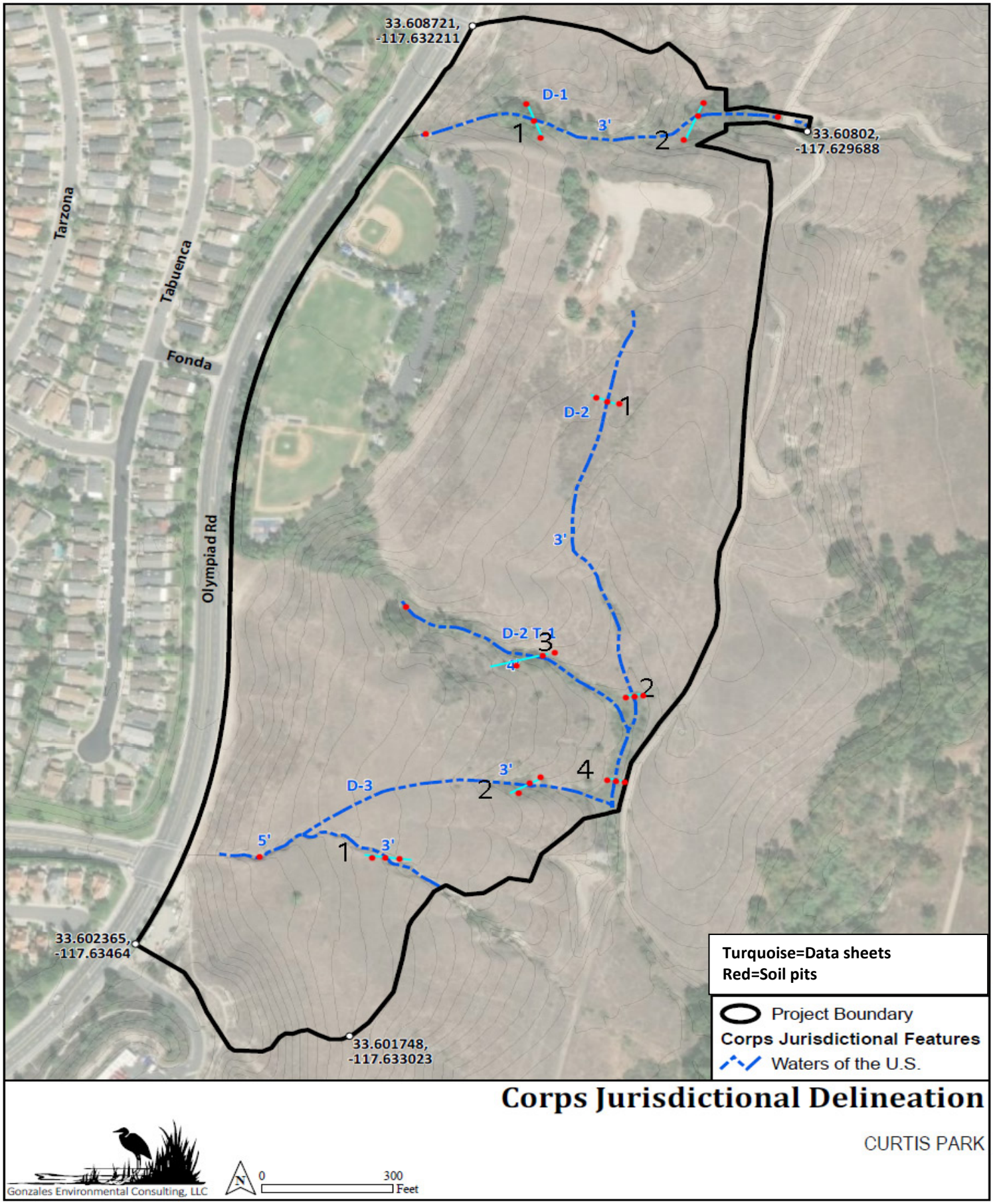
Community successional stage:

□NA
XEarly (herbaceous & seedlings)
□Mid (herbaceous, shrubs, saplings)
□Late (herbaceous, shrubs, mature trees)

Indicators:

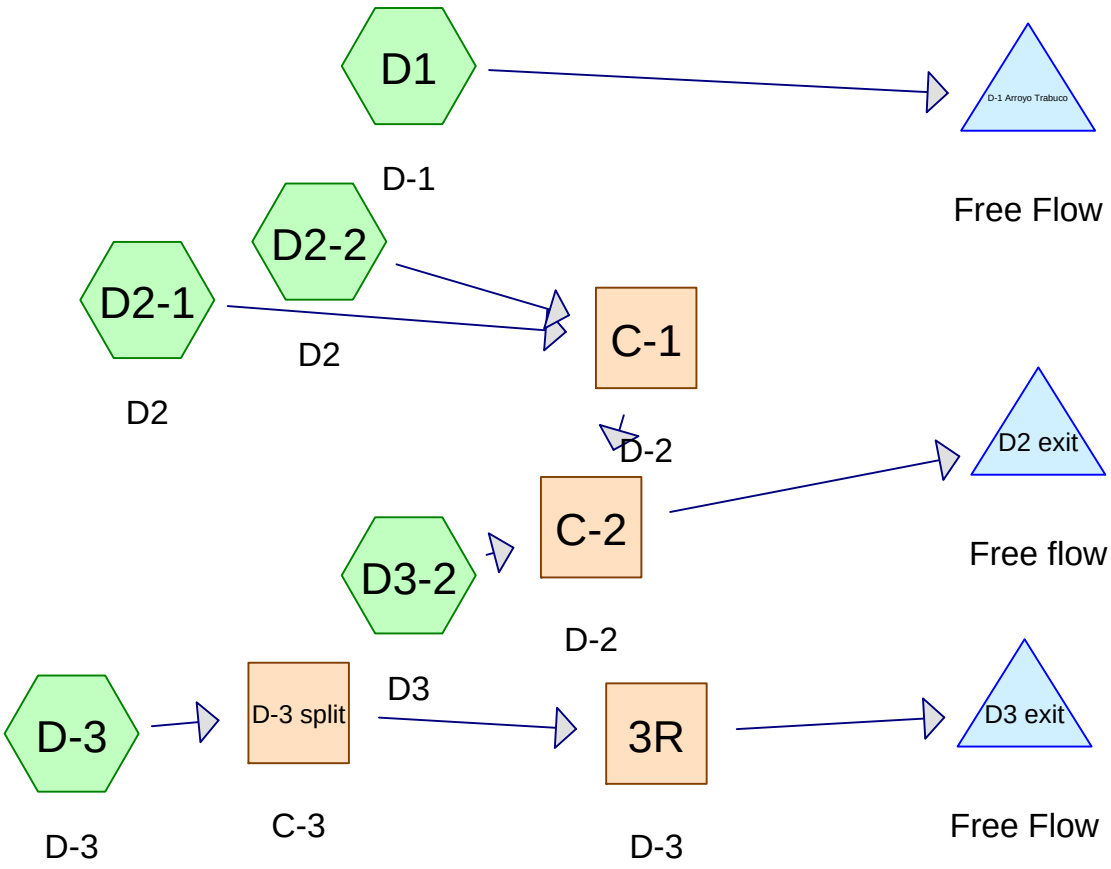
□Mudcracks
□Ripples
x Drift and/or debris
x Presence of bed and bank
x Benches
xSoil development
xSurface relief
□Other: _____
□Other: _____
□Other: _____

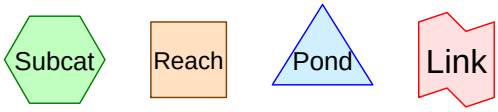
Comments: Waters of US


33.608721,
-117.632211
D-1
3'
1
2
33.60802,
-117.629688
Tarzona
Tabuenca
Fonda
Olympiad Rd
D-2
1
3'
D-2 T-1
3
4'
2
3'
4
D-3
2
5'
1
3'
33.602365,
-117.63464
33.601748,
-117.633023
Turquoise=Data sheets
Red=Soil pits
Project Boundary
Corps Jurisdictional Features
Waters of the U.S.
Corps Jurisdictional Delineation
CURTIS PARK
Gonzales Environmental Consulting, LLC
N
0
300
Feet

APPENDIX D

HYDROCAD REPORT





Routing Diagram for Mission Viejo Curtis
Prepared by Gonzales Environmental Consulting, LLC, Printed 11/13/2019
HydroCAD® 10.10-1 s/n 02488 © 2019 HydroCAD Software Solutions LLC

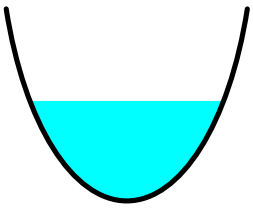
Summary for Reach 3R: D-3

Inflow Area = 64.000 ac, 38.00% Impervious, Inflow Depth > 1.17" for 2 yr event
Inflow = 72.52 cfs @ 9.88 hrs, Volume= 6.246 af
Outflow = 71.88 cfs @ 9.88 hrs, Volume= 6.244 af, Atten= 1%, Lag= 0.2 min

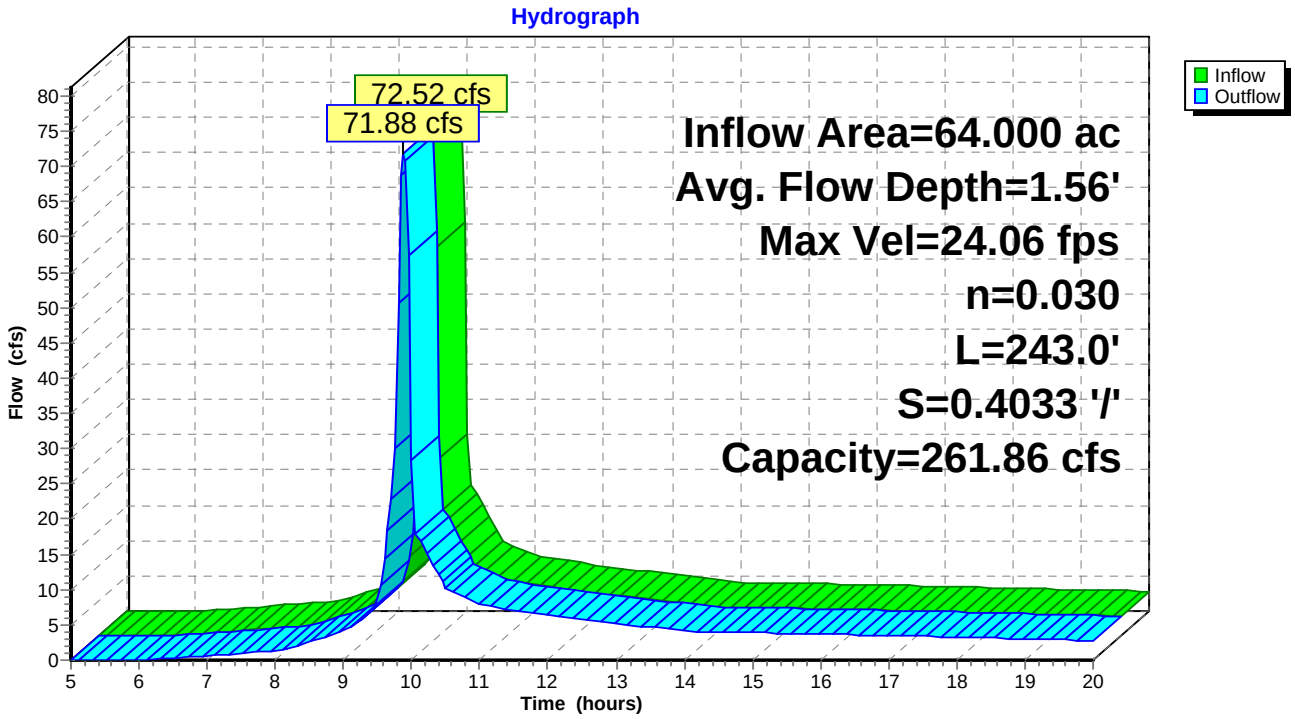
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 24.06 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 11.04 fps, Avg. Travel Time= 0.4 min

Peak Storage= 727 cf @ 9.88 hrs
Average Depth at Peak Storage= 1.56' , Surface Width= 2.88'
Bank-Full Depth= 3.00' Flow Area= 8.0 sf, Capacity= 261.86 cfs

4.00' x 3.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
Length= 243.0' Slope= 0.4033 '/'
Inlet Invert= 727.00', Outlet Invert= 629.00'



Reach 3R: D-3



Hydrograph for Reach 3R: D-3

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)
5.00	0.00	0	727.00	0.00
5.25	0.00	0	727.00	0.00
5.50	0.00	0	727.00	0.00
5.75	0.00	0	727.00	0.00
6.00	0.07	5	727.05	0.07
6.25	0.18	9	727.08	0.17
6.50	0.31	14	727.11	0.30
6.75	0.47	18	727.13	0.46
7.00	0.65	23	727.16	0.64
7.25	0.82	28	727.18	0.81
7.50	0.99	32	727.19	0.98
7.75	1.16	35	727.21	1.15
8.00	1.34	39	727.22	1.33
8.25	1.89	50	727.26	1.87
8.50	2.57	62	727.30	2.55
8.75	3.36	76	727.34	3.33
9.00	4.28	90	727.39	4.25
9.25	5.86	113	727.45	5.82
9.50	8.11	143	727.53	7.99
9.75	**30.98**	**380**	**728.01**	**30.03**
10.00	**25.17**	**345**	**727.95**	**28.41**
10.25	14.46	219	727.70	14.51
10.50	10.26	170	727.59	10.29
10.75	8.92	155	727.56	9.02
11.00	7.92	141	727.52	7.90
11.25	7.47	136	727.51	7.51
11.50	7.12	130	727.50	7.11
11.75	6.70	125	727.48	6.72
12.00	6.30	120	727.47	6.31
12.25	6.04	116	727.46	6.05
12.50	5.79	112	727.45	5.79
12.75	5.52	109	727.44	5.53
13.00	5.25	105	727.43	5.26
13.25	4.97	101	727.42	4.98
13.50	4.69	97	727.41	4.70
13.75	4.40	92	727.39	4.41
14.00	4.11	88	727.38	4.12
14.25	4.06	87	727.38	4.06
14.50	4.01	86	727.38	4.01
14.75	3.96	85	727.37	3.96
15.00	3.91	85	727.37	3.91
15.25	3.86	84	727.37	3.86
15.50	3.81	83	727.37	3.81
15.75	3.76	82	727.36	3.76
16.00	3.71	81	727.36	3.71
16.25	3.65	81	727.36	3.65
16.50	3.60	80	727.36	3.60
16.75	3.54	79	727.35	3.54
17.00	3.49	78	727.35	3.49
17.25	3.43	77	727.35	3.43
17.50	3.37	76	727.35	3.38
17.75	3.32	75	727.34	3.32
18.00	3.26	74	727.34	3.26
18.25	3.20	73	727.34	3.20
18.50	3.14	72	727.33	3.14
18.75	3.08	71	727.33	3.09
19.00	3.02	70	727.33	3.03
19.25	2.96	69	727.33	2.97
19.50	2.90	68	727.32	2.90
19.75	2.84	67	727.32	2.84
20.00	2.78	66	727.32	2.78

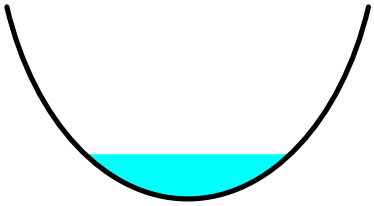
Summary for Reach C-1: D-2

Inflow Area = 38.400 ac, 0.00% Impervious, Inflow Depth > 0.47" for 2 yr event
Inflow = 7.91 cfs @ 10.16 hrs, Volume= 1.505 af
Outflow = 7.77 cfs @ 10.21 hrs, Volume= 1.500 af, Atten= 2%, Lag= 2.6 min

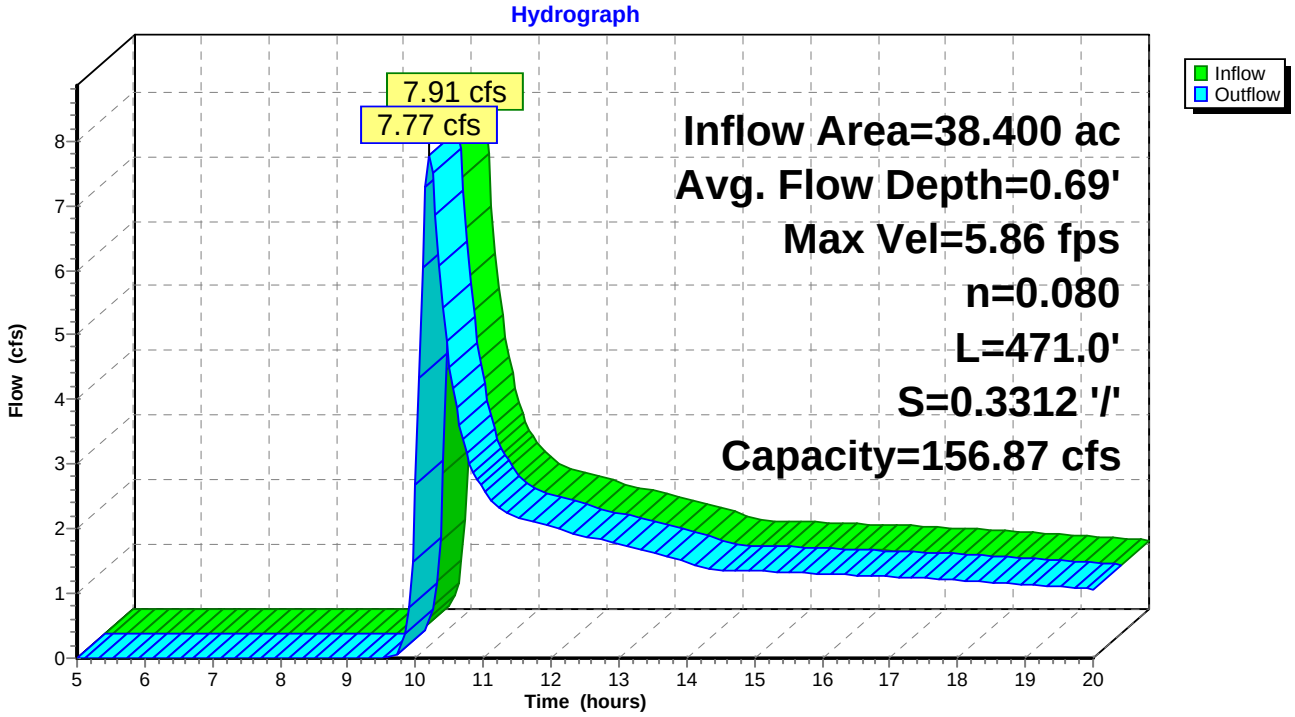
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.86 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 3.66 fps, Avg. Travel Time= 2.1 min

Peak Storage= 630 cf @ 10.18 hrs
Average Depth at Peak Storage= 0.69' , Surface Width= 2.89'
Bank-Full Depth= 3.00' Flow Area= 12.0 sf, Capacity= 156.87 cfs

6.00' x 3.00' deep Parabolic Channel, n= 0.080 Earth, long dense weeds
Length= 471.0' Slope= 0.3312 '/'
Inlet Invert= 1,641.00', Outlet Invert= 1,485.00'



Reach C-1: D-2



Hydrograph for Reach C-1: D-2

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)
5.00	0.00	0	1,641.00	0.00
5.25	0.00	0	1,641.00	0.00
5.50	0.00	0	1,641.00	0.00
5.75	0.00	0	1,641.00	0.00
6.00	0.00	0	1,641.00	0.00
6.25	0.00	0	1,641.00	0.00
6.50	0.00	0	1,641.00	0.00
6.75	0.00	0	1,641.00	0.00
7.00	0.00	0	1,641.00	0.00
7.25	0.00	0	1,641.00	0.00
7.50	0.00	0	1,641.00	0.00
7.75	0.00	0	1,641.00	0.00
8.00	0.00	0	1,641.00	0.00
8.25	0.00	0	1,641.00	0.00
8.50	0.00	0	1,641.00	0.00
8.75	0.00	0	1,641.00	0.00
9.00	0.00	0	1,641.00	0.00
9.25	0.00	0	1,641.00	0.00
9.50	0.00	0	1,641.00	0.00
9.75	0.20	28	1,641.09	0.07
10.00	**4.02**	**342**	**1,641.46**	**2.70**
10.25	**7.04**	**596**	**1,641.67**	**7.51**
10.50	4.21	412	1,641.52	4.49
10.75	3.03	325	1,641.45	3.18
11.00	2.54	284	1,641.41	2.60
11.25	2.28	263	1,641.39	2.32
11.50	2.17	253	1,641.38	2.19
11.75	2.10	247	1,641.37	2.11
12.00	2.02	240	1,641.37	2.04
12.25	1.94	233	1,641.36	1.95
12.50	1.88	228	1,641.35	1.89
12.75	1.82	223	1,641.35	1.83
13.00	1.76	218	1,641.34	1.77
13.25	1.69	212	1,641.34	1.71
13.50	1.62	206	1,641.33	1.64
13.75	1.55	199	1,641.32	1.56
14.00	1.47	192	1,641.31	1.48
14.25	1.39	185	1,641.31	1.40
14.50	1.36	182	1,641.30	1.37
14.75	1.35	181	1,641.30	1.35
15.00	1.34	180	1,641.30	1.35
15.25	1.34	179	1,641.30	1.34
15.50	1.33	178	1,641.30	1.33
15.75	1.32	178	1,641.30	1.32
16.00	1.31	177	1,641.30	1.31
16.25	1.30	175	1,641.30	1.30
16.50	1.29	174	1,641.29	1.29
16.75	1.27	173	1,641.29	1.28
17.00	1.26	172	1,641.29	1.26
17.25	1.25	171	1,641.29	1.25
17.50	1.23	169	1,641.29	1.24
17.75	1.22	168	1,641.29	1.22
18.00	1.20	166	1,641.29	1.21
18.25	1.19	165	1,641.28	1.19
18.50	1.17	163	1,641.28	1.17
18.75	1.15	162	1,641.28	1.16
19.00	1.14	160	1,641.28	1.14
19.25	1.12	158	1,641.28	1.12
19.50	1.10	156	1,641.27	1.10
19.75	1.08	155	1,641.27	1.09
20.00	1.06	153	1,641.27	1.07

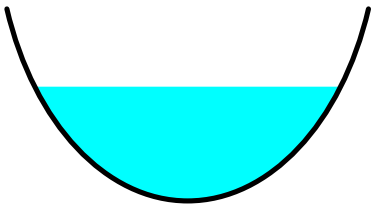
Summary for Reach C-2: D-2

Inflow Area = 102.400 ac, 23.75% Impervious, Inflow Depth > 0.90" for 2 yr event
Inflow = 53.33 cfs @ 10.14 hrs, Volume= 7.675 af
Outflow = 53.26 cfs @ 10.15 hrs, Volume= 7.673 af, Atten= 0%, Lag= 0.2 min

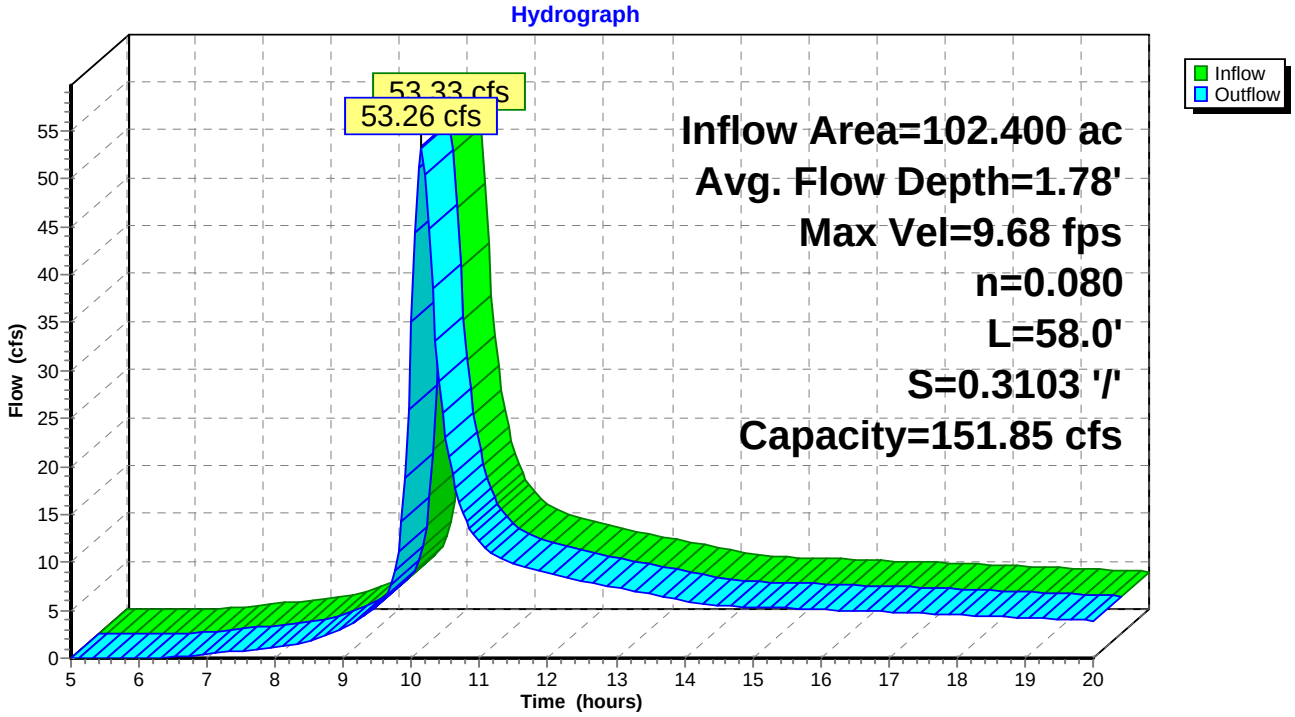
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 9.68 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.90 fps, Avg. Travel Time= 0.2 min

Peak Storage= 319 cf @ 10.14 hrs
Average Depth at Peak Storage= 1.78' , Surface Width= 4.63'
Bank-Full Depth= 3.00' Flow Area= 12.0 sf, Capacity= 151.85 cfs

6.00' x 3.00' deep Parabolic Channel, n= 0.080 Earth, long dense weeds
Length= 58.0' Slope= 0.3103 '/'
Inlet Invert= 619.00', Outlet Invert= 601.00'



Reach C-2: D-2



Hydrograph for Reach C-2: D-2

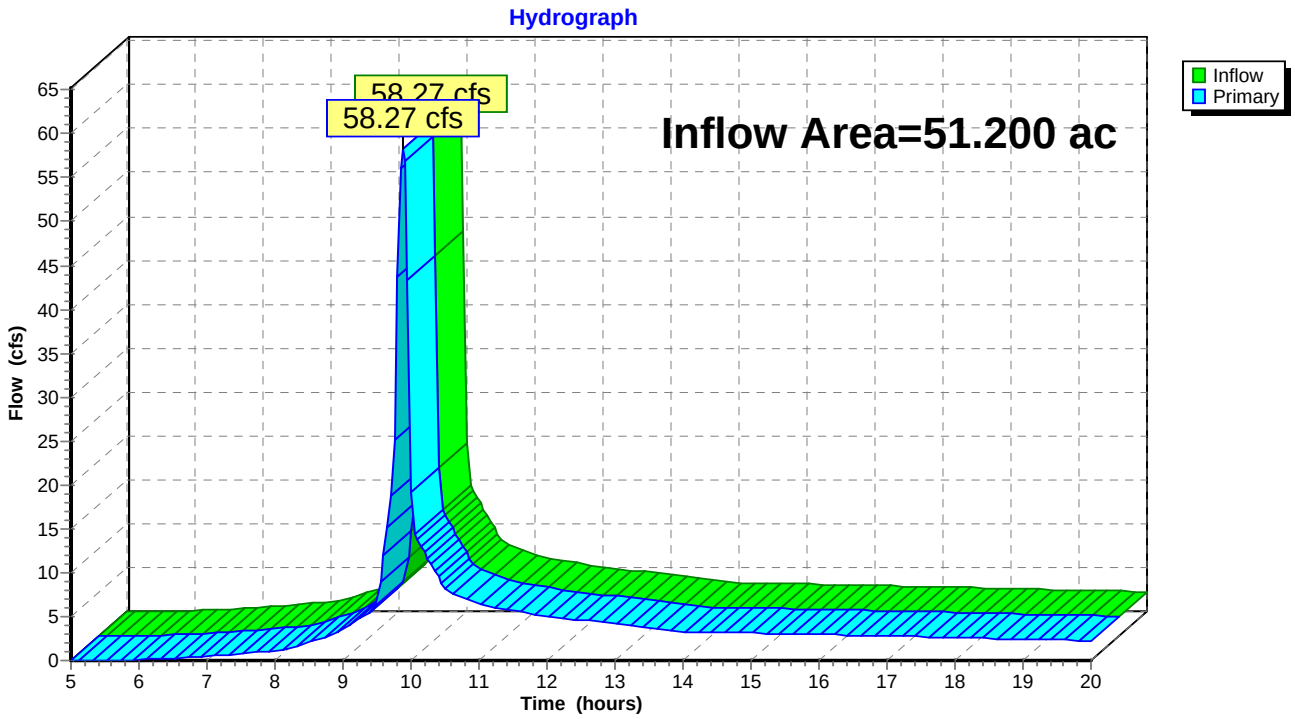
Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)
5.00	0.00	0	619.00	0.00
5.25	0.00	0	619.00	0.00
5.50	0.00	0	619.00	0.00
5.75	0.00	0	619.00	0.00
6.00	0.01	0	619.01	0.00
6.25	0.06	2	619.07	0.06
6.50	0.16	5	619.11	0.15
6.75	0.28	8	619.15	0.28
7.00	0.44	10	619.18	0.43
7.25	0.61	13	619.21	0.61
7.50	0.78	15	619.24	0.78
7.75	0.95	18	619.26	0.95
8.00	1.12	20	619.28	1.12
8.25	1.33	22	619.30	1.33
8.50	1.79	28	619.35	1.78
8.75	2.43	34	619.40	2.42
9.00	3.19	42	619.46	3.18
9.25	4.13	50	619.52	4.12
9.50	5.55	62	619.60	5.53
9.75	9.18	88	619.76	9.06
10.00	**35.58**	**236**	**620.46**	**35.00**
10.25	**44.46**	**280**	**620.64**	**44.82**
10.50	22.91	172	620.18	23.06
10.75	15.14	128	619.97	15.21
11.00	12.04	108	619.87	12.07
11.25	10.54	98	619.81	10.56
11.50	9.80	93	619.78	9.81
11.75	9.31	90	619.77	9.32
12.00	8.84	86	619.75	8.84
12.25	8.36	83	619.73	8.36
12.50	7.99	80	619.71	8.00
12.75	7.67	78	619.70	7.68
13.00	7.35	76	619.68	7.36
13.25	7.02	73	619.67	7.02
13.50	6.67	71	619.65	6.68
13.75	6.31	68	619.64	6.32
14.00	5.95	65	619.62	5.95
14.25	5.60	62	619.60	5.61
14.50	5.45	61	619.59	5.45
14.75	5.38	61	619.59	5.38
15.00	5.32	60	619.59	5.32
15.25	5.26	60	619.58	5.26
15.50	5.20	59	619.58	5.20
15.75	5.14	59	619.58	5.14
16.00	5.08	58	619.57	5.08
16.25	5.02	58	619.57	5.02
16.50	4.95	57	619.57	4.95
16.75	4.89	57	619.56	4.89
17.00	4.82	56	619.56	4.82
17.25	4.75	55	619.56	4.75
17.50	4.68	55	619.55	4.68
17.75	4.61	54	619.55	4.61
18.00	4.54	54	619.54	4.54
18.25	4.46	53	619.54	4.46
18.50	4.39	52	619.53	4.39
18.75	4.31	52	619.53	4.31
19.00	4.24	51	619.53	4.24
19.25	4.16	50	619.52	4.16
19.50	4.08	50	619.52	4.08
19.75	4.00	49	619.51	4.00
20.00	3.92	48	619.51	3.92

Summary for Pond D-1 Arroyo Trabuco: Free Flow

Inflow Area = 51.200 ac, 38.00% Impervious, Inflow Depth > 1.17" for 2 yr event
Inflow = 58.27 cfs @ 9.88 hrs, Volume= 4.998 af
Primary = 58.27 cfs @ 9.88 hrs, Volume= 4.998 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond D-1 Arroyo Trabuco: Free Flow



Hydrograph for Pond D-1 Arroyo Trabuco: Free Flow

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
5.00	0.00		0.00	18.25	2.56		2.56
5.25	0.00		0.00	18.50	2.51		2.51
5.50	0.00		0.00	18.75	2.47		2.47
5.75	0.00		0.00	19.00	2.42		2.42
6.00	0.06		0.06	19.25	2.37		2.37
6.25	0.14		0.14	19.50	2.32		2.32
6.50	0.25		0.25	19.75	2.27		2.27
6.75	0.38		0.38	20.00	2.22		2.22
7.00	0.52		0.52				
7.25	0.66		0.66				
7.50	0.79		0.79				
7.75	0.93		0.93				
8.00	1.08		1.08				
8.25	1.52		1.52				
8.50	2.07		2.07				
8.75	2.69		2.69				
9.00	3.44		3.44				
9.25	4.71		4.71				
9.50	6.53		6.53				
9.75	**25.15**		**25.15**				
10.00	**19.10**		**19.10**				
10.25	11.67		11.67				
10.50	8.09		8.09				
10.75	7.18		7.18				
11.00	6.30		6.30				
11.25	5.99		5.99				
11.50	5.68		5.68				
11.75	5.36		5.36				
12.00	5.03		5.03				
12.25	4.83		4.83				
12.50	4.63		4.63				
12.75	4.41		4.41				
13.00	4.20		4.20				
13.25	3.97		3.97				
13.50	3.75		3.75				
13.75	3.52		3.52				
14.00	3.29		3.29				
14.25	3.25		3.25				
14.50	3.21		3.21				
14.75	3.17		3.17				
15.00	3.13		3.13				
15.25	3.09		3.09				
15.50	3.05		3.05				
15.75	3.01		3.01				
16.00	2.96		2.96				
16.25	2.92		2.92				
16.50	2.88		2.88				
16.75	2.83		2.83				
17.00	2.79		2.79				
17.25	2.74		2.74				
17.50	2.70		2.70				
17.75	2.65		2.65				
18.00	2.61		2.61				

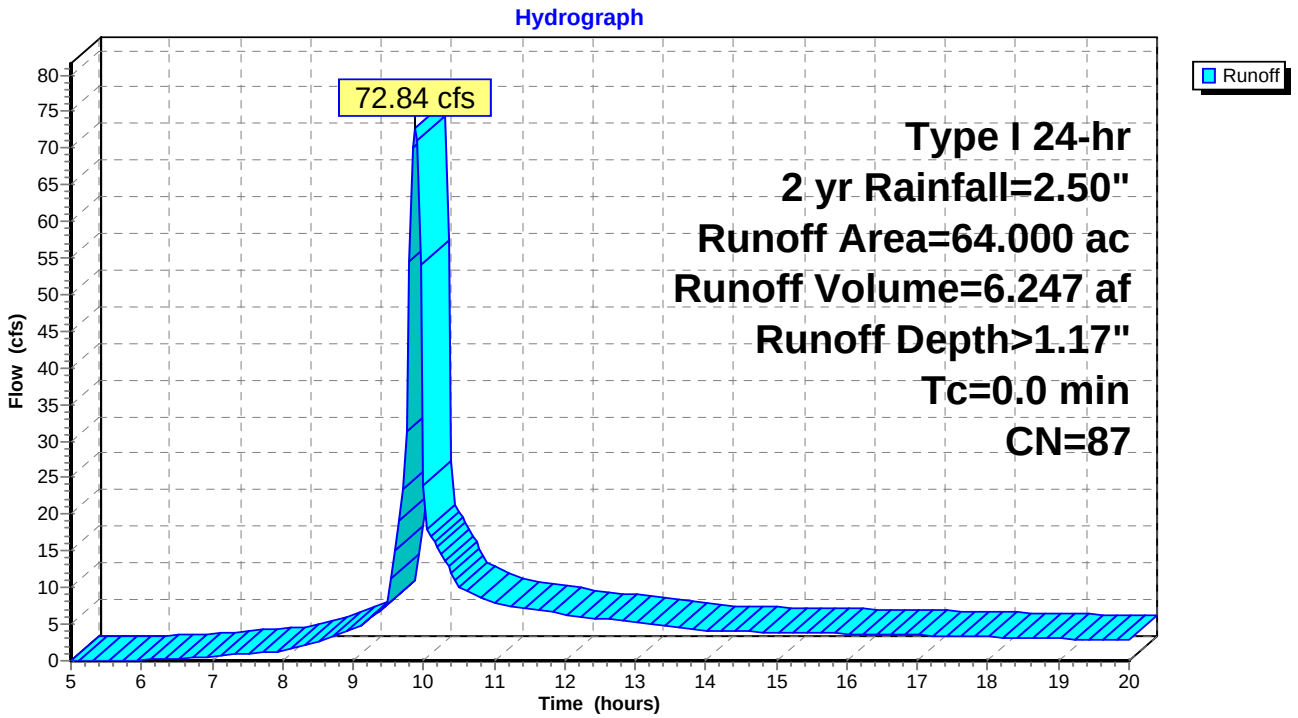
Summary for Subcatchment D-3: D-3

Runoff = 72.84 cfs @ 9.88 hrs, Volume= 6.247 af, Depth> 1.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type I 24-hr 2 yr Rainfall=2.50"

Area (ac)	CN	Description
64.000	87	1/4 acre lots, 38% imp, HSG D
39.680		62.00% Pervious Area
24.320		38.00% Impervious Area

Subcatchment D-3: D-3



Hydrograph for Subcatchment D-3: D-3

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.25	0.00	0.00	10.30	1.40	0.47	13.71	15.60	2.05	0.95	3.79
5.10	0.26	0.00	0.00	10.40	1.43	0.49	11.90	15.70	2.06	0.95	3.77
5.20	0.26	0.00	0.00	10.50	1.46	0.51	10.12	15.80	2.07	0.96	3.75
5.30	0.27	0.00	0.00	10.60	1.48	0.52	9.61	15.90	2.07	0.96	3.73
5.40	0.27	0.00	0.00	10.70	1.50	0.54	9.19	16.00	2.08	0.97	3.70
5.50	0.28	0.00	0.00	10.80	1.52	0.55	8.75	16.10	2.09	0.97	3.68
5.60	0.29	0.00	0.00	10.90	1.54	0.56	8.31	16.20	2.09	0.98	3.66
5.70	0.29	0.00	0.00	11.00	1.56	0.58	7.87	16.30	2.10	0.99	3.64
5.80	0.30	0.00	0.01	11.10	1.57	0.59	7.71	16.40	2.11	0.99	3.62
5.90	0.31	0.00	0.04	11.20	1.59	0.60	7.56	16.50	2.12	1.00	3.60
6.00	0.31	0.00	0.07	11.30	1.61	0.61	7.41	16.60	2.12	1.00	3.58
6.10	0.32	0.00	0.11	11.40	1.62	0.62	7.26	16.70	2.13	1.01	3.55
6.20	0.33	0.00	0.16	11.50	1.64	0.63	7.11	16.80	2.14	1.01	3.53
6.30	0.33	0.00	0.21	11.60	1.65	0.64	6.95	16.90	2.14	1.02	3.51
6.40	0.34	0.00	0.26	11.70	1.67	0.65	6.79	17.00	2.15	1.02	3.49
6.50	0.35	0.00	0.31	11.80	1.68	0.67	6.62	17.10	2.16	1.03	3.46
6.60	0.36	0.00	0.37	11.90	1.70	0.68	6.46	17.20	2.16	1.04	3.44
6.70	0.36	0.00	0.44	12.00	1.71	0.69	6.29	17.30	2.17	1.04	3.42
6.80	0.37	0.00	0.51	12.10	1.72	0.70	6.19	17.40	2.18	1.05	3.40
6.90	0.38	0.00	0.58	12.20	1.74	0.70	6.09	17.50	2.18	1.05	3.37
7.00	0.39	0.01	0.66	12.30	1.75	0.71	5.99	17.60	2.19	1.06	3.35
7.10	0.40	0.01	0.72	12.40	1.76	0.72	5.89	17.70	2.20	1.06	3.33
7.20	0.41	0.01	0.79	12.50	1.77	0.73	5.78	17.80	2.20	1.07	3.31
7.30	0.42	0.01	0.86	12.60	1.78	0.74	5.68	17.90	2.21	1.07	3.28
7.40	0.43	0.01	0.92	12.70	1.80	0.75	5.57	18.00	2.21	1.08	3.26
7.50	0.44	0.01	0.99	12.80	1.81	0.76	5.46	18.10	2.22	1.08	3.24
7.60	0.45	0.01	1.06	12.90	1.82	0.77	5.35	18.20	2.23	1.09	3.21
7.70	0.46	0.01	1.13	13.00	1.83	0.77	5.25	18.30	2.23	1.09	3.19
7.80	0.47	0.02	1.20	13.10	1.84	0.78	5.13	18.40	2.24	1.10	3.17
7.90	0.48	0.02	1.27	13.20	1.85	0.79	5.02	18.50	2.25	1.10	3.14
8.00	0.48	0.02	1.35	13.30	1.86	0.80	4.91	18.60	2.25	1.11	3.12
8.10	0.50	0.02	1.55	13.40	1.87	0.81	4.80	18.70	2.26	1.11	3.09
8.20	0.51	0.03	1.77	13.50	1.88	0.81	4.68	18.80	2.26	1.12	3.07
8.30	0.52	0.03	2.02	13.60	1.89	0.82	4.57	18.90	2.27	1.12	3.05
8.40	0.53	0.03	2.29	13.70	1.90	0.83	4.45	19.00	2.27	1.13	3.02
8.50	0.55	0.04	2.58	13.80	1.91	0.83	4.34	19.10	2.28	1.13	3.00
8.60	0.56	0.04	2.88	13.90	1.92	0.84	4.22	19.20	2.29	1.13	2.97
8.70	0.58	0.04	3.20	14.00	1.92	0.85	4.11	19.30	2.29	1.14	2.95
8.80	0.60	0.05	3.54	14.10	1.93	0.85	4.08	19.40	2.30	1.14	2.93
8.90	0.62	0.06	3.90	14.20	1.94	0.86	4.07	19.50	2.30	1.15	2.90
9.00	0.63	0.06	4.30	14.30	1.95	0.87	4.05	19.60	2.31	1.15	2.88
9.10	0.66	0.07	4.89	14.40	1.96	0.87	4.03	19.70	2.31	1.16	2.85
9.20	0.68	0.08	5.54	14.50	1.97	0.88	4.01	19.80	2.32	1.16	2.83
9.30	0.70	0.09	6.24	14.60	1.97	0.89	3.99	19.90	2.32	1.17	2.80
9.40	0.73	0.10	6.99	14.70	1.98	0.89	3.97	20.00	**2.33**	**1.17**	2.78
9.50	0.76	0.11	8.16	14.80	1.99	0.90	3.95				
9.60	0.80	0.13	15.01	14.90	2.00	0.90	3.93				
9.70	0.86	0.15	23.52	15.00	2.00	0.91	3.91				
9.80	0.97	0.21	54.52	15.10	2.01	0.92	3.89				
9.90	1.16	0.31	**71.05**	15.20	2.02	0.92	3.87				
10.00	1.29	0.39	23.87	15.30	2.03	0.93	3.85				
10.10	1.33	0.42	17.09	15.40	2.04	0.93	3.83				
10.20	1.37	0.45	15.45	15.50	2.04	0.94	3.81				

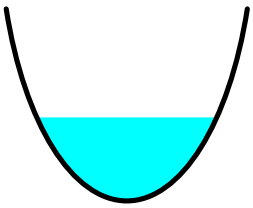
Summary for Reach D-3 split: C-3

Inflow Area = 64.000 ac, 38.00% Impervious, Inflow Depth > 1.17" for 2 yr event
Inflow = 72.84 cfs @ 9.88 hrs, Volume= 6.247 af
Outflow = 72.52 cfs @ 9.88 hrs, Volume= 6.246 af, Atten= 0%, Lag= 0.1 min

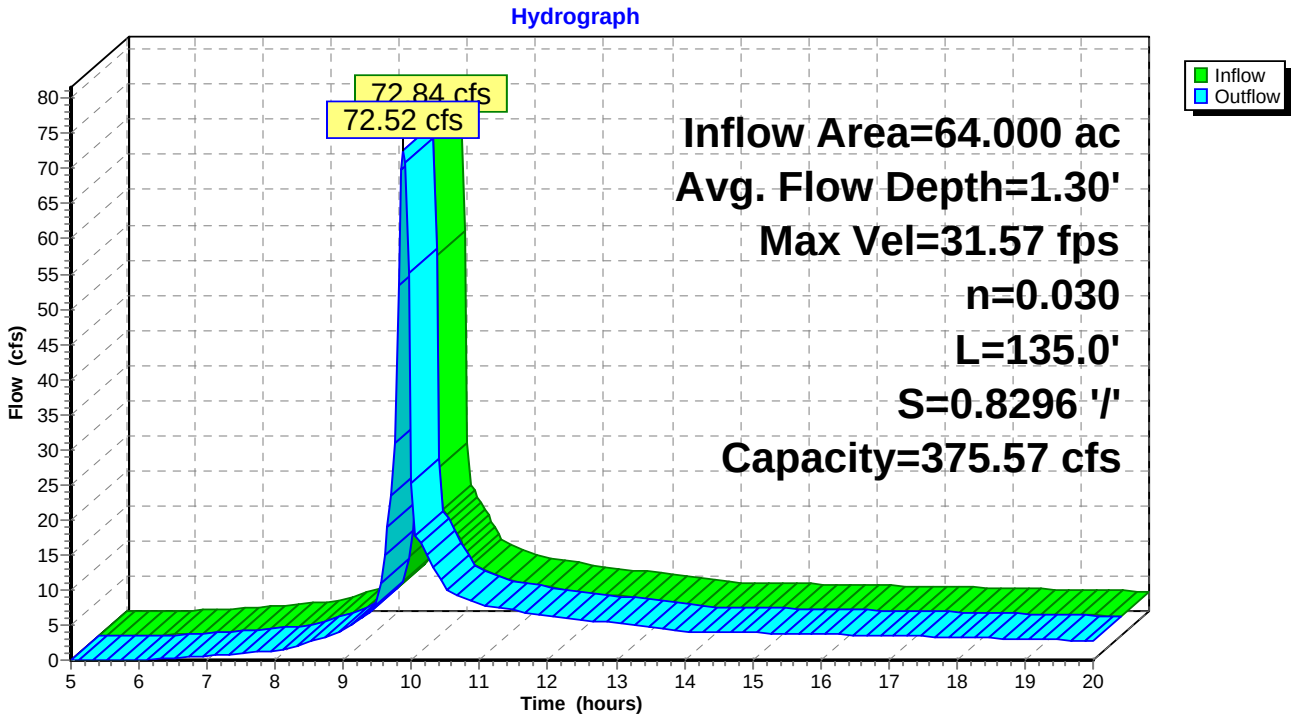
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 31.57 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 14.33 fps, Avg. Travel Time= 0.2 min

Peak Storage= 309 cf @ 9.88 hrs
Average Depth at Peak Storage= 1.30' , Surface Width= 2.64'
Bank-Full Depth= 3.00' Flow Area= 8.0 sf, Capacity= 375.57 cfs

4.00' x 3.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
Length= 135.0' Slope= 0.8296 '/'
Inlet Invert= 727.00', Outlet Invert= 615.00'



Reach D-3 split: C-3



Hydrograph for Reach D-3 split: C-3

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)
5.00	0.00	0	727.00	0.00
5.25	0.00	0	727.00	0.00
5.50	0.00	0	727.00	0.00
5.75	0.00	0	727.00	0.00
6.00	0.07	2	727.05	0.07
6.25	0.18	4	727.07	0.18
6.50	0.31	6	727.09	0.31
6.75	0.47	8	727.11	0.47
7.00	0.66	10	727.13	0.65
7.25	0.82	12	727.15	0.82
7.50	0.99	14	727.16	0.99
7.75	1.16	15	727.18	1.16
8.00	1.35	17	727.19	1.34
8.25	1.90	22	727.22	1.89
8.50	2.58	27	727.26	2.57
8.75	3.37	33	727.29	3.36
9.00	4.30	39	727.33	4.28
9.25	5.89	49	727.38	5.86
9.50	8.16	61	727.44	8.11
9.75	**31.43**	**164**	**727.86**	**30.98**
10.00	**23.87**	**137**	**727.76**	**25.17**
10.25	14.59	93	727.59	14.46
10.50	10.12	73	727.50	10.26
10.75	8.97	66	727.46	8.92
11.00	7.87	60	727.44	7.92
11.25	7.49	58	727.43	7.47
11.50	7.11	56	727.42	7.12
11.75	6.70	53	727.40	6.70
12.00	6.29	51	727.39	6.30
12.25	6.04	50	727.38	6.04
12.50	5.78	48	727.38	5.79
12.75	5.52	46	727.37	5.52
13.00	5.25	45	727.36	5.25
13.25	4.97	43	727.35	4.97
13.50	4.68	41	727.34	4.69
13.75	4.40	40	727.33	4.40
14.00	4.11	38	727.32	4.11
14.25	4.06	37	727.32	4.06
14.50	4.01	37	727.32	4.01
14.75	3.96	37	727.31	3.96
15.00	3.91	36	727.31	3.91
15.25	3.86	36	727.31	3.86
15.50	3.81	36	727.31	3.81
15.75	3.76	35	727.31	3.76
16.00	3.70	35	727.30	3.71
16.25	3.65	35	727.30	3.65
16.50	3.60	34	727.30	3.60
16.75	3.54	34	727.30	3.54
17.00	3.49	33	727.30	3.49
17.25	3.43	33	727.29	3.43
17.50	3.37	33	727.29	3.37
17.75	3.32	32	727.29	3.32
18.00	3.26	32	727.29	3.26
18.25	3.20	31	727.28	3.20
18.50	3.14	31	727.28	3.14
18.75	3.08	31	727.28	3.08
19.00	3.02	30	727.28	3.02
19.25	2.96	30	727.27	2.96
19.50	2.90	29	727.27	2.90
19.75	2.84	29	727.27	2.84
20.00	2.78	28	727.27	2.78

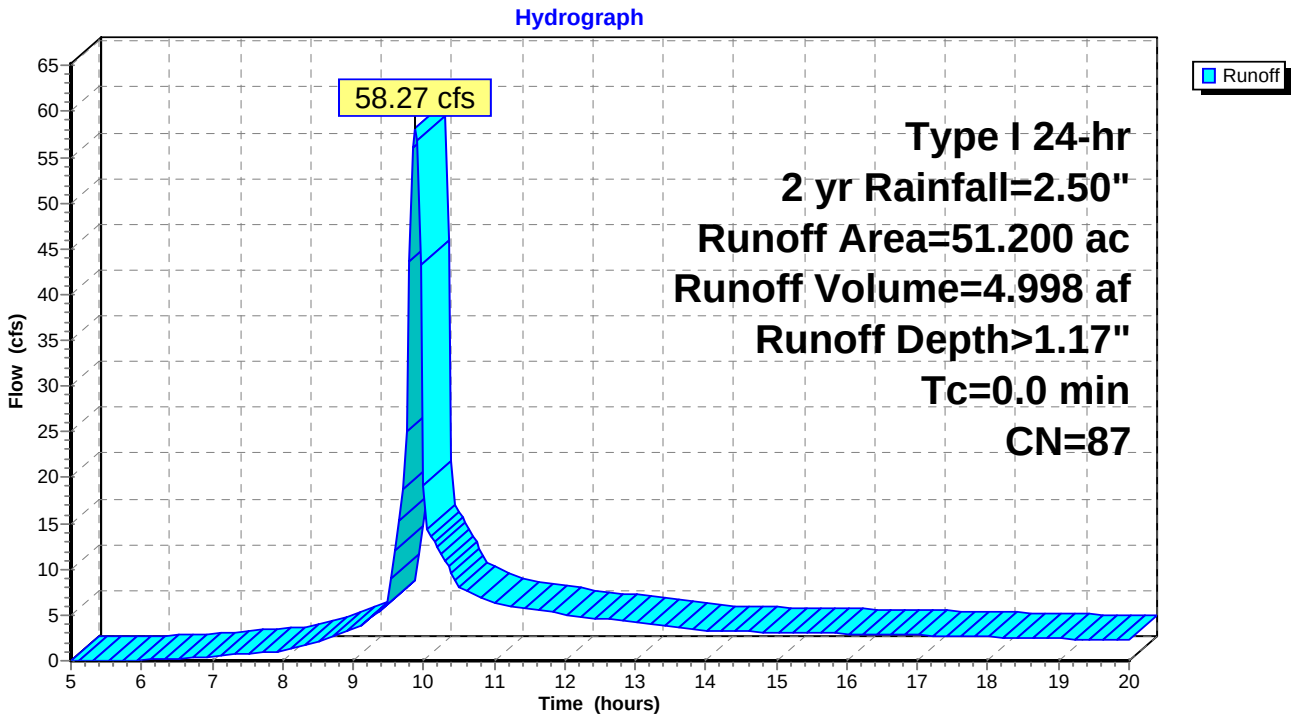
Summary for Subcatchment D1: D-1

Runoff = 58.27 cfs @ 9.88 hrs, Volume= 4.998 af, Depth> 1.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type I 24-hr 2 yr Rainfall=2.50"

Area (ac)	CN	Description
51.200	87	1/4 acre lots, 38% imp, HSG D
31.744		62.00% Pervious Area
19.456		38.00% Impervious Area

Subcatchment D1: D-1



Hydrograph for Subcatchment D1: D-1

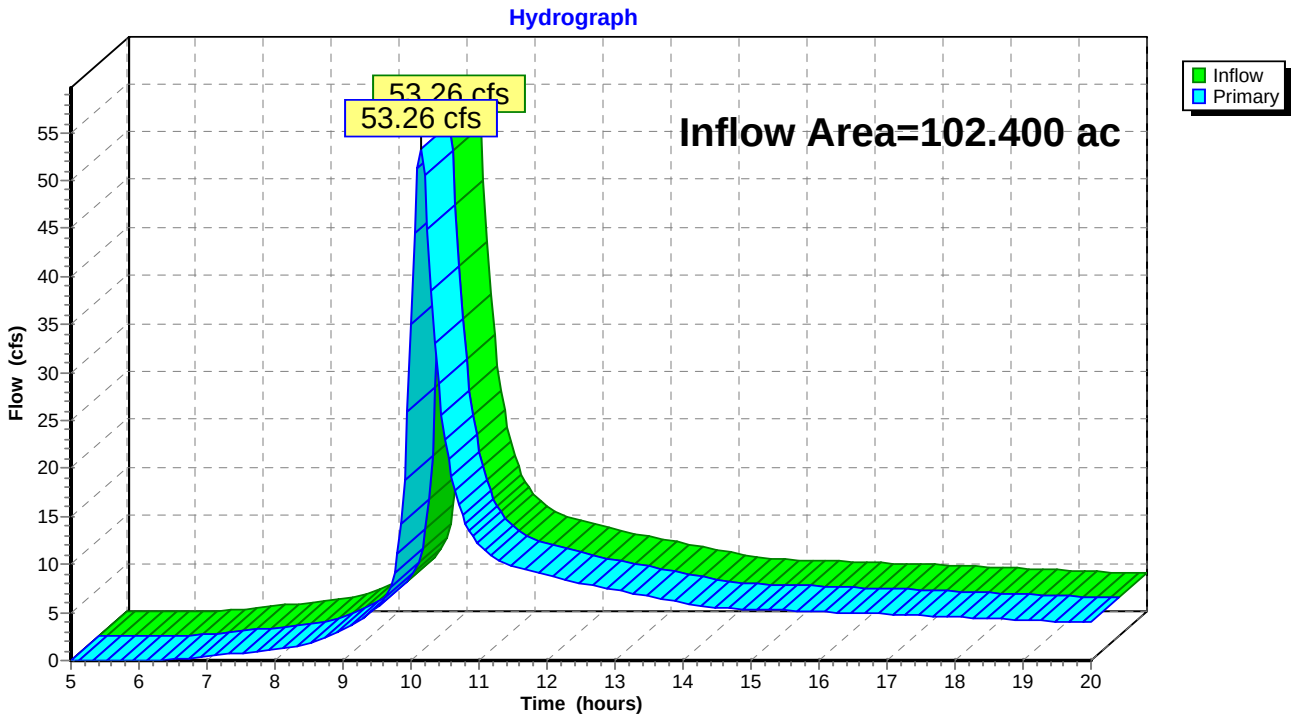
Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.25	0.00	0.00	10.30	1.40	0.47	10.97	15.60	2.05	0.95	3.03
5.10	0.26	0.00	0.00	10.40	1.43	0.49	9.52	15.70	2.06	0.95	3.01
5.20	0.26	0.00	0.00	10.50	1.46	0.51	8.09	15.80	2.07	0.96	3.00
5.30	0.27	0.00	0.00	10.60	1.48	0.52	7.69	15.90	2.07	0.96	2.98
5.40	0.27	0.00	0.00	10.70	1.50	0.54	7.35	16.00	2.08	0.97	2.96
5.50	0.28	0.00	0.00	10.80	1.52	0.55	7.00	16.10	2.09	0.97	2.95
5.60	0.29	0.00	0.00	10.90	1.54	0.56	6.65	16.20	2.09	0.98	2.93
5.70	0.29	0.00	0.00	11.00	1.56	0.58	6.30	16.30	2.10	0.99	2.91
5.80	0.30	0.00	0.00	11.10	1.57	0.59	6.17	16.40	2.11	0.99	2.90
5.90	0.31	0.00	0.03	11.20	1.59	0.60	6.05	16.50	2.12	1.00	2.88
6.00	0.31	0.00	0.06	11.30	1.61	0.61	5.93	16.60	2.12	1.00	2.86
6.10	0.32	0.00	0.09	11.40	1.62	0.62	5.81	16.70	2.13	1.01	2.84
6.20	0.33	0.00	0.13	11.50	1.64	0.63	5.68	16.80	2.14	1.01	2.83
6.30	0.33	0.00	0.16	11.60	1.65	0.64	5.56	16.90	2.14	1.02	2.81
6.40	0.34	0.00	0.21	11.70	1.67	0.65	5.43	17.00	2.15	1.02	2.79
6.50	0.35	0.00	0.25	11.80	1.68	0.67	5.30	17.10	2.16	1.03	2.77
6.60	0.36	0.00	0.30	11.90	1.70	0.68	5.17	17.20	2.16	1.04	2.75
6.70	0.36	0.00	0.35	12.00	1.71	0.69	5.03	17.30	2.17	1.04	2.74
6.80	0.37	0.00	0.40	12.10	1.72	0.70	4.95	17.40	2.18	1.05	2.72
6.90	0.38	0.00	0.46	12.20	1.74	0.70	4.87	17.50	2.18	1.05	2.70
7.00	0.39	0.01	0.52	12.30	1.75	0.71	4.79	17.60	2.19	1.06	2.68
7.10	0.40	0.01	0.58	12.40	1.76	0.72	4.71	17.70	2.20	1.06	2.66
7.20	0.41	0.01	0.63	12.50	1.77	0.73	4.63	17.80	2.20	1.07	2.64
7.30	0.42	0.01	0.68	12.60	1.78	0.74	4.54	17.90	2.21	1.07	2.63
7.40	0.43	0.01	0.74	12.70	1.80	0.75	4.46	18.00	2.21	1.08	2.61
7.50	0.44	0.01	0.79	12.80	1.81	0.76	4.37	18.10	2.22	1.08	2.59
7.60	0.45	0.01	0.85	12.90	1.82	0.77	4.28	18.20	2.23	1.09	2.57
7.70	0.46	0.01	0.90	13.00	1.83	0.77	4.20	18.30	2.23	1.09	2.55
7.80	0.47	0.02	0.96	13.10	1.84	0.78	4.11	18.40	2.24	1.10	2.53
7.90	0.48	0.02	1.01	13.20	1.85	0.79	4.02	18.50	2.25	1.10	2.51
8.00	0.48	0.02	1.08	13.30	1.86	0.80	3.93	18.60	2.25	1.11	2.49
8.10	0.50	0.02	1.24	13.40	1.87	0.81	3.84	18.70	2.26	1.11	2.48
8.20	0.51	0.03	1.42	13.50	1.88	0.81	3.75	18.80	2.26	1.12	2.46
8.30	0.52	0.03	1.62	13.60	1.89	0.82	3.66	18.90	2.27	1.12	2.44
8.40	0.53	0.03	1.83	13.70	1.90	0.83	3.56	19.00	2.27	1.13	2.42
8.50	0.55	0.04	2.07	13.80	1.91	0.83	3.47	19.10	2.28	1.13	2.40
8.60	0.56	0.04	2.30	13.90	1.92	0.84	3.38	19.20	2.29	1.13	2.38
8.70	0.58	0.04	2.56	14.00	1.92	0.85	3.29	19.30	2.29	1.14	2.36
8.80	0.60	0.05	2.83	14.10	1.93	0.85	3.27	19.40	2.30	1.14	2.34
8.90	0.62	0.06	3.12	14.20	1.94	0.86	3.25	19.50	2.30	1.15	2.32
9.00	0.63	0.06	3.44	14.30	1.95	0.87	3.24	19.60	2.31	1.15	2.30
9.10	0.66	0.07	3.91	14.40	1.96	0.87	3.22	19.70	2.31	1.16	2.28
9.20	0.68	0.08	4.43	14.50	1.97	0.88	3.21	19.80	2.32	1.16	2.26
9.30	0.70	0.09	4.99	14.60	1.97	0.89	3.19	19.90	2.32	1.17	2.24
9.40	0.73	0.10	5.59	14.70	1.98	0.89	3.18	20.00	**2.33**	**1.17**	2.22
9.50	0.76	0.11	6.53	14.80	1.99	0.90	3.16				
9.60	0.80	0.13	12.01	14.90	2.00	0.90	3.14				
9.70	0.86	0.15	18.81	15.00	2.00	0.91	3.13				
9.80	0.97	0.21	43.62	15.10	2.01	0.92	3.11				
9.90	1.16	0.31	**56.84**	15.20	2.02	0.92	3.10				
10.00	1.29	0.39	19.10	15.30	2.03	0.93	3.08				
10.10	1.33	0.42	13.67	15.40	2.04	0.93	3.06				
10.20	1.37	0.45	12.36	15.50	2.04	0.94	3.05				

Summary for Pond D2 exit: Free flow

Inflow Area = 102.400 ac, 23.75% Impervious, Inflow Depth > 0.90" for 2 yr event
Inflow = 53.26 cfs @ 10.15 hrs, Volume= 7.673 af
Primary = 53.26 cfs @ 10.15 hrs, Volume= 7.673 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond D2 exit: Free flow



Hydrograph for Pond D2 exit: Free flow

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
5.00	0.00		0.00	18.25	4.46		4.46
5.25	0.00		0.00	18.50	4.39		4.39
5.50	0.00		0.00	18.75	4.31		4.31
5.75	0.00		0.00	19.00	4.24		4.24
6.00	0.00		0.00	19.25	4.16		4.16
6.25	0.06		0.06	19.50	4.08		4.08
6.50	0.15		0.15	19.75	4.00		4.00
6.75	0.28		0.28	20.00	3.92		3.92
7.00	0.43		0.43				
7.25	0.61		0.61				
7.50	0.78		0.78				
7.75	0.95		0.95				
8.00	1.12		1.12				
8.25	1.33		1.33				
8.50	1.78		1.78				
8.75	2.42		2.42				
9.00	3.18		3.18				
9.25	4.12		4.12				
9.50	5.53		5.53				
9.75	9.06		9.06				
10.00	**35.00**		**35.00**				
10.25	**44.82**		**44.82**				
10.50	23.06		23.06				
10.75	15.21		15.21				
11.00	12.07		12.07				
11.25	10.56		10.56				
11.50	9.81		9.81				
11.75	9.32		9.32				
12.00	8.84		8.84				
12.25	8.36		8.36				
12.50	8.00		8.00				
12.75	7.68		7.68				
13.00	7.36		7.36				
13.25	7.02		7.02				
13.50	6.68		6.68				
13.75	6.32		6.32				
14.00	5.95		5.95				
14.25	5.61		5.61				
14.50	5.45		5.45				
14.75	5.38		5.38				
15.00	5.32		5.32				
15.25	5.26		5.26				
15.50	5.20		5.20				
15.75	5.14		5.14				
16.00	5.08		5.08				
16.25	5.02		5.02				
16.50	4.95		4.95				
16.75	4.89		4.89				
17.00	4.82		4.82				
17.25	4.75		4.75				
17.50	4.68		4.68				
17.75	4.61		4.61				
18.00	4.54		4.54				

Summary for Subcatchment D2-1: D2

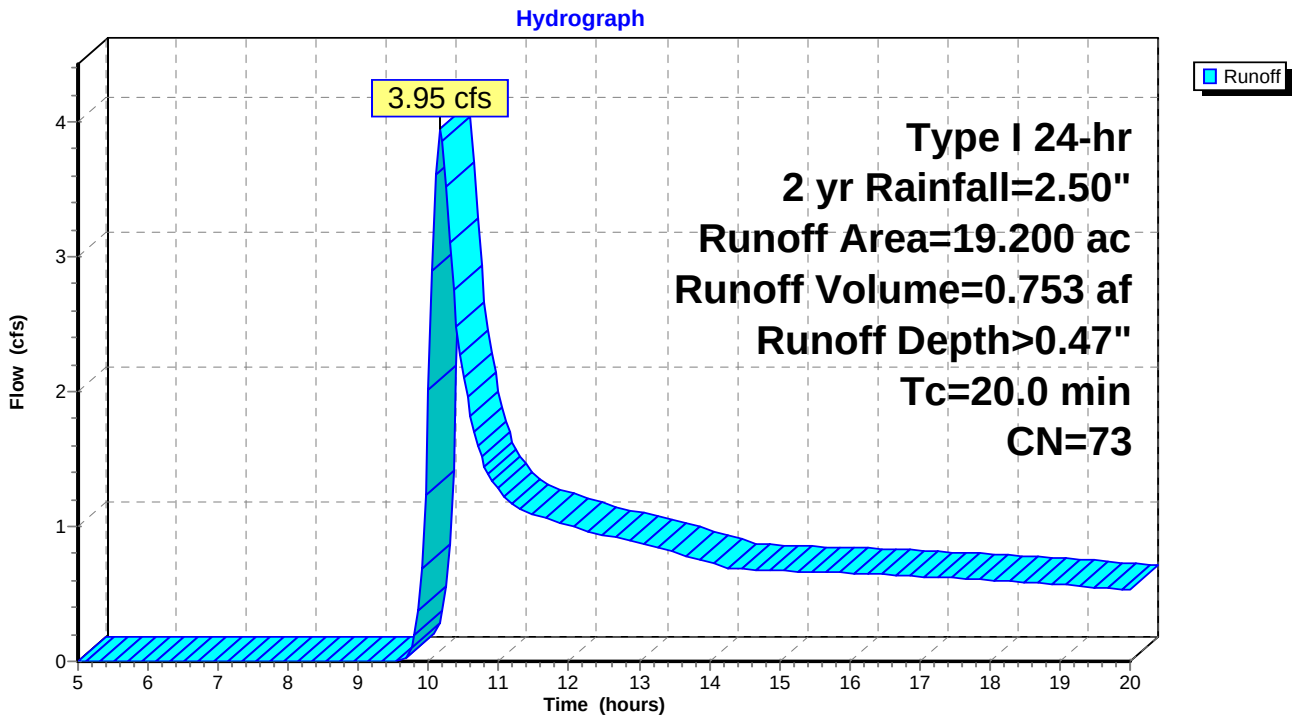
Runoff = 3.95 cfs @ 10.16 hrs, Volume= 0.753 af, Depth> 0.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type I 24-hr 2 yr Rainfall=2.50"

Area (ac)	CN	Description
19.200	73	Brush, Good, HSG D
19.200		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0					**Direct Entry, My own Tc**

Subcatchment D2-1: D2



Hydrograph for Subcatchment D2-1: D2

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.25	0.00	0.00	10.30	1.40	0.10	3.11	15.60	2.05	0.34	0.66
5.10	0.26	0.00	0.00	10.40	1.43	0.11	2.48	15.70	2.06	0.35	0.66
5.20	0.26	0.00	0.00	10.50	1.46	0.12	2.10	15.80	2.07	0.35	0.66
5.30	0.27	0.00	0.00	10.60	1.48	0.12	1.82	15.90	2.07	0.35	0.66
5.40	0.27	0.00	0.00	10.70	1.50	0.13	1.60	16.00	2.08	0.36	0.65
5.50	0.28	0.00	0.00	10.80	1.52	0.14	1.44	16.10	2.09	0.36	0.65
5.60	0.29	0.00	0.00	10.90	1.54	0.14	1.34	16.20	2.09	0.36	0.65
5.70	0.29	0.00	0.00	11.00	1.56	0.15	1.27	16.30	2.10	0.37	0.65
5.80	0.30	0.00	0.00	11.10	1.57	0.15	1.21	16.40	2.11	0.37	0.65
5.90	0.31	0.00	0.00	11.20	1.59	0.16	1.16	16.50	2.12	0.37	0.64
6.00	0.31	0.00	0.00	11.30	1.61	0.16	1.13	16.60	2.12	0.38	0.64
6.10	0.32	0.00	0.00	11.40	1.62	0.17	1.10	16.70	2.13	0.38	0.64
6.20	0.33	0.00	0.00	11.50	1.64	0.18	1.09	16.80	2.14	0.38	0.64
6.30	0.33	0.00	0.00	11.60	1.65	0.18	1.07	16.90	2.14	0.39	0.63
6.40	0.34	0.00	0.00	11.70	1.67	0.19	1.06	17.00	2.15	0.39	0.63
6.50	0.35	0.00	0.00	11.80	1.68	0.19	1.04	17.10	2.16	0.39	0.63
6.60	0.36	0.00	0.00	11.90	1.70	0.20	1.03	17.20	2.16	0.40	0.62
6.70	0.36	0.00	0.00	12.00	1.71	0.20	1.01	17.30	2.17	0.40	0.62
6.80	0.37	0.00	0.00	12.10	1.72	0.21	0.99	17.40	2.18	0.40	0.62
6.90	0.38	0.00	0.00	12.20	1.74	0.21	0.98	17.50	2.18	0.41	0.62
7.00	0.39	0.00	0.00	12.30	1.75	0.22	0.96	17.60	2.19	0.41	0.61
7.10	0.40	0.00	0.00	12.40	1.76	0.22	0.95	17.70	2.20	0.41	0.61
7.20	0.41	0.00	0.00	12.50	1.77	0.23	0.94	17.80	2.20	0.41	0.61
7.30	0.42	0.00	0.00	12.60	1.78	0.23	0.93	17.90	2.21	0.42	0.60
7.40	0.43	0.00	0.00	12.70	1.80	0.23	0.92	18.00	2.21	0.42	0.60
7.50	0.44	0.00	0.00	12.80	1.81	0.24	0.90	18.10	2.22	0.42	0.60
7.60	0.45	0.00	0.00	12.90	1.82	0.24	0.89	18.20	2.23	0.43	0.60
7.70	0.46	0.00	0.00	13.00	1.83	0.25	0.88	18.30	2.23	0.43	0.59
7.80	0.47	0.00	0.00	13.10	1.84	0.25	0.87	18.40	2.24	0.43	0.59
7.90	0.48	0.00	0.00	13.20	1.85	0.26	0.85	18.50	2.25	0.44	0.59
8.00	0.48	0.00	0.00	13.30	1.86	0.26	0.84	18.60	2.25	0.44	0.58
8.10	0.50	0.00	0.00	13.40	1.87	0.26	0.83	18.70	2.26	0.44	0.58
8.20	0.51	0.00	0.00	13.50	1.88	0.27	0.81	18.80	2.26	0.44	0.58
8.30	0.52	0.00	0.00	13.60	1.89	0.27	0.80	18.90	2.27	0.45	0.57
8.40	0.53	0.00	0.00	13.70	1.90	0.28	0.78	19.00	2.27	0.45	0.57
8.50	0.55	0.00	0.00	13.80	1.91	0.28	0.77	19.10	2.28	0.45	0.56
8.60	0.56	0.00	0.00	13.90	1.92	0.28	0.75	19.20	2.29	0.46	0.56
8.70	0.58	0.00	0.00	14.00	1.92	0.29	0.73	19.30	2.29	0.46	0.56
8.80	0.60	0.00	0.00	14.10	1.93	0.29	0.72	19.40	2.30	0.46	0.55
8.90	0.62	0.00	0.00	14.20	1.94	0.29	0.70	19.50	2.30	0.46	0.55
9.00	0.63	0.00	0.00	14.30	1.95	0.30	0.69	19.60	2.31	0.47	0.55
9.10	0.66	0.00	0.00	14.40	1.96	0.30	0.68	19.70	2.31	0.47	0.54
9.20	0.68	0.00	0.00	14.50	1.97	0.31	0.68	19.80	2.32	0.47	0.54
9.30	0.70	0.00	0.00	14.60	1.97	0.31	0.68	19.90	2.32	0.48	0.54
9.40	0.73	0.00	0.00	14.70	1.98	0.31	0.68	20.00	**2.33**	**0.48**	0.53
9.50	0.76	0.00	0.00	14.80	1.99	0.32	0.68				
9.60	0.80	0.00	0.01	14.90	2.00	0.32	0.67				
9.70	0.86	0.00	0.05	15.00	2.00	0.32	0.67				
9.80	0.97	0.01	0.20	15.10	2.01	0.33	0.67				
9.90	1.16	0.04	0.69	15.20	2.02	0.33	0.67				
10.00	1.29	0.07	2.01	15.30	2.03	0.33	0.67				
10.10	1.33	0.08	**3.61**	15.40	2.04	0.34	0.67				
10.20	1.37	0.09	**3.85**	15.50	2.04	0.34	0.66				

Summary for Subcatchment D2-2: D2

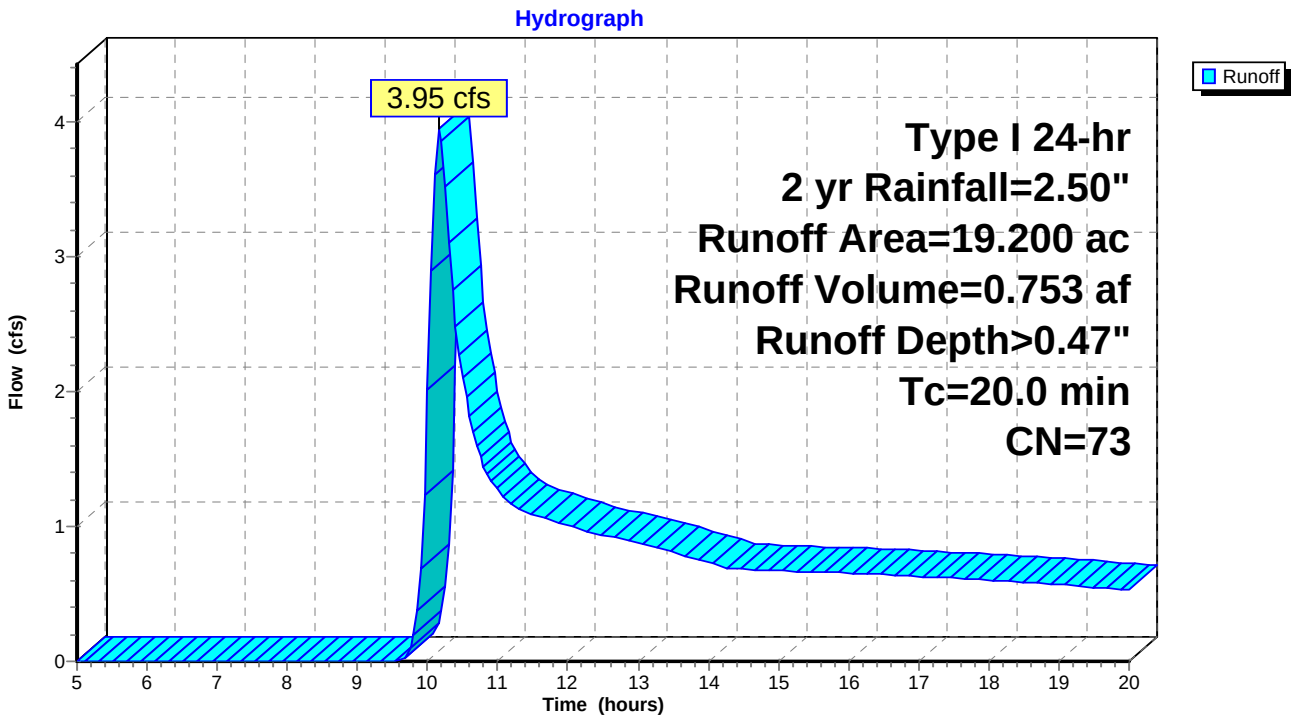
Runoff = 3.95 cfs @ 10.16 hrs, Volume= 0.753 af, Depth> 0.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type I 24-hr 2 yr Rainfall=2.50"

Area (ac)	CN	Description
19.200	73	Brush, Good, HSG D
19.200		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0					**Direct Entry, My own Tc**

Subcatchment D2-2: D2



Hydrograph for Subcatchment D2-2: D2

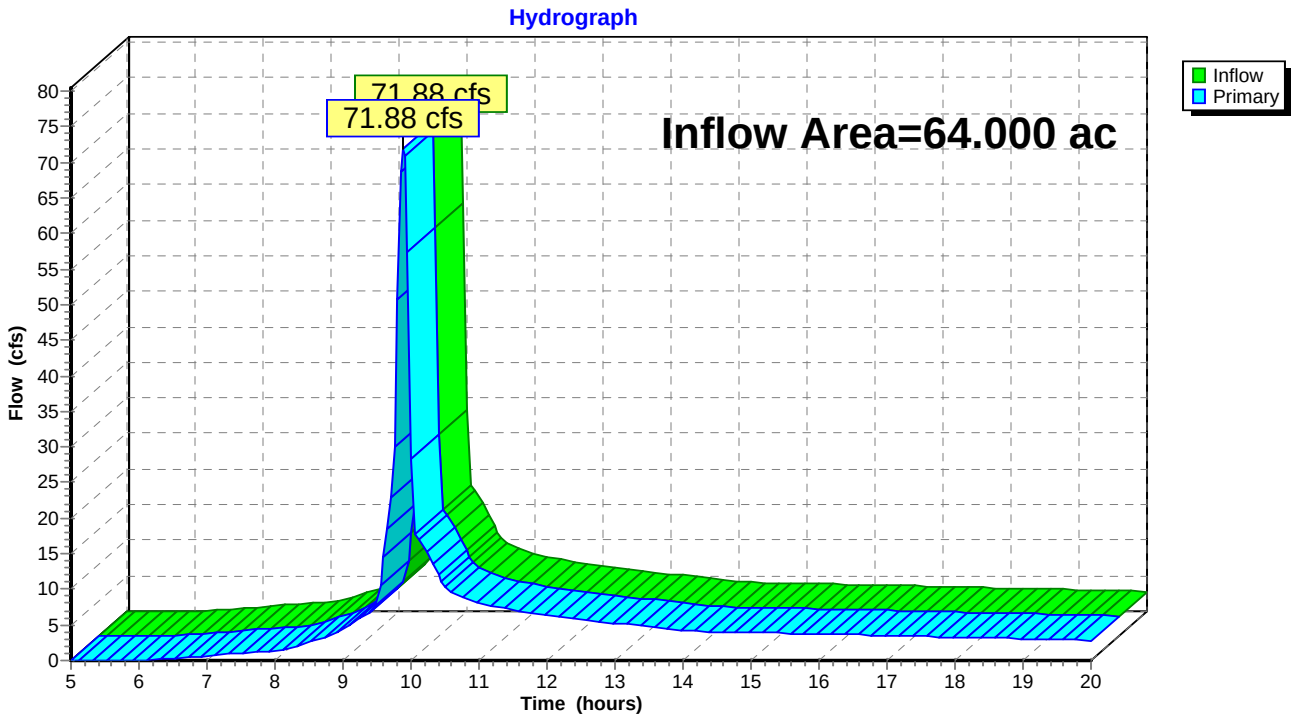
Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.25	0.00	0.00	10.30	1.40	0.10	3.11	15.60	2.05	0.34	0.66
5.10	0.26	0.00	0.00	10.40	1.43	0.11	2.48	15.70	2.06	0.35	0.66
5.20	0.26	0.00	0.00	10.50	1.46	0.12	2.10	15.80	2.07	0.35	0.66
5.30	0.27	0.00	0.00	10.60	1.48	0.12	1.82	15.90	2.07	0.35	0.66
5.40	0.27	0.00	0.00	10.70	1.50	0.13	1.60	16.00	2.08	0.36	0.65
5.50	0.28	0.00	0.00	10.80	1.52	0.14	1.44	16.10	2.09	0.36	0.65
5.60	0.29	0.00	0.00	10.90	1.54	0.14	1.34	16.20	2.09	0.36	0.65
5.70	0.29	0.00	0.00	11.00	1.56	0.15	1.27	16.30	2.10	0.37	0.65
5.80	0.30	0.00	0.00	11.10	1.57	0.15	1.21	16.40	2.11	0.37	0.65
5.90	0.31	0.00	0.00	11.20	1.59	0.16	1.16	16.50	2.12	0.37	0.64
6.00	0.31	0.00	0.00	11.30	1.61	0.16	1.13	16.60	2.12	0.38	0.64
6.10	0.32	0.00	0.00	11.40	1.62	0.17	1.10	16.70	2.13	0.38	0.64
6.20	0.33	0.00	0.00	11.50	1.64	0.18	1.09	16.80	2.14	0.38	0.64
6.30	0.33	0.00	0.00	11.60	1.65	0.18	1.07	16.90	2.14	0.39	0.63
6.40	0.34	0.00	0.00	11.70	1.67	0.19	1.06	17.00	2.15	0.39	0.63
6.50	0.35	0.00	0.00	11.80	1.68	0.19	1.04	17.10	2.16	0.39	0.63
6.60	0.36	0.00	0.00	11.90	1.70	0.20	1.03	17.20	2.16	0.40	0.62
6.70	0.36	0.00	0.00	12.00	1.71	0.20	1.01	17.30	2.17	0.40	0.62
6.80	0.37	0.00	0.00	12.10	1.72	0.21	0.99	17.40	2.18	0.40	0.62
6.90	0.38	0.00	0.00	12.20	1.74	0.21	0.98	17.50	2.18	0.41	0.62
7.00	0.39	0.00	0.00	12.30	1.75	0.22	0.96	17.60	2.19	0.41	0.61
7.10	0.40	0.00	0.00	12.40	1.76	0.22	0.95	17.70	2.20	0.41	0.61
7.20	0.41	0.00	0.00	12.50	1.77	0.23	0.94	17.80	2.20	0.41	0.61
7.30	0.42	0.00	0.00	12.60	1.78	0.23	0.93	17.90	2.21	0.42	0.60
7.40	0.43	0.00	0.00	12.70	1.80	0.23	0.92	18.00	2.21	0.42	0.60
7.50	0.44	0.00	0.00	12.80	1.81	0.24	0.90	18.10	2.22	0.42	0.60
7.60	0.45	0.00	0.00	12.90	1.82	0.24	0.89	18.20	2.23	0.43	0.60
7.70	0.46	0.00	0.00	13.00	1.83	0.25	0.88	18.30	2.23	0.43	0.59
7.80	0.47	0.00	0.00	13.10	1.84	0.25	0.87	18.40	2.24	0.43	0.59
7.90	0.48	0.00	0.00	13.20	1.85	0.26	0.85	18.50	2.25	0.44	0.59
8.00	0.48	0.00	0.00	13.30	1.86	0.26	0.84	18.60	2.25	0.44	0.58
8.10	0.50	0.00	0.00	13.40	1.87	0.26	0.83	18.70	2.26	0.44	0.58
8.20	0.51	0.00	0.00	13.50	1.88	0.27	0.81	18.80	2.26	0.44	0.58
8.30	0.52	0.00	0.00	13.60	1.89	0.27	0.80	18.90	2.27	0.45	0.57
8.40	0.53	0.00	0.00	13.70	1.90	0.28	0.78	19.00	2.27	0.45	0.57
8.50	0.55	0.00	0.00	13.80	1.91	0.28	0.77	19.10	2.28	0.45	0.56
8.60	0.56	0.00	0.00	13.90	1.92	0.28	0.75	19.20	2.29	0.46	0.56
8.70	0.58	0.00	0.00	14.00	1.92	0.29	0.73	19.30	2.29	0.46	0.56
8.80	0.60	0.00	0.00	14.10	1.93	0.29	0.72	19.40	2.30	0.46	0.55
8.90	0.62	0.00	0.00	14.20	1.94	0.29	0.70	19.50	2.30	0.46	0.55
9.00	0.63	0.00	0.00	14.30	1.95	0.30	0.69	19.60	2.31	0.47	0.55
9.10	0.66	0.00	0.00	14.40	1.96	0.30	0.68	19.70	2.31	0.47	0.54
9.20	0.68	0.00	0.00	14.50	1.97	0.31	0.68	19.80	2.32	0.47	0.54
9.30	0.70	0.00	0.00	14.60	1.97	0.31	0.68	19.90	2.32	0.48	0.54
9.40	0.73	0.00	0.00	14.70	1.98	0.31	0.68	20.00	**2.33**	**0.48**	0.53
9.50	0.76	0.00	0.00	14.80	1.99	0.32	0.68				
9.60	0.80	0.00	0.01	14.90	2.00	0.32	0.67				
9.70	0.86	0.00	0.05	15.00	2.00	0.32	0.67				
9.80	0.97	0.01	0.20	15.10	2.01	0.33	0.67				
9.90	1.16	0.04	0.69	15.20	2.02	0.33	0.67				
10.00	1.29	0.07	2.01	15.30	2.03	0.33	0.67				
10.10	1.33	0.08	**3.61**	15.40	2.04	0.34	0.67				
10.20	1.37	0.09	**3.85**	15.50	2.04	0.34	0.66				

Summary for Pond D3 exit: Free Flow

Inflow Area = 64.000 ac, 38.00% Impervious, Inflow Depth > 1.17" for 2 yr event
Inflow = 71.88 cfs @ 9.88 hrs, Volume= 6.244 af
Primary = 71.88 cfs @ 9.88 hrs, Volume= 6.244 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond D3 exit: Free Flow



Hydrograph for Pond D3 exit: Free Flow

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
5.00	0.00		0.00	18.25	3.20		3.20
5.25	0.00		0.00	18.50	3.14		3.14
5.50	0.00		0.00	18.75	3.09		3.09
5.75	0.00		0.00	19.00	3.03		3.03
6.00	0.07		0.07	19.25	2.97		2.97
6.25	0.17		0.17	19.50	2.90		2.90
6.50	0.30		0.30	19.75	2.84		2.84
6.75	0.46		0.46	20.00	2.78		2.78
7.00	0.64		0.64				
7.25	0.81		0.81				
7.50	0.98		0.98				
7.75	1.15		1.15				
8.00	1.33		1.33				
8.25	1.87		1.87				
8.50	2.55		2.55				
8.75	3.33		3.33				
9.00	4.25		4.25				
9.25	5.82		5.82				
9.50	7.99		7.99				
9.75	**30.03**		**30.03**				
10.00	**28.41**		**28.41**				
10.25	14.51		14.51				
10.50	10.29		10.29				
10.75	9.02		9.02				
11.00	7.90		7.90				
11.25	7.51		7.51				
11.50	7.11		7.11				
11.75	6.72		6.72				
12.00	6.31		6.31				
12.25	6.05		6.05				
12.50	5.79		5.79				
12.75	5.53		5.53				
13.00	5.26		5.26				
13.25	4.98		4.98				
13.50	4.70		4.70				
13.75	4.41		4.41				
14.00	4.12		4.12				
14.25	4.06		4.06				
14.50	4.01		4.01				
14.75	3.96		3.96				
15.00	3.91		3.91				
15.25	3.86		3.86				
15.50	3.81		3.81				
15.75	3.76		3.76				
16.00	3.71		3.71				
16.25	3.65		3.65				
16.50	3.60		3.60				
16.75	3.54		3.54				
17.00	3.49		3.49				
17.25	3.43		3.43				
17.50	3.38		3.38				
17.75	3.32		3.32				
18.00	3.26		3.26				

Summary for Subcatchment D3-2: D3

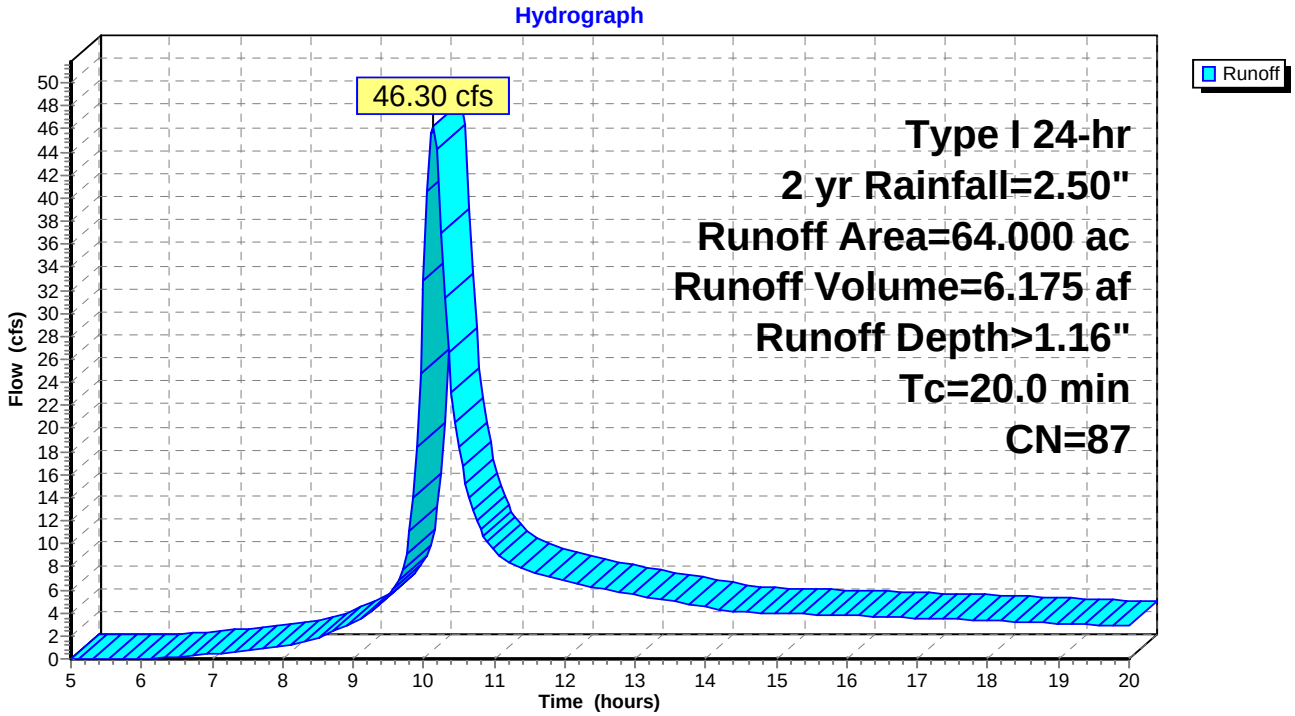
Runoff = 46.30 cfs @ 10.13 hrs, Volume= 6.175 af, Depth> 1.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type I 24-hr 2 yr Rainfall=2.50"

Area (ac)	CN	Description
64.000	87	1/4 acre lots, 38% imp, HSG D
39.680		62.00% Pervious Area
24.320		38.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0					**Direct Entry, My own Tc**

Subcatchment D3-2: D3



Hydrograph for Subcatchment D3-2: D3

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.25	0.00	0.00	10.30	1.40	0.47	31.31	15.60	2.05	0.95	3.85
5.10	0.26	0.00	0.00	10.40	1.43	0.49	23.15	15.70	2.06	0.95	3.83
5.20	0.26	0.00	0.00	10.50	1.46	0.51	18.41	15.80	2.07	0.96	3.81
5.30	0.27	0.00	0.00	10.60	1.48	0.52	15.20	15.90	2.07	0.96	3.79
5.40	0.27	0.00	0.00	10.70	1.50	0.54	12.85	16.00	2.08	0.97	3.77
5.50	0.28	0.00	0.00	10.80	1.52	0.55	11.24	16.10	2.09	0.97	3.75
5.60	0.29	0.00	0.00	10.90	1.54	0.56	10.19	16.20	2.09	0.98	3.73
5.70	0.29	0.00	0.00	11.00	1.56	0.58	9.44	16.30	2.10	0.99	3.71
5.80	0.30	0.00	0.00	11.10	1.57	0.59	8.87	16.40	2.11	0.99	3.69
5.90	0.31	0.00	0.00	11.20	1.59	0.60	8.41	16.50	2.12	1.00	3.66
6.00	0.31	0.00	0.01	11.30	1.61	0.61	8.06	16.60	2.12	1.00	3.64
6.10	0.32	0.00	0.02	11.40	1.62	0.62	7.81	16.70	2.13	1.01	3.62
6.20	0.33	0.00	0.05	11.50	1.64	0.63	7.62	16.80	2.14	1.01	3.60
6.30	0.33	0.00	0.08	11.60	1.65	0.64	7.44	16.90	2.14	1.02	3.58
6.40	0.34	0.00	0.12	11.70	1.67	0.65	7.28	17.00	2.15	1.02	3.56
6.50	0.35	0.00	0.16	11.80	1.68	0.67	7.12	17.10	2.16	1.03	3.53
6.60	0.36	0.00	0.21	11.90	1.70	0.68	6.96	17.20	2.16	1.04	3.51
6.70	0.36	0.00	0.26	12.00	1.71	0.69	6.80	17.30	2.17	1.04	3.49
6.80	0.37	0.00	0.31	12.10	1.72	0.70	6.64	17.40	2.18	1.05	3.47
6.90	0.38	0.00	0.37	12.20	1.74	0.70	6.48	17.50	2.18	1.05	3.44
7.00	0.39	0.01	0.44	12.30	1.75	0.71	6.34	17.60	2.19	1.06	3.42
7.10	0.40	0.01	0.50	12.40	1.76	0.72	6.22	17.70	2.20	1.06	3.40
7.20	0.41	0.01	0.57	12.50	1.77	0.73	6.11	17.80	2.20	1.07	3.38
7.30	0.42	0.01	0.65	12.60	1.78	0.74	6.00	17.90	2.21	1.07	3.35
7.40	0.43	0.01	0.71	12.70	1.80	0.75	5.90	18.00	2.21	1.08	3.33
7.50	0.44	0.01	0.78	12.80	1.81	0.76	5.79	18.10	2.22	1.08	3.31
7.60	0.45	0.01	0.85	12.90	1.82	0.77	5.69	18.20	2.23	1.09	3.28
7.70	0.46	0.01	0.92	13.00	1.83	0.77	5.58	18.30	2.23	1.09	3.26
7.80	0.47	0.02	0.98	13.10	1.84	0.78	5.47	18.40	2.24	1.10	3.24
7.90	0.48	0.02	1.05	13.20	1.85	0.79	5.36	18.50	2.25	1.10	3.21
8.00	0.48	0.02	1.12	13.30	1.86	0.80	5.25	18.60	2.25	1.11	3.19
8.10	0.50	0.02	1.19	13.40	1.87	0.81	5.14	18.70	2.26	1.11	3.17
8.20	0.51	0.03	1.28	13.50	1.88	0.81	5.03	18.80	2.26	1.12	3.14
8.30	0.52	0.03	1.40	13.60	1.89	0.82	4.92	18.90	2.27	1.12	3.12
8.40	0.53	0.03	1.58	13.70	1.90	0.83	4.81	19.00	2.27	1.13	3.10
8.50	0.55	0.04	1.79	13.80	1.91	0.83	4.69	19.10	2.28	1.13	3.07
8.60	0.56	0.04	2.03	13.90	1.92	0.84	4.58	19.20	2.29	1.13	3.05
8.70	0.58	0.04	2.29	14.00	1.92	0.85	4.46	19.30	2.29	1.14	3.02
8.80	0.60	0.05	2.57	14.10	1.93	0.85	4.35	19.40	2.30	1.14	3.00
8.90	0.62	0.06	2.87	14.20	1.94	0.86	4.24	19.50	2.30	1.15	2.98
9.00	0.63	0.06	3.19	14.30	1.95	0.87	4.16	19.60	2.31	1.15	2.95
9.10	0.66	0.07	3.53	14.40	1.96	0.87	4.11	19.70	2.31	1.16	2.93
9.20	0.68	0.08	3.91	14.50	1.97	0.88	4.08	19.80	2.32	1.16	2.90
9.30	0.70	0.09	4.38	14.60	1.97	0.89	4.05	19.90	2.32	1.17	2.88
9.40	0.73	0.10	4.93	14.70	1.98	0.89	4.03	20.00	**2.33**	**1.17**	2.86
9.50	0.76	0.11	5.55	14.80	1.99	0.90	4.01				
9.60	0.80	0.13	6.28	14.90	2.00	0.90	3.99				
9.70	0.86	0.15	7.71	15.00	2.00	0.91	3.97				
9.80	0.97	0.21	11.14	15.10	2.01	0.92	3.95				
9.90	1.16	0.31	18.43	15.20	2.02	0.92	3.93				
10.00	1.29	0.39	32.88	15.30	2.03	0.93	3.91				
10.10	1.33	0.42	**45.55**	15.40	2.04	0.93	3.89				
10.20	1.37	0.45	**42.46**	15.50	2.04	0.94	3.87				

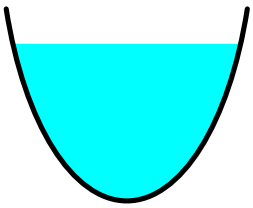
Summary for Reach 3R: D-3

Inflow Area = 64.000 ac, 38.00% Impervious, Inflow Depth > 2.80" for 5 yr event
Inflow = 175.86 cfs @ 9.87 hrs, Volume= 14.951 af
Outflow = 175.34 cfs @ 9.87 hrs, Volume= 14.947 af, Atten= 0%, Lag= 0.1 min

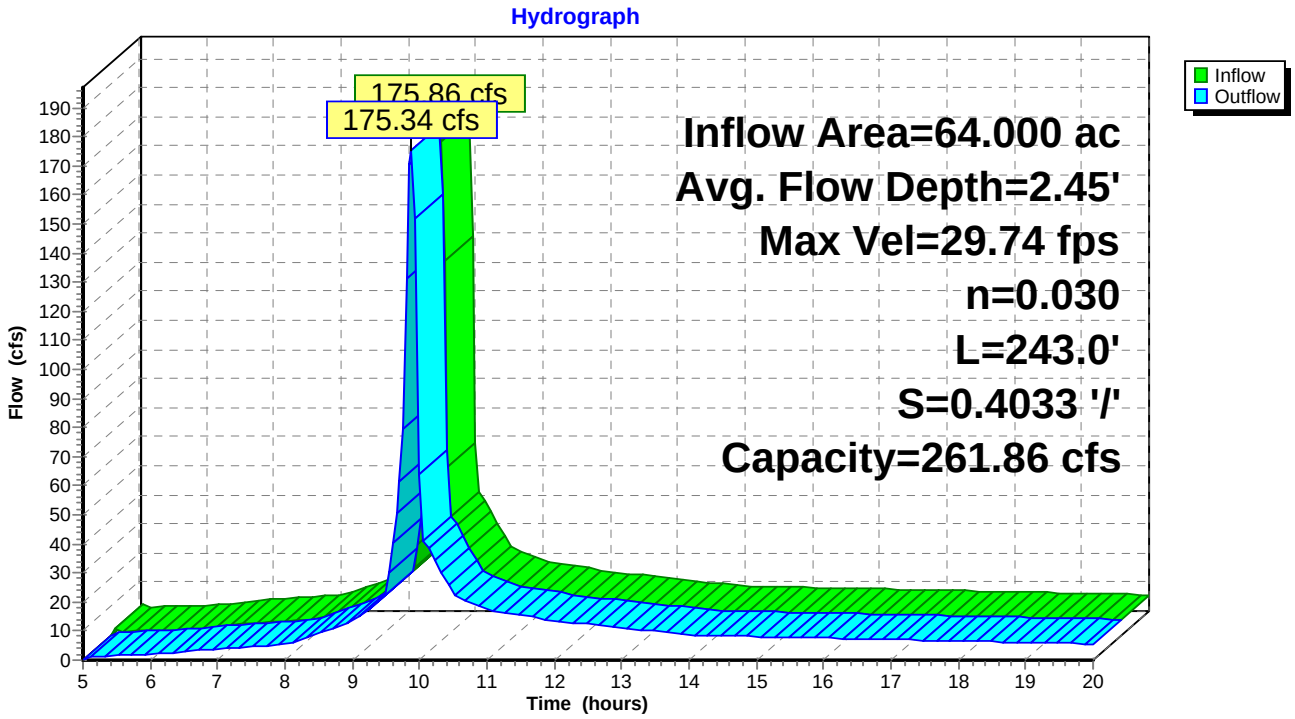
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 29.74 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 14.02 fps, Avg. Travel Time= 0.3 min

Peak Storage= 1,435 cf @ 9.87 hrs
Average Depth at Peak Storage= 2.45' , Surface Width= 3.62'
Bank-Full Depth= 3.00' Flow Area= 8.0 sf, Capacity= 261.86 cfs

4.00' x 3.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
Length= 243.0' Slope= 0.4033 '/'
Inlet Invert= 727.00', Outlet Invert= 629.00'



Reach 3R: D-3



Hydrograph for Reach 3R: D-3

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)
5.00	0.00	0	727.00	0.00
5.25	1.87	38	727.22	1.31
5.50	1.50	48	727.25	1.74
5.75	1.92	49	727.26	1.81
6.00	2.04	54	727.27	2.08
6.25	2.49	61	727.30	2.45
6.50	2.93	69	727.32	2.93
6.75	3.45	77	727.35	3.43
7.00	4.00	86	727.38	3.99
7.25	4.38	92	727.39	4.37
7.50	4.75	97	727.41	4.74
7.75	5.12	103	727.42	5.11
8.00	5.53	109	727.44	5.51
8.25	7.28	132	727.50	7.23
8.50	9.28	158	727.56	9.23
8.75	11.38	183	727.62	11.33
9.00	13.69	210	727.68	13.63
9.25	17.73	254	727.77	17.64
9.50	23.23	309	727.88	23.00
9.75	**81.47**	**787**	**728.64**	**79.54**
10.00	**57.65**	**636**	**728.42**	**63.75**
10.25	32.77	400	728.05	32.74
10.50	22.88	308	727.88	22.99
10.75	19.73	277	727.82	19.91
11.00	17.39	250	727.76	17.33
11.25	16.29	240	727.74	16.39
11.50	15.45	230	727.72	15.42
11.75	14.46	220	727.70	14.51
12.00	13.54	209	727.68	13.54
12.25	12.92	202	727.66	12.94
12.50	12.33	195	727.65	12.34
12.75	11.72	188	727.63	11.74
13.00	11.11	181	727.62	11.12
13.25	10.49	173	727.60	10.51
13.50	9.87	166	727.58	9.88
13.75	9.24	158	727.56	9.25
14.00	8.62	150	727.54	8.63
14.25	8.48	148	727.54	8.49
14.50	8.37	147	727.54	8.37
14.75	8.25	145	727.53	8.25
15.00	8.13	144	727.53	8.14
15.25	8.01	142	727.52	8.02
15.50	7.89	141	727.52	7.90
15.75	7.77	139	727.52	7.78
16.00	7.65	138	727.51	7.65
16.25	7.53	136	727.51	7.53
16.50	7.41	134	727.51	7.41
16.75	7.28	133	727.50	7.29
17.00	7.16	131	727.50	7.16
17.25	7.04	129	727.49	7.04
17.50	6.91	128	727.49	6.91
17.75	6.78	126	727.48	6.79
18.00	6.66	124	727.48	6.66
18.25	6.53	123	727.48	6.53
18.50	6.40	121	727.47	6.41
18.75	6.28	119	727.47	6.28
19.00	6.15	117	727.46	6.15
19.25	6.02	116	727.46	6.02
19.50	5.89	114	727.45	5.89
19.75	5.76	112	727.45	5.76
20.00	5.63	110	727.44	5.63

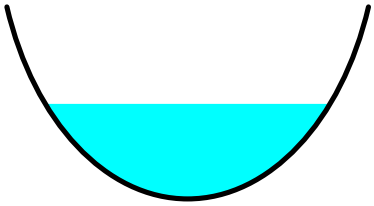
Summary for Reach C-1: D-2

Inflow Area = 38.400 ac, 0.00% Impervious, Inflow Depth > 1.65" for 5 yr event
Inflow = 37.77 cfs @ 10.14 hrs, Volume= 5.274 af
Outflow = 37.37 cfs @ 10.16 hrs, Volume= 5.264 af, Atten= 1%, Lag= 1.5 min

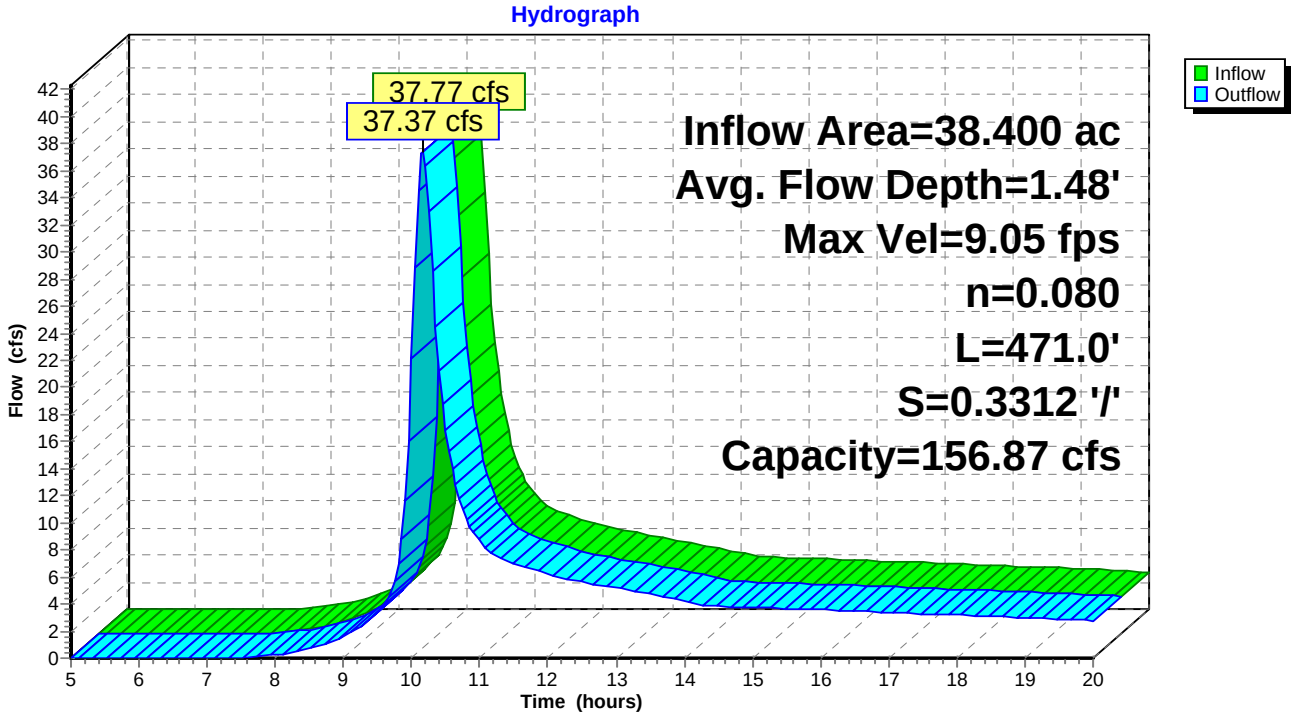
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 9.05 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 4.73 fps, Avg. Travel Time= 1.7 min

Peak Storage= 1,964 cf @ 10.15 hrs
Average Depth at Peak Storage= 1.48' , Surface Width= 4.22'
Bank-Full Depth= 3.00' Flow Area= 12.0 sf, Capacity= 156.87 cfs

6.00' x 3.00' deep Parabolic Channel, n= 0.080 Earth, long dense weeds
Length= 471.0' Slope= 0.3312 '/'
Inlet Invert= 1,641.00', Outlet Invert= 1,485.00'



Reach C-1: D-2



Hydrograph for Reach C-1: D-2

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)
5.00	0.00	0	1,641.00	0.00
5.25	0.00	0	1,641.00	0.00
5.50	0.00	0	1,641.00	0.00
5.75	0.00	0	1,641.00	0.00
6.00	0.00	0	1,641.00	0.00
6.25	0.00	0	1,641.00	0.00
6.50	0.00	0	1,641.00	0.00
6.75	0.00	0	1,641.00	0.00
7.00	0.00	0	1,641.00	0.00
7.25	0.00	0	1,641.00	0.00
7.50	0.02	4	1,641.02	0.00
7.75	0.13	29	1,641.09	0.09
8.00	0.28	55	1,641.14	0.24
8.25	0.45	79	1,641.17	0.41
8.50	0.74	113	1,641.22	0.68
8.75	1.17	158	1,641.28	1.09
9.00	1.73	210	1,641.33	1.64
9.25	2.47	270	1,641.39	2.34
9.50	3.59	353	1,641.47	3.41
9.75	6.36	517	1,641.61	5.69
10.00	**25.69**	**1,409**	**1,642.19**	**22.08**
10.25	**30.79**	**1,733**	**1,642.36**	**32.97**
10.50	15.87	1,066	1,641.99	16.81
10.75	10.53	789	1,641.81	10.97
11.00	8.42	667	1,641.72	8.60
11.25	7.39	606	1,641.68	7.49
11.50	6.88	575	1,641.65	6.93
11.75	6.54	554	1,641.64	6.58
12.00	6.20	534	1,641.62	6.25
12.25	5.87	513	1,641.61	5.91
12.50	5.62	497	1,641.59	5.65
12.75	5.39	482	1,641.58	5.42
13.00	5.16	468	1,641.57	5.19
13.25	4.93	452	1,641.56	4.96
13.50	4.68	436	1,641.54	4.71
13.75	4.43	420	1,641.53	4.46
14.00	4.17	402	1,641.52	4.21
14.25	3.93	385	1,641.50	3.96
14.50	3.83	377	1,641.49	3.84
14.75	3.78	374	1,641.49	3.79
15.00	3.74	371	1,641.49	3.74
15.25	3.70	368	1,641.49	3.70
15.50	3.66	365	1,641.48	3.66
15.75	3.61	362	1,641.48	3.62
16.00	3.57	359	1,641.48	3.58
16.25	3.52	356	1,641.47	3.53
16.50	3.48	353	1,641.47	3.49
16.75	3.43	349	1,641.47	3.44
17.00	3.38	346	1,641.47	3.39
17.25	3.34	342	1,641.46	3.34
17.50	3.29	339	1,641.46	3.29
17.75	3.24	335	1,641.46	3.24
18.00	3.19	331	1,641.45	3.19
18.25	3.13	328	1,641.45	3.14
18.50	3.08	324	1,641.45	3.09
18.75	3.03	320	1,641.44	3.03
19.00	2.97	315	1,641.44	2.98
19.25	2.92	311	1,641.43	2.93
19.50	2.86	307	1,641.43	2.87
19.75	2.81	303	1,641.43	2.82
20.00	2.75	299	1,641.42	2.76

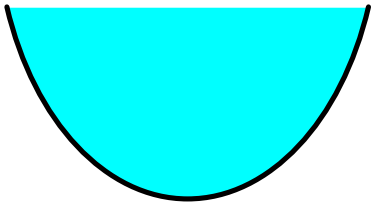
Summary for Reach C-2: D-2

Inflow Area = 102.400 ac, 23.75% Impervious, Inflow Depth > 2.36" for 5 yr event
Inflow = 150.54 cfs @ 10.13 hrs, Volume= 20.100 af
Outflow = 150.39 cfs @ 10.14 hrs, Volume= 20.095 af, Atten= 0%, Lag= 0.1 min

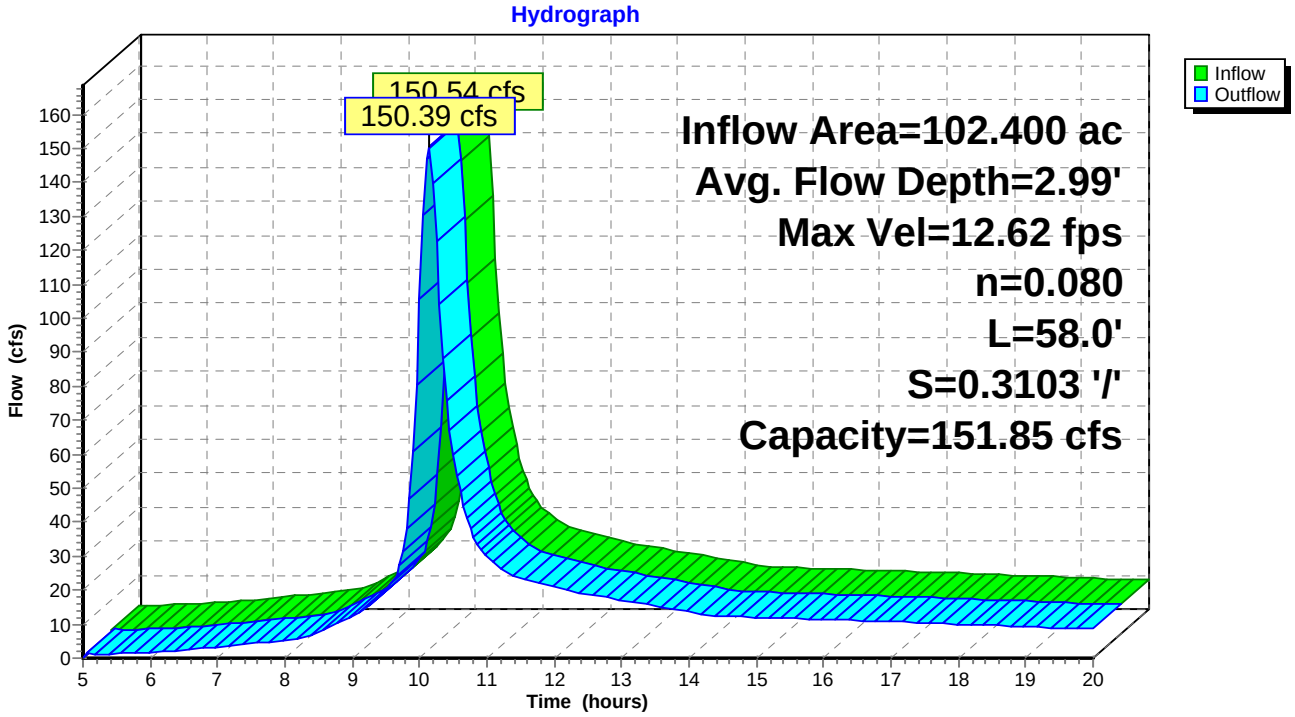
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 12.62 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 6.39 fps, Avg. Travel Time= 0.2 min

Peak Storage= 692 cf @ 10.14 hrs
Average Depth at Peak Storage= 2.99' , Surface Width= 5.99'
Bank-Full Depth= 3.00' Flow Area= 12.0 sf, Capacity= 151.85 cfs

6.00' x 3.00' deep Parabolic Channel, n= 0.080 Earth, long dense weeds
Length= 58.0' Slope= 0.3103 '/'
Inlet Invert= 619.00', Outlet Invert= 601.00'



Reach C-2: D-2



Hydrograph for Reach C-2: D-2

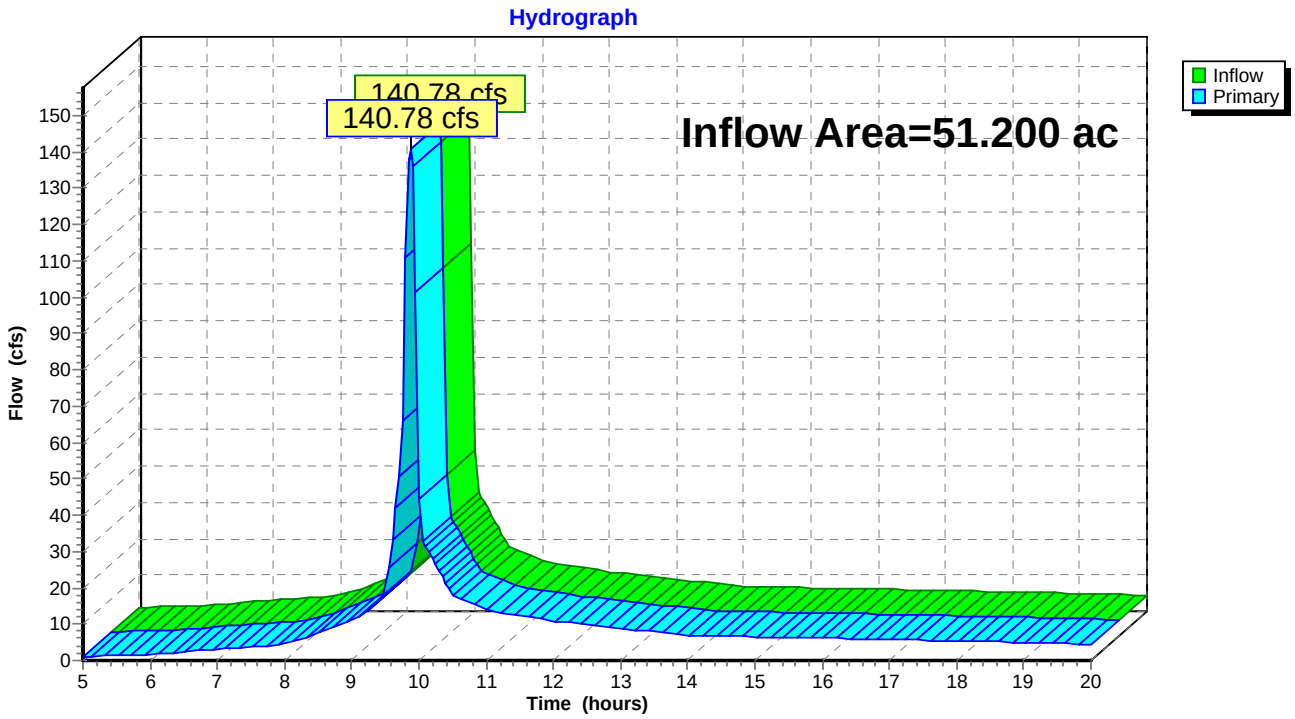
Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)
5.00	0.98	0	619.00	0.00
5.25	1.20	23	619.31	1.40
5.50	1.40	23	619.31	1.35
5.75	1.61	26	619.33	1.62
6.00	1.82	28	619.35	1.81
6.25	2.04	30	619.37	2.03
6.50	2.39	34	619.40	2.39
6.75	2.84	38	619.43	2.83
7.00	3.34	43	619.47	3.33
7.25	3.86	48	619.50	3.86
7.50	4.29	52	619.53	4.29
7.75	4.76	55	619.56	4.75
8.00	5.28	60	619.58	5.28
8.25	5.97	65	619.62	5.95
8.50	7.63	78	619.70	7.60
8.75	9.93	94	619.79	9.90
9.00	12.55	111	619.88	12.51
9.25	15.67	130	619.98	15.62
9.50	20.32	157	620.11	20.26
9.75	31.75	217	620.38	31.49
10.00	**106.69**	**532**	**621.51**	**105.49**
10.25	**121.67**	**591**	**621.69**	**122.51**
10.50	59.36	346	620.88	59.70
10.75	37.93	249	620.51	38.07
11.00	29.56	207	620.34	29.62
11.25	25.59	186	620.25	25.62
11.50	23.57	176	620.20	23.59
11.75	22.22	168	620.16	22.24
12.00	20.94	161	620.13	20.95
12.25	19.68	154	620.10	19.70
12.50	18.72	149	620.07	18.73
12.75	17.89	144	620.05	17.90
13.00	17.05	139	620.02	17.06
13.25	16.21	134	620.00	16.22
13.50	15.35	129	619.97	15.36
13.75	14.47	123	619.95	14.48
14.00	13.59	118	619.92	13.60
14.25	12.76	113	619.89	12.77
14.50	12.37	110	619.88	12.38
14.75	12.18	109	619.87	12.19
15.00	12.02	108	619.87	12.02
15.25	11.86	107	619.86	11.87
15.50	11.70	106	619.85	11.70
15.75	11.54	105	619.85	11.54
16.00	11.38	104	619.84	11.38
16.25	11.21	103	619.84	11.21
16.50	11.04	101	619.83	11.05
16.75	10.87	100	619.82	10.88
17.00	10.70	99	619.82	10.70
17.25	10.53	98	619.81	10.53
17.50	10.36	97	619.81	10.36
17.75	10.18	96	619.80	10.18
18.00	10.01	94	619.79	10.01
18.25	9.83	93	619.79	9.83
18.50	9.65	92	619.78	9.65
18.75	9.47	91	619.77	9.47
19.00	9.28	90	619.76	9.29
19.25	9.10	88	619.76	9.11
19.50	8.92	87	619.75	8.92
19.75	8.73	86	619.74	8.74
20.00	8.55	84	619.73	8.55

Summary for Pond D-1 Arroyo Trabuco: Free Flow

Inflow Area = 51.200 ac, 38.00% Impervious, Inflow Depth > 2.80" for 5 yr event
Inflow = 140.78 cfs @ 9.87 hrs, Volume= 11.964 af
Primary = 140.78 cfs @ 9.87 hrs, Volume= 11.964 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond D-1 Arroyo Trabuco: Free Flow



Hydrograph for Pond D-1 Arroyo Trabuco: Free Flow

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
5.00	1.00		1.00	18.25	5.22		5.22
5.25	1.16		1.16	18.50	5.12		5.12
5.50	1.33		1.33	18.75	5.02		5.02
5.75	1.49		1.49	19.00	4.92		4.92
6.00	1.65		1.65	19.25	4.81		4.81
6.25	1.98		1.98	19.50	4.71		4.71
6.50	2.36		2.36	19.75	4.61		4.61
6.75	2.77		2.77	20.00	4.50		4.50
7.00	3.21		3.21				
7.25	3.51		3.51				
7.50	3.81		3.81				
7.75	4.10		4.10				
8.00	4.43		4.43				
8.25	5.84		5.84				
8.50	7.44		7.44				
8.75	9.12		9.12				
9.00	10.97		10.97				
9.25	14.22		14.22				
9.50	18.67		18.67				
9.75	**65.90**		**65.90**				
10.00	**44.18**		**44.18**				
10.25	26.42		26.42				
10.50	18.07		18.07				
10.75	15.88		15.88				
11.00	13.83		13.83				
11.25	13.07		13.07				
11.50	12.33		12.33				
11.75	11.58		11.58				
12.00	10.82		10.82				
12.25	10.34		10.34				
12.50	9.86		9.86				
12.75	9.37		9.37				
13.00	8.88		8.88				
13.25	8.39		8.39				
13.50	7.89		7.89				
13.75	7.39		7.39				
14.00	6.89		6.89				
14.25	6.79		6.79				
14.50	6.69		6.69				
14.75	6.60		6.60				
15.00	6.51		6.51				
15.25	6.41		6.41				
15.50	6.31		6.31				
15.75	6.22		6.22				
16.00	6.12		6.12				
16.25	6.02		6.02				
16.50	5.92		5.92				
16.75	5.83		5.83				
17.00	5.73		5.73				
17.25	5.63		5.63				
17.50	5.53		5.53				
17.75	5.43		5.43				
18.00	5.33		5.33				

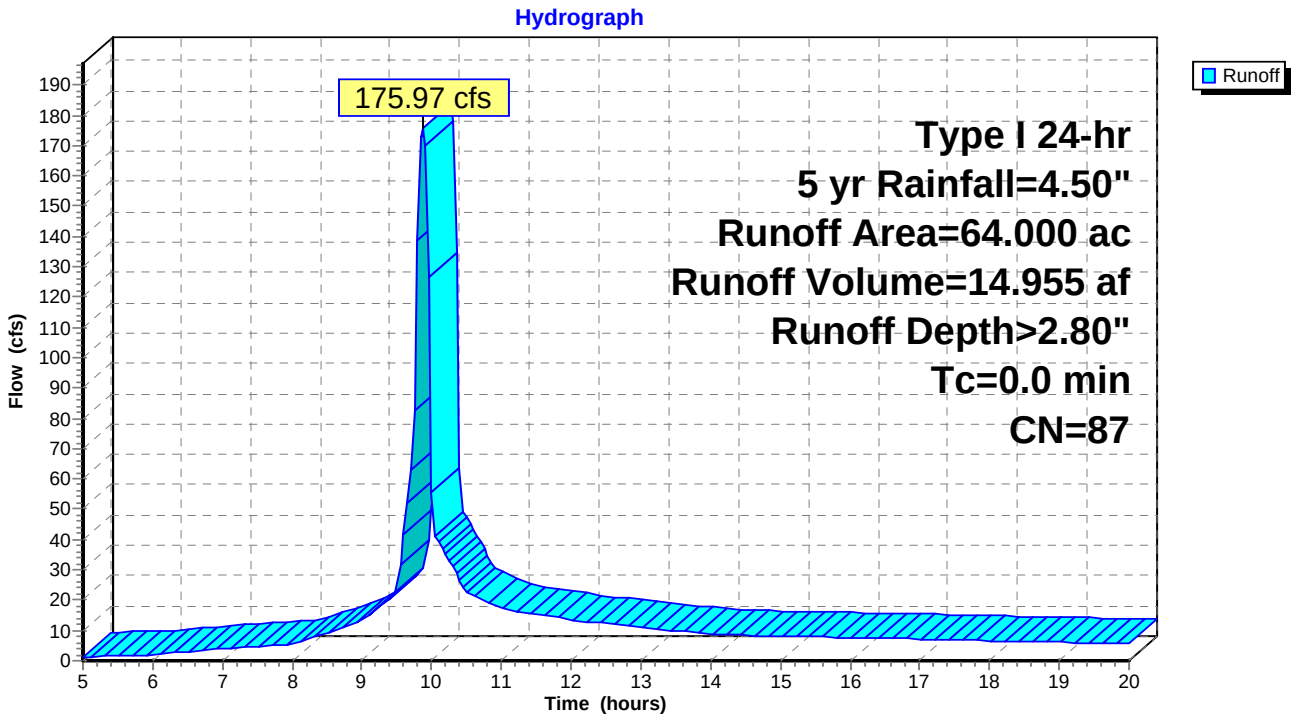
Summary for Subcatchment D-3: D-3

Runoff = 175.97 cfs @ 9.87 hrs, Volume= 14.955 af, Depth> 2.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type I 24-hr 5 yr Rainfall=4.50"

Area (ac)	CN	Description
64.000	87	1/4 acre lots, 38% imp, HSG D
39.680		62.00% Pervious Area
24.320		38.00% Impervious Area

Subcatchment D-3: D-3



Hydrograph for Subcatchment D-3: D-3

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.45	0.01	1.25	10.30	2.53	1.33	30.93	15.60	3.69	2.35	7.84
5.10	0.46	0.02	1.33	10.40	2.58	1.38	26.69	15.70	3.70	2.37	7.80
5.20	0.47	0.02	1.41	10.50	2.62	1.42	22.59	15.80	3.72	2.38	7.75
5.30	0.48	0.02	1.50	10.60	2.66	1.45	21.38	15.90	3.73	2.39	7.70
5.40	0.49	0.02	1.58	10.70	2.70	1.48	20.36	16.00	3.74	2.40	7.65
5.50	0.51	0.03	1.66	10.80	2.74	1.51	19.33	16.10	3.76	2.41	7.60
5.60	0.52	0.03	1.74	10.90	2.77	1.54	18.29	16.20	3.77	2.43	7.55
5.70	0.53	0.03	1.82	11.00	2.80	1.57	17.28	16.30	3.78	2.44	7.50
5.80	0.54	0.03	1.90	11.10	2.83	1.60	16.88	16.40	3.80	2.45	7.46
5.90	0.55	0.04	1.98	11.20	2.86	1.62	16.52	16.50	3.81	2.46	7.41
6.00	0.56	0.04	2.07	11.30	2.89	1.65	16.15	16.60	3.82	2.47	7.36
6.10	0.57	0.04	2.22	11.40	2.92	1.67	15.78	16.70	3.83	2.48	7.31
6.20	0.59	0.05	2.39	11.50	2.95	1.70	15.41	16.80	3.85	2.50	7.26
6.30	0.60	0.05	2.57	11.60	2.98	1.72	15.04	16.90	3.86	2.51	7.21
6.40	0.61	0.05	2.75	11.70	3.00	1.74	14.66	17.00	3.87	2.52	7.16
6.50	0.63	0.06	2.94	11.80	3.03	1.76	14.28	17.10	3.88	2.53	7.11
6.60	0.64	0.06	3.14	11.90	3.05	1.79	13.90	17.20	3.89	2.54	7.06
6.70	0.66	0.07	3.35	12.00	3.08	1.81	13.52	17.30	3.91	2.55	7.01
6.80	0.67	0.07	3.56	12.10	3.10	1.83	13.27	17.40	3.92	2.56	6.96
6.90	0.69	0.08	3.79	12.20	3.12	1.85	13.04	17.50	3.93	2.57	6.91
7.00	0.70	0.09	4.01	12.30	3.15	1.87	12.80	17.60	3.94	2.58	6.86
7.10	0.72	0.09	4.16	12.40	3.17	1.89	12.56	17.70	3.95	2.59	6.81
7.20	0.74	0.10	4.31	12.50	3.19	1.91	12.32	17.80	3.96	2.60	6.76
7.30	0.75	0.11	4.46	12.60	3.21	1.93	12.08	17.90	3.98	2.61	6.71
7.40	0.77	0.11	4.61	12.70	3.23	1.94	11.84	18.00	3.99	2.62	6.66
7.50	0.79	0.12	4.76	12.80	3.25	1.96	11.59	18.10	4.00	2.64	6.61
7.60	0.80	0.13	4.91	12.90	3.27	1.98	11.35	18.20	4.01	2.65	6.56
7.70	0.82	0.13	5.05	13.00	3.29	2.00	11.10	18.30	4.02	2.66	6.50
7.80	0.84	0.14	5.20	13.10	3.31	2.02	10.86	18.40	4.03	2.67	6.45
7.90	0.86	0.15	5.35	13.20	3.33	2.03	10.61	18.50	4.04	2.68	6.40
8.00	0.87	0.16	5.53	13.30	3.35	2.05	10.36	18.60	4.05	2.69	6.35
8.10	0.89	0.17	6.19	13.40	3.37	2.06	10.11	18.70	4.06	2.70	6.30
8.20	0.91	0.18	6.92	13.50	3.39	2.08	9.86	18.80	4.07	2.70	6.25
8.30	0.93	0.19	7.68	13.60	3.40	2.09	9.61	18.90	4.08	2.71	6.20
8.40	0.96	0.20	8.48	13.70	3.42	2.11	9.36	19.00	4.09	2.72	6.15
8.50	0.99	0.22	9.30	13.80	3.43	2.12	9.11	19.10	4.11	2.73	6.09
8.60	1.01	0.23	10.12	13.90	3.45	2.14	8.85	19.20	4.12	2.74	6.04
8.70	1.04	0.25	10.96	14.00	3.46	2.15	8.61	19.30	4.13	2.75	5.99
8.80	1.07	0.27	11.84	14.10	3.48	2.16	8.55	19.40	4.14	2.76	5.94
8.90	1.11	0.28	12.74	14.20	3.49	2.18	8.51	19.50	4.15	2.77	5.89
9.00	1.14	0.30	13.72	14.30	3.51	2.19	8.46	19.60	4.16	2.78	5.84
9.10	1.18	0.33	15.27	14.40	3.52	2.20	8.41	19.70	4.17	2.79	5.79
9.20	1.22	0.35	16.92	14.50	3.54	2.22	8.37	19.80	4.17	2.80	5.73
9.30	1.27	0.38	18.64	14.60	3.55	2.23	8.32	19.90	4.18	2.81	5.68
9.40	1.31	0.41	20.43	14.70	3.57	2.24	8.27	20.00	**4.19**	**2.82**	5.63
9.50	1.36	0.44	23.34	14.80	3.58	2.26	8.23				
9.60	1.44	0.49	41.77	14.90	3.60	2.27	8.18				
9.70	1.55	0.57	63.00	15.00	3.61	2.28	8.13				
9.80	1.75	0.71	**138.85**	15.10	3.62	2.29	8.08				
9.90	2.08	0.97	**169.91**	15.20	3.64	2.31	8.04				
10.00	2.32	1.16	55.23	15.30	3.65	2.32	7.99				
10.10	2.39	1.22	39.13	15.40	3.66	2.33	7.94				
10.20	2.46	1.28	35.09	15.50	3.68	2.34	7.89				

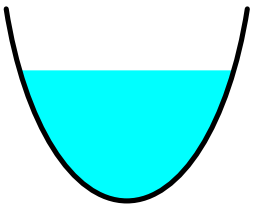
Summary for Reach D-3 split: C-3

Inflow Area = 64.000 ac, 38.00% Impervious, Inflow Depth > 2.80" for 5 yr event
Inflow = 175.97 cfs @ 9.87 hrs, Volume= 14.955 af
Outflow = 175.86 cfs @ 9.87 hrs, Volume= 14.951 af, Atten= 0%, Lag= 0.0 min

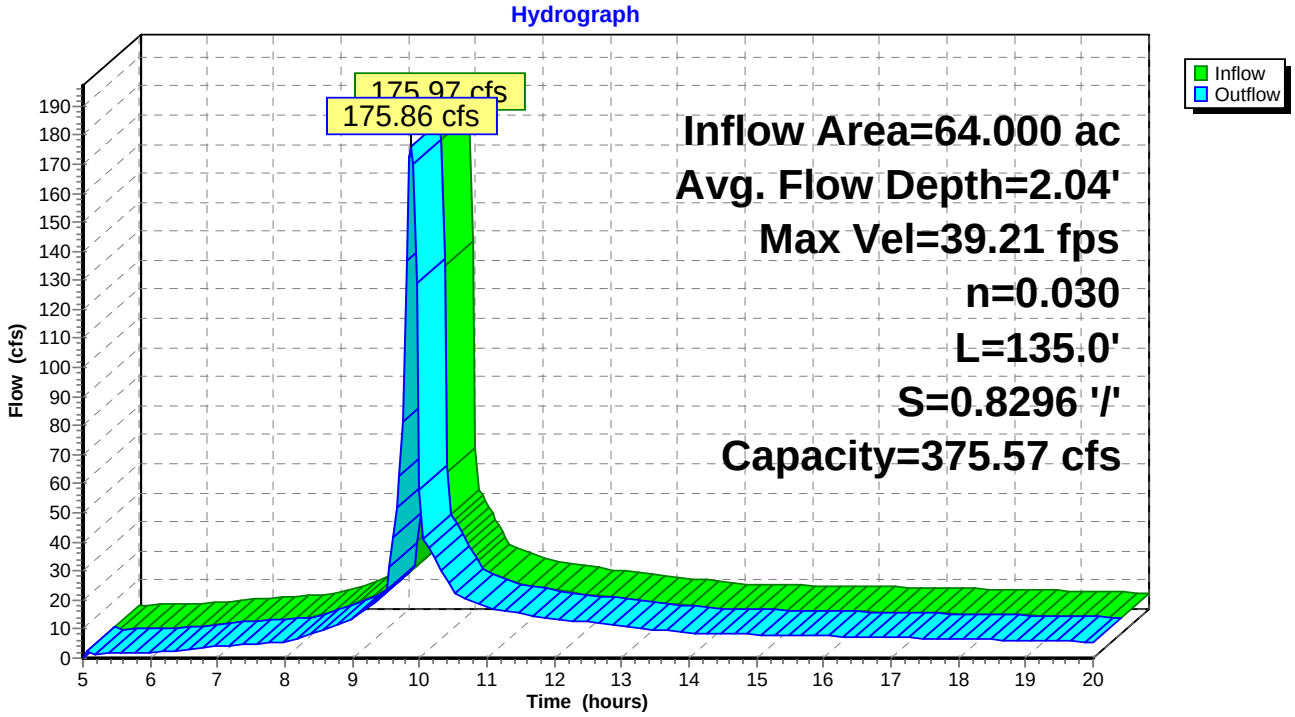
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 39.21 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 18.23 fps, Avg. Travel Time= 0.1 min

Peak Storage= 604 cf @ 9.87 hrs
Average Depth at Peak Storage= 2.04' , Surface Width= 3.30'
Bank-Full Depth= 3.00' Flow Area= 8.0 sf, Capacity= 375.57 cfs

4.00' x 3.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
Length= 135.0' Slope= 0.8296 '/'
Inlet Invert= 727.00', Outlet Invert= 615.00'



Reach D-3 split: C-3



Hydrograph for Reach D-3 split: C-3

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)
5.00	1.25	0	727.00	0.00
5.25	1.45	22	727.22	1.87
5.50	1.66	18	727.20	1.50
5.75	1.86	22	727.22	1.92
6.00	2.07	23	727.23	2.04
6.25	2.48	26	727.25	2.49
6.50	2.94	30	727.27	2.93
6.75	3.46	33	727.29	3.45
7.00	4.01	37	727.32	4.00
7.25	4.39	39	727.33	4.38
7.50	4.76	42	727.34	4.75
7.75	5.13	44	727.36	5.12
8.00	5.53	47	727.37	5.53
8.25	7.30	57	727.42	7.28
8.50	9.30	68	727.47	9.28
8.75	11.40	79	727.52	11.38
9.00	13.72	90	727.57	13.69
9.25	17.77	109	727.65	17.73
9.50	23.34	132	727.74	23.23
9.75	**82.38**	**338**	**728.38**	**81.47**
10.00	**55.23**	**255**	**728.15**	**57.65**
10.25	33.02	170	727.88	32.77
10.50	22.59	131	727.73	22.88
10.75	19.85	117	727.68	19.73
11.00	17.28	107	727.64	17.39
11.25	16.34	102	727.62	16.29
11.50	15.41	98	727.61	15.45
11.75	14.47	93	727.59	14.46
12.00	13.52	89	727.57	13.54
12.25	12.92	86	727.56	12.92
12.50	12.32	83	727.54	12.33
12.75	11.72	80	727.53	11.72
13.00	11.10	77	727.52	11.11
13.25	10.49	74	727.50	10.49
13.50	9.86	71	727.49	9.87
13.75	9.23	67	727.47	9.24
14.00	8.61	64	727.46	8.62
14.25	8.48	63	727.45	8.48
14.50	8.37	63	727.45	8.37
14.75	8.25	62	727.45	8.25
15.00	8.13	62	727.44	8.13
15.25	8.01	61	727.44	8.01
15.50	7.89	60	727.44	7.89
15.75	7.77	60	727.43	7.77
16.00	7.65	59	727.43	7.65
16.25	7.53	58	727.43	7.53
16.50	7.41	57	727.42	7.41
16.75	7.28	57	727.42	7.28
17.00	7.16	56	727.42	7.16
17.25	7.03	55	727.41	7.04
17.50	6.91	55	727.41	6.91
17.75	6.78	54	727.41	6.78
18.00	6.66	53	727.40	6.66
18.25	6.53	52	727.40	6.53
18.50	6.40	52	727.40	6.40
18.75	6.27	51	727.39	6.28
19.00	6.15	50	727.39	6.15
19.25	6.02	49	727.38	6.02
19.50	5.89	49	727.38	5.89
19.75	5.76	48	727.38	5.76
20.00	5.63	47	727.37	5.63

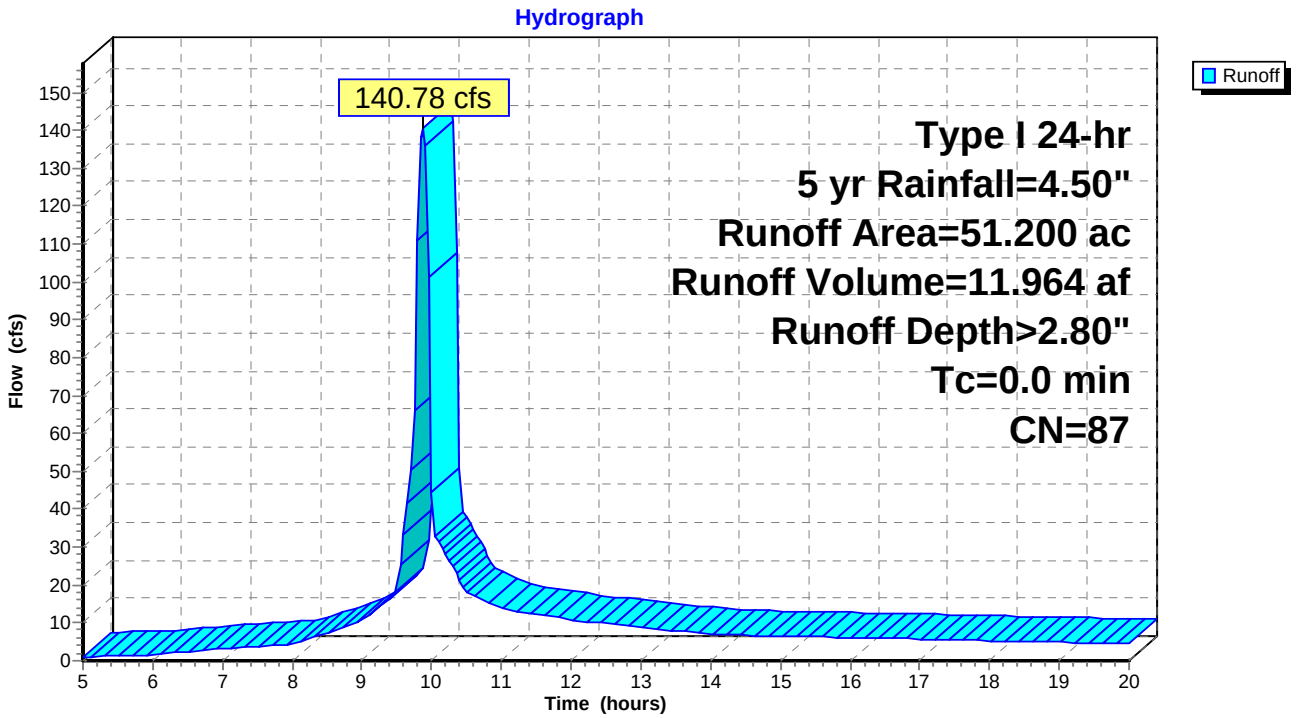
Summary for Subcatchment D1: D-1

Runoff = 140.78 cfs @ 9.87 hrs, Volume= 11.964 af, Depth> 2.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type I 24-hr 5 yr Rainfall=4.50"

Area (ac)	CN	Description
51.200	87	1/4 acre lots, 38% imp, HSG D
31.744		62.00% Pervious Area
19.456		38.00% Impervious Area

Subcatchment D1: D-1



Hydrograph for Subcatchment D1: D-1

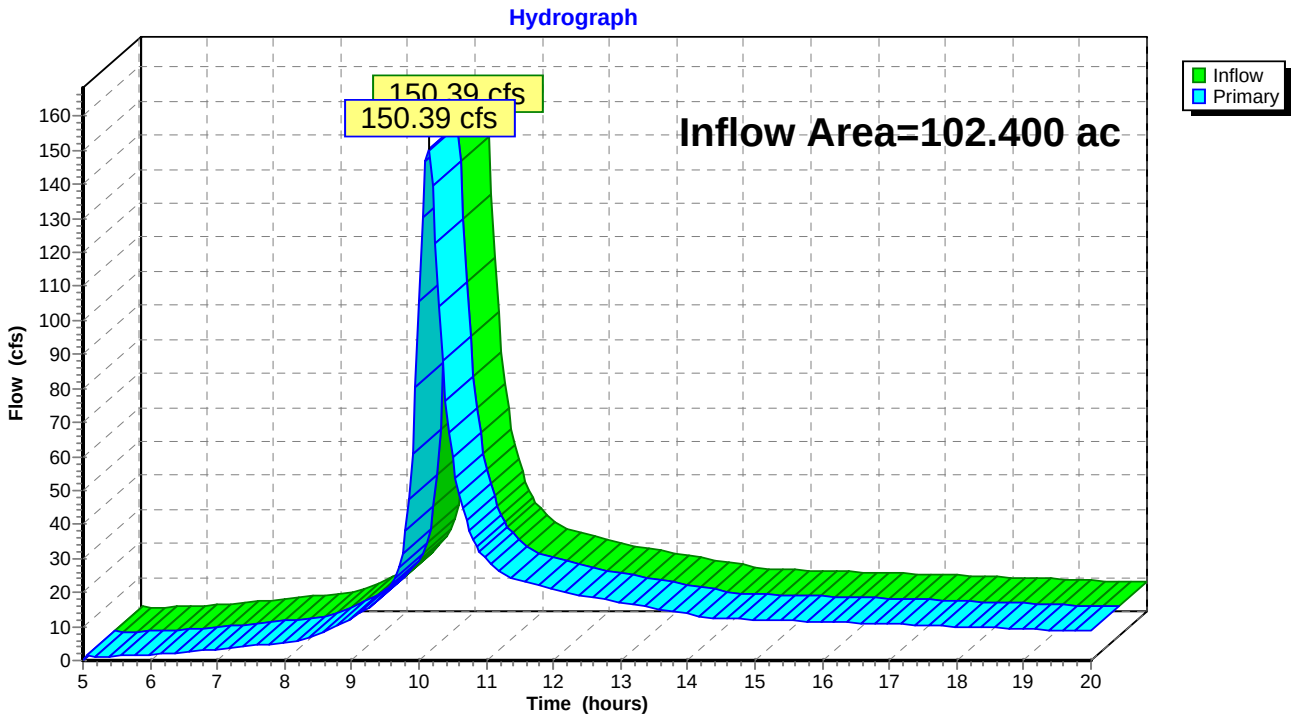
Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.45	0.01	1.00	10.30	2.53	1.33	24.75	15.60	3.69	2.35	6.28
5.10	0.46	0.02	1.06	10.40	2.58	1.38	21.35	15.70	3.70	2.37	6.24
5.20	0.47	0.02	1.13	10.50	2.62	1.42	18.07	15.80	3.72	2.38	6.20
5.30	0.48	0.02	1.20	10.60	2.66	1.45	17.10	15.90	3.73	2.39	6.16
5.40	0.49	0.02	1.26	10.70	2.70	1.48	16.29	16.00	3.74	2.40	6.12
5.50	0.51	0.03	1.33	10.80	2.74	1.51	15.47	16.10	3.76	2.41	6.08
5.60	0.52	0.03	1.39	10.90	2.77	1.54	14.63	16.20	3.77	2.43	6.04
5.70	0.53	0.03	1.46	11.00	2.80	1.57	13.83	16.30	3.78	2.44	6.00
5.80	0.54	0.03	1.52	11.10	2.83	1.60	13.51	16.40	3.80	2.45	5.96
5.90	0.55	0.04	1.59	11.20	2.86	1.62	13.22	16.50	3.81	2.46	5.92
6.00	0.56	0.04	1.65	11.30	2.89	1.65	12.92	16.60	3.82	2.47	5.89
6.10	0.57	0.04	1.78	11.40	2.92	1.67	12.63	16.70	3.83	2.48	5.85
6.20	0.59	0.05	1.91	11.50	2.95	1.70	12.33	16.80	3.85	2.50	5.81
6.30	0.60	0.05	2.06	11.60	2.98	1.72	12.03	16.90	3.86	2.51	5.77
6.40	0.61	0.05	2.20	11.70	3.00	1.74	11.73	17.00	3.87	2.52	5.73
6.50	0.63	0.06	2.36	11.80	3.03	1.76	11.42	17.10	3.88	2.53	5.69
6.60	0.64	0.06	2.52	11.90	3.05	1.79	11.12	17.20	3.89	2.54	5.65
6.70	0.66	0.07	2.68	12.00	3.08	1.81	10.82	17.30	3.91	2.55	5.61
6.80	0.67	0.07	2.85	12.10	3.10	1.83	10.62	17.40	3.92	2.56	5.57
6.90	0.69	0.08	3.03	12.20	3.12	1.85	10.43	17.50	3.93	2.57	5.53
7.00	0.70	0.09	3.21	12.30	3.15	1.87	10.24	17.60	3.94	2.58	5.49
7.10	0.72	0.09	3.33	12.40	3.17	1.89	10.05	17.70	3.95	2.59	5.45
7.20	0.74	0.10	3.45	12.50	3.19	1.91	9.86	17.80	3.96	2.60	5.41
7.30	0.75	0.11	3.57	12.60	3.21	1.93	9.66	17.90	3.98	2.61	5.37
7.40	0.77	0.11	3.69	12.70	3.23	1.94	9.47	18.00	3.99	2.62	5.33
7.50	0.79	0.12	3.81	12.80	3.25	1.96	9.28	18.10	4.00	2.64	5.28
7.60	0.80	0.13	3.92	12.90	3.27	1.98	9.08	18.20	4.01	2.65	5.24
7.70	0.82	0.13	4.04	13.00	3.29	2.00	8.88	18.30	4.02	2.66	5.20
7.80	0.84	0.14	4.16	13.10	3.31	2.02	8.69	18.40	4.03	2.67	5.16
7.90	0.86	0.15	4.28	13.20	3.33	2.03	8.49	18.50	4.04	2.68	5.12
8.00	0.87	0.16	4.43	13.30	3.35	2.05	8.29	18.60	4.05	2.69	5.08
8.10	0.89	0.17	4.96	13.40	3.37	2.06	8.09	18.70	4.06	2.70	5.04
8.20	0.91	0.18	5.54	13.50	3.39	2.08	7.89	18.80	4.07	2.70	5.00
8.30	0.93	0.19	6.15	13.60	3.40	2.09	7.69	18.90	4.08	2.71	4.96
8.40	0.96	0.20	6.78	13.70	3.42	2.11	7.49	19.00	4.09	2.72	4.92
8.50	0.99	0.22	7.44	13.80	3.43	2.12	7.28	19.10	4.11	2.73	4.88
8.60	1.01	0.23	8.10	13.90	3.45	2.14	7.08	19.20	4.12	2.74	4.83
8.70	1.04	0.25	8.77	14.00	3.46	2.15	6.89	19.30	4.13	2.75	4.79
8.80	1.07	0.27	9.47	14.10	3.48	2.16	6.84	19.40	4.14	2.76	4.75
8.90	1.11	0.28	10.19	14.20	3.49	2.18	6.80	19.50	4.15	2.77	4.71
9.00	1.14	0.30	10.97	14.30	3.51	2.19	6.77	19.60	4.16	2.78	4.67
9.10	1.18	0.33	12.21	14.40	3.52	2.20	6.73	19.70	4.17	2.79	4.63
9.20	1.22	0.35	13.54	14.50	3.54	2.22	6.69	19.80	4.17	2.80	4.59
9.30	1.27	0.38	14.91	14.60	3.55	2.23	6.66	19.90	4.18	2.81	4.55
9.40	1.31	0.41	16.34	14.70	3.57	2.24	6.62	20.00	**4.19**	**2.82**	4.50
9.50	1.36	0.44	18.67	14.80	3.58	2.26	6.58				
9.60	1.44	0.49	33.41	14.90	3.60	2.27	6.54				
9.70	1.55	0.57	50.40	15.00	3.61	2.28	6.51				
9.80	1.75	0.71	**111.08**	15.10	3.62	2.29	6.47				
9.90	2.08	0.97	**135.93**	15.20	3.64	2.31	6.43				
10.00	2.32	1.16	44.18	15.30	3.65	2.32	6.39				
10.10	2.39	1.22	31.31	15.40	3.66	2.33	6.35				
10.20	2.46	1.28	28.07	15.50	3.68	2.34	6.31				

Summary for Pond D2 exit: Free flow

Inflow Area = 102.400 ac, 23.75% Impervious, Inflow Depth > 2.35" for 5 yr event
Inflow = 150.39 cfs @ 10.14 hrs, Volume= 20.095 af
Primary = 150.39 cfs @ 10.14 hrs, Volume= 20.095 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond D2 exit: Free flow



Hydrograph for Pond D2 exit: Free flow

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
5.00	0.00		0.00	18.25	9.83		9.83
5.25	1.40		1.40	18.50	9.65		9.65
5.50	1.35		1.35	18.75	9.47		9.47
5.75	1.62		1.62	19.00	9.29		9.29
6.00	1.81		1.81	19.25	9.11		9.11
6.25	2.03		2.03	19.50	8.92		8.92
6.50	2.39		2.39	19.75	8.74		8.74
6.75	2.83		2.83	20.00	8.55		8.55
7.00	3.33		3.33				
7.25	3.86		3.86				
7.50	4.29		4.29				
7.75	4.75		4.75				
8.00	5.28		5.28				
8.25	5.95		5.95				
8.50	7.60		7.60				
8.75	9.90		9.90				
9.00	12.51		12.51				
9.25	15.62		15.62				
9.50	20.26		20.26				
9.75	31.49		31.49				
10.00	**105.49**		**105.49**				
10.25	**122.51**		**122.51**				
10.50	59.70		59.70				
10.75	38.07		38.07				
11.00	29.62		29.62				
11.25	25.62		25.62				
11.50	23.59		23.59				
11.75	22.24		22.24				
12.00	20.95		20.95				
12.25	19.70		19.70				
12.50	18.73		18.73				
12.75	17.90		17.90				
13.00	17.06		17.06				
13.25	16.22		16.22				
13.50	15.36		15.36				
13.75	14.48		14.48				
14.00	13.60		13.60				
14.25	12.77		12.77				
14.50	12.38		12.38				
14.75	12.19		12.19				
15.00	12.02		12.02				
15.25	11.87		11.87				
15.50	11.70		11.70				
15.75	11.54		11.54				
16.00	11.38		11.38				
16.25	11.21		11.21				
16.50	11.05		11.05				
16.75	10.88		10.88				
17.00	10.70		10.70				
17.25	10.53		10.53				
17.50	10.36		10.36				
17.75	10.18		10.18				
18.00	10.01		10.01				

Summary for Subcatchment D2-1: D2

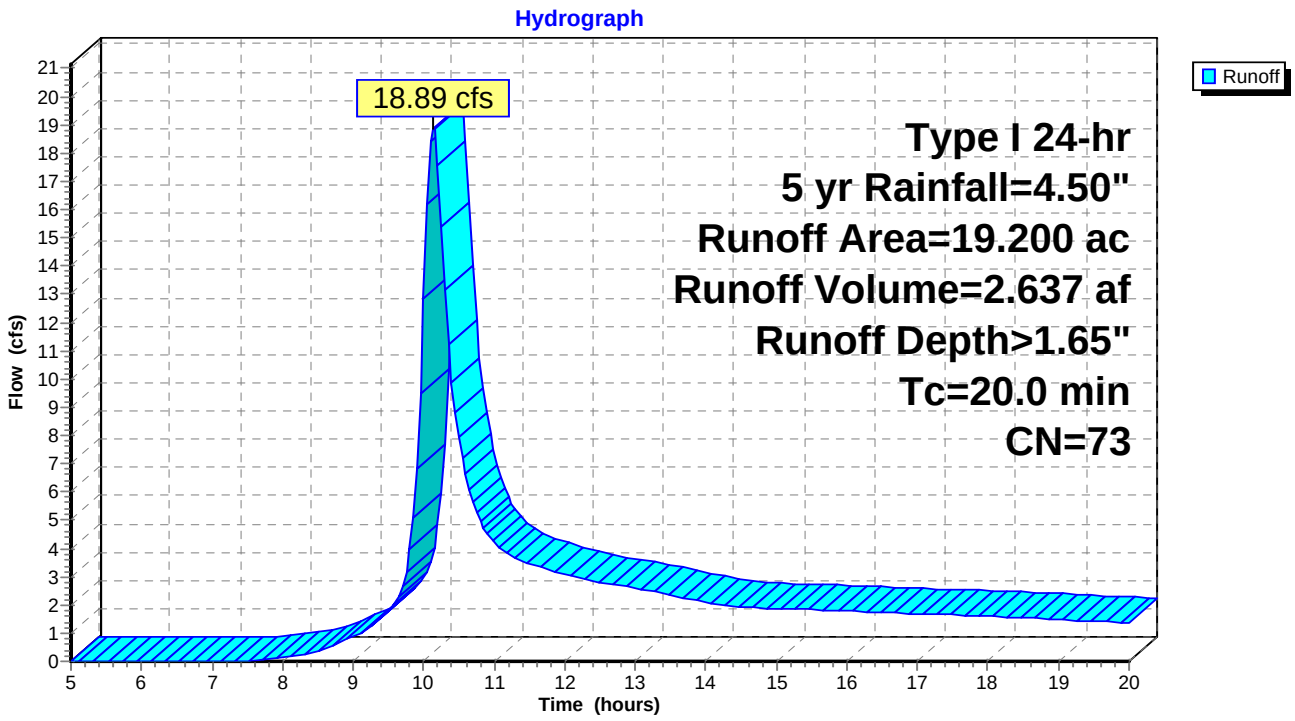
Runoff = 18.89 cfs @ 10.14 hrs, Volume= 2.637 af, Depth> 1.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type I 24-hr 5 yr Rainfall=4.50"

Area (ac)	CN	Description
19.200	73	Brush, Good, HSG D
19.200		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0					**Direct Entry, My own Tc**

Subcatchment D2-1: D2



Hydrograph for Subcatchment D2-1: D2

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.45	0.00	0.00	10.30	2.53	0.58	13.14	15.60	3.69	1.31	1.82
5.10	0.46	0.00	0.00	10.40	2.58	0.61	9.85	15.70	3.70	1.32	1.81
5.20	0.47	0.00	0.00	10.50	2.62	0.64	7.94	15.80	3.72	1.33	1.80
5.30	0.48	0.00	0.00	10.60	2.66	0.66	6.62	15.90	3.73	1.34	1.79
5.40	0.49	0.00	0.00	10.70	2.70	0.68	5.64	16.00	3.74	1.35	1.79
5.50	0.51	0.00	0.00	10.80	2.74	0.70	4.96	16.10	3.76	1.36	1.78
5.60	0.52	0.00	0.00	10.90	2.77	0.72	4.53	16.20	3.77	1.36	1.77
5.70	0.53	0.00	0.00	11.00	2.80	0.74	4.21	16.30	3.78	1.37	1.76
5.80	0.54	0.00	0.00	11.10	2.83	0.76	3.97	16.40	3.80	1.38	1.75
5.90	0.55	0.00	0.00	11.20	2.86	0.78	3.77	16.50	3.81	1.39	1.74
6.00	0.56	0.00	0.00	11.30	2.89	0.79	3.63	16.60	3.82	1.40	1.73
6.10	0.57	0.00	0.00	11.40	2.92	0.81	3.52	16.70	3.83	1.41	1.72
6.20	0.59	0.00	0.00	11.50	2.95	0.83	3.44	16.80	3.85	1.42	1.71
6.30	0.60	0.00	0.00	11.60	2.98	0.84	3.37	16.90	3.86	1.43	1.70
6.40	0.61	0.00	0.00	11.70	3.00	0.86	3.30	17.00	3.87	1.43	1.69
6.50	0.63	0.00	0.00	11.80	3.03	0.88	3.24	17.10	3.88	1.44	1.68
6.60	0.64	0.00	0.00	11.90	3.05	0.89	3.17	17.20	3.89	1.45	1.67
6.70	0.66	0.00	0.00	12.00	3.08	0.91	3.10	17.30	3.91	1.46	1.66
6.80	0.67	0.00	0.00	12.10	3.10	0.92	3.03	17.40	3.92	1.47	1.65
6.90	0.69	0.00	0.00	12.20	3.12	0.94	2.97	17.50	3.93	1.48	1.64
7.00	0.70	0.00	0.00	12.30	3.15	0.95	2.91	17.60	3.94	1.49	1.63
7.10	0.72	0.00	0.00	12.40	3.17	0.96	2.86	17.70	3.95	1.49	1.62
7.20	0.74	0.00	0.00	12.50	3.19	0.98	2.81	17.80	3.96	1.50	1.61
7.30	0.75	0.00	0.00	12.60	3.21	0.99	2.76	17.90	3.98	1.51	1.60
7.40	0.77	0.00	0.00	12.70	3.23	1.00	2.72	18.00	3.99	1.52	1.59
7.50	0.79	0.00	0.01	12.80	3.25	1.02	2.67	18.10	4.00	1.53	1.58
7.60	0.80	0.00	0.03	12.90	3.27	1.03	2.63	18.20	4.01	1.53	1.57
7.70	0.82	0.00	0.05	13.00	3.29	1.04	2.58	18.30	4.02	1.54	1.56
7.80	0.84	0.00	0.08	13.10	3.31	1.06	2.53	18.40	4.03	1.55	1.55
7.90	0.86	0.00	0.11	13.20	3.33	1.07	2.49	18.50	4.04	1.56	1.54
8.00	0.87	0.00	0.14	13.30	3.35	1.08	2.44	18.60	4.05	1.57	1.53
8.10	0.89	0.01	0.17	13.40	3.37	1.09	2.39	18.70	4.06	1.57	1.52
8.20	0.91	0.01	0.20	13.50	3.39	1.10	2.34	18.80	4.07	1.58	1.51
8.30	0.93	0.01	0.25	13.60	3.40	1.11	2.29	18.90	4.08	1.59	1.50
8.40	0.96	0.01	0.30	13.70	3.42	1.13	2.24	19.00	4.09	1.60	1.49
8.50	0.99	0.02	0.37	13.80	3.43	1.14	2.19	19.10	4.11	1.60	1.48
8.60	1.01	0.02	0.45	13.90	3.45	1.15	2.14	19.20	4.12	1.61	1.46
8.70	1.04	0.02	0.54	14.00	3.46	1.16	2.09	19.30	4.13	1.62	1.45
8.80	1.07	0.03	0.64	14.10	3.48	1.17	2.03	19.40	4.14	1.63	1.44
8.90	1.11	0.03	0.75	14.20	3.49	1.18	1.99	19.50	4.15	1.63	1.43
9.00	1.14	0.04	0.87	14.30	3.51	1.19	1.95	19.60	4.16	1.64	1.42
9.10	1.18	0.05	1.00	14.40	3.52	1.20	1.93	19.70	4.17	1.65	1.41
9.20	1.22	0.06	1.15	14.50	3.54	1.21	1.91	19.80	4.17	1.65	1.40
9.30	1.27	0.07	1.33	14.60	3.55	1.22	1.90	19.90	4.18	1.66	1.39
9.40	1.31	0.08	1.54	14.70	3.57	1.22	1.89	20.00	**4.19**	**1.67**	1.38
9.50	1.36	0.09	1.79	14.80	3.58	1.23	1.89				
9.60	1.44	0.11	2.09	14.90	3.60	1.24	1.88				
9.70	1.55	0.15	2.65	15.00	3.61	1.25	1.87				
9.80	1.75	0.21	3.96	15.10	3.62	1.26	1.86				
9.90	2.08	0.36	6.85	15.20	3.64	1.27	1.85				
10.00	2.32	0.47	12.84	15.30	3.65	1.28	1.84				
10.10	2.39	0.51	**18.43**	15.40	3.66	1.29	1.84				
10.20	2.46	0.55	**17.55**	15.50	3.68	1.30	1.83				

Summary for Subcatchment D2-2: D2

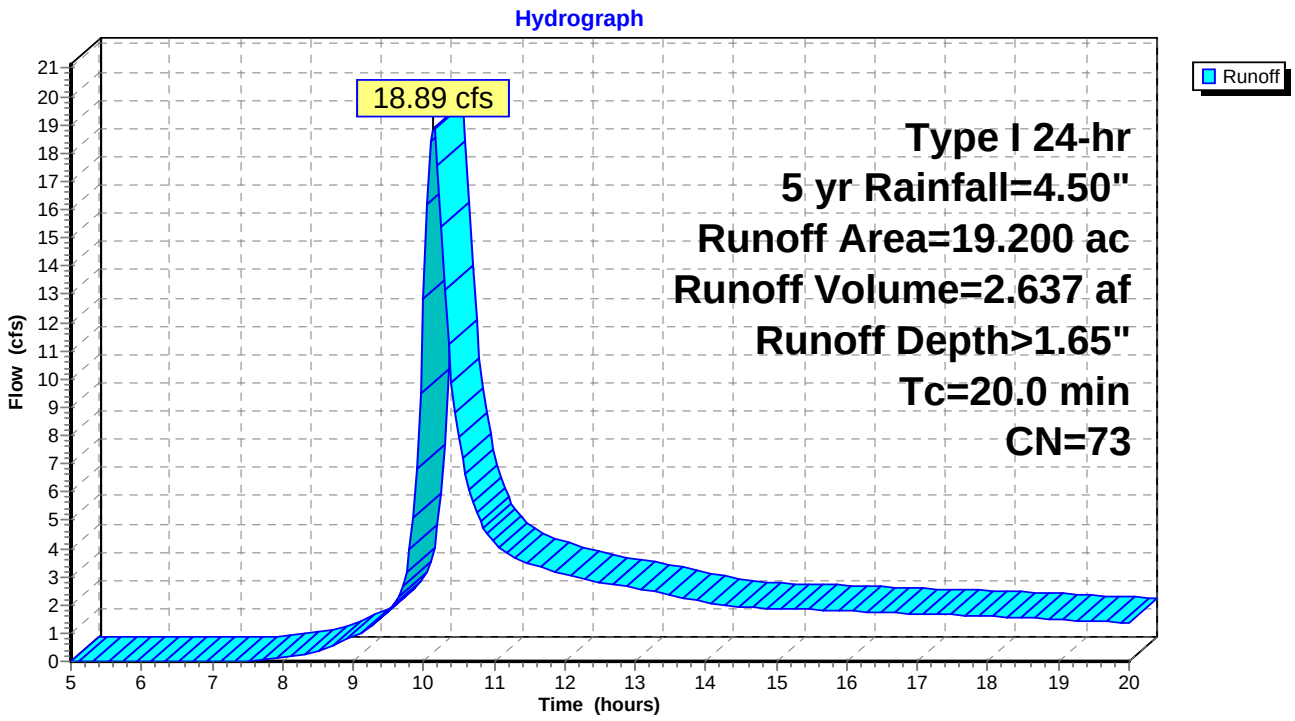
Runoff = 18.89 cfs @ 10.14 hrs, Volume= 2.637 af, Depth> 1.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type I 24-hr 5 yr Rainfall=4.50"

Area (ac)	CN	Description
19.200	73	Brush, Good, HSG D
19.200		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0					**Direct Entry, My own Tc**

Subcatchment D2-2: D2



Hydrograph for Subcatchment D2-2: D2

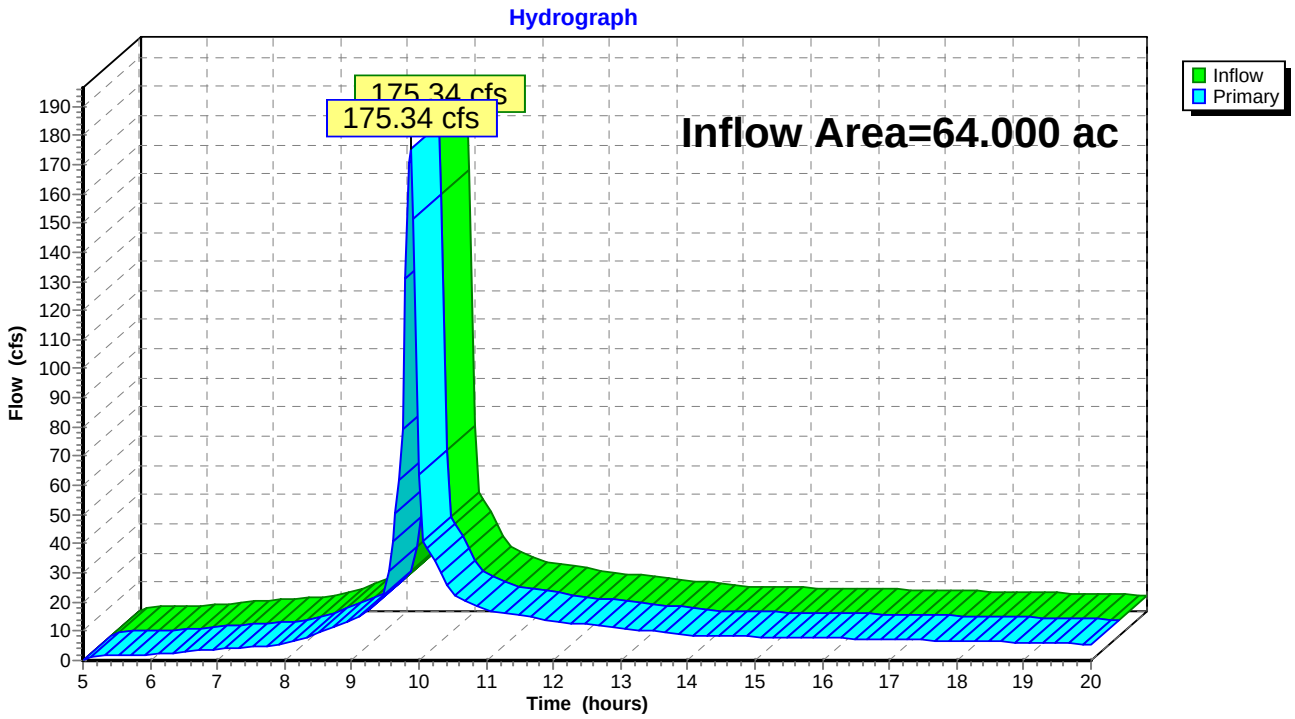
Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.45	0.00	0.00	10.30	2.53	0.58	13.14	15.60	3.69	1.31	1.82
5.10	0.46	0.00	0.00	10.40	2.58	0.61	9.85	15.70	3.70	1.32	1.81
5.20	0.47	0.00	0.00	10.50	2.62	0.64	7.94	15.80	3.72	1.33	1.80
5.30	0.48	0.00	0.00	10.60	2.66	0.66	6.62	15.90	3.73	1.34	1.79
5.40	0.49	0.00	0.00	10.70	2.70	0.68	5.64	16.00	3.74	1.35	1.79
5.50	0.51	0.00	0.00	10.80	2.74	0.70	4.96	16.10	3.76	1.36	1.78
5.60	0.52	0.00	0.00	10.90	2.77	0.72	4.53	16.20	3.77	1.36	1.77
5.70	0.53	0.00	0.00	11.00	2.80	0.74	4.21	16.30	3.78	1.37	1.76
5.80	0.54	0.00	0.00	11.10	2.83	0.76	3.97	16.40	3.80	1.38	1.75
5.90	0.55	0.00	0.00	11.20	2.86	0.78	3.77	16.50	3.81	1.39	1.74
6.00	0.56	0.00	0.00	11.30	2.89	0.79	3.63	16.60	3.82	1.40	1.73
6.10	0.57	0.00	0.00	11.40	2.92	0.81	3.52	16.70	3.83	1.41	1.72
6.20	0.59	0.00	0.00	11.50	2.95	0.83	3.44	16.80	3.85	1.42	1.71
6.30	0.60	0.00	0.00	11.60	2.98	0.84	3.37	16.90	3.86	1.43	1.70
6.40	0.61	0.00	0.00	11.70	3.00	0.86	3.30	17.00	3.87	1.43	1.69
6.50	0.63	0.00	0.00	11.80	3.03	0.88	3.24	17.10	3.88	1.44	1.68
6.60	0.64	0.00	0.00	11.90	3.05	0.89	3.17	17.20	3.89	1.45	1.67
6.70	0.66	0.00	0.00	12.00	3.08	0.91	3.10	17.30	3.91	1.46	1.66
6.80	0.67	0.00	0.00	12.10	3.10	0.92	3.03	17.40	3.92	1.47	1.65
6.90	0.69	0.00	0.00	12.20	3.12	0.94	2.97	17.50	3.93	1.48	1.64
7.00	0.70	0.00	0.00	12.30	3.15	0.95	2.91	17.60	3.94	1.49	1.63
7.10	0.72	0.00	0.00	12.40	3.17	0.96	2.86	17.70	3.95	1.49	1.62
7.20	0.74	0.00	0.00	12.50	3.19	0.98	2.81	17.80	3.96	1.50	1.61
7.30	0.75	0.00	0.00	12.60	3.21	0.99	2.76	17.90	3.98	1.51	1.60
7.40	0.77	0.00	0.00	12.70	3.23	1.00	2.72	18.00	3.99	1.52	1.59
7.50	0.79	0.00	0.01	12.80	3.25	1.02	2.67	18.10	4.00	1.53	1.58
7.60	0.80	0.00	0.03	12.90	3.27	1.03	2.63	18.20	4.01	1.53	1.57
7.70	0.82	0.00	0.05	13.00	3.29	1.04	2.58	18.30	4.02	1.54	1.56
7.80	0.84	0.00	0.08	13.10	3.31	1.06	2.53	18.40	4.03	1.55	1.55
7.90	0.86	0.00	0.11	13.20	3.33	1.07	2.49	18.50	4.04	1.56	1.54
8.00	0.87	0.00	0.14	13.30	3.35	1.08	2.44	18.60	4.05	1.57	1.53
8.10	0.89	0.01	0.17	13.40	3.37	1.09	2.39	18.70	4.06	1.57	1.52
8.20	0.91	0.01	0.20	13.50	3.39	1.10	2.34	18.80	4.07	1.58	1.51
8.30	0.93	0.01	0.25	13.60	3.40	1.11	2.29	18.90	4.08	1.59	1.50
8.40	0.96	0.01	0.30	13.70	3.42	1.13	2.24	19.00	4.09	1.60	1.49
8.50	0.99	0.02	0.37	13.80	3.43	1.14	2.19	19.10	4.11	1.60	1.48
8.60	1.01	0.02	0.45	13.90	3.45	1.15	2.14	19.20	4.12	1.61	1.46
8.70	1.04	0.02	0.54	14.00	3.46	1.16	2.09	19.30	4.13	1.62	1.45
8.80	1.07	0.03	0.64	14.10	3.48	1.17	2.03	19.40	4.14	1.63	1.44
8.90	1.11	0.03	0.75	14.20	3.49	1.18	1.99	19.50	4.15	1.63	1.43
9.00	1.14	0.04	0.87	14.30	3.51	1.19	1.95	19.60	4.16	1.64	1.42
9.10	1.18	0.05	1.00	14.40	3.52	1.20	1.93	19.70	4.17	1.65	1.41
9.20	1.22	0.06	1.15	14.50	3.54	1.21	1.91	19.80	4.17	1.65	1.40
9.30	1.27	0.07	1.33	14.60	3.55	1.22	1.90	19.90	4.18	1.66	1.39
9.40	1.31	0.08	1.54	14.70	3.57	1.22	1.89	20.00	**4.19**	**1.67**	1.38
9.50	1.36	0.09	1.79	14.80	3.58	1.23	1.89				
9.60	1.44	0.11	2.09	14.90	3.60	1.24	1.88				
9.70	1.55	0.15	2.65	15.00	3.61	1.25	1.87				
9.80	1.75	0.21	3.96	15.10	3.62	1.26	1.86				
9.90	2.08	0.36	6.85	15.20	3.64	1.27	1.85				
10.00	2.32	0.47	12.84	15.30	3.65	1.28	1.84				
10.10	2.39	0.51	**18.43**	15.40	3.66	1.29	1.84				
10.20	2.46	0.55	**17.55**	15.50	3.68	1.30	1.83				

Summary for Pond D3 exit: Free Flow

Inflow Area = 64.000 ac, 38.00% Impervious, Inflow Depth > 2.80" for 5 yr event
Inflow = 175.34 cfs @ 9.87 hrs, Volume= 14.947 af
Primary = 175.34 cfs @ 9.87 hrs, Volume= 14.947 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond D3 exit: Free Flow



Hydrograph for Pond D3 exit: Free Flow

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
5.00	0.00		0.00	18.25	6.53		6.53
5.25	1.31		1.31	18.50	6.41		6.41
5.50	1.74		1.74	18.75	6.28		6.28
5.75	1.81		1.81	19.00	6.15		6.15
6.00	2.08		2.08	19.25	6.02		6.02
6.25	2.45		2.45	19.50	5.89		5.89
6.50	2.93		2.93	19.75	5.76		5.76
6.75	3.43		3.43	20.00	5.63		5.63
7.00	3.99		3.99				
7.25	4.37		4.37				
7.50	4.74		4.74				
7.75	5.11		5.11				
8.00	5.51		5.51				
8.25	7.23		7.23				
8.50	9.23		9.23				
8.75	11.33		11.33				
9.00	13.63		13.63				
9.25	17.64		17.64				
9.50	23.00		23.00				
9.75	**79.54**		**79.54**				
10.00	**63.75**		**63.75**				
10.25	32.74		32.74				
10.50	22.99		22.99				
10.75	19.91		19.91				
11.00	17.33		17.33				
11.25	16.39		16.39				
11.50	15.42		15.42				
11.75	14.51		14.51				
12.00	13.54		13.54				
12.25	12.94		12.94				
12.50	12.34		12.34				
12.75	11.74		11.74				
13.00	11.12		11.12				
13.25	10.51		10.51				
13.50	9.88		9.88				
13.75	9.25		9.25				
14.00	8.63		8.63				
14.25	8.49		8.49				
14.50	8.37		8.37				
14.75	8.25		8.25				
15.00	8.14		8.14				
15.25	8.02		8.02				
15.50	7.90		7.90				
15.75	7.78		7.78				
16.00	7.65		7.65				
16.25	7.53		7.53				
16.50	7.41		7.41				
16.75	7.29		7.29				
17.00	7.16		7.16				
17.25	7.04		7.04				
17.50	6.91		6.91				
17.75	6.79		6.79				
18.00	6.66		6.66				

Summary for Subcatchment D3-2: D3

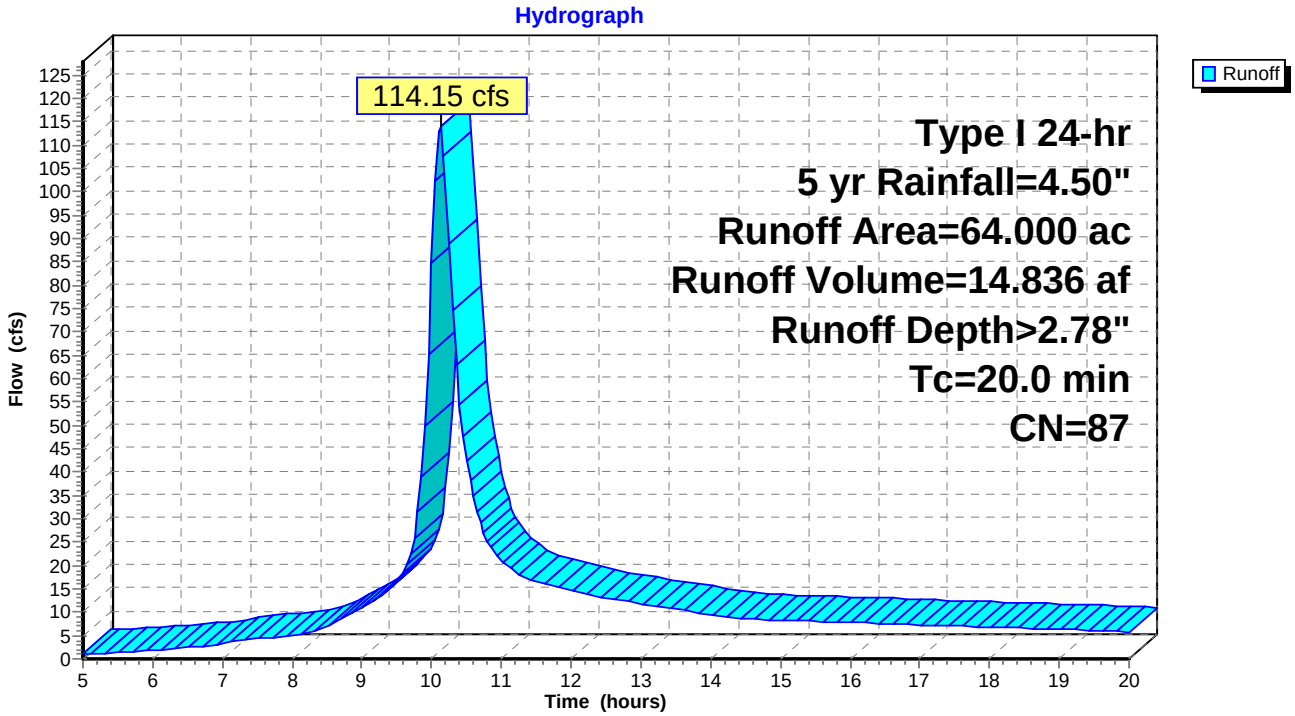
Runoff = 114.15 cfs @ 10.12 hrs, Volume= 14.836 af, Depth> 2.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type I 24-hr 5 yr Rainfall=4.50"

Area (ac)	CN	Description
64.000	87	1/4 acre lots, 38% imp, HSG D
39.680		62.00% Pervious Area
24.320		38.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0					**Direct Entry, My own Tc**

Subcatchment D3-2: D3



Hydrograph for Subcatchment D3-2: D3

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.45	0.01	0.98	10.30	2.53	1.33	74.54	15.60	3.69	2.35	7.99
5.10	0.46	0.02	1.07	10.40	2.58	1.38	54.25	15.70	3.70	2.37	7.95
5.20	0.47	0.02	1.15	10.50	2.62	1.42	42.55	15.80	3.72	2.38	7.90
5.30	0.48	0.02	1.24	10.60	2.66	1.45	34.71	15.90	3.73	2.39	7.85
5.40	0.49	0.02	1.32	10.70	2.70	1.48	29.08	16.00	3.74	2.40	7.80
5.50	0.51	0.03	1.40	10.80	2.74	1.51	25.24	16.10	3.76	2.41	7.75
5.60	0.52	0.03	1.49	10.90	2.77	1.54	22.74	16.20	3.77	2.43	7.70
5.70	0.53	0.03	1.57	11.00	2.80	1.57	20.97	16.30	3.78	2.44	7.66
5.80	0.54	0.03	1.65	11.10	2.83	1.60	19.62	16.40	3.80	2.45	7.61
5.90	0.55	0.04	1.73	11.20	2.86	1.62	18.54	16.50	3.81	2.46	7.56
6.00	0.56	0.04	1.82	11.30	2.89	1.65	17.72	16.60	3.82	2.47	7.51
6.10	0.57	0.04	1.90	11.40	2.92	1.67	17.12	16.70	3.83	2.48	7.46
6.20	0.59	0.05	1.98	11.50	2.95	1.70	16.64	16.80	3.85	2.50	7.41
6.30	0.60	0.05	2.10	11.60	2.98	1.72	16.23	16.90	3.86	2.51	7.36
6.40	0.61	0.05	2.24	11.70	3.00	1.74	15.83	17.00	3.87	2.52	7.31
6.50	0.63	0.06	2.39	11.80	3.03	1.76	15.45	17.10	3.88	2.53	7.26
6.60	0.64	0.06	2.57	11.90	3.05	1.79	15.07	17.20	3.89	2.54	7.21
6.70	0.66	0.07	2.75	12.00	3.08	1.81	14.69	17.30	3.91	2.55	7.16
6.80	0.67	0.07	2.94	12.10	3.10	1.83	14.31	17.40	3.92	2.56	7.11
6.90	0.69	0.08	3.13	12.20	3.12	1.85	13.94	17.50	3.93	2.57	7.06
7.00	0.70	0.09	3.34	12.30	3.15	1.87	13.62	17.60	3.94	2.58	7.01
7.10	0.72	0.09	3.55	12.40	3.17	1.89	13.34	17.70	3.95	2.59	6.96
7.20	0.74	0.10	3.76	12.50	3.19	1.91	13.08	17.80	3.96	2.60	6.91
7.30	0.75	0.11	3.96	12.60	3.21	1.93	12.83	17.90	3.98	2.61	6.86
7.40	0.77	0.11	4.13	12.70	3.23	1.94	12.59	18.00	3.99	2.62	6.81
7.50	0.79	0.12	4.29	12.80	3.25	1.96	12.35	18.10	4.00	2.64	6.76
7.60	0.80	0.13	4.44	12.90	3.27	1.98	12.10	18.20	4.01	2.65	6.71
7.70	0.82	0.13	4.59	13.00	3.29	2.00	11.86	18.30	4.02	2.66	6.66
7.80	0.84	0.14	4.74	13.10	3.31	2.02	11.62	18.40	4.03	2.67	6.61
7.90	0.86	0.15	4.89	13.20	3.33	2.03	11.37	18.50	4.04	2.68	6.56
8.00	0.87	0.16	5.04	13.30	3.35	2.05	11.13	18.60	4.05	2.69	6.51
8.10	0.89	0.17	5.19	13.40	3.37	2.06	10.88	18.70	4.06	2.70	6.46
8.20	0.91	0.18	5.40	13.50	3.39	2.08	10.63	18.80	4.07	2.70	6.41
8.30	0.93	0.19	5.77	13.60	3.40	2.09	10.38	18.90	4.08	2.71	6.36
8.40	0.96	0.20	6.30	13.70	3.42	2.11	10.13	19.00	4.09	2.72	6.30
8.50	0.99	0.22	6.96	13.80	3.43	2.12	9.88	19.10	4.11	2.73	6.25
8.60	1.01	0.23	7.68	13.90	3.45	2.14	9.63	19.20	4.12	2.74	6.20
8.70	1.04	0.25	8.45	14.00	3.46	2.15	9.38	19.30	4.13	2.75	6.15
8.80	1.07	0.27	9.25	14.10	3.48	2.16	9.13	19.40	4.14	2.76	6.10
8.90	1.11	0.28	10.07	14.20	3.49	2.18	8.90	19.50	4.15	2.77	6.05
9.00	1.14	0.30	10.91	14.30	3.51	2.19	8.73	19.60	4.16	2.78	6.00
9.10	1.18	0.33	11.79	14.40	3.52	2.20	8.62	19.70	4.17	2.79	5.95
9.20	1.22	0.35	12.76	14.50	3.54	2.22	8.54	19.80	4.17	2.80	5.89
9.30	1.27	0.38	13.94	14.60	3.55	2.23	8.48	19.90	4.18	2.81	5.84
9.40	1.31	0.41	15.35	14.70	3.57	2.24	8.42	20.00	**4.19**	**2.82**	5.79
9.50	1.36	0.44	16.91	14.80	3.58	2.26	8.37				
9.60	1.44	0.49	18.71	14.90	3.60	2.27	8.32				
9.70	1.55	0.57	22.39	15.00	3.61	2.28	8.28				
9.80	1.75	0.71	31.34	15.10	3.62	2.29	8.23				
9.90	2.08	0.97	49.77	15.20	3.64	2.31	8.18				
10.00	2.32	1.16	84.61	15.30	3.65	2.32	8.14				
10.10	2.39	1.22	**112.97**	15.40	3.66	2.33	8.09				
10.20	2.46	1.28	102.88	15.50	3.68	2.34	8.04				

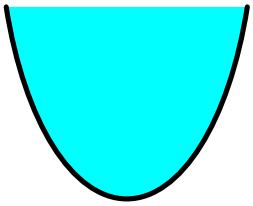
Summary for Reach 3R: D-3

Inflow Area = 64.000 ac, 38.00% Impervious, Inflow Depth > 4.51" for 100 yr event
Inflow = 282.25 cfs @ 9.87 hrs, Volume= 24.047 af
Outflow = 281.69 cfs @ 9.87 hrs, Volume= 24.043 af, Atten= 0%, Lag= 0.1 min

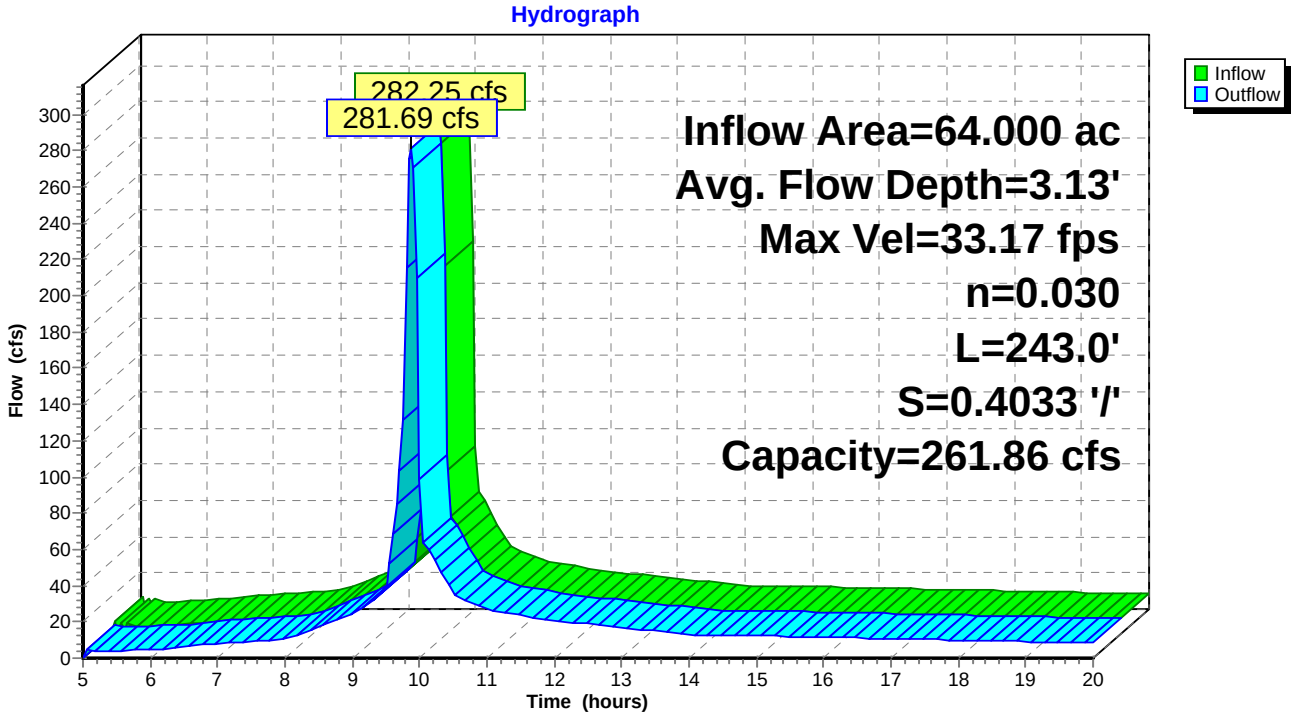
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 33.17 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 16.01 fps, Avg. Travel Time= 0.3 min

Peak Storage= 2,067 cf @ 9.87 hrs
Average Depth at Peak Storage= 3.13' , Surface Width= 4.08'
Bank-Full Depth= 3.00' Flow Area= 8.0 sf, Capacity= 261.86 cfs

4.00' x 3.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
Length= 243.0' Slope= 0.4033 '/'
Inlet Invert= 727.00', Outlet Invert= 629.00'



Reach 3R: D-3



Hydrograph for Reach 3R: D-3

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)
5.00	0.00	0	727.00	0.00
5.25	5.40	80	727.36	3.61
5.50	3.44	95	727.40	4.53
5.75	4.84	90	727.39	4.26
6.00	4.62	100	727.41	4.90
6.25	5.65	108	727.44	5.49
6.50	6.37	121	727.47	6.42
6.75	7.34	133	727.50	7.28
7.00	8.25	146	727.53	8.25
7.25	8.84	153	727.55	8.82
7.50	9.38	160	727.57	9.37
7.75	9.93	166	727.58	9.91
8.00	10.52	173	727.60	10.50
8.25	13.62	209	727.68	13.55
8.50	17.06	247	727.76	16.98
8.75	20.50	283	727.83	20.44
9.00	24.22	320	727.90	24.14
9.25	30.79	383	728.01	30.66
9.50	39.60	460	728.15	39.25
9.75	**134.56**	**1,154**	**729.12**	**131.74**
10.00	**90.29**	**889**	**728.78**	**98.91**
10.25	51.17	557	728.30	51.04
10.50	35.49	427	728.09	35.70
10.75	30.51	382	728.01	30.76
11.00	26.83	345	727.95	26.74
11.25	25.06	330	727.92	25.21
11.50	23.74	315	727.89	23.68
11.75	22.15	301	727.86	22.24
12.00	20.72	285	727.83	20.71
12.25	19.73	276	727.82	19.77
12.50	18.82	266	727.80	18.82
12.75	17.86	256	727.78	17.88
13.00	16.91	246	727.76	16.93
13.25	15.95	236	727.73	15.97
13.50	14.99	225	727.71	15.01
13.75	14.02	214	727.69	14.04
14.00	13.07	204	727.67	13.08
14.25	12.85	201	727.66	12.86
14.50	12.67	199	727.66	12.67
14.75	12.48	197	727.65	12.49
15.00	12.30	195	727.65	12.30
15.25	12.11	192	727.64	12.11
15.50	11.92	190	727.64	11.93
15.75	11.73	188	727.63	11.74
16.00	11.54	186	727.63	11.55
16.25	11.35	184	727.62	11.36
16.50	11.16	181	727.62	11.17
16.75	10.97	179	727.61	10.97
17.00	10.78	177	727.61	10.78
17.25	10.59	174	727.60	10.59
17.50	10.39	172	727.60	10.40
17.75	10.20	170	727.59	10.20
18.00	10.00	167	727.58	10.01
18.25	9.81	165	727.58	9.81
18.50	9.61	163	727.57	9.62
18.75	9.42	160	727.57	9.42
19.00	9.22	158	727.56	9.23
19.25	9.03	155	727.56	9.03
19.50	8.83	153	727.55	8.84
19.75	8.63	150	727.54	8.64
20.00	8.44	148	727.54	8.44

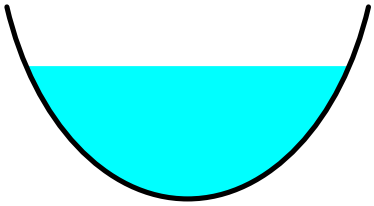
Summary for Reach C-1: D-2

Inflow Area = 38.400 ac, 0.00% Impervious, Inflow Depth > 3.10" for 100 yr event
Inflow = 74.79 cfs @ 10.13 hrs, Volume= 9.933 af
Outflow = 74.12 cfs @ 10.15 hrs, Volume= 9.919 af, Atten= 1%, Lag= 1.3 min

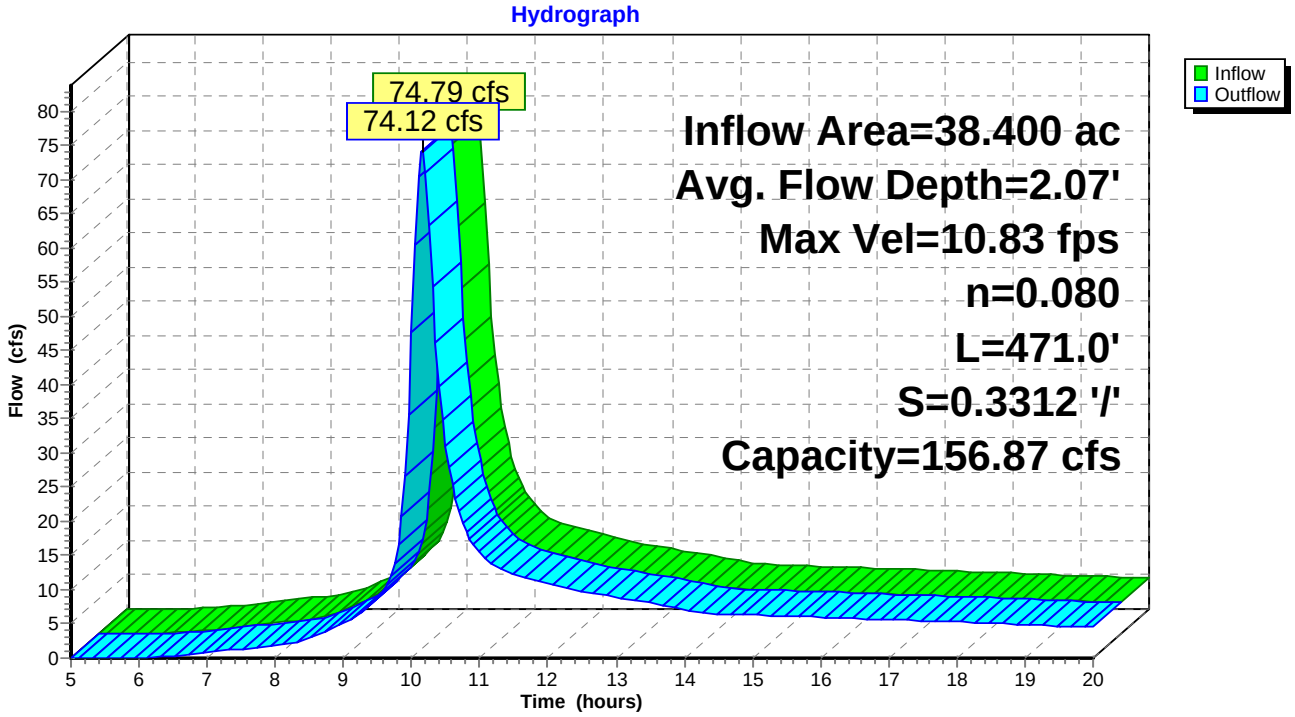
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 10.83 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 5.36 fps, Avg. Travel Time= 1.5 min

Peak Storage= 3,250 cf @ 10.14 hrs
Average Depth at Peak Storage= 2.07' , Surface Width= 4.99'
Bank-Full Depth= 3.00' Flow Area= 12.0 sf, Capacity= 156.87 cfs

6.00' x 3.00' deep Parabolic Channel, n= 0.080 Earth, long dense weeds
Length= 471.0' Slope= 0.3312 '/'
Inlet Invert= 1,641.00', Outlet Invert= 1,485.00'



Reach C-1: D-2



Hydrograph for Reach C-1: D-2

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)
5.00	0.00	0	1,641.00	0.00
5.25	0.00	0	1,641.00	0.00
5.50	0.00	0	1,641.00	0.00
5.75	0.01	1	1,641.00	0.00
6.00	0.09	19	1,641.07	0.05
6.25	0.22	46	1,641.12	0.18
6.50	0.39	71	1,641.16	0.35
6.75	0.60	98	1,641.20	0.56
7.00	0.86	127	1,641.24	0.81
7.25	1.14	157	1,641.28	1.10
7.50	1.42	184	1,641.31	1.38
7.75	1.69	209	1,641.33	1.65
8.00	1.97	233	1,641.36	1.93
8.25	2.31	260	1,641.39	2.25
8.50	3.06	316	1,641.44	2.94
8.75	4.12	391	1,641.51	3.98
9.00	5.37	474	1,641.57	5.21
9.25	6.90	567	1,641.65	6.69
9.50	9.20	697	1,641.74	8.91
9.75	14.98	969	1,641.93	13.80
10.00	**53.38**	**2,438**	**1,642.71**	**47.59**
10.25	**59.52**	**2,806**	**1,642.88**	**63.37**
10.50	29.54	1,670	1,642.33	31.11
10.75	19.14	1,212	1,642.08	19.84
11.00	15.09	1,015	1,641.95	15.37
11.25	13.13	915	1,641.89	13.28
11.50	12.14	864	1,641.86	12.22
11.75	11.47	829	1,641.83	11.54
12.00	10.83	795	1,641.81	10.90
12.25	10.20	762	1,641.79	10.26
12.50	9.72	735	1,641.77	9.77
12.75	9.30	712	1,641.75	9.34
13.00	8.87	689	1,641.74	8.92
13.25	8.44	665	1,641.72	8.49
13.50	8.00	640	1,641.70	8.05
13.75	7.55	614	1,641.68	7.60
14.00	7.09	587	1,641.66	7.14
14.25	6.67	561	1,641.64	6.71
14.50	6.48	549	1,641.63	6.49
14.75	6.38	543	1,641.63	6.39
15.00	6.30	538	1,641.63	6.31
15.25	6.22	534	1,641.62	6.23
15.50	6.14	529	1,641.62	6.15
15.75	6.06	524	1,641.61	6.07
16.00	5.98	518	1,641.61	5.99
16.25	5.89	513	1,641.61	5.90
16.50	5.81	508	1,641.60	5.82
16.75	5.72	503	1,641.60	5.73
17.00	5.63	497	1,641.59	5.64
17.25	5.54	491	1,641.59	5.56
17.50	5.45	486	1,641.58	5.47
17.75	5.36	480	1,641.58	5.38
18.00	5.27	474	1,641.57	5.28
18.25	5.18	468	1,641.57	5.19
18.50	5.09	462	1,641.57	5.10
18.75	5.00	456	1,641.56	5.01
19.00	4.90	450	1,641.56	4.91
19.25	4.81	444	1,641.55	4.82
19.50	4.71	438	1,641.54	4.72
19.75	4.61	431	1,641.54	4.63
20.00	4.52	425	1,641.53	4.53

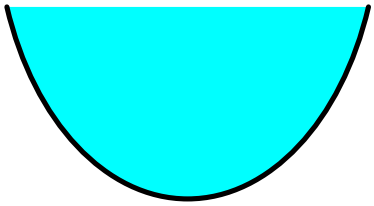
Summary for Reach C-2: D-2

Inflow Area = 102.400 ac, 23.75% Impervious, Inflow Depth > 3.97" for 100 yr event
Inflow = 256.96 cfs @ 10.13 hrs, Volume= 33.839 af
Outflow = 256.72 cfs @ 10.13 hrs, Volume= 33.829 af, Atten= 0%, Lag= 0.1 min

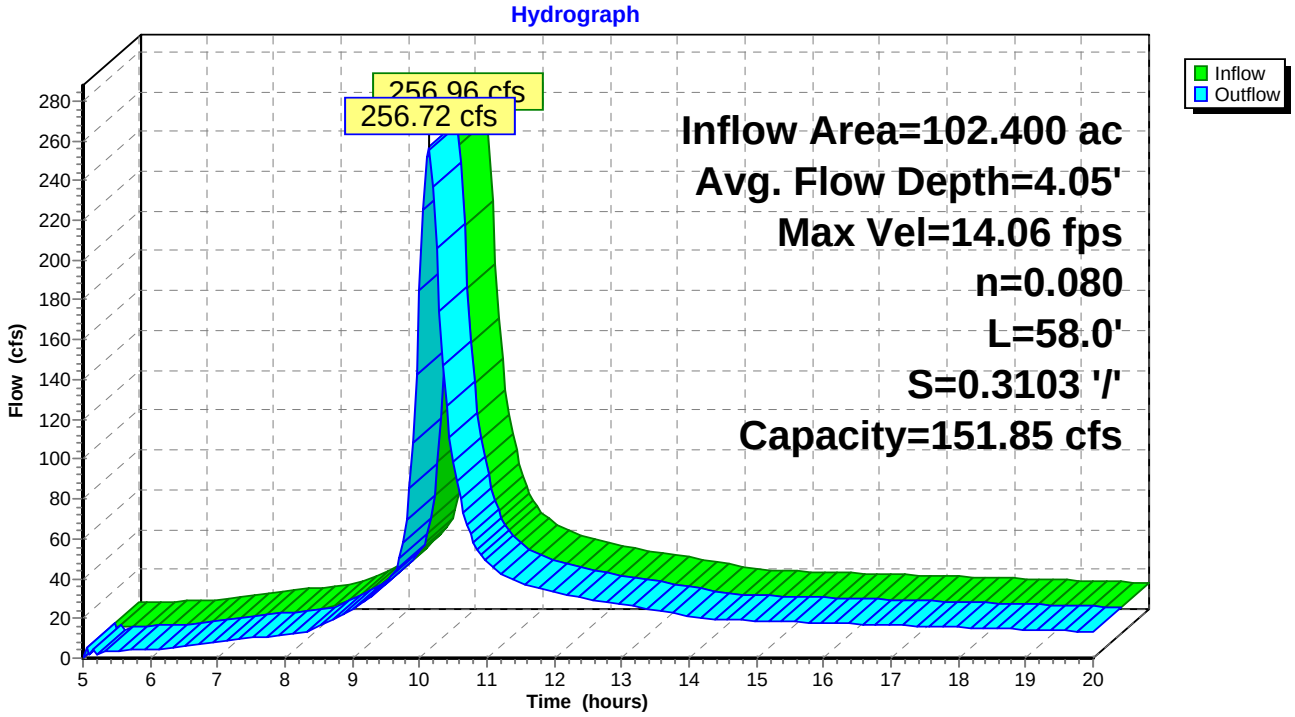
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 14.06 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 7.44 fps, Avg. Travel Time= 0.1 min

Peak Storage= 1,059 cf @ 10.13 hrs
Average Depth at Peak Storage= 4.05' , Surface Width= 6.97'
Bank-Full Depth= 3.00' Flow Area= 12.0 sf, Capacity= 151.85 cfs

6.00' x 3.00' deep Parabolic Channel, n= 0.080 Earth, long dense weeds
Length= 58.0' Slope= 0.3103 '/'
Inlet Invert= 619.00', Outlet Invert= 601.00'



Reach C-2: D-2



Hydrograph for Reach C-2: D-2

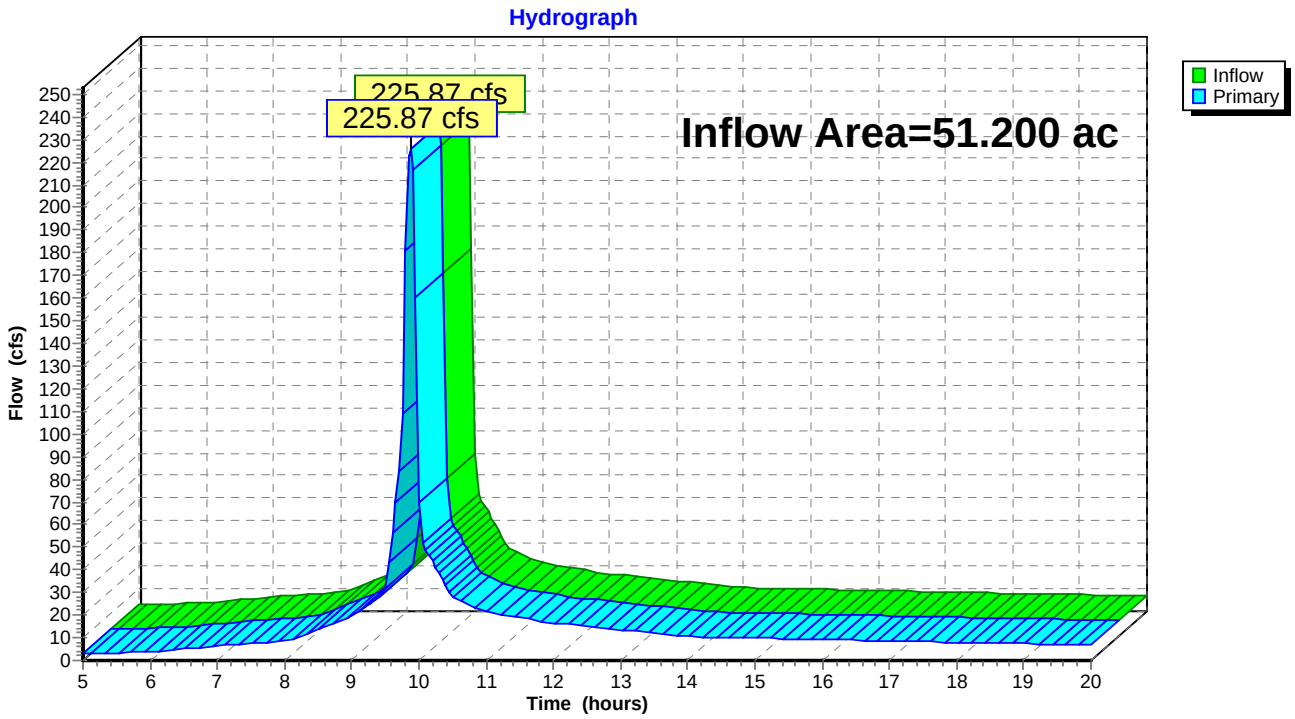
Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)
5.00	3.12	0	619.00	0.00
5.25	3.46	53	619.54	4.45
5.50	3.78	44	619.47	3.41
5.75	4.11	51	619.53	4.24
6.00	4.47	53	619.54	4.41
6.25	4.95	57	619.57	4.97
6.50	5.77	64	619.61	5.75
6.75	6.79	71	619.66	6.78
7.00	7.92	80	619.71	7.91
7.25	9.11	88	619.76	9.10
7.50	10.07	95	619.79	10.06
7.75	10.91	100	619.83	10.90
8.00	11.73	106	619.85	11.72
8.25	12.86	113	619.89	12.84
8.50	15.99	132	619.99	15.95
8.75	20.27	157	620.11	20.22
9.00	24.93	183	620.23	24.88
9.25	30.33	211	620.35	30.26
9.50	38.36	250	620.52	38.27
9.75	58.18	340	620.86	57.77
10.00	**186.26**	**812**	**622.33**	**184.43**
10.25	**204.97**	**882**	**622.53**	**206.31**
10.50	98.04	503	621.41	98.56
10.75	61.84	357	620.92	62.05
11.00	47.85	295	620.69	47.94
11.25	41.23	264	620.57	41.27
11.50	37.85	248	620.51	37.88
11.75	35.58	237	620.46	35.60
12.00	33.43	227	620.42	33.45
12.25	31.35	216	620.38	31.37
12.50	29.76	208	620.34	29.77
12.75	28.37	201	620.31	28.38
13.00	26.99	194	620.28	27.01
13.25	25.61	187	620.25	25.63
13.50	24.21	179	620.21	24.23
13.75	22.80	171	620.18	22.82
14.00	21.38	164	620.14	21.40
14.25	20.06	156	620.11	20.07
14.50	19.43	153	620.09	19.44
14.75	19.11	151	620.08	19.11
15.00	18.84	149	620.07	18.84
15.25	18.57	148	620.07	18.58
15.50	18.30	146	620.06	18.31
15.75	18.03	145	620.05	18.04
16.00	17.76	143	620.04	17.77
16.25	17.49	141	620.04	17.49
16.50	17.21	140	620.03	17.22
16.75	16.94	138	620.02	16.94
17.00	16.66	136	620.01	16.66
17.25	16.38	135	620.00	16.38
17.50	16.09	133	620.00	16.10
17.75	15.81	131	619.99	15.81
18.00	15.53	130	619.98	15.53
18.25	15.24	128	619.97	15.24
18.50	14.95	126	619.96	14.96
18.75	14.67	124	619.95	14.67
19.00	14.37	123	619.94	14.38
19.25	14.09	121	619.93	14.09
19.50	13.79	119	619.92	13.80
19.75	13.50	117	619.91	13.50
20.00	13.21	115	619.91	13.21

Summary for Pond D-1 Arroyo Trabuco: Free Flow

Inflow Area = 51.200 ac, 38.00% Impervious, Inflow Depth > 4.51" for 100 yr event
Inflow = 225.87 cfs @ 9.87 hrs, Volume= 19.245 af
Primary = 225.87 cfs @ 9.87 hrs, Volume= 19.245 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond D-1 Arroyo Trabuco: Free Flow



Hydrograph for Pond D-1 Arroyo Trabuco: Free Flow

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
5.00	2.83		2.83	18.25	7.85		7.85
5.25	3.09		3.09	18.50	7.69		7.69
5.50	3.34		3.34	18.75	7.53		7.53
5.75	3.59		3.59	19.00	7.38		7.38
6.00	3.84		3.84	19.25	7.22		7.22
6.25	4.46		4.46	19.50	7.06		7.06
6.50	5.14		5.14	19.75	6.91		6.91
6.75	5.86		5.86	20.00	6.75		6.75
7.00	6.62		6.62				
7.25	7.07		7.07				
7.50	7.51		7.51				
7.75	7.94		7.94				
8.00	8.42		8.42				
8.25	10.92		10.92				
8.50	13.67		13.67				
8.75	16.43		16.43				
9.00	19.40		19.40				
9.25	24.68		24.68				
9.50	31.80		31.80				
9.75	**108.70**		**108.70**				
10.00	**69.50**		**69.50**				
10.25	41.22		41.22				
10.50	28.05		28.05				
10.75	24.56		24.56				
11.00	21.33		21.33				
11.25	20.11		20.11				
11.50	18.93		18.93				
11.75	17.74		17.74				
12.00	16.55		16.55				
12.25	15.79		15.79				
12.50	15.04		15.04				
12.75	14.28		14.28				
13.00	13.52		13.52				
13.25	12.75		12.75				
13.50	11.98		11.98				
13.75	11.21		11.21				
14.00	10.45		10.45				
14.25	10.28		10.28				
14.50	10.14		10.14				
14.75	9.99		9.99				
15.00	9.84		9.84				
15.25	9.69		9.69				
15.50	9.54		9.54				
15.75	9.39		9.39				
16.00	9.23		9.23				
16.25	9.08		9.08				
16.50	8.93		8.93				
16.75	8.77		8.77				
17.00	8.62		8.62				
17.25	8.47		8.47				
17.50	8.31		8.31				
17.75	8.16		8.16				
18.00	8.00		8.00				

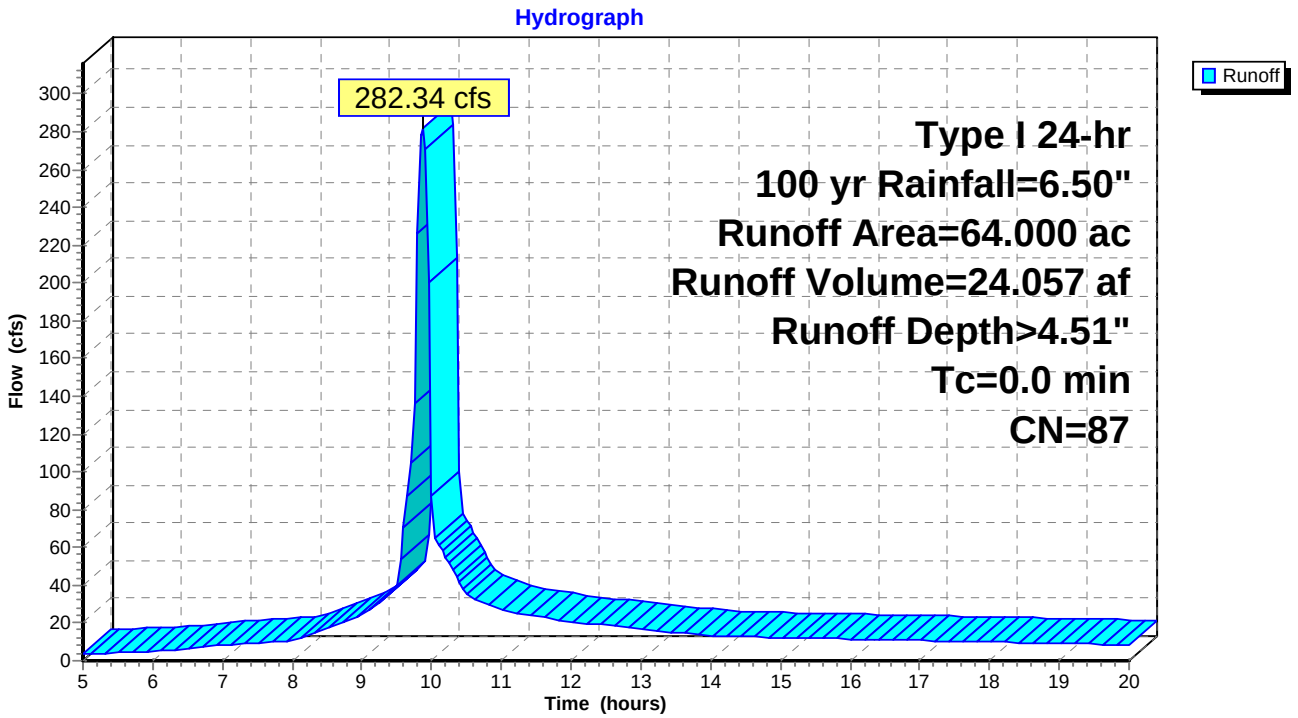
Summary for Subcatchment D-3: D-3

Runoff = 282.34 cfs @ 9.87 hrs, Volume= 24.057 af, Depth> 4.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type I 24-hr 100 yr Rainfall=6.50"

Area (ac)	CN	Description
64.000	87	1/4 acre lots, 38% imp, HSG D
39.680		62.00% Pervious Area
24.320		38.00% Impervious Area

Subcatchment D-3: D-3



Hydrograph for Subcatchment D-3: D-3

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.65	0.07	3.54	10.30	3.65	2.32	48.20	15.60	5.33	3.88	11.84
5.10	0.67	0.07	3.67	10.40	3.72	2.39	41.50	15.70	5.35	3.90	11.77
5.20	0.68	0.08	3.80	10.50	3.79	2.44	35.07	15.80	5.37	3.92	11.69
5.30	0.70	0.08	3.93	10.60	3.85	2.50	33.14	15.90	5.39	3.94	11.62
5.40	0.71	0.09	4.05	10.70	3.90	2.55	31.52	16.00	5.41	3.95	11.54
5.50	0.73	0.10	4.18	10.80	3.95	2.59	29.89	16.10	5.43	3.97	11.47
5.60	0.75	0.10	4.30	10.90	4.00	2.64	28.25	16.20	5.45	3.99	11.39
5.70	0.76	0.11	4.43	11.00	4.05	2.68	26.66	16.30	5.46	4.01	11.31
5.80	0.78	0.12	4.55	11.10	4.09	2.72	26.02	16.40	5.48	4.02	11.24
5.90	0.80	0.12	4.67	11.20	4.14	2.76	25.43	16.50	5.50	4.04	11.16
6.00	0.81	0.13	4.80	11.30	4.18	2.80	24.85	16.60	5.52	4.06	11.08
6.10	0.83	0.14	5.10	11.40	4.22	2.84	24.26	16.70	5.54	4.08	11.01
6.20	0.85	0.15	5.41	11.50	4.26	2.88	23.67	16.80	5.55	4.09	10.93
6.30	0.87	0.16	5.74	11.60	4.30	2.91	23.07	16.90	5.57	4.11	10.85
6.40	0.88	0.16	6.07	11.70	4.34	2.95	22.48	17.00	5.59	4.13	10.78
6.50	0.90	0.17	6.42	11.80	4.38	2.98	21.88	17.10	5.61	4.14	10.70
6.60	0.92	0.18	6.77	11.90	4.41	3.02	21.28	17.20	5.62	4.16	10.62
6.70	0.95	0.20	7.14	12.00	4.45	3.05	20.69	17.30	5.64	4.18	10.55
6.80	0.97	0.21	7.51	12.10	4.48	3.08	20.30	17.40	5.66	4.19	10.47
6.90	0.99	0.22	7.89	12.20	4.51	3.11	19.93	17.50	5.68	4.21	10.39
7.00	1.01	0.23	8.27	12.30	4.55	3.14	19.55	17.60	5.69	4.22	10.31
7.10	1.04	0.24	8.51	12.40	4.58	3.17	19.18	17.70	5.71	4.24	10.24
7.20	1.06	0.26	8.73	12.50	4.61	3.20	18.80	17.80	5.73	4.26	10.16
7.30	1.09	0.27	8.95	12.60	4.64	3.23	18.42	17.90	5.74	4.27	10.08
7.40	1.11	0.29	9.17	12.70	4.67	3.26	18.04	18.00	5.76	4.29	10.00
7.50	1.13	0.30	9.39	12.80	4.70	3.29	17.66	18.10	5.78	4.30	9.92
7.60	1.16	0.31	9.60	12.90	4.73	3.31	17.28	18.20	5.79	4.32	9.85
7.70	1.18	0.33	9.82	13.00	4.76	3.34	16.90	18.30	5.81	4.33	9.77
7.80	1.21	0.35	10.04	13.10	4.79	3.37	16.52	18.40	5.82	4.35	9.69
7.90	1.24	0.36	10.25	13.20	4.81	3.39	16.13	18.50	5.84	4.36	9.61
8.00	1.26	0.38	10.53	13.30	4.84	3.42	15.75	18.60	5.85	4.38	9.53
8.10	1.29	0.39	11.71	13.40	4.86	3.44	15.36	18.70	5.87	4.39	9.46
8.20	1.32	0.41	13.00	13.50	4.89	3.46	14.98	18.80	5.88	4.41	9.38
8.30	1.35	0.43	14.32	13.60	4.91	3.49	14.59	18.90	5.90	4.42	9.30
8.40	1.39	0.46	15.68	13.70	4.94	3.51	14.20	19.00	5.92	4.44	9.22
8.50	1.42	0.48	17.08	13.80	4.96	3.53	13.82	19.10	5.93	4.45	9.14
8.60	1.46	0.51	18.44	13.90	4.98	3.55	13.43	19.20	5.94	4.46	9.06
8.70	1.51	0.54	19.83	14.00	5.01	3.57	13.06	19.30	5.96	4.48	8.99
8.80	1.55	0.57	21.25	14.10	5.03	3.59	12.96	19.40	5.97	4.49	8.91
8.90	1.60	0.61	22.70	14.20	5.05	3.61	12.89	19.50	5.99	4.51	8.83
9.00	1.65	0.64	24.26	14.30	5.07	3.63	12.82	19.60	6.00	4.52	8.75
9.10	1.71	0.68	26.80	14.40	5.09	3.65	12.74	19.70	6.02	4.53	8.67
9.20	1.76	0.73	29.48	14.50	5.11	3.67	12.67	19.80	6.03	4.55	8.59
9.30	1.83	0.77	32.23	14.60	5.13	3.69	12.59	19.90	6.04	4.56	8.51
9.40	1.90	0.83	35.05	14.70	5.15	3.71	12.52	20.00	**6.06**	**4.57**	8.43
9.50	1.97	0.88	39.75	14.80	5.17	3.73	12.45				
9.60	2.08	0.97	70.42	14.90	5.19	3.75	12.37				
9.70	2.25	1.10	104.77	15.00	5.21	3.77	12.30				
9.80	2.52	1.33	**226.55**	15.10	5.23	3.79	12.22				
9.90	3.01	1.75	**270.70**	15.20	5.25	3.81	12.15				
10.00	3.35	2.05	86.88	15.30	5.27	3.82	12.07				
10.10	3.46	2.15	61.33	15.40	5.29	3.84	12.00				
10.20	3.56	2.24	54.81	15.50	5.31	3.86	11.92				

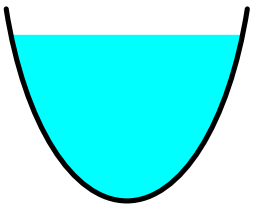
Summary for Reach D-3 split: C-3

Inflow Area = 64.000 ac, 38.00% Impervious, Inflow Depth > 4.51" for 100 yr event
Inflow = 282.34 cfs @ 9.87 hrs, Volume= 24.057 af
Outflow = 282.25 cfs @ 9.87 hrs, Volume= 24.047 af, Atten= 0%, Lag= 0.0 min

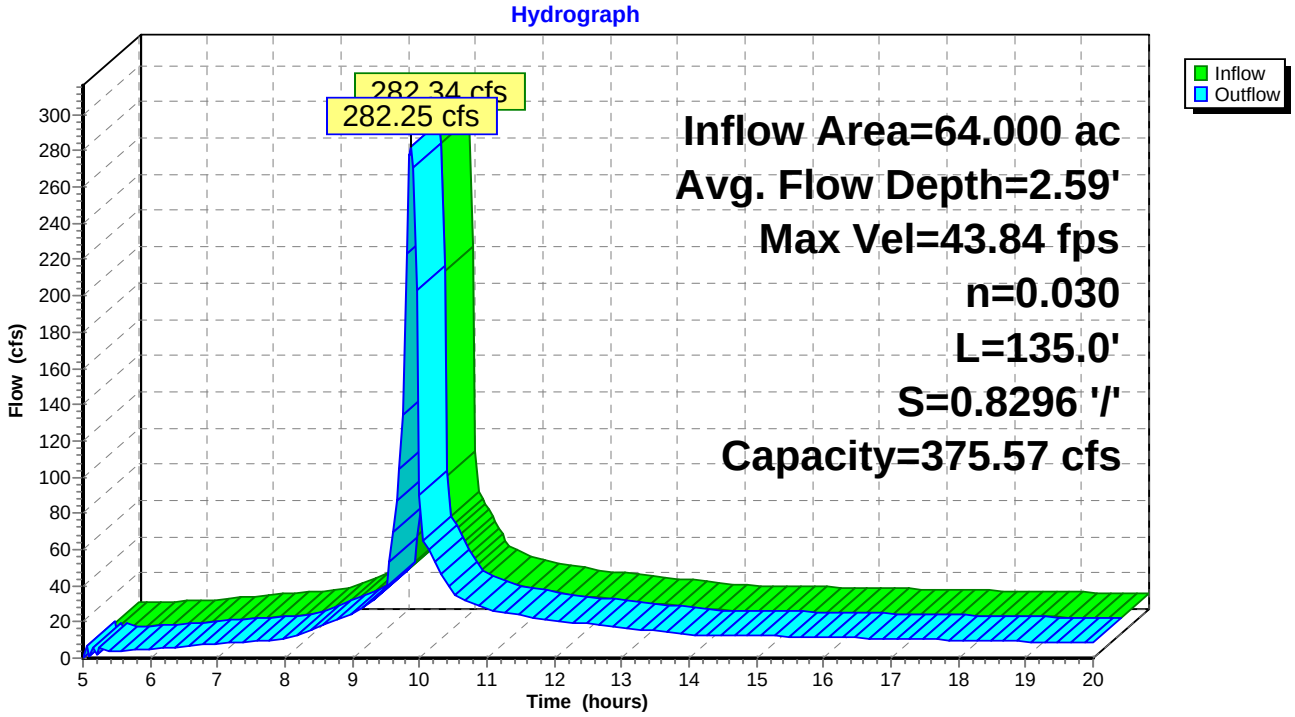
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 43.84 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 20.86 fps, Avg. Travel Time= 0.1 min

Peak Storage= 868 cf @ 9.87 hrs
Average Depth at Peak Storage= 2.59' , Surface Width= 3.72'
Bank-Full Depth= 3.00' Flow Area= 8.0 sf, Capacity= 375.57 cfs

4.00' x 3.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
Length= 135.0' Slope= 0.8296 '/'
Inlet Invert= 727.00', Outlet Invert= 615.00'



Reach D-3 split: C-3



Hydrograph for Reach D-3 split: C-3

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)
5.00	3.54	0	727.00	0.00
5.25	3.86	46	727.37	5.40
5.50	4.18	33	727.29	3.44
5.75	4.49	42	727.35	4.84
6.00	4.80	41	727.34	4.62
6.25	5.57	47	727.37	5.65
6.50	6.42	52	727.39	6.37
6.75	7.32	57	727.42	7.34
7.00	8.27	62	727.45	8.25
7.25	8.84	65	727.46	8.84
7.50	9.39	68	727.48	9.38
7.75	9.93	71	727.49	9.93
8.00	10.53	74	727.50	10.52
8.25	13.65	90	727.57	13.62
8.50	17.08	106	727.64	17.06
8.75	20.53	121	727.70	20.50
9.00	24.26	137	727.76	24.22
9.25	30.85	163	727.85	30.79
9.50	39.75	196	727.96	39.60
9.75	**135.87**	**493**	**728.78**	**134.56**
10.00	**86.88**	**358**	**728.44**	**90.29**
10.25	51.52	237	728.09	51.17
10.50	35.07	181	727.91	35.49
10.75	30.70	162	727.85	30.51
11.00	26.66	147	727.79	26.83
11.25	25.14	140	727.77	25.06
11.50	23.67	134	727.75	23.74
11.75	22.18	128	727.72	22.15
12.00	20.69	122	727.70	20.72
12.25	19.74	117	727.68	19.73
12.50	18.80	113	727.67	18.82
12.75	17.85	109	727.65	17.86
13.00	16.90	105	727.63	16.91
13.25	15.94	100	727.62	15.95
13.50	14.98	96	727.60	14.99
13.75	14.01	91	727.58	14.02
14.00	13.06	87	727.56	13.07
14.25	12.85	86	727.55	12.85
14.50	12.67	85	727.55	12.67
14.75	12.48	84	727.55	12.48
15.00	12.30	83	727.54	12.30
15.25	12.11	82	727.54	12.11
15.50	11.92	81	727.53	11.92
15.75	11.73	80	727.53	11.73
16.00	11.54	79	727.53	11.54
16.25	11.35	78	727.52	11.35
16.50	11.16	77	727.52	11.16
16.75	10.97	76	727.51	10.97
17.00	10.78	75	727.51	10.78
17.25	10.58	74	727.50	10.59
17.50	10.39	73	727.50	10.39
17.75	10.20	72	727.50	10.20
18.00	10.00	71	727.49	10.00
18.25	9.81	70	727.49	9.81
18.50	9.61	69	727.48	9.61
18.75	9.42	68	727.48	9.42
19.00	9.22	67	727.47	9.22
19.25	9.03	66	727.47	9.03
19.50	8.83	65	727.46	8.83
19.75	8.63	64	727.46	8.63
20.00	8.43	63	727.45	8.44

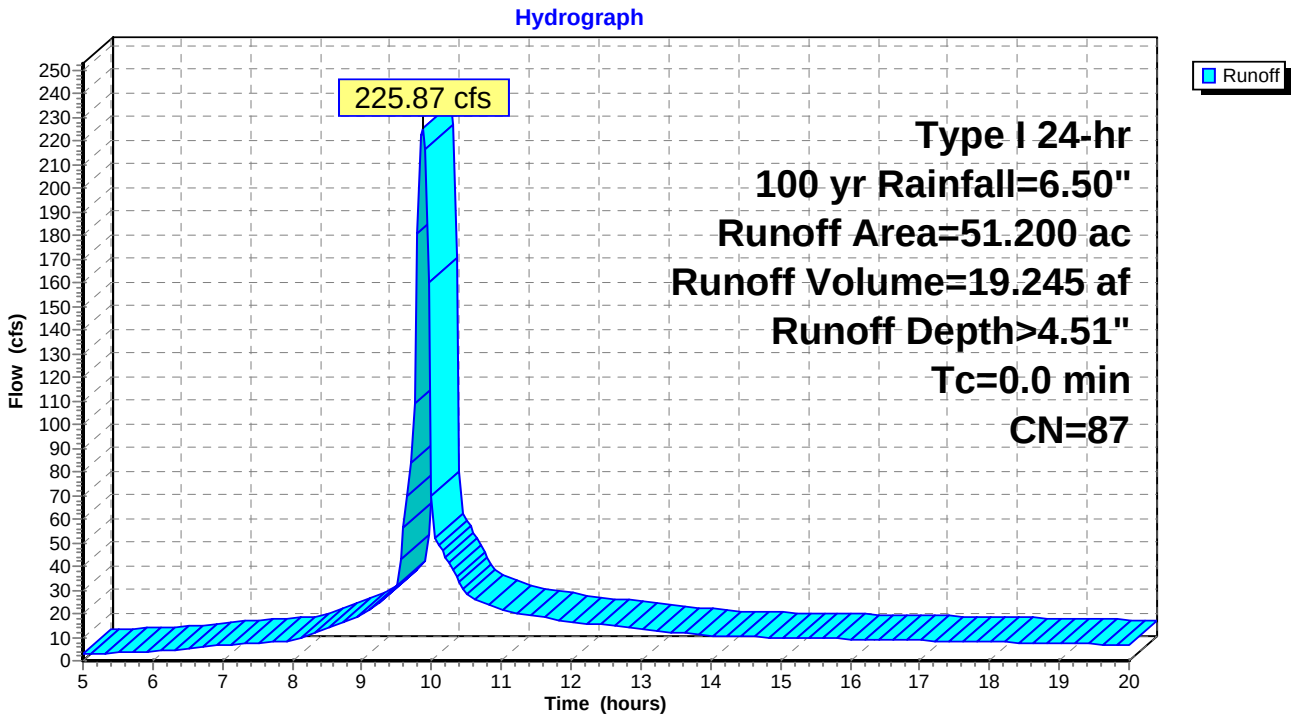
Summary for Subcatchment D1: D-1

Runoff = 225.87 cfs @ 9.87 hrs, Volume= 19.245 af, Depth> 4.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type I 24-hr 100 yr Rainfall=6.50"

Area (ac)	CN	Description
51.200	87	1/4 acre lots, 38% imp, HSG D
31.744		62.00% Pervious Area
19.456		38.00% Impervious Area

Subcatchment D1: D-1



Hydrograph for Subcatchment D1: D-1

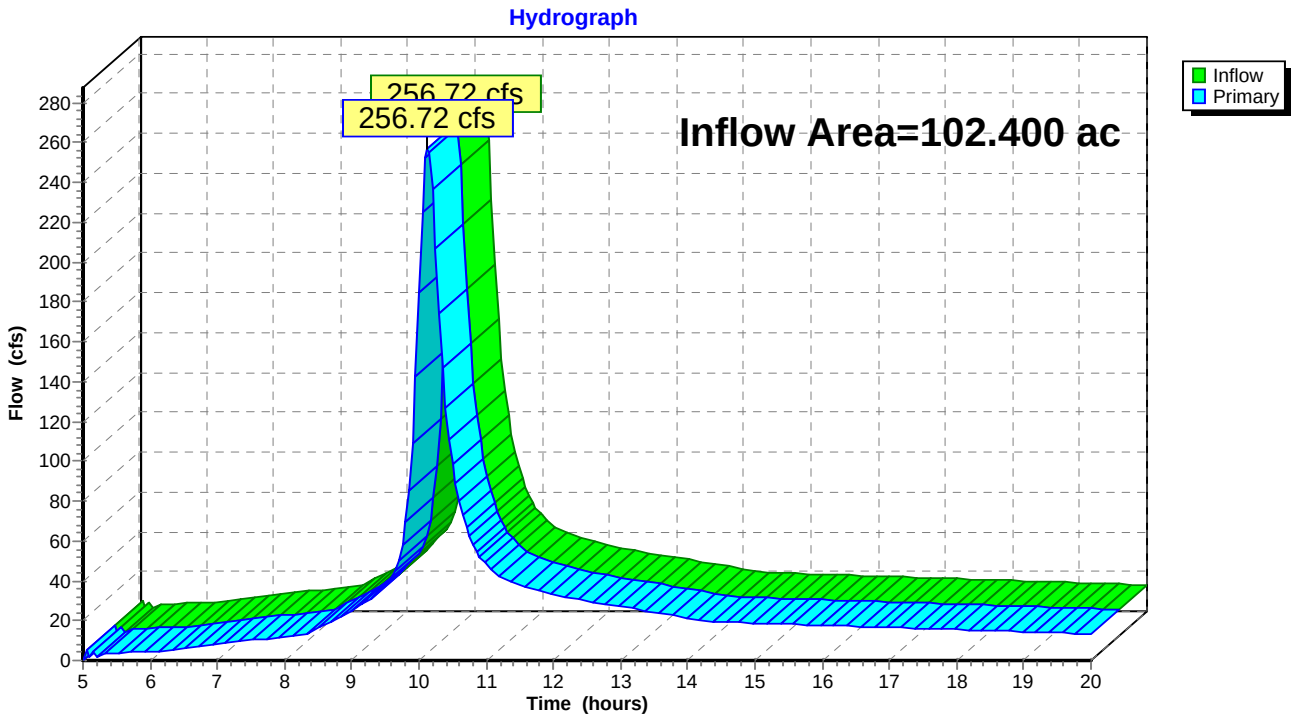
Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.65	0.07	2.83	10.30	3.65	2.32	38.56	15.60	5.33	3.88	9.48
5.10	0.67	0.07	2.93	10.40	3.72	2.39	33.20	15.70	5.35	3.90	9.42
5.20	0.68	0.08	3.04	10.50	3.79	2.44	28.05	15.80	5.37	3.92	9.35
5.30	0.70	0.08	3.14	10.60	3.85	2.50	26.51	15.90	5.39	3.94	9.29
5.40	0.71	0.09	3.24	10.70	3.90	2.55	25.21	16.00	5.41	3.95	9.23
5.50	0.73	0.10	3.34	10.80	3.95	2.59	23.91	16.10	5.43	3.97	9.17
5.60	0.75	0.10	3.44	10.90	4.00	2.64	22.60	16.20	5.45	3.99	9.11
5.70	0.76	0.11	3.54	11.00	4.05	2.68	21.33	16.30	5.46	4.01	9.05
5.80	0.78	0.12	3.64	11.10	4.09	2.72	20.81	16.40	5.48	4.02	8.99
5.90	0.80	0.12	3.74	11.20	4.14	2.76	20.35	16.50	5.50	4.04	8.93
6.00	0.81	0.13	3.84	11.30	4.18	2.80	19.88	16.60	5.52	4.06	8.87
6.10	0.83	0.14	4.08	11.40	4.22	2.84	19.41	16.70	5.54	4.08	8.81
6.20	0.85	0.15	4.33	11.50	4.26	2.88	18.93	16.80	5.55	4.09	8.74
6.30	0.87	0.16	4.59	11.60	4.30	2.91	18.46	16.90	5.57	4.11	8.68
6.40	0.88	0.16	4.86	11.70	4.34	2.95	17.98	17.00	5.59	4.13	8.62
6.50	0.90	0.17	5.14	11.80	4.38	2.98	17.50	17.10	5.61	4.14	8.56
6.60	0.92	0.18	5.42	11.90	4.41	3.02	17.02	17.20	5.62	4.16	8.50
6.70	0.95	0.20	5.71	12.00	4.45	3.05	16.55	17.30	5.64	4.18	8.44
6.80	0.97	0.21	6.01	12.10	4.48	3.08	16.24	17.40	5.66	4.19	8.37
6.90	0.99	0.22	6.31	12.20	4.51	3.11	15.94	17.50	5.68	4.21	8.31
7.00	1.01	0.23	6.62	12.30	4.55	3.14	15.64	17.60	5.69	4.22	8.25
7.10	1.04	0.24	6.81	12.40	4.58	3.17	15.34	17.70	5.71	4.24	8.19
7.20	1.06	0.26	6.98	12.50	4.61	3.20	15.04	17.80	5.73	4.26	8.13
7.30	1.09	0.27	7.16	12.60	4.64	3.23	14.74	17.90	5.74	4.27	8.06
7.40	1.11	0.29	7.33	12.70	4.67	3.26	14.43	18.00	5.76	4.29	8.00
7.50	1.13	0.30	7.51	12.80	4.70	3.29	14.13	18.10	5.78	4.30	7.94
7.60	1.16	0.31	7.68	12.90	4.73	3.31	13.83	18.20	5.79	4.32	7.88
7.70	1.18	0.33	7.86	13.00	4.76	3.34	13.52	18.30	5.81	4.33	7.82
7.80	1.21	0.35	8.03	13.10	4.79	3.37	13.21	18.40	5.82	4.35	7.75
7.90	1.24	0.36	8.20	13.20	4.81	3.39	12.91	18.50	5.84	4.36	7.69
8.00	1.26	0.38	8.42	13.30	4.84	3.42	12.60	18.60	5.85	4.38	7.63
8.10	1.29	0.39	9.37	13.40	4.86	3.44	12.29	18.70	5.87	4.39	7.57
8.20	1.32	0.41	10.40	13.50	4.89	3.46	11.98	18.80	5.88	4.41	7.50
8.30	1.35	0.43	11.46	13.60	4.91	3.49	11.67	18.90	5.90	4.42	7.44
8.40	1.39	0.46	12.55	13.70	4.94	3.51	11.36	19.00	5.92	4.44	7.38
8.50	1.42	0.48	13.67	13.80	4.96	3.53	11.05	19.10	5.93	4.45	7.31
8.60	1.46	0.51	14.75	13.90	4.98	3.55	10.74	19.20	5.94	4.46	7.25
8.70	1.51	0.54	15.86	14.00	5.01	3.57	10.45	19.30	5.96	4.48	7.19
8.80	1.55	0.57	17.00	14.10	5.03	3.59	10.37	19.40	5.97	4.49	7.13
8.90	1.60	0.61	18.16	14.20	5.05	3.61	10.31	19.50	5.99	4.51	7.06
9.00	1.65	0.64	19.40	14.30	5.07	3.63	10.25	19.60	6.00	4.52	7.00
9.10	1.71	0.68	21.44	14.40	5.09	3.65	10.19	19.70	6.02	4.53	6.94
9.20	1.76	0.73	23.58	14.50	5.11	3.67	10.14	19.80	6.03	4.55	6.87
9.30	1.83	0.77	25.79	14.60	5.13	3.69	10.08	19.90	6.04	4.56	6.81
9.40	1.90	0.83	28.04	14.70	5.15	3.71	10.02	20.00	**6.06**	**4.57**	6.75
9.50	1.97	0.88	31.80	14.80	5.17	3.73	9.96				
9.60	2.08	0.97	56.34	14.90	5.19	3.75	9.90				
9.70	2.25	1.10	83.81	15.00	5.21	3.77	9.84				
9.80	2.52	1.33	**181.24**	15.10	5.23	3.79	9.78				
9.90	3.01	1.75	**216.56**	15.20	5.25	3.81	9.72				
10.00	3.35	2.05	69.50	15.30	5.27	3.82	9.66				
10.10	3.46	2.15	49.06	15.40	5.29	3.84	9.60				
10.20	3.56	2.24	43.85	15.50	5.31	3.86	9.54				

Summary for Pond D2 exit: Free flow

Inflow Area = 102.400 ac, 23.75% Impervious, Inflow Depth > 3.96" for 100 yr event
Inflow = 256.72 cfs @ 10.13 hrs, Volume= 33.829 af
Primary = 256.72 cfs @ 10.13 hrs, Volume= 33.829 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond D2 exit: Free flow



Hydrograph for Pond D2 exit: Free flow

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
5.00	0.00		0.00	18.25	15.24		15.24
5.25	4.45		4.45	18.50	14.96		14.96
5.50	3.41		3.41	18.75	14.67		14.67
5.75	4.24		4.24	19.00	14.38		14.38
6.00	4.41		4.41	19.25	14.09		14.09
6.25	4.97		4.97	19.50	13.80		13.80
6.50	5.75		5.75	19.75	13.50		13.50
6.75	6.78		6.78	20.00	13.21		13.21
7.00	7.91		7.91				
7.25	9.10		9.10				
7.50	10.06		10.06				
7.75	10.90		10.90				
8.00	11.72		11.72				
8.25	12.84		12.84				
8.50	15.95		15.95				
8.75	20.22		20.22				
9.00	24.88		24.88				
9.25	30.26		30.26				
9.50	38.27		38.27				
9.75	57.77		57.77				
10.00	**184.43**		**184.43**				
10.25	**206.31**		**206.31**				
10.50	98.56		98.56				
10.75	62.05		62.05				
11.00	47.94		47.94				
11.25	41.27		41.27				
11.50	37.88		37.88				
11.75	35.60		35.60				
12.00	33.45		33.45				
12.25	31.37		31.37				
12.50	29.77		29.77				
12.75	28.38		28.38				
13.00	27.01		27.01				
13.25	25.63		25.63				
13.50	24.23		24.23				
13.75	22.82		22.82				
14.00	21.40		21.40				
14.25	20.07		20.07				
14.50	19.44		19.44				
14.75	19.11		19.11				
15.00	18.84		18.84				
15.25	18.58		18.58				
15.50	18.31		18.31				
15.75	18.04		18.04				
16.00	17.77		17.77				
16.25	17.49		17.49				
16.50	17.22		17.22				
16.75	16.94		16.94				
17.00	16.66		16.66				
17.25	16.38		16.38				
17.50	16.10		16.10				
17.75	15.81		15.81				
18.00	15.53		15.53				

Summary for Subcatchment D2-1: D2

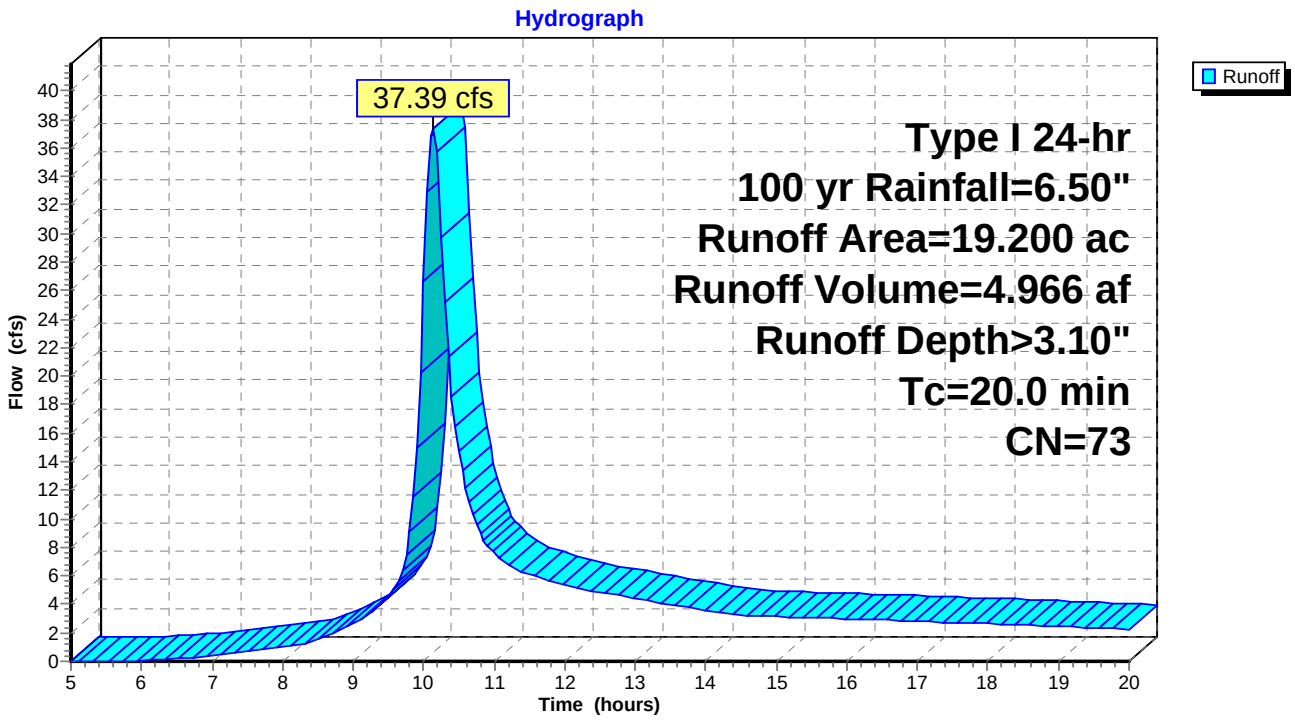
Runoff = 37.39 cfs @ 10.13 hrs, Volume= 4.966 af, Depth> 3.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type I 24-hr 100 yr Rainfall=6.50"

Area (ac)	CN	Description
19.200	73	Brush, Good, HSG D
19.200		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0					**Direct Entry, My own Tc**

Subcatchment D2-1: D2



Hydrograph for Subcatchment D2-1: D2

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.65	0.00	0.00	10.30	3.65	1.28	25.20	15.60	5.33	2.54	3.05
5.10	0.67	0.00	0.00	10.40	3.72	1.33	18.60	15.70	5.35	2.56	3.04
5.20	0.68	0.00	0.00	10.50	3.79	1.38	14.77	15.80	5.37	2.57	3.02
5.30	0.70	0.00	0.00	10.60	3.85	1.42	12.18	15.90	5.39	2.59	3.01
5.40	0.71	0.00	0.00	10.70	3.90	1.46	10.29	16.00	5.41	2.60	2.99
5.50	0.73	0.00	0.00	10.80	3.95	1.49	8.99	16.10	5.43	2.62	2.97
5.60	0.75	0.00	0.00	10.90	4.00	1.53	8.15	16.20	5.45	2.63	2.95
5.70	0.76	0.00	0.00	11.00	4.05	1.56	7.54	16.30	5.46	2.65	2.94
5.80	0.78	0.00	0.01	11.10	4.09	1.60	7.08	16.40	5.48	2.66	2.92
5.90	0.80	0.00	0.02	11.20	4.14	1.63	6.71	16.50	5.50	2.68	2.90
6.00	0.81	0.00	0.04	11.30	4.18	1.66	6.43	16.60	5.52	2.69	2.89
6.10	0.83	0.00	0.07	11.40	4.22	1.69	6.23	16.70	5.54	2.71	2.87
6.20	0.85	0.00	0.09	11.50	4.26	1.72	6.07	16.80	5.55	2.72	2.85
6.30	0.87	0.00	0.12	11.60	4.30	1.75	5.93	16.90	5.57	2.74	2.83
6.40	0.88	0.01	0.16	11.70	4.34	1.77	5.80	17.00	5.59	2.75	2.82
6.50	0.90	0.01	0.19	11.80	4.38	1.80	5.67	17.10	5.61	2.77	2.80
6.60	0.92	0.01	0.23	11.90	4.41	1.83	5.54	17.20	5.62	2.78	2.78
6.70	0.95	0.01	0.28	12.00	4.45	1.86	5.42	17.30	5.64	2.79	2.76
6.80	0.97	0.01	0.32	12.10	4.48	1.88	5.28	17.40	5.66	2.81	2.75
6.90	0.99	0.02	0.37	12.20	4.51	1.91	5.16	17.50	5.68	2.82	2.73
7.00	1.01	0.02	0.43	12.30	4.55	1.93	5.05	17.60	5.69	2.84	2.71
7.10	1.04	0.02	0.48	12.40	4.58	1.96	4.95	17.70	5.71	2.85	2.69
7.20	1.06	0.03	0.54	12.50	4.61	1.98	4.86	17.80	5.73	2.86	2.67
7.30	1.09	0.03	0.60	12.60	4.64	2.00	4.77	17.90	5.74	2.88	2.65
7.40	1.11	0.03	0.66	12.70	4.67	2.03	4.69	18.00	5.76	2.89	2.64
7.50	1.13	0.04	0.71	12.80	4.70	2.05	4.61	18.10	5.78	2.90	2.62
7.60	1.16	0.04	0.77	12.90	4.73	2.07	4.52	18.20	5.79	2.92	2.60
7.70	1.18	0.05	0.82	13.00	4.76	2.09	4.44	18.30	5.81	2.93	2.58
7.80	1.21	0.05	0.87	13.10	4.79	2.11	4.35	18.40	5.82	2.94	2.56
7.90	1.24	0.06	0.93	13.20	4.81	2.13	4.26	18.50	5.84	2.96	2.54
8.00	1.26	0.06	0.98	13.30	4.84	2.15	4.18	18.60	5.85	2.97	2.53
8.10	1.29	0.07	1.04	13.40	4.86	2.17	4.09	18.70	5.87	2.98	2.51
8.20	1.32	0.08	1.11	13.50	4.89	2.19	4.00	18.80	5.88	2.99	2.49
8.30	1.35	0.09	1.21	13.60	4.91	2.21	3.91	18.90	5.90	3.01	2.47
8.40	1.39	0.10	1.36	13.70	4.94	2.23	3.82	19.00	5.92	3.02	2.45
8.50	1.42	0.11	1.53	13.80	4.96	2.25	3.73	19.10	5.93	3.03	2.43
8.60	1.46	0.12	1.73	13.90	4.98	2.27	3.64	19.20	5.94	3.04	2.41
8.70	1.51	0.13	1.95	14.00	5.01	2.28	3.54	19.30	5.96	3.05	2.39
8.80	1.55	0.15	2.18	14.10	5.03	2.30	3.45	19.40	5.97	3.07	2.37
8.90	1.60	0.16	2.42	14.20	5.05	2.32	3.37	19.50	5.99	3.08	2.35
9.00	1.65	0.18	2.68	14.30	5.07	2.33	3.31	19.60	6.00	3.09	2.34
9.10	1.71	0.20	2.96	14.40	5.09	2.35	3.27	19.70	6.02	3.10	2.32
9.20	1.76	0.22	3.27	14.50	5.11	2.37	3.24	19.80	6.03	3.11	2.30
9.30	1.83	0.25	3.64	14.60	5.13	2.38	3.22	19.90	6.04	3.13	2.28
9.40	1.90	0.28	4.09	14.70	5.15	2.40	3.20	20.00	**6.06**	**3.14**	2.26
9.50	1.97	0.31	4.60	14.80	5.17	2.42	3.18				
9.60	2.08	0.35	5.19	14.90	5.19	2.43	3.17				
9.70	2.25	0.44	6.35	15.00	5.21	2.45	3.15				
9.80	2.52	0.58	9.14	15.10	5.23	2.46	3.14				
9.90	3.01	0.86	15.04	15.20	5.25	2.48	3.12				
10.00	3.35	1.08	26.69	15.30	5.27	2.50	3.10				
10.10	3.46	1.15	**36.82**	15.40	5.29	2.51	3.09				
10.20	3.56	1.22	**34.24**	15.50	5.31	2.53	3.07				

Summary for Subcatchment D2-2: D2

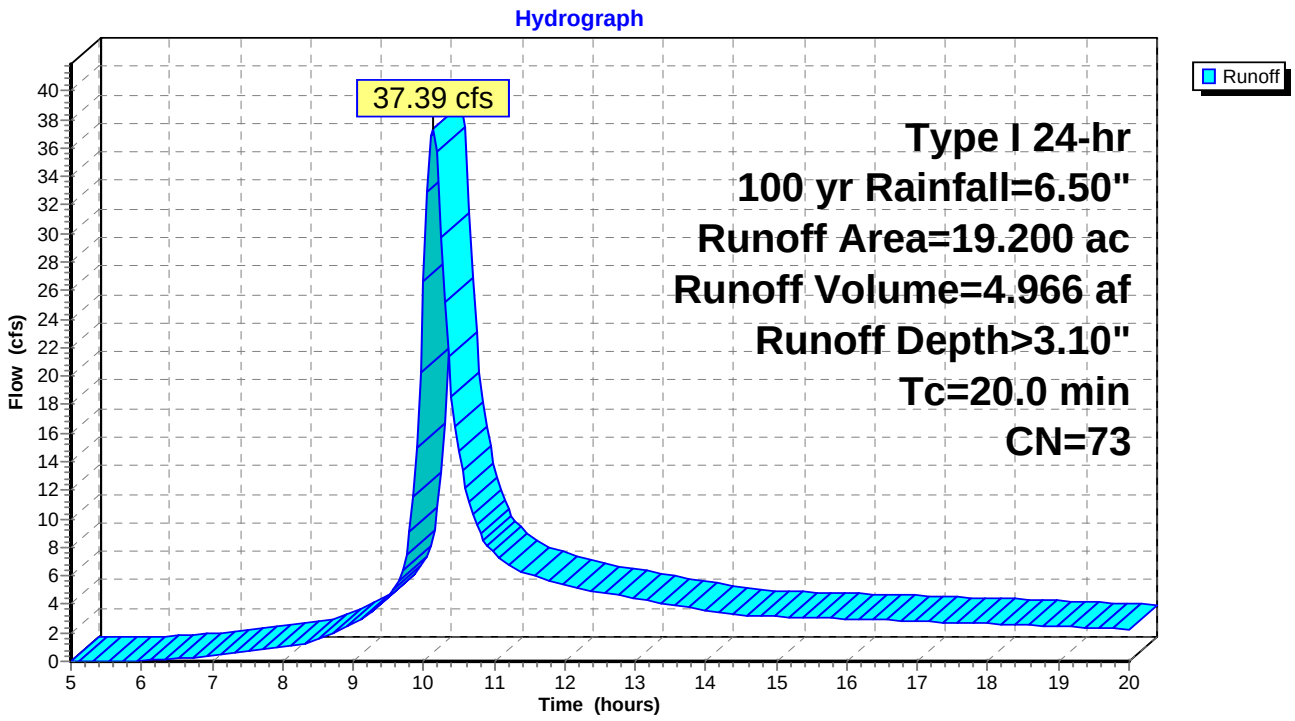
Runoff = 37.39 cfs @ 10.13 hrs, Volume= 4.966 af, Depth> 3.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type I 24-hr 100 yr Rainfall=6.50"

Area (ac)	CN	Description
19.200	73	Brush, Good, HSG D
19.200		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0					**Direct Entry, My own Tc**

Subcatchment D2-2: D2



Hydrograph for Subcatchment D2-2: D2

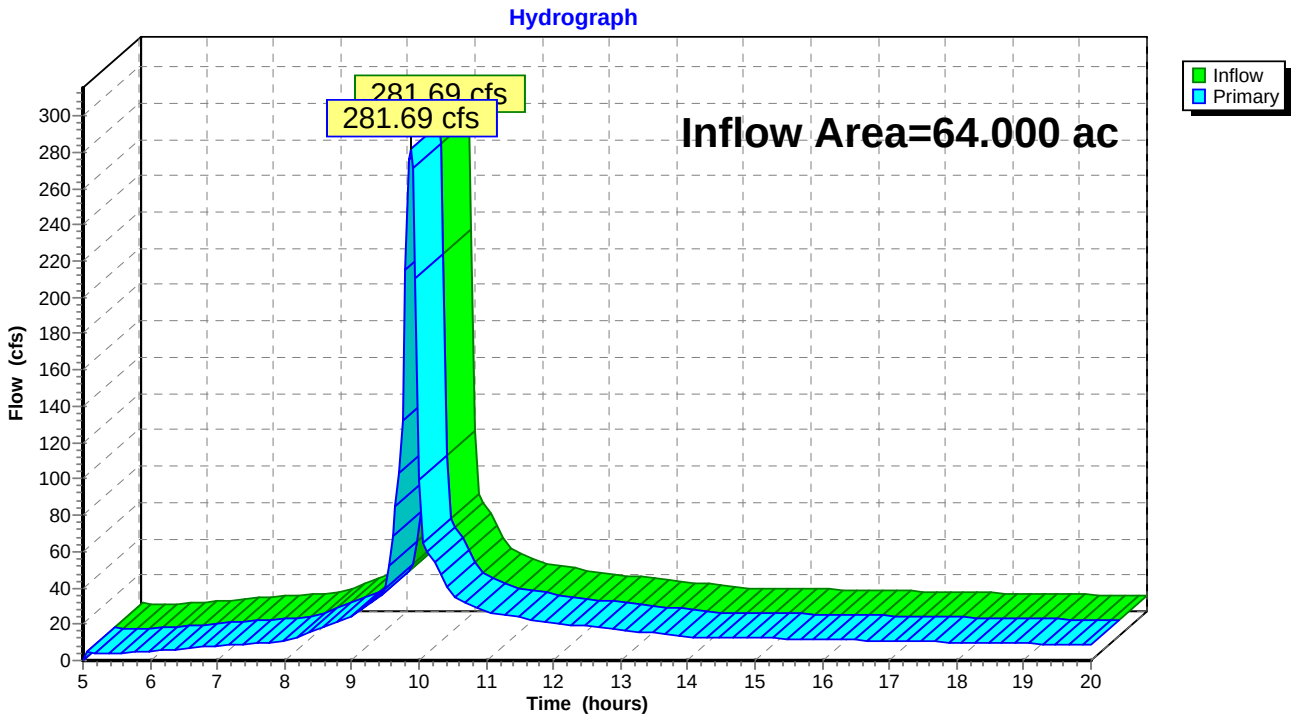
Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.65	0.00	0.00	10.30	3.65	1.28	25.20	15.60	5.33	2.54	3.05
5.10	0.67	0.00	0.00	10.40	3.72	1.33	18.60	15.70	5.35	2.56	3.04
5.20	0.68	0.00	0.00	10.50	3.79	1.38	14.77	15.80	5.37	2.57	3.02
5.30	0.70	0.00	0.00	10.60	3.85	1.42	12.18	15.90	5.39	2.59	3.01
5.40	0.71	0.00	0.00	10.70	3.90	1.46	10.29	16.00	5.41	2.60	2.99
5.50	0.73	0.00	0.00	10.80	3.95	1.49	8.99	16.10	5.43	2.62	2.97
5.60	0.75	0.00	0.00	10.90	4.00	1.53	8.15	16.20	5.45	2.63	2.95
5.70	0.76	0.00	0.00	11.00	4.05	1.56	7.54	16.30	5.46	2.65	2.94
5.80	0.78	0.00	0.01	11.10	4.09	1.60	7.08	16.40	5.48	2.66	2.92
5.90	0.80	0.00	0.02	11.20	4.14	1.63	6.71	16.50	5.50	2.68	2.90
6.00	0.81	0.00	0.04	11.30	4.18	1.66	6.43	16.60	5.52	2.69	2.89
6.10	0.83	0.00	0.07	11.40	4.22	1.69	6.23	16.70	5.54	2.71	2.87
6.20	0.85	0.00	0.09	11.50	4.26	1.72	6.07	16.80	5.55	2.72	2.85
6.30	0.87	0.00	0.12	11.60	4.30	1.75	5.93	16.90	5.57	2.74	2.83
6.40	0.88	0.01	0.16	11.70	4.34	1.77	5.80	17.00	5.59	2.75	2.82
6.50	0.90	0.01	0.19	11.80	4.38	1.80	5.67	17.10	5.61	2.77	2.80
6.60	0.92	0.01	0.23	11.90	4.41	1.83	5.54	17.20	5.62	2.78	2.78
6.70	0.95	0.01	0.28	12.00	4.45	1.86	5.42	17.30	5.64	2.79	2.76
6.80	0.97	0.01	0.32	12.10	4.48	1.88	5.28	17.40	5.66	2.81	2.75
6.90	0.99	0.02	0.37	12.20	4.51	1.91	5.16	17.50	5.68	2.82	2.73
7.00	1.01	0.02	0.43	12.30	4.55	1.93	5.05	17.60	5.69	2.84	2.71
7.10	1.04	0.02	0.48	12.40	4.58	1.96	4.95	17.70	5.71	2.85	2.69
7.20	1.06	0.03	0.54	12.50	4.61	1.98	4.86	17.80	5.73	2.86	2.67
7.30	1.09	0.03	0.60	12.60	4.64	2.00	4.77	17.90	5.74	2.88	2.65
7.40	1.11	0.03	0.66	12.70	4.67	2.03	4.69	18.00	5.76	2.89	2.64
7.50	1.13	0.04	0.71	12.80	4.70	2.05	4.61	18.10	5.78	2.90	2.62
7.60	1.16	0.04	0.77	12.90	4.73	2.07	4.52	18.20	5.79	2.92	2.60
7.70	1.18	0.05	0.82	13.00	4.76	2.09	4.44	18.30	5.81	2.93	2.58
7.80	1.21	0.05	0.87	13.10	4.79	2.11	4.35	18.40	5.82	2.94	2.56
7.90	1.24	0.06	0.93	13.20	4.81	2.13	4.26	18.50	5.84	2.96	2.54
8.00	1.26	0.06	0.98	13.30	4.84	2.15	4.18	18.60	5.85	2.97	2.53
8.10	1.29	0.07	1.04	13.40	4.86	2.17	4.09	18.70	5.87	2.98	2.51
8.20	1.32	0.08	1.11	13.50	4.89	2.19	4.00	18.80	5.88	2.99	2.49
8.30	1.35	0.09	1.21	13.60	4.91	2.21	3.91	18.90	5.90	3.01	2.47
8.40	1.39	0.10	1.36	13.70	4.94	2.23	3.82	19.00	5.92	3.02	2.45
8.50	1.42	0.11	1.53	13.80	4.96	2.25	3.73	19.10	5.93	3.03	2.43
8.60	1.46	0.12	1.73	13.90	4.98	2.27	3.64	19.20	5.94	3.04	2.41
8.70	1.51	0.13	1.95	14.00	5.01	2.28	3.54	19.30	5.96	3.05	2.39
8.80	1.55	0.15	2.18	14.10	5.03	2.30	3.45	19.40	5.97	3.07	2.37
8.90	1.60	0.16	2.42	14.20	5.05	2.32	3.37	19.50	5.99	3.08	2.35
9.00	1.65	0.18	2.68	14.30	5.07	2.33	3.31	19.60	6.00	3.09	2.34
9.10	1.71	0.20	2.96	14.40	5.09	2.35	3.27	19.70	6.02	3.10	2.32
9.20	1.76	0.22	3.27	14.50	5.11	2.37	3.24	19.80	6.03	3.11	2.30
9.30	1.83	0.25	3.64	14.60	5.13	2.38	3.22	19.90	6.04	3.13	2.28
9.40	1.90	0.28	4.09	14.70	5.15	2.40	3.20	20.00	**6.06**	**3.14**	2.26
9.50	1.97	0.31	4.60	14.80	5.17	2.42	3.18				
9.60	2.08	0.35	5.19	14.90	5.19	2.43	3.17				
9.70	2.25	0.44	6.35	15.00	5.21	2.45	3.15				
9.80	2.52	0.58	9.14	15.10	5.23	2.46	3.14				
9.90	3.01	0.86	15.04	15.20	5.25	2.48	3.12				
10.00	3.35	1.08	26.69	15.30	5.27	2.50	3.10				
10.10	3.46	1.15	**36.82**	15.40	5.29	2.51	3.09				
10.20	3.56	1.22	**34.24**	15.50	5.31	2.53	3.07				

Summary for Pond D3 exit: Free Flow

Inflow Area = 64.000 ac, 38.00% Impervious, Inflow Depth > 4.51" for 100 yr event
Inflow = 281.69 cfs @ 9.87 hrs, Volume= 24.043 af
Primary = 281.69 cfs @ 9.87 hrs, Volume= 24.043 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond D3 exit: Free Flow



Hydrograph for Pond D3 exit: Free Flow

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
5.00	0.00		0.00	18.25	9.81		9.81
5.25	3.61		3.61	18.50	9.62		9.62
5.50	4.53		4.53	18.75	9.42		9.42
5.75	4.26		4.26	19.00	9.23		9.23
6.00	4.90		4.90	19.25	9.03		9.03
6.25	5.49		5.49	19.50	8.84		8.84
6.50	6.42		6.42	19.75	8.64		8.64
6.75	7.28		7.28	20.00	8.44		8.44
7.00	8.25		8.25				
7.25	8.82		8.82				
7.50	9.37		9.37				
7.75	9.91		9.91				
8.00	10.50		10.50				
8.25	13.55		13.55				
8.50	16.98		16.98				
8.75	20.44		20.44				
9.00	24.14		24.14				
9.25	30.66		30.66				
9.50	39.25		39.25				
9.75	**131.74**		**131.74**				
10.00	**98.91**		**98.91**				
10.25	51.04		51.04				
10.50	35.70		35.70				
10.75	30.76		30.76				
11.00	26.74		26.74				
11.25	25.21		25.21				
11.50	23.68		23.68				
11.75	22.24		22.24				
12.00	20.71		20.71				
12.25	19.77		19.77				
12.50	18.82		18.82				
12.75	17.88		17.88				
13.00	16.93		16.93				
13.25	15.97		15.97				
13.50	15.01		15.01				
13.75	14.04		14.04				
14.00	13.08		13.08				
14.25	12.86		12.86				
14.50	12.67		12.67				
14.75	12.49		12.49				
15.00	12.30		12.30				
15.25	12.11		12.11				
15.50	11.93		11.93				
15.75	11.74		11.74				
16.00	11.55		11.55				
16.25	11.36		11.36				
16.50	11.17		11.17				
16.75	10.97		10.97				
17.00	10.78		10.78				
17.25	10.59		10.59				
17.50	10.40		10.40				
17.75	10.20		10.20				
18.00	10.01		10.01				

Summary for Subcatchment D3-2: D3

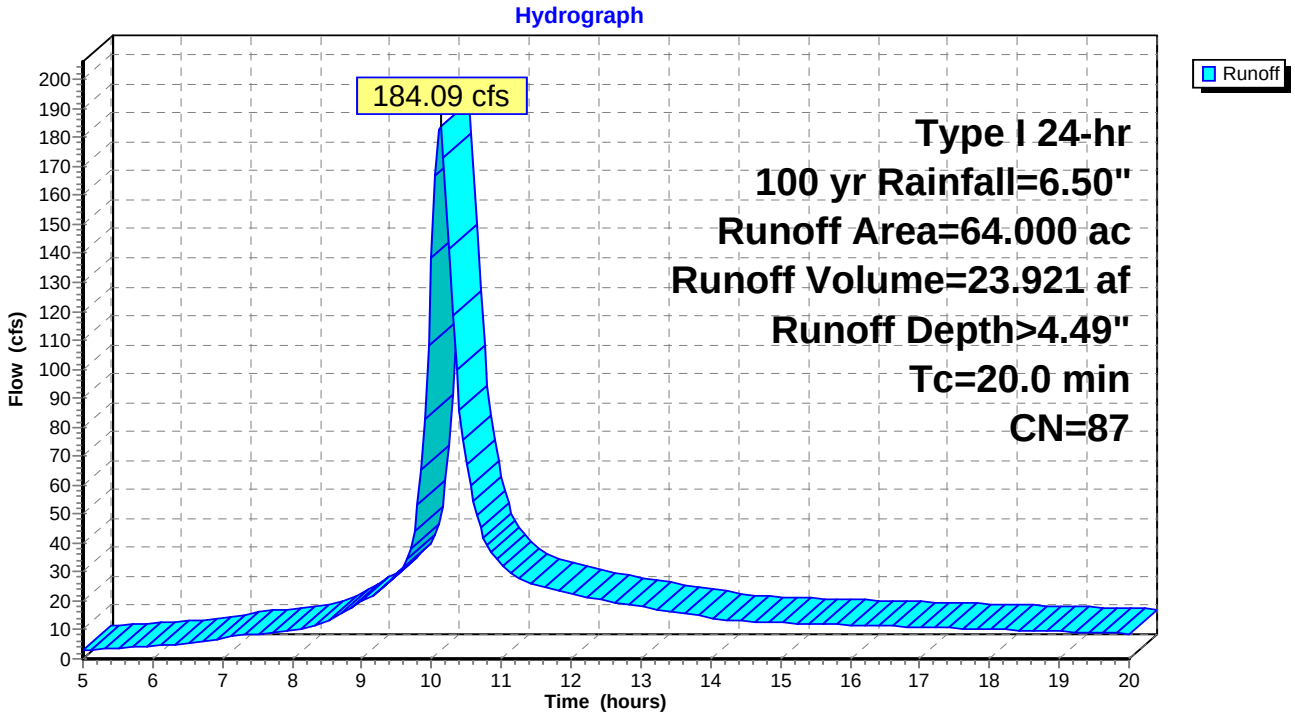
Runoff = 184.09 cfs @ 10.12 hrs, Volume= 23.921 af, Depth> 4.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type I 24-hr 100 yr Rainfall=6.50"

Area (ac)	CN	Description
64.000	87	1/4 acre lots, 38% imp, HSG D
39.680		62.00% Pervious Area
24.320		38.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0					**Direct Entry, My own Tc**

Subcatchment D3-2: D3



Hydrograph for Subcatchment D3-2: D3

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.65	0.07	3.12	10.30	3.65	2.32	118.63	15.60	5.33	3.88	12.08
5.10	0.67	0.07	3.26	10.40	3.72	2.39	85.82	15.70	5.35	3.90	12.00
5.20	0.68	0.08	3.39	10.50	3.79	2.44	66.93	15.80	5.37	3.92	11.93
5.30	0.70	0.08	3.52	10.60	3.85	2.50	54.36	15.90	5.39	3.94	11.85
5.40	0.71	0.09	3.65	10.70	3.90	2.55	45.38	16.00	5.41	3.95	11.78
5.50	0.73	0.10	3.78	10.80	3.95	2.59	39.27	16.10	5.43	3.97	11.70
5.60	0.75	0.10	3.91	10.90	4.00	2.64	35.30	16.20	5.45	3.99	11.62
5.70	0.76	0.11	4.04	11.00	4.05	2.68	32.48	16.30	5.46	4.01	11.55
5.80	0.78	0.12	4.17	11.10	4.09	2.72	30.34	16.40	5.48	4.02	11.47
5.90	0.80	0.12	4.29	11.20	4.14	2.76	28.65	16.50	5.50	4.04	11.40
6.00	0.81	0.13	4.42	11.30	4.18	2.80	27.34	16.60	5.52	4.06	11.32
6.10	0.83	0.14	4.54	11.40	4.22	2.84	26.38	16.70	5.54	4.08	11.24
6.20	0.85	0.15	4.68	11.50	4.26	2.88	25.63	16.80	5.55	4.09	11.17
6.30	0.87	0.16	4.88	11.60	4.30	2.91	24.96	16.90	5.57	4.11	11.09
6.40	0.88	0.16	5.13	11.70	4.34	2.95	24.34	17.00	5.59	4.13	11.01
6.50	0.90	0.17	5.42	11.80	4.38	2.98	23.73	17.10	5.61	4.14	10.94
6.60	0.92	0.18	5.73	11.90	4.41	3.02	23.13	17.20	5.62	4.16	10.86
6.70	0.95	0.20	6.06	12.00	4.45	3.05	22.53	17.30	5.64	4.18	10.78
6.80	0.97	0.21	6.40	12.10	4.48	3.08	21.93	17.40	5.66	4.19	10.71
6.90	0.99	0.22	6.75	12.20	4.51	3.11	21.35	17.50	5.68	4.21	10.63
7.00	1.01	0.23	7.11	12.30	4.55	3.14	20.84	17.60	5.69	4.22	10.55
7.10	1.04	0.24	7.49	12.40	4.58	3.17	20.40	17.70	5.71	4.24	10.47
7.20	1.06	0.26	7.85	12.50	4.61	3.20	19.99	17.80	5.73	4.26	10.40
7.30	1.09	0.27	8.17	12.60	4.64	3.23	19.60	17.90	5.74	4.27	10.32
7.40	1.11	0.29	8.44	12.70	4.67	3.26	19.22	18.00	5.76	4.29	10.24
7.50	1.13	0.30	8.69	12.80	4.70	3.29	18.84	18.10	5.78	4.30	10.16
7.60	1.16	0.31	8.92	12.90	4.73	3.31	18.46	18.20	5.79	4.32	10.09
7.70	1.18	0.33	9.14	13.00	4.76	3.34	18.08	18.30	5.81	4.33	10.01
7.80	1.21	0.35	9.36	13.10	4.79	3.37	17.70	18.40	5.82	4.35	9.93
7.90	1.24	0.36	9.58	13.20	4.81	3.39	17.32	18.50	5.84	4.36	9.85
8.00	1.26	0.38	9.80	13.30	4.84	3.42	16.93	18.60	5.85	4.38	9.78
8.10	1.29	0.39	10.02	13.40	4.86	3.44	16.55	18.70	5.87	4.39	9.70
8.20	1.32	0.41	10.35	13.50	4.89	3.46	16.17	18.80	5.88	4.41	9.62
8.30	1.35	0.43	10.97	13.60	4.91	3.49	15.79	18.90	5.90	4.42	9.54
8.40	1.39	0.46	11.91	13.70	4.94	3.51	15.40	19.00	5.92	4.44	9.46
8.50	1.42	0.48	13.05	13.80	4.96	3.53	15.01	19.10	5.93	4.45	9.39
8.60	1.46	0.51	14.30	13.90	4.98	3.55	14.63	19.20	5.94	4.46	9.31
8.70	1.51	0.54	15.62	14.00	5.01	3.57	14.24	19.30	5.96	4.48	9.23
8.80	1.55	0.57	16.97	14.10	5.03	3.59	13.85	19.40	5.97	4.49	9.15
8.90	1.60	0.61	18.33	14.20	5.05	3.61	13.50	19.50	5.99	4.51	9.07
9.00	1.65	0.64	19.72	14.30	5.07	3.63	13.23	19.60	6.00	4.52	8.99
9.10	1.71	0.68	21.16	14.40	5.09	3.65	13.06	19.70	6.02	4.53	8.91
9.20	1.76	0.73	22.73	14.50	5.11	3.67	12.94	19.80	6.03	4.55	8.84
9.30	1.83	0.77	24.65	14.60	5.13	3.69	12.84	19.90	6.04	4.56	8.76
9.40	1.90	0.83	26.92	14.70	5.15	3.71	12.76	20.00	**6.06**	**4.57**	8.68
9.50	1.97	0.88	29.45	14.80	5.17	3.73	12.68				
9.60	2.08	0.97	32.32	14.90	5.19	3.75	12.60				
9.70	2.25	1.10	38.34	15.00	5.21	3.77	12.53				
9.80	2.52	1.33	53.07	15.10	5.23	3.79	12.45				
9.90	3.01	1.75	83.03	15.20	5.25	3.81	12.38				
10.00	3.35	2.05	138.67	15.30	5.27	3.82	12.30				
10.10	3.46	2.15	**182.58**	15.40	5.29	3.84	12.23				
10.20	3.56	2.24	164.81	15.50	5.31	3.86	12.15				

APPENDIX E

USACE JD FORM

PRELIMINARY JURISDICTIONAL DETERMINATION FORM

This preliminary JD finds that there *"may be"* waters of the United States on the subject project site, and identifies all aquatic features on the site that could be affected by the proposed activity, based on the following information:

District Office: Los Angeles District | File/ORM #: | PJD Date: November 3, 2019

State: CA | City/County: Mission Viejo/Orange

Nearest Waterbody: Unnamed drainages to Arroyo Trabuco

Location: TRS, LatLong or UTM: -117.631663˚west /33.631663˚north

Name/ Address of Person Requesting PJD: Gonzales Environmental Consulting, LLC
Teresa Gonzales
358 Crystal Drive
San Jacinto, CA92583

Identify (Estimate) Amount of Waters in the Review Area:

Non-Wetland Waters: 4017 linear ft | 0.301 acres | Stream Flow: Intermittant

Wetlands: acre(s) | Cowardin Class: Riverine

Name of Any Water Bodies on the Site Identified as Section 10 Waters: Tidal: | Non-Tidal:

☐ Office (Desk) Determination
☐ Field Determination: | Date of Field Trip:

SUPPORTING DATA: Data reviewed for preliminary JD (check all that apply - checked items should be included in case file and, where checked and requested, appropriately reference sources below):

- ☐ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant:
- ☑ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
  - ☐ Office concurs with data sheets/delineation report.
  - ☐ Office does not concur with data sheets/delineation report.
- ☐ Data sheets prepared by the Corps
- ☐ Corps navigable waters' study:
- ☑ U.S. Geological Survey Hydrologic Atlas:
  - ☐ USGS NHD data.
  - ☐ USGS 8 and 12 digit HUC maps.
- ☑ U.S. Geological Survey map(s). Cite quad name: San Juan Capistrano
- ☑ USDA Natural Resources Conservation Service Soil Survey. Citation: Soil Survey Staff, Natural Resources Conservation
- ☐ National wetlands inventory map(s). Cite name:
- ☐ State/Local wetland inventory map(s):
- ☐ FEMA/FIRM maps:
- ☐ 100-year Floodplain Elevation is:
- ☑ Photographs: ☑ Aerial (Name & Date): Google, 2019
  - ☐ Other (Name & Date):
- ☐ Previous determination(s). File no. and date of response letter:
- ☑ Other information (please specify): Jurisdictional Delineation

IMPORTANT NOTE: The information recorded on this form has not necessarily been verified by the Corps and should not be relied upon for later jurisdictional determinations.

Teresa Gonzales

Signature and Date of Regulatory Project Manager (REQUIRED)

Signature and Date of Person Requesting Preliminary JD (REQUIRED, unless obtaining the signature is impracticable)

EXPLANATION OF PRELIMINARY AND APPROVED JURISDICTIONAL DETERMINATIONS:

1. The Corps of Engineers believes that there may be jurisdictional waters of the United States on the subject site, and the permit applicant or other affected party who requested this preliminary JD is hereby advised of his or her option to request and obtain an approved jurisdictional determination (JD) for that site. Nevertheless, the permit applicant or other person who requested this preliminary JD has declined to exercise the option to obtain an approved JD in this instance and at this time.

2. In any circumstance where a permit applicant obtains an individual permit, or a Nationwide General Permit (NWP) or other general permit verification requiring "preconstruction notification" (PCN), or requests verification for a non-reporting NWP or other general permit, and the permit applicant has not requested an approved JD for the activity, the permit applicant is hereby made aware of the following: (1) the permit applicant has elected to seek a permit authorization based on a preliminary JD, which does not make an official determination of jurisdictional waters; (2) that the applicant has the option to request an approved JD before accepting the terms and conditions of the permit authorization, and that basing a permit authorization on an approved JD could possibly result in less compensatory mitigation being required or different special conditions; (3) that the applicant has the right to request an individual permit rather than accepting the terms and conditions of the NWP or other general permit authorization; (4) that the applicant can accept a permit authorization and thereby agree to comply with all the terms and conditions of that permit, including whatever mitigation requirements the Corps has determined to be necessary; (5) that undertaking any activity in reliance upon the subject permit authorization without requesting an approved JD constitutes the applicant's acceptance of the use of the preliminary JD, but that either form of JD will be processed as soon as is practicable; (6) accepting a permit authorization (e.g., signing a proffered individual permit) or undertaking any activity in reliance on any form of Corps permit authorization based on a preliminary JD constitutes agreement that all wetlands and other water bodies on the site affected in any way by that activity are jurisdictional waters of the United States, and precludes any challenge to such jurisdiction in any administrative or judicial compliance or enforcement action, or in any administrative appeal or in any Federal court; and (7) whether the applicant elects to use either an approved JD or a preliminary JD, that JD will be processed as soon as is practicable. Further, an approved JD, a proffered individual permit (and all terms and conditions contained therein), or individual permit denial can be administratively appealed pursuant to 33 C.F.R. Part 331, and that in any administrative appeal, jurisdictional issues can be raised (see 33 C.F.R. 331.5(a)(2)). If, during that administrative appeal, it becomes necessary to make an official determination whether CWA jurisdiction exists over a site, or to provide an official delineation of jurisdictional waters on the site, the Corps will provide an approved JD to accomplish that result, as soon as is practicable.

PRELIMINARY JURISDICTIONAL DETERMINATION FORM

This preliminary JD finds that there *"may be"* waters of the United States on the subject project site, and identifies all aquatic features on the site that could be affected by the proposed activity, based on the following information:

Appendix A - Sites

District Office	Los Angeles District File/ORM #			PJD Date:	Nov 3, 2019
State	CA	City/County Mission Viejo/Orange		Person Requestinq PJD	Teresa Gonzales

Site Number	Latitude	Longitude	Cowardin Class	Est. Amount of Aquatic Resource in Review Area	Class of Aquatic Resource
	33.631663N	-117.631663W	Riverine	0.301 acres	Non-Section 10 non-wetland

Notes:

The existing project waters of unnamed drainages flow off site into Arroyo Trabuco. Please see attached connectivity analysis.

APPENDIX F

CONNECTIVITY MAP & ANALYSIS

Hydrologic Connectivity Analysis

CURTIS PARK

Gonzales Environmental Consulting, LLC

N 0 2 Miles

The JD for the project concerns unnamed drainages [-117.631663˚west and latitude 33.631663˚north] which are tributary to Arroyo Trabuco which is tributary to San Juan Creek and eventually the Pacific Ocean in the City of Mission Viejo of County of Orange, California.

Two of the drainages (D-1 and D-3) are natural channel which begin with over the side drains from Olympiad Road. Drainage 2 begins at Landscape maintenance and from existing Curtis Park and join with Drainage 3. The unnamed drainages starts on the project site, flows 4017 feet through the project site where it exits the project and hydrologically connects to Arroyo Trabuco which then connects to San Juan Creek (3.5 miles), which connects to Pacific Ocean (2.25 miles).

Drainage gradient for the project site is 11%, project site to San Juan Creek is 7%.

Unnamed drainage OHWM of the 4017 foot-long natural channels consists of an incised channel the width of which averages 3-5 feet. The natural channel contains bare ground, grassland and Quercus Agrifolia alliance habitat. Downstream the drainages free flow on to Arroyo Trabuco. The stretch into San Juan Creek consists of natural channel with riparian habitat.

Chemical characteristics of flows within the drainages are dictated by the land use of the drainage area (51.2 acres for Drainage 1, 19.2 acres for Drainage 2, and 64 acres for Drainage 3) which consists of natural and urban landscape. Storm and nuisance water contributes along with non-point source chemicals associated with the urban landscape are found throughout the drainage area. As a result, non-point-source chemicals associated with the urban landscape including residential uses have the potential to be present within storm and nuisance flows.

Furthermore, Arroyo Trabuco Creek is on the 303(d) list (TMDL required list) of impaired waters for Diazinon, Phosphorus, Total Nitrogen as N, and Toxicity[1]. With respect to storm flows, the 2-year, 24-hour precipitation is 2.5 inches in the project area. The 100-year, 12-hour precipitation is 6.5 inches in the project area. Unnamed Drainage 1 Q2 is 58.27 cfs, Q5 is 140.78 cfs, and Q100 is 225.87cfs Unnamed Drainage 2 Q2 is 53.26 cfs, Q5 is 150.39 cfs, and Q100 is 256.72 cfs. Unnamed Drainage 3 Q2 is 72.84 cfs, Q5 is 175.34 cfs, and Q100 is 281.69 cfs.

In summary the unnamed drainages are: (1) tributary to Arroyo Trabuco and located in the City of Mission Viejo of County of Orange, California; (2) conveys flows from the natural and urban landscape; (3) Unnamed Drainage 1 Q2 is 58.27 cfs, Q5 is 140.78 cfs, and Q100 is 225.87cfs Unnamed Drainage 2 Q2 is 53.26 cfs, Q5 is 150.39 cfs, and Q100 is 256.72 cfs. Unnamed Drainage 3 Q2 is 72.84 cfs, Q5 is 175.34 cfs, and Q100 is 281.69 cfs and (4) supports an OHWM that contains bare ground, grassland and Quercus agrifolia alliance species. Based on the above, we conclude that the unnamed drainages are relatively permanent water (RPW) per the Rapanos JD process, and therefore is a water of the United States.

Hydrograph data source:

Orange County Hydrology Manual 1986. 190 pgs.
Orange County Hydrology Manual 1986 Soil Maps. 3 pgs.
County of Orange Environmental Management Agency. 1996. Orange County Local Drainage Manual 267 pgs.
Rain Gage Data: HB Edison WQ station DCC; Station ID: 21CAOCSD-DCC
USGS 11047300 ARROYO TRABUCO A SAN JUAN CAPISTRANO CA

[1] USEPA. 2010. Approved 2010 303(d) list.
https://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml?wbid=CAB80114000200502 01172510