

**PD-R21-0002/CUP21-0004/P-E25-0001 CREEKSIDE PLAZA ARCO
EXHIBIT P - OAK RESOURCES TECHNICAL REPORT**



October 11, 2023

Marc Strauch
Strauch Companies
193 Blue Ravine Rd, Suite 135
Folsom, CA 95630

**Subject: Oak Resources Technical Report for the ±4.34-acre Creekside Plaza Project Site,
El Dorado County, CA**

Dear Mr. Strauch:

At your request, Salix Consulting, Inc. (Salix) is providing this letter to revise previous reporting of Oak Resources (*Quercus* sp.) present on the Creekside Plaza project site and to conform to the provisions of El Dorado County Ordinance No. 5061 and the El Dorado County Oak Resource Management Plan (ORMP). Oak Resources are Oak Woodlands, Individual Native Oak Trees, and Heritage Trees as defined in Section 130.39.030 of the El Dorado County Ordinance Code.

Introduction

The site is located in unincorporated El Dorado County, California, on the corner of Missouri Flat Road and Forni Road just west of Placerville. It is situated in Section 24, Township 10 North, Range 10 East on the Placerville 7½ minute USGS quadrangle (Figure 1). The approximate latitude and longitude for the site are 38°42'28" north and 120°49'54" west. Elevations are between 1,723 feet to 1,761 feet. A recent aerial photo of the site and surrounding area is presented in Figure 2. The current proposed project will include a gas station and a convenience store with a car wash.

The purpose of this report is to present information and recommendations on the existing oak resources in the Creekside Plaza project area including the extent and location of oak woodlands, individual native oak trees, and the presence of heritage trees (i.e., trees with a single main trunk measuring 36 inches (dbh) or greater, or with a multiple trunk with an aggregate trunk measuring 36 inches (dbh) or greater). This report identifies and quantifies project-related impacts to oak resources as defined in the Oak Resources Conservation Ordinance (Chapter 130.39 of Title 130) and the El Dorado County Oak Resource Management Plan (ORMP). This report also recommends measures identifying how specific oak trees and woodlands and those retained shall be protected during development and related work consistent with the requirements of the El Dorado County Oak Resource Management Plan (ORMP). It makes specific recommendations for conservation and mitigation measures (including fees) consistent with the Ordinance and the ORMP. The Oak Resources Technical Report Checklist is included as an attachment to this report.

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Methodology

Previous oak assessments on this parcel were conducted in 2016, 2018, and 2021. A field survey to re-identify, locate, and quantify all oak resources present on the property was conducted on September 12, 2023, by Salix biologist Jeff Glazner. Oak woodlands were mapped and assessed in accordance with the CDFG 2009 *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities* and subsequent updates, and the *List of Vegetation Alliances and Associations* (CDFG 2010) and subsequent updates.

No individual native oak trees occurred outside an oak woodland and no Heritage Trees were present to require identification on the Oak Resources Map (Figure 3).

Spatial data (imagery) was collected by our unmanned aerial vehicle (UAV) in September of 2023, which was utilized to create a current orthomosaic aerial basemap used in this report. The acreage of existing oak woodland was calculated from field observations from interpretation of the new aerial photo examination. The project site plan, provided by the project engineer, was then overlaid to determine the area of impact to the oak woodland that would occur with implementation of all phases of the proposed project. From the area of impact, mitigation requirements and fees were calculated, and oak protection measures are presented for those oak resources remaining on site consistent with the requirements of the ORMP.

Results

Salix identified a total of ± 1.53 acres of oak woodland on site. The oak woodland is embedded within a larger blue oak–foothill pine woodland; however, the foothill pine (*Pinus sabiniana*) was not mapped as part of this analysis. The oak resources are a mix of interior live oak (*Quercus wislizeni*) and blue oak (*Q. douglasii*) and are contiguous with the foothill pines (Figure 3). A few valley oaks (*Quercus lobata*) are present along the riparian corridor that runs through the center of the site. The woodland is dense, and shrubs such as coyote brush (*Baccharis pilularis*) and buck brush (*Ceanothus cuneatus*) are common, particularly where the oak canopy is minimal. North of the stream, buckeye (*Aesculus californica*) is common. Open areas are increasingly filling in with oak and shrubs. The riparian component of the site consists of a dense canopy of narrow-leaved willow (*Salix exigua*), red willow (*S. laevigata*), arroyo willow (*S. lasiolepis*), valley oak, and Fremont cottonwood (*Populus fremontii*). Himalayan blackberry (*Rubus armeniacus*) forms dense thickets within and along the riparian habitat. The remainder of the site is ruderal grassland.

No individual native oak trees were mapped outside of the oak woodland component because none were present, and no Heritage Trees occur on the property. One Heritage Tree that occurred along Missouri Flat Road had been identified as a hazard tree in 2018. This tree had been in decline for several years, and at the time of this survey the main trunk had toppled, and the tree was stump sprouting.

Representative ground photos are presented in Figures 5a and 5b and aerials in Figure 5c.

Impacts and Mitigation

The ORMP presents a variety of options for mitigation of impacts to oak resources, including payment of in-lieu fees, establishment of conservation easements with onsite replacement

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planting, and County-approved off-site mitigation. Existing oak woodland onsite totals ±1.53 acres. The proposed project will impact ±0.76 acre of oak woodland (49% of the total woodland onsite) and will avoid ±0.77 acre (Figure 4). The various mitigation options are presented below.

In-Lieu Fee:

Based on the mitigation requirements presented in the table below, the proposed project will require a mitigation of ratio of 1:1. At this mitigation ratio and an impact of ±0.76 acre we estimate a potential in-lieu mitigation fee of **\$6,296.60** (0.76-acre x \$8,285). No additional costs for Heritage Trees or individual oak trees should be required. The ultimate determination of the fee amount will be made by El Dorado County.

Percent of Oak Woodland Impact	Oak Woodland Mitigation Ratio
0-50%	1:1
50.1-75%	1.5:1
75.1-100%	2:1

Establishment of Onsite or Offsite Conservation Easement with Replanting:

An alternative to paying the in-lieu fee would be the dedication of a conservation easement within the area outside of the project limits that is just over an acre in size. All replacement planting mitigation options require an oak resource replacement planting plan for both on and off-site mitigation, which is outside the scope of work for this correspondence and is not included as part of this report. Generally, the replacement planting areas would be large enough to accommodate replacement plantings at a density equal to the density of oak woodlands impacted; up to a maximum density of 200 trees per acre. A deed restriction or conservation easement to the satisfaction of El Dorado County's County Counsel and the Community Development Services Director (or their designee) would be required to ensure the long-term conservation of any on-site replacement trees planted. Plantings are required to be monitored for a period of seven years to ensure success criteria is met.

Within the proposed impacted oak woodland, we estimate an existing density of 50 trees per acre. For both on- and off-site planting options the formula is: (Impacted Oak Woodland Area in acres) x (Impacted Oak Woodland Density in trees/acre) = the total number of replacement trees to be replanted. This comes out to (0.76-acre x 50 trees/acre) = 38 replacement plantings with container trees (one-gallon or Tree Pot 4-sized container trees). Ultimately, El Dorado County will determine the number of replacement trees. If using locally-sourced acorns (rather than container trees), the required number of acorns is three times the amount replacement trees (a 3:1 ratio).

Protection Measures

El Dorado County's ORMP Appendix D references general guidelines and best management practices for working near oak resources (a copy of the Appendix is provided with this letter as

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an attachment), and these should be integrated into the project plans and implemented to avoid impacts to protected oak resources. The County should be consulted for any additional requirements, if needed.

If you need any further information or clarification of the data collected, please contact us at (530) 888-0130.

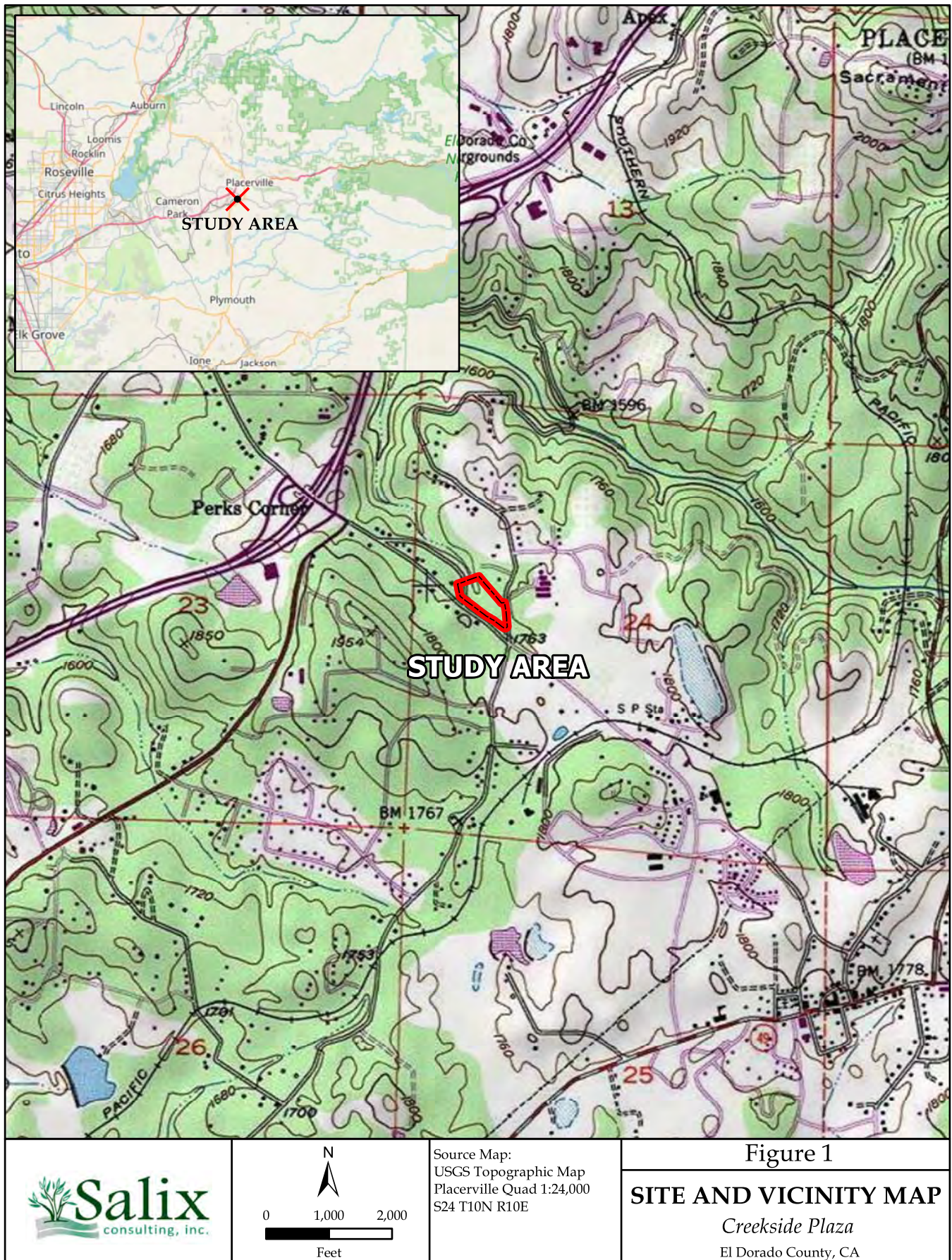
Sincerely,



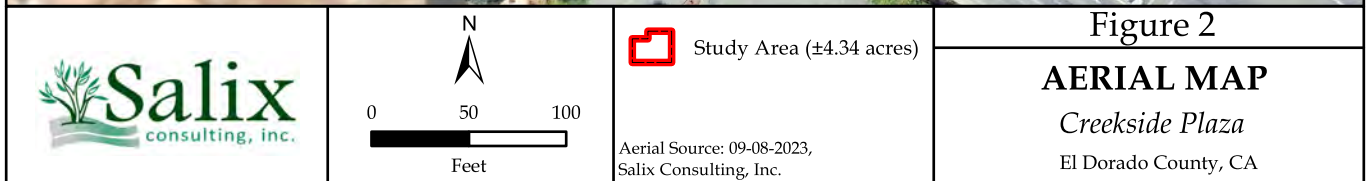
Jeff Glazner
Principal Biologist

Attachments: Figure 1 - Site and Vicinity
 Figure 2 - Aerial Map
 Figure 3 - Existing Oak Woodland
 Figure 4 - Proposed Project Impacts to Oak Woodland
 Figures 5a-c - Site and Aerial Photos
 Attachment A - Oak Resources Technical Report Checklist
 Attachment B - Appendix D: Best Management Practices for Oak Resources

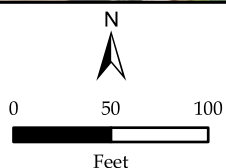
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- Study Area (±4.34 acres)
- Oak Woodland (±1.53 Acres)

Aerial Source: 09-08-2023,
Salix Consulting, Inc.

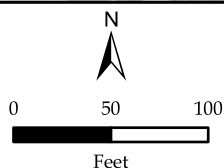
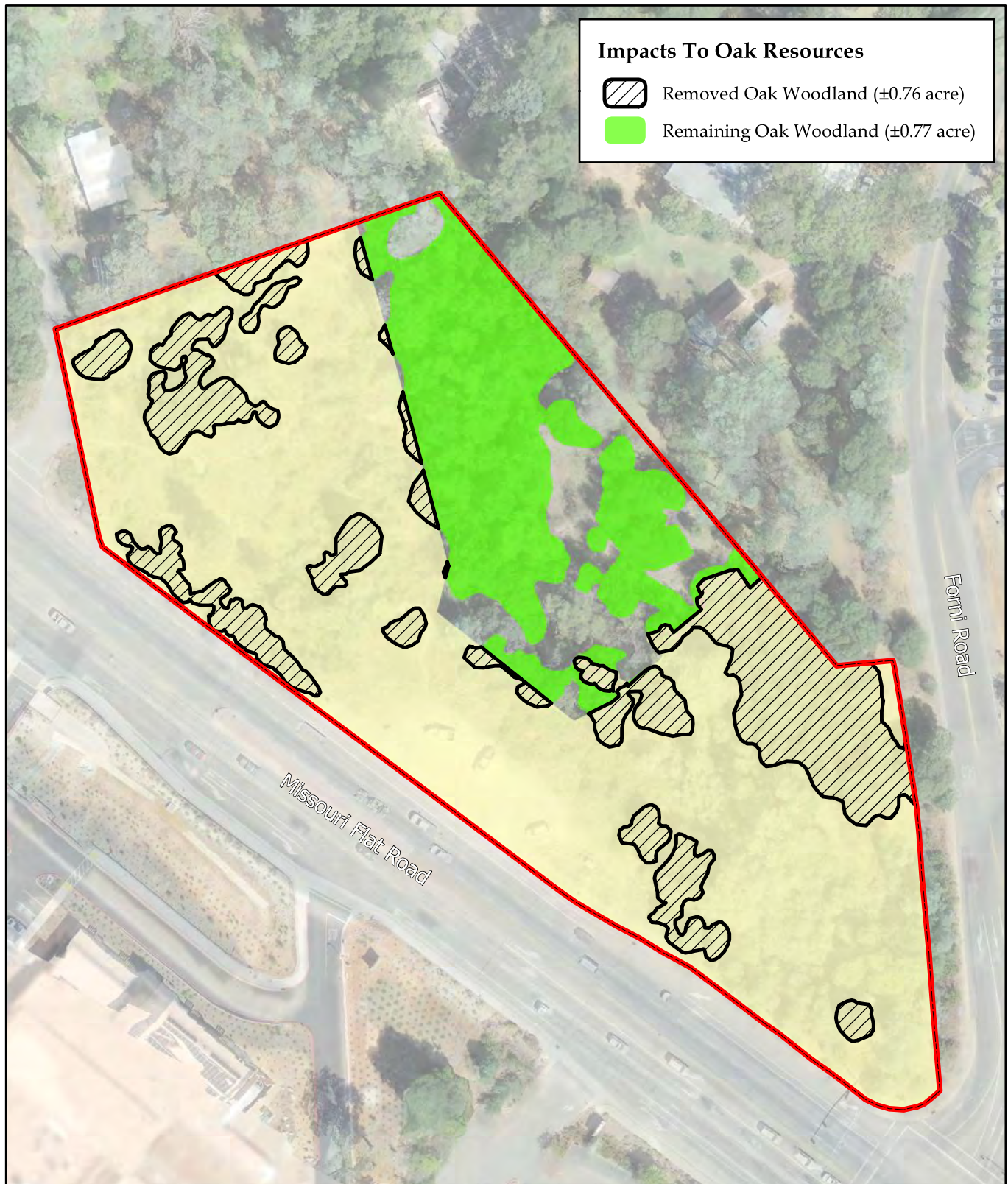
Figure 3

OAK RESOURCES MAP

Creekside Plaza

El Dorado County, CA

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- Study Area (±4.34 acres)
- Development Footprint

Aerial Source: 09-08-2023,
Salix Consulting, Inc.

Figure 4

OAK IMPACTS MAP

Creekside Plaza
El Dorado County, CA

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Looking across interior area of site.
Photo date: September 12, 2023



Looking east over western area of site.
Photo date September 12, 2023



Figure 5a

SITE PHOTOS

Creekside Plaza
El Dorado County, CA

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Looking north along Forni Road frontage.
Photo date: September 12, 2023



Looking southeast along Missouri Flat Road frontage.
Photo date September 12, 2023



Figure 5b

SITE PHOTOS

Creekside Plaza

El Dorado County, CA

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Looking east over the Study Area with the approximate boundary of the Study Area.
Photo date: September 8, 2023



Looking southeast towards the intersection of Missouri Flat Road and Forni Road.
Photo date September 8, 2023



Figure 5c

AERIAL PHOTOS

Creekside Plaza

El Dorado County, CA

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**COMMUNITY DEVELOPMENT SERVICES
PLANNING AND BUILDING DEPARTMENT**

2850 Fairlane Court, Placerville, CA 95667

Phone: (530) 621-5355 www.edcgov.us/Planning/

OAK RESOURCES TECHNICAL REPORT CHECKLIST

The following information is required for all Oak Resources Technical Reports consistent with Section 2.5 (Oak Resources Technical Reports) of the Oak Resources Management Plan (ORMP):

FORMS AND MAPS REQUIRED

Place a check (✓) on the "Applicant" lines for those items completed. The planner receiving the application will check (✓) the "County" line.

Check

(✓)

Applicant County

☒

☐

1) Identify, locate, and quantify all oak resources on the property, as applicable:

- a) Oak woodlands shall be mapped and assessed in accordance with the CDFG 2009 *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities* and subsequent updates, and the *List of Vegetation Alliances and Associations* (CDFG 2010) and subsequent updates;
- b) Data collected for individual native oak trees and Heritage Trees shall include: location, species, trunk diameter (dbh), height, canopy radius, and general health and structural condition.

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2) Identify and quantify project-related impacts to oak resources

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3) Measures identifying how specific trees and woodlands (or retained portions thereof) shall be protected during development and related work

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Check
(√)

Applicant County



4) Proposed actions to mitigate impacts to oak resources, consistent with the requirements included in the ORMP:

- a) For replacement planting, the report shall provide detail regarding the quantity, location, planting density, replacement tree size(s), and acorn/seedling source consistent with the definition of Replacement Planting included in the ORMP;
- b) For conservation easement placement/acquisition and/or land acquisition in fee title, the report shall provide documentation of easement placement on-site and/or documentation of easement or land acquisition off-site to the satisfaction of the County;
- c) For in-lieu fee payment, the report shall document the quantity of impacts (acreage of oak woodlands and/or total diameter inches of individual native oak trees/Heritage Trees) and the total in-lieu fee payment necessary (presented separately for oak woodlands, individual native oak trees, and Heritage Trees, where applicable).



5) Identification of responsible parties



6) Identification of maintenance, monitoring, and reporting requirements



7) Analysis of non-PCA conservation easement areas, where applicable



8) Site map(s) depicting:

- a) location of all oak woodlands, individual native oak trees, and Heritage Trees;
- b) location of all proposed project-related improvements (including, but not limited to, the limits of grading, fuel modification/defensible space areas, and above- and below-ground infrastructure);
- c) Site map(s) shall also clearly identify impacted oak resources.



9) Planning and Building Department Summary Data Sheet of Oak Resources Impacts for Oak Tree/Oak Woodland Removal Permits.

SUPPLEMENTAL DATA FOR INDIVIDUAL NATIVE OAK TREES WITHIN OAK WOODLANDS:

The ORMP and Oak Resources Conservation Ordinance (No. 5061) was adopted on October 24, 2017 and the Board of Supervisors will review implementation within 12 months after adoption. The Board requested the following supplemental information:



10) Provide an inventory (species and size) of impacted Individual Native Oak Trees greater than 24 inches and less than 36 inches (dbh) in oak woodlands.



COMMUNITY DEVELOPMENT SERVICES PLANNING AND BUILDING DEPARTMENT

2850 Fairlane Court, Placerville, CA 95667

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Summary Data Sheet of Oak Resources Impacts for Oak Tree/Oak Woodland Removal Permits

Description	Blue (<i>Quercus douglasii</i>)	California Black (<i>Quercus kelloggii</i>)	Canyon Live (<i>Quercus chrysolepis</i>)	Interior Live (<i>Quercus wislizeni</i>)	Oregon White (<i>Quercus garryana</i>)	Valley (<i>Quercus lobata</i>)	Oracle (hybrid) (<i>Quercus x morehus</i>)
Individual Native Oak Trees							
Quantity (number of trees) of individual native oak trees to be removed, by species							
Quantity (number of trees) of individual native oak trees to be removed, greater than 24 inches and less than 36 inches (dbh), by species							
Total trunk diameter inches (dbh) to be removed*	N/A						
Heritage Trees							
Quantity (number of trees) of Heritage Trees to be removed, by species							
Total trunk diameter inches (dbh) to be removed*	N/A						
Oak Woodlands							
Total Acreage of existing oak woodlands**	1.53						
Acreage of existing oak woodlands to be removed	0.76						
Percentage of existing oak woodlands to be removed*	49%						

* Information used for purposes of calculating in-lieu mitigation fee payment.

** If Heritage Trees occur within oak woodlands, the area of impacted Heritage Tree(s) should be included in oak woodland acreage calculations.

Revised 11/22/2017

ATTACHMENT B

Appendix D

Best Management Practices for Oak Resources

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Appendix D

Best Management Practices for Oak Resources

Information on building around oaks and oaks in the home garden can be found in the University of California Division of Agriculture and Natural Resources' (UC ANR) leaflet, [Living Among the Oaks](#). Additional information on disturbance around oaks and protecting trees from construction impacts can be found in the UC Cooperative Extension's (UCCE) handout, [Disturbance Around Oaks](#) (Frost 2001) and the California Department of Forestry and Fire Protection's (CAL FIRE) Tree Notes, [Protecting Trees from Construction Impacts](#) (Sanborn 1989). Information on the [Care of California's Native Oaks](#) is also available through the California Oak Foundation¹. Qualified professionals and interested persons should contact the local El Dorado County UCCE Advisor and the UC ANR and other sources for the most recent research.

The following are general guidelines or best management practices for tree protection during construction activities, taken from some of the above sources:

- The root protection zone (RPZ) is roughly one-third larger than the drip line (or outermost edge of the foliage based on the longest branch).
- Install high visibility fencing around the RPZ of any tree or cluster of trees with overlapping canopy that are identified on an approved grading plan as needing protection. The fencing should be four-feet high and bright orange with steel t-posts spaced 8 feet apart.
- Do not grade, cut, fill or trench within the RPZ.
- Do not store oil, gasoline, chemicals, other construction materials, or equipment within the RPZ.
- Do not store soil within the RPZ.
- Do not allow concrete, plaster, or paint washout within the RPZ.
- Do not irrigate within the RPZ or allow irrigation to filter into the RPZ.
- Plant only drought tolerant species within the RPZ.

The following are general guidelines for protecting oak trees in gardens and yards.

- Avoid summer irrigation.
- Disturb the zone within six feet of the trunk as little as possible. The base of the tree should be kept dry.
- Limit plantings beneath oak trees to drought-tolerant species that do not require summer irrigation.
- Landscape beneath oak trees with non-living plant materials such as wood chips.

¹ Now a project of the California Wildlife Foundation
(<http://www.californiawildlifefoundation.org/projects.html>)

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Best Management Practices for Oak Resources

- Refer to [Living Among the Oaks](#) or contact the [El Dorado County Master Gardener Program](#) (through the UCCE office) for more information on oaks in the home garden.

The County also identifies tree protection measures in its [Design and Improvement Standards Manual](#) (revised 1990), which includes the following:

- Do not change the amount of irrigation provided to any oak tree from that which was provided prior to the commencement of construction activity.
- Do not trench, grade, or pave into the dripline area of an oak tree.
- Do not park or operate any motor vehicle within the dripline area of any oak tree.
- Do not place or store any equipment or construction materials within the dripline of any oak tree.
- Do not attach any signs, ropes, cables, or any other items to any oak trees.
- Do not place or allow to flow into or over the dripline area of any oak tree any oil, fuel, concrete mix, or other deleterious material.
- Where construction activity is proposed within 50 feet of an oak tree:
 - A 6-foot tall temporary fence shall be placed the protected area prior to the work beginning.
 - No grade changes shall occur within the protected area unless specifically indicated in the plans.
 - No trenching shall be allowed within the protected area. If it is necessary to install underground utilities within the temporary fence, the utility trench shall be hand dug so as not to cut any roots over 2” in diameter, or a line may be bored and drilled.
 - Only dead, weakened, diseased, or dangerous branches shall be removed, and only by a licensed arborist. Any roots 2” in diameter or larger that must be cut shall be cleanly cut with pruning (not excavation) equipment.
 - Hose off all dust from foliage of oak trees once every week during the construction of the project.

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EXHIBIT Q - UPDATED BIOLOGICAL RESOURCES ASSESSMENT**



June 23, 2021

Marc Strauch
Strauch Companies
193 Blue Ravine Rd, Suite 135
Folsom, CA 95630

**Subject: Update to Biological Resources Assessment for the ±4.3-acre
Creekside Plaza Project Site, El Dorado County, CA**

Dear Mr. Strauch:

At your request, Salix Consulting, Inc. (Salix) has prepared this report, which updates our *Creekside Plaza, El Dorado County, Biological Resource Assessment Update* dated June 7, 2016. The objective of this analysis is to confirm and/or update the biological conditions identified in the 2016 update and to determine if there are any changes to known special-status species in the region.

LOCATION AND SETTING

The study area is located in unincorporated El Dorado County, California, on the corner of Missouri Flat Road and Forni Road just west of Placerville. It is situated in Section 24, Township 10 North, Range 10 East on the Placerville 7 ½ minute USGS quadrangle (Figure 1). The approximate latitude and longitude for the site are 38°42'28" north and 120°49'54" west. Elevations are between 1725 feet to 1770 feet. A recent aerial is presented as Figure 2.

The site is located along two busy roads and is generally inaccessible by slope dense vegetation. A portion of the frontage along Missouri Flat Road is used as a "parking lot" but most of the remainder of the site is fallow. The site was relatively clear in the 80's and 90's but vegetation has become quite dense over recent years. Currently, much of the site supports dense woody vegetation, particularly along the intermittent stream (Figure 2). The habitat types are the same as described before – blue oak-foothill pine woodland (previously called "foothill woodland"), riparian, and ruderal with the addition of an annual grassland component represented by larger openings in the woodland.

METHODS

New queries were conducted of the California Department of Fish and Wildlife's *Natural Diversity Data Base* (2021), the California Native Plant Society (CNPS) Inventory for Special-

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EXHIBIT Q - UPDATED BIOLOGICAL RESOURCES ASSESSMENT

status plants (2021), and the USFWS *Information for Planning and Conservation* (2021) Environmental Conservation Online System for the study area to identify special-status species known to occur in the project region and determine if there were any changes since the 2016 update. The seven-quadrangle search area included the Coloma, Garden Valley, Slate Mtn., Shingle Springs, Placerville, Camino, and Fiddletown USGS quadrangles.

For the purposes of this report, special status species are those that fall into one or more of the following categories:

- Listed as endangered or threatened under the federal Endangered Species Act (or formally proposed for listing),
- Listed as endangered or threatened under the California Endangered Species Act (or proposed for listing),
- Designated as rare, protected, or fully protected pursuant to California Fish and Game Code,
- Designated a Species of Concern by the California Department of Fish and Wildlife,
- Defined as rare or endangered under Section 15380 of the California Environmental Quality Act (CEQA), or
- Designated as Rank 1, 2, or 3 on lists maintained by the California Native Plant Society.

A field assessment was conducted on April 9, 2021 by Biologist Hunter Gallant. The property was evaluated for similarities and differences from the 2016 update. Vegetation units and aquatic resources were observed for any changes that may have occurred. During the field assessment, representative aerial and ground photographs were taken. Surveys to determine the actual presence or absence of potentially occurring special-status species were not conducted during this reconnaissance-level evaluation.

FINDINGS

Soils

The area around the Forni Road property is underlain by Mesozoic granitic rock, as illustrated in Figure 3.

Three soils series have been mapped on the site:

- Boomer gravelly loam, 3 to 15 percent slopes
- Diamond Springs very fine sandy loam, 9 to 15 percent slopes
- Placer diggings

None of these soils are ultramafic (serpentine or gabbroic), that are known to support special-status plants in the region.

Hydrology

The hydrology of the study area remains the same as evaluated in 2016. The Forni Road site is in the South Fork American watershed (HUC 18020129). The main hydrological feature on the site is a stream channel emerging from a culvert under Forni Road. This channel is noted on the USGS quad, and it receives dry-season runoff from developments upstream. As observed during the April 2021 site evaluation, water was flowing at a trickle in the stream. The

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EXHIBIT Q - UPDATED BIOLOGICAL RESOURCES ASSESSMENT

unnamed stream is a tributary of Weber Creek. Weber Creek flows into the South Fork of the American River which flows into Folsom Lake. The American River is a tributary of the Sacramento River.

Habitat and Vegetation

The site has remained unaltered since we reviewed it in 2016. New aerial photography and habitat mapping are presented here, and habitat types are quantified in Table 1, and illustrated in Figure 4. Figures 5a-b provide representative aerial site photos, and Figures 5c-d show representative ground photos of the study area.

Table 1
Biological Communities within the Creekside Plaza Study Area

Biological Community	Acreage
Annual Grassland	0.33
Ruderal	0.43
Blue Oak-Foothill Pine Woodland	2.06
Riparian	1.52
Total	4.34

Annual Grassland is mapped along the edge of Missouri Flat Road near the northwestern boundary of the study area (Figure 5c). It supports weedy annual species including yellow star thistle (*Centaurea solstitialis*), ripgut grass (*Bromus diandrus*), soft chess (*Bromus hordeaceus*), blue wildrye (*Elymus glaucus*), foxtail barley (*Hordeum murinum*), Italian ryegrass (*Festuca perennis*), and harding grass (*Phalaris aquatica*). A few coyote brush (*Baccharis pilularis*) shrubs occur, and a remnant residential footprint with ornamental landscape species, [deodar cedar (*Cedrus deodara*)] and a few dead fruit trees are grouped into this component as well. An existing heritage live oak (*Quercus wislizeni*) occurred here near Missouri Flat Road in the past but has broken off at the trunk in the recent past.

Ruderal habitats are those that are often continuously disturbed. They tend to be sparsely vegetated and support undesirable non-native species. Species in the ruderal area include skeleton weed (*Chondrilla juncea*), Russian thistle (*Salsola tragus*), yellow starthistle, red sand spurry (*Spergularia rubra*), horehound (*Marrubium vulgare*), puncture vine (*Tribulus terrestris*), fluvellin (*Kickxia elatine*), and barbed goatgrass (*Aegilops triuncialis*). Vehicular traffic is high in this area as it is utilized as a used car lot where people regularly park their vehicles and put them up for sale. Higher traffic areas are completely barren with ruderal vegetation limited to the edges as it transitions to blue oak- foothill pine woodland.

Riparian habitat occurs along the intermittent stream that bisects the site. The riparian corridor consists of a dense canopy of narrow-leaved willow (*Salix exigua*), red willow (*S. laevigata*), arroyo willow (*S. lasiolepis*), valley oak (*Quercus lobata*), and Fremont cottonwood (*Populus fremontii*). Himalayan blackberry (*Rubus armeniacus*) forms dense thickets within and along the riparian habitat.

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Blue oak- foothill pine woodland occurs adjacent to the stream and riparian corridor. Interior live oak, blue oak (*Quercus douglasii*), and foothill pine (*Pinus sabiniana*) are common species; interior live oak being the dominant oak species. A few valley oaks are present along the stream. The woodland is becoming dense, and shrubs such as coyote brush and buck brush (*Ceanothus cuneatus*) are also filling the voids. North of the stream, buckeye (*Aesculus californica*) is common. Open areas are increasingly filling in with oak and shrubs.

Wildlife Occurrence and Usage

The project site is located in a highly urban area but, nonetheless, is refugia for locally common species due to the dense vegetative cover and availability of water. The taller trees located throughout the site, including foothill pines, oaks, and cottonwoods, may provide potential nesting and roosting habitat for raptors. Shrubs and trees provide nesting and foraging habitat for resident and migratory songbirds. Bird species observed during the April 9 site visit include western scrub jay, bushtit, oak titmouse, house sparrow, California quail, Anna's hummingbird, and European starling.

Larger mammals such as deer and coyote are likely to pass through the site and seek refuge near the stream. Smaller mammals, such as western grey squirrel, were numerous in the woodland canopy. Because of the shallow surface water depths and limited drainage area, occurrence of aquatic species within the onsite drainage is likely limited to smaller amphibians such as Pacific tree frog and western toad, but not fish or turtles.

Aquatic Resources

Aquatic resources were originally delineated by North Fork Associates in August 2006 (*Wetland Delineation for the ±4.5-acre Forni Road Project, North Fork Associates, 2006*). A jurisdictional determination was issued by the U.S. Army Corps of Engineers (Corps) in September 2008 (SPK 200200211) and expired in 2013. In later conversations with the Corps regarding re-verification of the delineation, and following a field visit by the Corps, it was determined that the delineation needed to be updated. The updated delineation was completed by Salix Consulting, Inc. (*Wetland Delineation for the ±4.31-acre Creekside Plaza Study Area, November 2015*), and a Preliminary Jurisdictional Determination was issued by the Corps April 19, 2016.

Two types of aquatic resources occur within the study area—a wetland swale and an intermittent stream. The wetland swale begins along the southwestern boundary and flows northeast. The intermittent stream traverses the site from southeast to northwest. From the April 2021 field visit, on site aquatic resources have remained unchanged from previous surveys.

Special-Status Species

Salix re-queried the California Natural Diversity Database (CNDDB 2021) for location records for special-status species known to occur in the 7-quadrangle region surrounding the study area (as described above). In addition, the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Conservation database (IPaC 2021) was queried for the study area, as was the California Native Plant Society (CNPS 2021) Inventory for special-status plants occurring in the 7-quad area. Figures 6a and 6b illustrate special-status species occurrences within a 5-mile radius of the study area.

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EXHIBIT Q - UPDATED BIOLOGICAL RESOURCES ASSESSMENT**

Plants

Table 2 lists 16 special-status plants that appear in the 2016 database queries, and their likelihood to occur on the site remains “none” due to the absence of suitable habitat or substrates. Note that Chaparral sedge (*Carex xerophila*) and Bisbee Peak rush rose (*Crocianthemum suffrutescens*) appeared in the 2021 CNDDDB query and are included in the analysis in Table 2. Neither species is expected to occur on the site due to the absence of suitable soils.

Table 2. Special-Status Plants Determined to have NO POTENTIAL to Occur Within the Creekside Plaza Study Area (2021)					
Species	Status* Federal State CNPS			Habitat	Reason for NO POTENTIAL to occur
Plants					
Red Hills soaproot <i>Chlorogalum grandiflorum</i>		-	1B.2	Chaparral; cismontane woodland[serpentinite or gabbroic].;	Site lacks gabbro/serpentine soils.
Jepson’s Onion <i>Allium jepsonii</i>			1B.2	Cismontane woodland; lower montane coniferous forest; [serpentinite or volcanic].;	Site lacks serpentine soils.
Stebbins' morning-glory <i>Calystegia stebbinsii</i>	FE	CE	1B.1	Chaparral (openings); cismontane woodland; [serpentinite or gabbroic].	Site lacks gabbro/serpentine soils.
Pine Hill flannelbush <i>Fremontodendron decumbens</i>	FE	CR	1B.2	Chaparral; cismontane woodland; [gabbroic or serpentinite].	Site lacks gabbro/serpentine soils.
Western vibernum <i>Viburnum ellipticum</i>	-	-	2B.3	Chaparral; cismontane woodland; lower montane coniferous forest. Generally on north-facing slopes.	No suitable habitat. Site lacks shaded slopes.
Layne’s ragwort <i>Packera layneae</i>	FT	CR	1B.2	Chaparral; cismontane woodland; [gabbroic or serpentinite].	Site lacks gabbro/serpentine soils.
El Dorado County mules ears <i>Wyethia reticulata</i>	-	-	1B.2	Chaparral; cismontane woodland; lower montane coniferous forest [clay or gabbroic]	Site lacks gabbro soils
Pine Hill ceanothus <i>Ceanothus roderickii</i>	FE	CR	1B.1	Chaparral; cismontane woodland; [serpentinite or gabbroic].	Site lacks gabbro/serpentine soils
Eldorado bedstraw <i>Galium californicum sierrae</i>	FE	CR	1B.2	Chaparral; cismontane woodland; lower montane coniferous forest [gabbroic]	Site lacks gabbro soils
Pleasant Valley mariposa-lily <i>Calochortus clavatus avius</i>	-	-	1B.2	Lower montane coniferous forest (Josephine silt loam and volcanic)	No suitable habitat occurs onsite.

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Table 2. Special-Status Plants Determined to have NO POTENTIAL to Occur Within the Creekside Plaza Study Area (2021)					
Species	Status* Federal State CNPS			Habitat	Reason for NO POTENTIAL to occur
Parry's horkelia <i>Horkelia parryi</i>	-	-	1B.2	Chaparral; cismontane woodland; [especially Ione formation]	No suitable habitat occurs onsite.
Nissenan manzanita <i>Arctostaphylos missanana</i>	-	-	1B.2	Closed-cone coniferous forest; chaparral	No suitable habitat occurs onsite.
Sierra arching sedge <i>Carex cyrtostachya</i>	-	-	1B.2	Lower montane coniferous forest; Meadows & seeps; Marshes & swamps; Riparian forest margins	No suitable habitat occurs onsite.
Van Zuuk's morning-glory <i>Calystegia vanzuukiae</i>	-	-	1B.3	Chaparral; Cismontaine woodland (Gabbro, serpentinite)	Site lacks gabbro/serpentine soils
Chaparral sedge <i>Carex xerophila</i>	-	-	1B.2	Chaparral, Cismontane woodland, Lower montane coniferous forest (serpentinite, gabbroic)	Site lacks gabbro/serpentine soils
Bisbee Peak rush rose <i>Crocanthemum suffrutescens</i>	-	-	3.2	Chaparral (Often gabbroic or lone soil; often burnded or disturbed areas)	Site lacks gabbro/Ione soils.

Animals

Table 3 lists 10 special-status animals that appeared in both the 2016 database queries and the 2021 queries, whose likelihood to occur on the site remains "none" due to the absence of suitable habitat or substrates, and the Table also lists one species whose likelihood to occur on the site remains "unlikely" due to the presence of only marginal habitat. Note that the 2016 CNDDDB query results included great gray owl, which did not appear on the 2021 query results.

Two (2) additional species with state status appeared in the 2021 query results: pallid bat (*Antrozous pallidus*) and western bumble bee (*Bombus occidentalis*). Neither of these species is likely to occur within the Study area.

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Table 3. Special-Status Wildlife That Could Occur Within the Creekside Plaza Study Area (2021)					
Species	Federal	Status* State	Other	Habitat	Potential for Occurrence**
Amphibians					
California red-legged frog <i>Rana draytonii</i>	FT	SSC	-	Ponds and deeper pools along streams with emergent or overhanging vegetation. Surface water to at least June.	None. Drainage does not provide suitable aquatic habitat for species. Prefers ponds or slow-moving reaches of streams with permanent surface water. CNDDDB does not show any occurrences within five miles
Foothill yellow-legged frog <i>Rana boylei</i>	-	SSC	-	Found in partially shaded, shallow streams with rocky substrates. Needs some cobble-sized rocks as a substrate for egg laying. Requires water for 15 weeks for larval transformation.	Unlikely. Marginal habitat observed along intermittent stream. Closely associated with steeper gradient streams with rocky substrate. CNDDDB does not show any occurrences within five miles.
Insects					
Western bumble bee <i>Bombus occidentalis</i>	-	CE	-	Nests are primarily in underground cavities such as old squirrel or other animal nests and in open west-southwest slopes bordered by trees. Forages on a variety of flowering plants for pollen and nectar	None. Site does not present appropriate nesting habitat.
Fish					
Delta Smelt <i>Hypomesus transpacificus</i>	FT	-CT	-	Endemic to the Sacramento-San Joaquin Delta in coastal and brackish waters. Occurs seasonally in Suisun and San Pablo bays. Spawning usually occurs in dead-end sloughs and shallow channels.	None. Study area located outside range of species. No suitable habitat present.

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<p align="center">Table 3. Special-Status Wildlife That Could Occur Within the Creekside Plaza Study Area (2021)</p>					
Species	Federal	Status* State	Other	Habitat	Potential for Occurrence**
Reptiles					
Western pond turtle <i>Emys marmorata</i>	-	SSC	-	Inhabits ponds, marshes, rivers, streams, and irrigation ditches with aquatic vegetation. Requires suitable basking sites and upland habitat for egg laying.	None. Drainage does not provide suitable aquatic habitat for reproduction. Prefers perennial surface water with deep pools and basking sites. May utilize drainage as a travel corridor.
California horned lizard <i>Phrynosoma coronatum frontale</i>		SSC	-	Found in a variety of habitats, but most common in sandy washes with scattered shrubs. Requires open areas for sunning, shrubs for cover, and sandy soil for hiding.	None. No suitable habitat present on site. Prefers open habitats of lowlands, such as sandy washes and flood plains. No individuals observed within project site during field survey.
Birds					
Bank swallow <i>Riparia riparia</i>	-	CT	-	Colonial nester near riparian and other lowland habitats. Requires vertical banks or cliffs with fine-textured, sandy soils near streams, rivers, and lakes.	None. No suitable nesting habitat present onsite.
Tri-colored blackbird <i>Agelaius tricolor</i>	-	CE	-	Colonial nester in dense cattails, tules, brambles, or other dense vegetation. Requires open water, dense vegetation, and open grassy areas for foraging.	None. No suitable nesting habitat present onsite.
Northern goshawk <i>Accipiter gentilis</i>	-	SSC		Dense, mature coniferous forests, most typically dense fir stands in the Sierra Nevada mountains.	None. No suitable nesting habitat present onsite.
Mammals					
Fisher- West Coast DPS <i>Pekania pennanti</i>	FPT	CC, SSC	-	Occurs in intermediate to large-tree stage coniferous forests and riparian woodlands with a high percent of canopy closure.	None. Site lacks suitable habitat.

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Table 3. Special-Status Wildlife That Could Occur Within the Creekside Plaza Study Area (2021)					
Species	Status*			Habitat	Potential for Occurrence**
	Federal	State	Other		
Pallid bat <i>Antrozous pallidus</i>	-	SSC	-	Occurs in grasslands, woodlands, deserts & urban habitats; open habitat required for foraging. Common in dry habitats with rocky outcrops, cliffs, and crevices for roosting. Roosts include caves, mines, bridges & occasionally hollow trees, buildings.	None. Site lacks suitable habitat.

***Status Codes:**

Federal

FE Federal Endangered
FPT Federal Proposed Threatened
FT Federal Threatened

State

CC California Candidate
CE California Endangered
CFP California Fully Protected
CR California Rare
CT California Threatened
SSC California Species of Concern

****Definitions for the Potential to Occur:**

- **None.** Suitable habitat does not occur.
- **Unlikely.** Some habitat may occur, but disturbance or other activities may restrict or eliminate the possibility of the species occurring. Habitat may be very marginal, or the study area may be outside the range of the species.

Recommendations

Aquatic Resources

On January 11, 2018, the USACOE authorized Nationwide Permit 39 for discharge of fill material into 0.23 acre of waters of the U.S. for construction of a mixed-use commercial development (SPK-2002-00211), specifically for grading and redirection of drainage into a storm drain. The permit will be valid until March 18, 2022. The Corps will likely require proof that the project complies with any stipulations made by the USFWS and that aquatic resource credits have been purchased.

The project will require a Clean Water Act Section 401 Water Quality Certification from the Central Valley Regional Water Quality Control Board. Application should be made to the Board when CEQA certification is obtained.

As noted in the 2011 Biological Resources Assessment, the site has habitat regulated by the California Department of Fish and Wildlife (CDFW) pursuant to Section 1600 of the California Fish and Game Code. Activities affecting the stream and associated riparian habitat would require a Lake and Streambed Alteration Agreement (LSAA) from CDFW. When the project design is finalized and CEQA certification is obtained, an application for an LSAA should be submitted to CDFW.

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Oak Resources Conservation Ordinance

In 2017, El Dorado County adopted an Oak Resources Conservation ordinance (Ordinance No. 5061) and the Oak Resources Management Plan (Plan), which must be applied to the Creekside Plaza project. A separate memo outlining the requirements that apply to the current proposed project will be provided under separate cover.

Special-Status Plants

Botanical surveys have been conducted on the site several times since 2006, and no special-status plant species known to occur in the region have ever been located. Given the very low probability of a special status plant species to occupy the site, we do not recommend any further special status plant surveys.

Nesting Raptors and Migratory birds

If site disturbance occurs during the nesting season (Feb. 15-Aug. 31), a pre-construction survey should be conducted by a qualified biologist no more than 15 days prior to initiation of development activities. If active nests are found on or immediately adjacent to the site, a no-work-zone buffer should be established by the biologist and confirmed by El Dorado County and if necessary, CDFW. If no nesting is found to occur, necessary tree removal could then proceed.

Summary

We reviewed the 2011 Biological Resources Assessment and the 2016 update for the Creekside Plaza site, queried three data bases to determine if new information would warrant any further analysis or study of this site, and conducted a field evaluation of the site in April 2021. We identified species that were not noted in the previous analyses, most of which have no suitable habitat in the study area. Other than maturing woody vegetation, the study area is essentially unchanged from the 2016 evaluation. The aquatic resources remain unchanged, and the oak trees are larger. The new information discovered during this analysis does not affect our previous findings.

Please contact me at (530) 888-0130 if you have any questions about this report.
Sincerely,



Jeff Glazner
Principal Biologist

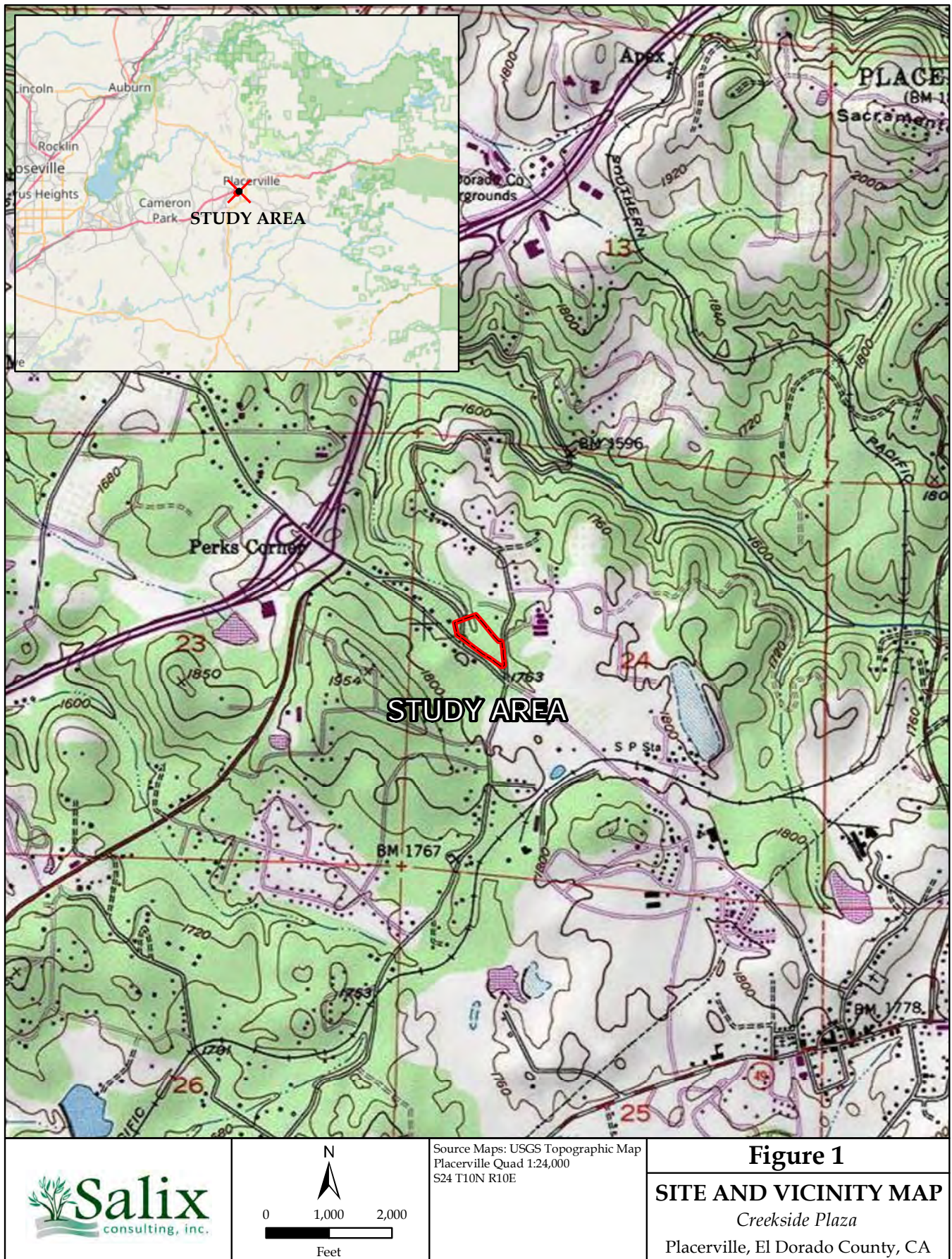
cc: Leslie Burnside, Barghausen Consulting Engineers, Inc.

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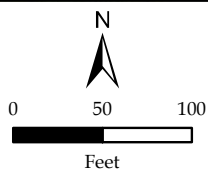
Attachments:

- Figure 1. Site and Vicinity
- Figure 2. Aerial Photo
- Figure 3. Soils Map
- Figure 4. Habitat Map
- Figure 5a-d. Site Photos
- Figure 6a. CNDDB Special-status Plant Occurrence Map
- Figure 6b. CNDDB Special-status Animal Occurrence Map

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Study Area
(±4.34 acres)

Imagery: 4-9-21 Salix Consulting, Inc.

Figure 2

AERIAL MAP

Creekside Plaza

Placerville, El Dorado County, CA

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Looking northwest over study area.
Photo Date: 4-9-21.



Looking northeast over study area.
Photo Date: 4-9-21.



Figure 5a

SITE PHOTOS

Creskide Plaza
El Dorado County, CA

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Looking southeast over study area.
Photo Date: 4-9-21.



Looking southwest over study area.
Photo Date: 4-9-21.



Figure 5b

SITE PHOTOS

Creekside Plaza
El Dorado County, CA

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Looking southeast over ruderal area along Missouri Flat Road.
Photo Date: 4-9-21



Looking north over grassland and woodland areas in western
area of site.
Photo Date: 4-9-21.



Figure 5c

SITE PHOTOS

Creekside Plaza
El Dorado County, CA



Looking northeast into dense vegetation on property.
Photo Date: 4-9-21



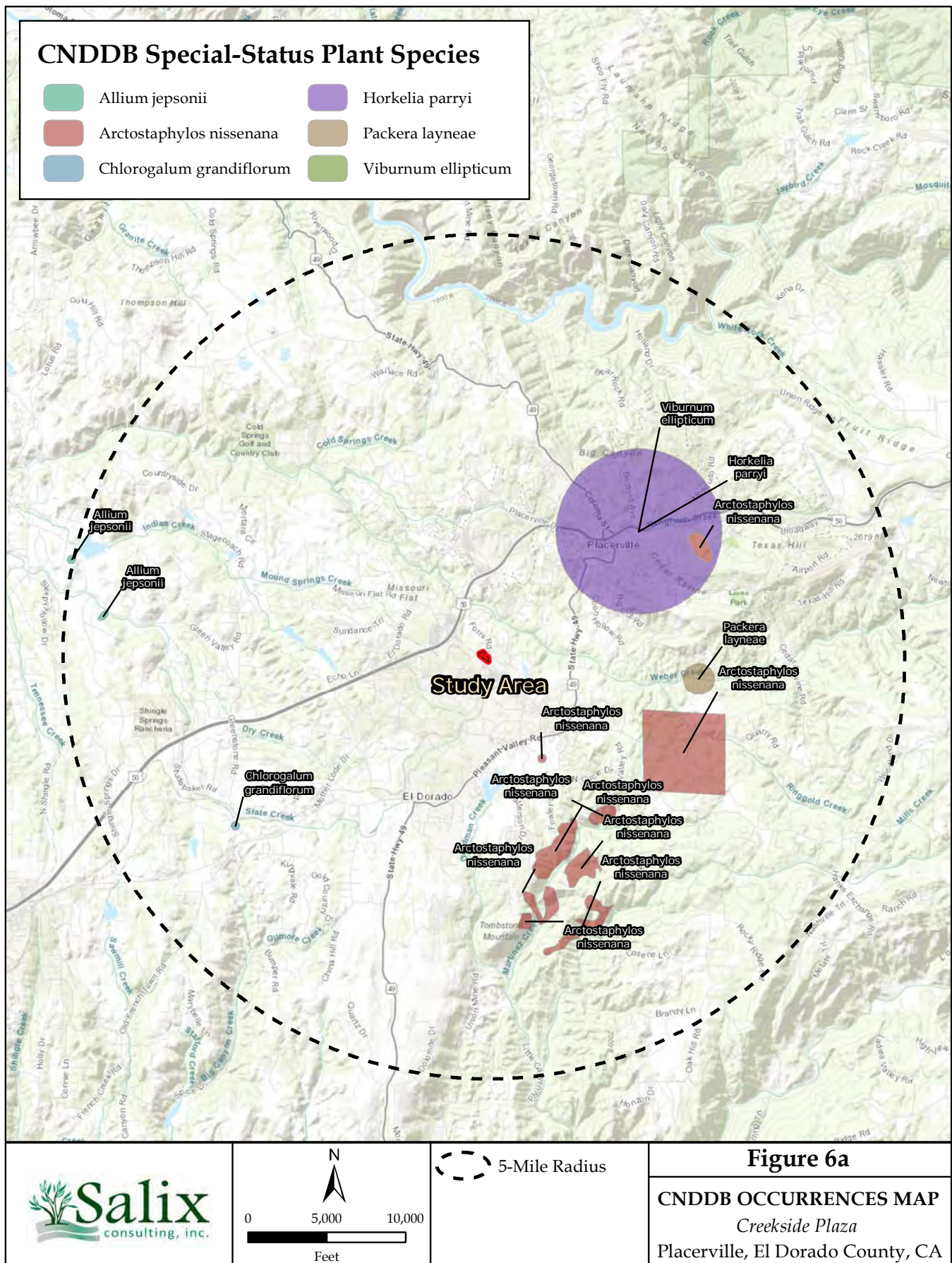
Looking north into dense vegetation on property.
Photo Date: 4-9-21.



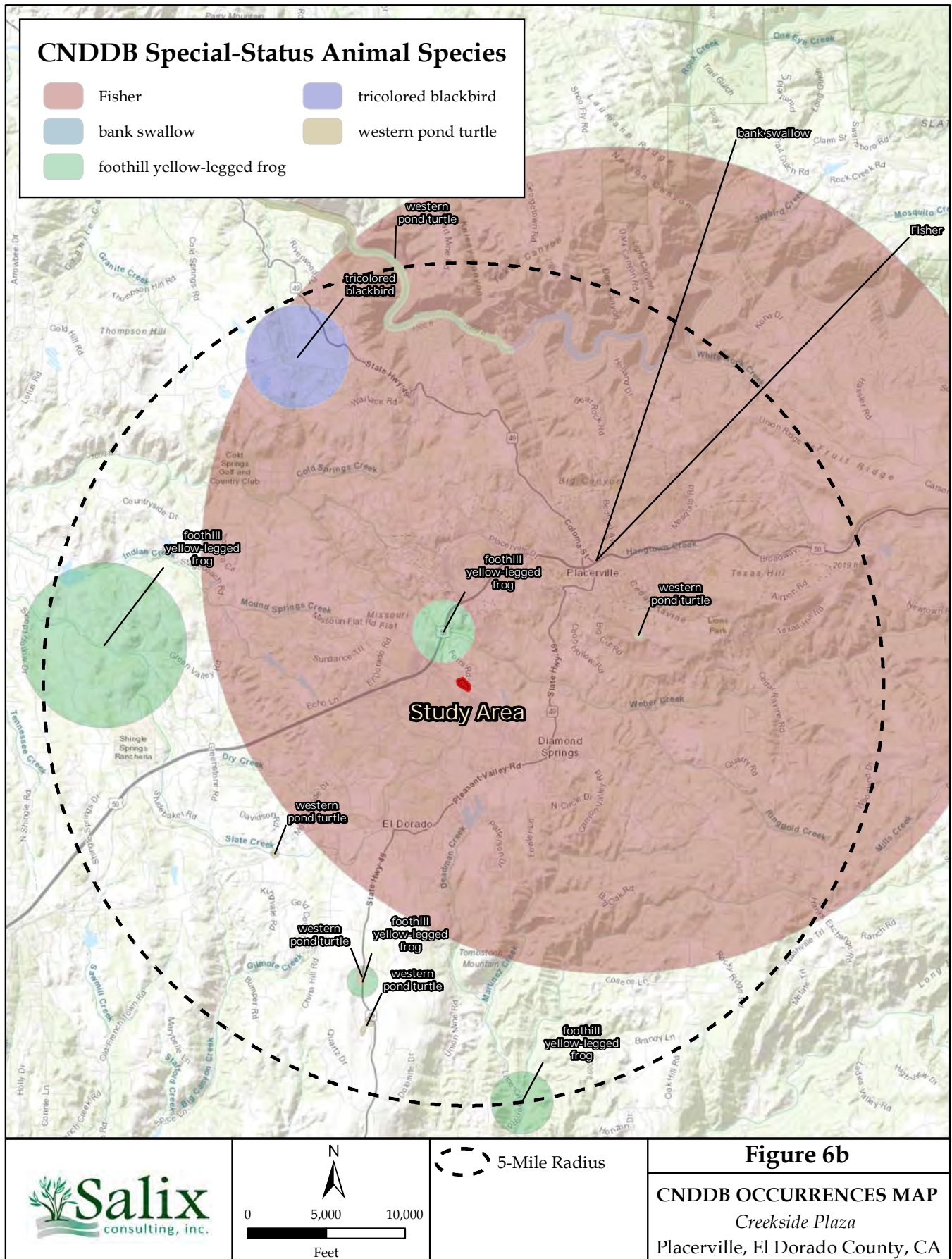
Figure 5d

SITE PHOTOS
Creekside Plaza
El Dorado County, CA

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EXHIBIT R - PRELIMINARY STORMWATER CONTROL PLAN**



B A R G H A U S E N

PRELIMINARY STORMWATER CONTROL PLAN

for

Creekside Plaza

NWC Missouri Flat Road and Forni Road

December 8, 2023

Marc Strauch & Company, A California Corporation

Marc Strauch

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Folsom, CA 95650

prepared by:

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EXHIBIT R - PRELIMINARY STORMWATER CONTROL PLAN

1.0 INTRODUCTION

The project site is located on the northwest corner of Missouri Flat Road and Forni Road in Placerville, California at 3820 Forni Road and 4179 and 4221 Missouri Flat Road (refer to Figure 1 - Site Location Map). The existing property is comprised of three parcels approximately 4.3 acres in total size and is currently owned by Grado Equities VII, LLC.

The facilities proposed for this location include a 2,880 square-foot ampm Convenience Store, an ARCO fueling facility with eight (8) dispensers, and a 3,337 square-foot Carwash and Mechanical Room. The fueling facility is supported by two underground storage tanks containing two (2) grades of gasoline (87 and 92 Octane) and one (1) compartment for diesel.

The existing condition of the site consists of a combination of grass, brush, and oak trees. Drainage originates on or above the project site and drains from the east, southeast, south, and southwest into an existing unnamed tributary of Weber Creek that flows through the site from the southeast to the northwest. The tributary converges with Weber Creek at a flow distance of approximately one mile downstream from the site.

The drainage for the site was analyzed using methodology as discussed in the El Dorado County Drainage Manual, adopted September 22, 2020.

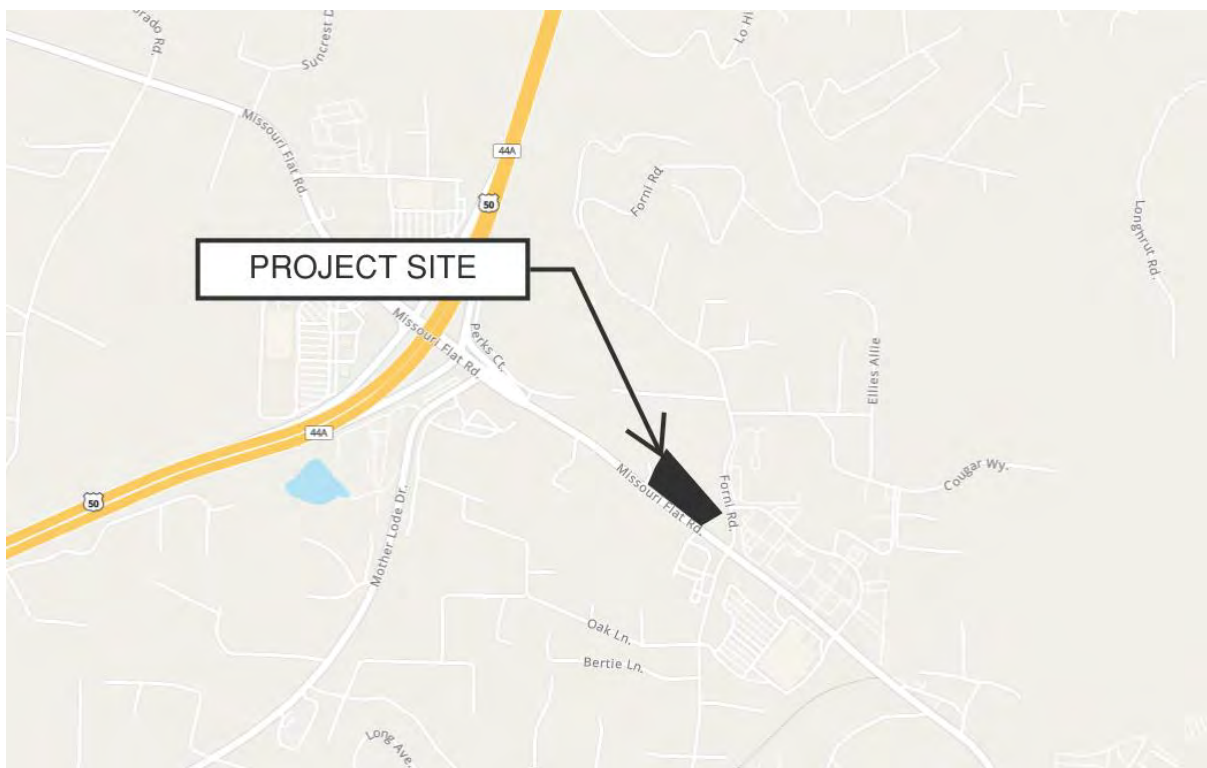


Figure 1 Site Location Map

2.0 PROJECT REQUIREMENTS AND SUMMARY OF COMPLIANCE

The project is classified as a Type 5 – Hydromodification Project per the West Slope Requirements. As such, the following measures are to be implemented; a description of compliance is also provided:

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EXHIBIT R - PRELIMINARY STORMWATER CONTROL PLAN

1. **Limit clearing, grading, and soil compaction** – the extent of construction impacts has been minimized to the maximum extent practicable. The site is constrained to the smallest impact footprint required for construction of the development.
2. **Minimize impervious surfaces** – Impervious surfacing has been minimized to the extent practicable while meeting the overall functionality and use of the development.
3. **Direct runoff to landscaping and/or use porous pavement** – The topography of the site requires retaining walls to be constructed on the northern and eastern extents of the development. The retaining walls are also necessary to avoid impacts to the seasonal tributary and associated wetlands directly east of the development. Directing runoff to landscaping areas and/or the use of porous pavement is not feasible for this site since additional hydrostatic pressure could be exerted on the retaining walls. The project has incorporated alternative stormwater detention and treatment measures in order to meet the intent of this requirement.
4. **Conserve natural areas** – The footprint of the development has been reduced to the extent practicable. The development plans to protect the seasonal tributary and associated wetlands from impacts caused by construction activities.
5. **Comply with County slope and stream setback ordinances** – The site conforms to all applicable County slope and stream setback ordinances. The southern portion of the site has been previously reviewed by the County; the ARCO development has been designed to hold the limits of the previously approved site to the south and maintaining the drainage concepts while also adjusting to meet the use of the updated planned development to the greatest extent practicable.
6. **Comply with County grading, erosion, and sediment control ordinance** – The site conforms to all applicable County grading, erosion, and sediment control ordinances. A detailed erosion control plan and Stormwater Pollution Prevention Plan (SWPPP) shall be prepared, and a Notice of Intent filed for the Statewide General NPDES Permit for stormwater discharges issued by the State Water Resources Control Board at the time of construction document submittal.
7. **Implement and direct water to Site Design Measures** – Stormwater runoff from the site will be directed to an ADS BayFilter proprietary system as approved by El Dorado County as well as an underground stormwater detention system. Stormwater will then be released at a controlled rate and outlet to the natural wetland located onsite as approved previously by El Dorado County.
8. **Direct runoff from the 85th percentile 24-hour storm event (1.13 inch of water and 0.2 inches/hour intensity per the SWMP for Western El Dorado County) to one or more Stormwater Treatment and Baseline Hydromodification Measures using volumetric and/or flow-based sizing criteria** – All collected stormwater runoff for the 85th percentile 24-hour storm will be directed to an ADS BayFilter proprietary system prior to being discharged from the site. The proprietary system has been sized using flow-based sizing criteria. Additional information regarding all stormwater calculations is included herein.
9. **Identify potential sources of pollutants and implement corresponding source control measures** – Please refer to Section 6 for additional information.
10. **Provide ongoing maintenance of water detention and treatment facilities** – All stormwater detention and treatment facilities will be maintained by the Owner.

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EXHIBIT R - PRELIMINARY STORMWATER CONTROL PLAN

3.0 Drainage Analysis

Catchment Description/Delineation:

Refer to **Appendix A** for a detailed map of the drainage basin. A brief description of current conditions and the development conditions are as follows:

3.1 Existing Conditions

- Size: 1.5 acres (refer to **Appendix A** for detailed map)
- Ground Cover: Combination of grass, brush, and oak trees.
- Description: The site generally slopes from the southwest to the northeast across the limits of the basin. The basin is bounded by a curb and sidewalk to the west and wetlands on the east. The site currently occupies a drainage channel that outlets drainage to the existing unnamed tributary to Weber Creek.

3.2 Developed Conditions

- Size: 1.5 acres (refer to **Appendix A** for detailed map). Although the site has been designed to provide a ridgeline at each proposed driveway to separate onsite and offsite runoff, calculations were performed using the entire impervious area of the development to demonstrate treatment requirements are met for the entirety of the site.
- Ground Cover: The site will be developed with a combination of pervious and impervious surfacing. Improvements will include the construction of a covered six (6) MPD ARCO fuel station, a 2,880 square-foot ampm convenience store, and an automatic carwash, paved parking and maneuvering areas, pedestrian and bicycle facilities, landscaping, site retaining walls, and a stormwater conveyance, treatment, and detention system.
- Description: The site will generally slope from southeast to northwest at varying slopes, following natural drainage patterns to the greatest extent practicable.

All stormwater runoff from the DMA depicted in **Appendix A** drains to the lowest point on site via concrete valley gutters and sheet flow. A summary of the DMA is as follows:

Table 1: Drainage Management Area Summary

Drainage Management Area #	Overall Area (SF)	Impervious Area (SF)	Impervious Runoff Coefficient	Pervious Area (SF)	Pervious Runoff Coefficient	Composite Runoff Coefficient
1	65,449	47,287	0.90	18,162	0.20	0.71

4.0 Hydraulic Analysis

4.1 Existing Conditions

Hydraulic calculations were performed to determine the peak flow discharged from the site under existing conditions for design storms with a recurrence interval of 2, 10, and 100 years. The analysis was completed utilizing the Rational Method in accordance with the requirements of Section 2 of the County of El Dorado Drainage Manual Adopted September 22, 2020. Detailed

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EXHIBIT R - PRELIMINARY STORMWATER CONTROL PLAN

calculations shall be included with construction document submittal. Assumptions and variables used are listed below:

- Mean annual rainfall: 38 inches. Obtained from El Dorado County information.
- Rainfall depth: As listed below. Obtained from NOAA Atlas 14 (refer to **Appendix B**).
- Rainfall intensity: As listed below. Obtained from NOAA Atlas 14 (refer to **Appendix B**).
- Time of concentration: 12 minutes. Calculated in accordance with TR55 per the El Dorado Drainage Manual.
- Peak Flow: Calculated in accordance with Rational Method as modified by the El Dorado Drainage Manual.
- Runoff Coefficient: 0.2 – Unimproved.

A summary of the results is listed below in Table 2: Calculation Summary – Existing Conditions:

Table 2: Calculation Summary - Existing Conditions

Drainage Management Area #	Design Storm	Tc (Minutes)	Peak Flow (CFS)
1	2-Year	12	1.42
	10-Year	12	2.01
	100-Year	12	2.96

4.2 Developed Conditions

Hydraulic calculations were performed to determine the peak flow discharged from the site under developed conditions for design storms with recurrence interval of 2, 10, and 100 years. The peak discharged was evaluated based upon detained conditions. The analysis was completed utilizing the Rational Method in accordance with the requirements of Section 2 of the County of El Dorado Drainage Manual Adopted September 22, 2020.

All stormwater runoff generated within the limits of DMA 1 from a design storm with a recurrence interval of 100 years or less will be detained in order to minimize the overall amount of water discharged from the overall site. A discussion of the detention and treatment systems follows within Sections 5 and 7, respectively.

Detailed calculations shall be provided upon construction document submittal. Assumptions and variables used are listed below:

- Mean Annual Rainfall: 38 inches. Obtained from El Dorado County information.
- Rainfall Depth: As listed below. Obtained from NOAA Atlas 14 (refer to **Appendix B**).

PD-R21-0002/CUP21-0004/P-E25-0001 CREEKSIDE PLAZA ARCO

EXHIBIT R - PRELIMINARY STORMWATER CONTROL PLAN

- Rainfall Intensity: As listed below. Obtained from NOAA Atlas 14 (refer to **Appendix B**).
- Time of Concentration: 4 minutes. Calculated in accordance with TR55 per the El Dorado Drainage Manual.
- Peak Flow: Calculated in accordance with Rational Method as modified by the El Dorado Drainage Manual.
- Runoff Coefficient: 0.75 – as calculated via composite C value using areas and values shown in Table 1

A summary of the results is listed below in Table 3: Calculation Summary – Developed Conditions:

Table 3: Calculation Summary - Developed Conditions

Drainage Management Area #	Overall Area (SF)	Composite Runoff Coefficient	Design Storm	Tc (Minutes)	Undetained Peak Flow (CFS)
1	65,449	0.71	2-Year	4	2.42
			10-Year	4	3.43
			100-Year	4	5.02

5.0 Stormwater Detention

As previously mentioned, a stormwater detention system designed to detain stormwater discharges from DMA 1 will be provided. The stormwater detention system will consist of two barrels of ADS MC 3500 chambers and a flow control box. The flow control box will be fitted with a discharge manifold with two orifices (at varying elevations) and an overflow weir. Construction requirements shall be provided with construction document submittal, preliminary calculations using theoretical values for elevations have been provided in **Appendix C**. Preliminary sizing specifications of the detention system have been provided in **Appendix D**. A summary of the system is as follows:

Detention System Data:

- Detention Pipe: 63 feet of MC 3500 Chambers
- Available Storage: 1483 CF
- Orifice No. 1: 1.5 inch diameter orifice with elevation meeting the bottom of the detention system
- Orifice No. 2: 2 inch diameter orifice with elevation meeting the 10-year 24-hour design storm depth
- Overflow Weir: 12 inch diameter circular weir with top of weir elevation meeting the 100-year 24-hour design storm depth

The detained peak flow from DMA 1 and the overall discharge from the drainage basin are summarized below in Table 4.

PD-R21-0002/CUP21-0004/P-E25-0001 CREEKSIDE PLAZA ARCO

EXHIBIT R - PRELIMINARY STORMWATER CONTROL PLAN

Table 4: Calculation Summary - Discharged Flows

Drainage Management Area #	Design Storm	Tc (Minutes)	Undetained Peak Flow (CFS)	Detained Peak Flow (CFS)	Existing Peak Flow (CFS)
1	2-Year	4	2.42	0.065	1.42
	10-Year	4	3.43	0.134	2.01
	100-Year	4	5.02	0.196	2.96

As shown above, the peak flow for the developed site has been attenuated to the extent feasible. A comparison of the existing and developed peak flow discharges from the site is shown to demonstrate that hydromodification requirements to attenuate peak flows from the 2-year, 24-hour storm are met.

6.0 Potential Sources of Pollutants

Potential sources of pollution following the completion of construction activities may include:

- Landscaping and the application of pesticides, herbicides, and/or fertilizer
- Car wash
- Fueling area
- Trash enclosure

6.1 Source Control BMPs

The following Source Control BMPs as prepared by the California Stormwater Quality Association (CASQA) shall be incorporated in the design of the site:

- SD-10: Site Design and Landscape Planning
- SD-12: Efficient Irrigation:
- SD-13: Storm Drain System Signs
- SD-30: Fueling Areas
- SD-32: Trash Enclosures
- SD-33: Vehicle Washing Areas

7.0 Stormwater Treatment

In addition to the implementation of the Source Control BMPs, a stormwater treatment system will be installed to treat all stormwater runoff from the 85th percentile, 24-hour design storm event. The stormwater treatment system will consist of a proprietary device manufactured by ADS called a BayFilter 545 device.

PD-R21-0002/CUP21-0004/P-E25-0001 CREEKSIDE PLAZA ARCO

EXHIBIT R - PRELIMINARY STORMWATER CONTROL PLAN

The system has been sized per flow-based requirements. Each cartridge has a treatment flowrate of 0.10 CFS per cartridge. The calculated peak flow anticipated for the 85th percentile, 24-hour design storm event using an intensity of 0.2 in/hr per the SWMP for Western El Dorado County is 0.22 CFS. Three cartridges will be required to treat the design flow. Preliminary calculations to determine the design flow and the number of cartridges are provided below. The preliminary design detail of the chosen model is provided in **Appendix D**.

Design Flow (Q=CiA)

Q (cfs)	C	I (in/hr)	A (acres)
0.21	0.71	0.2	1.50

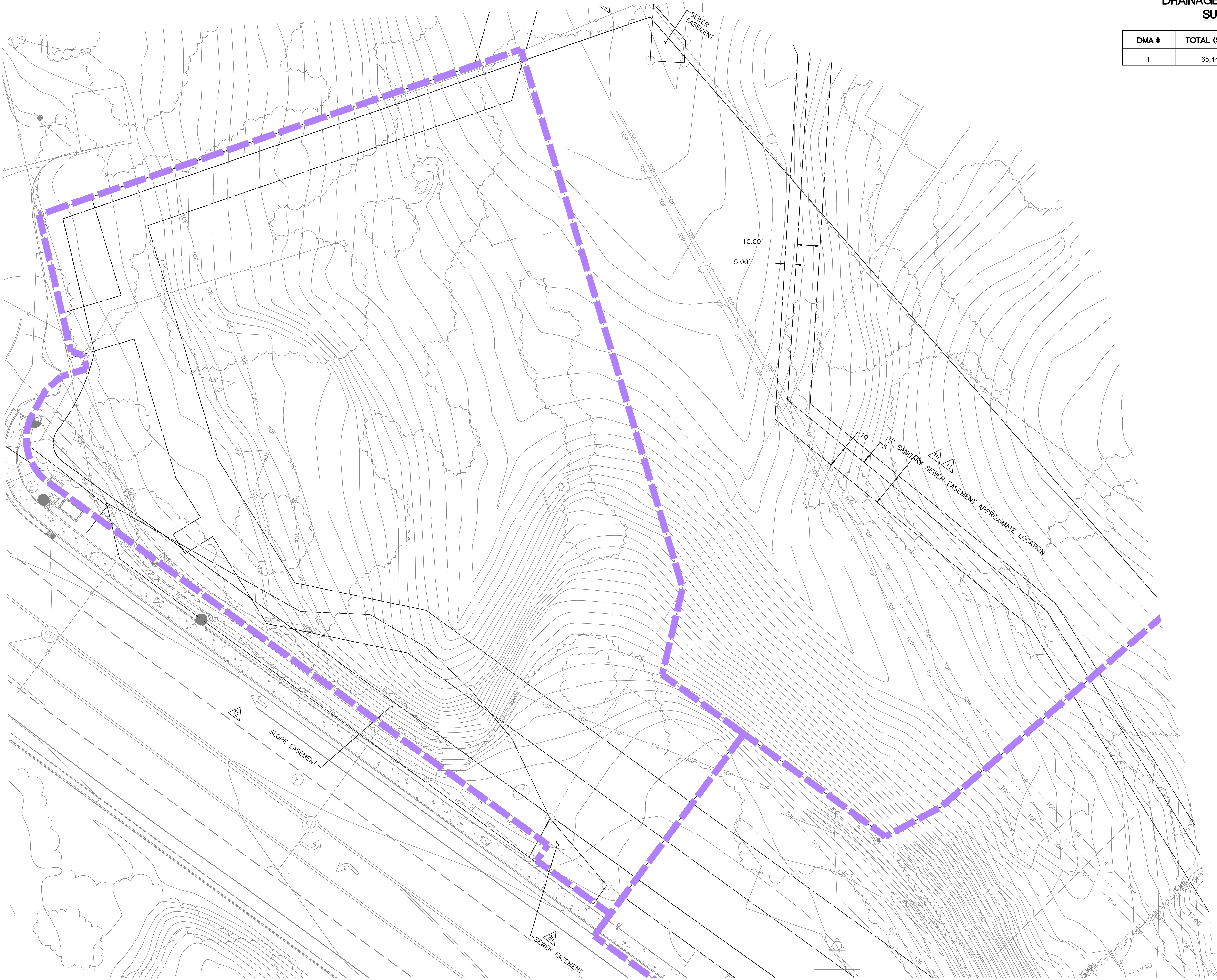
Filter Flow Rate: 0.100 cfs

Number of cartridges required (design peak flow divided by filter flow rate): 3 cartridges

Appendix A

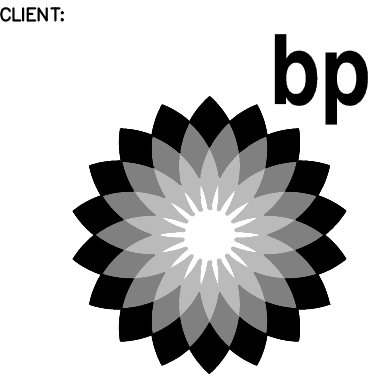
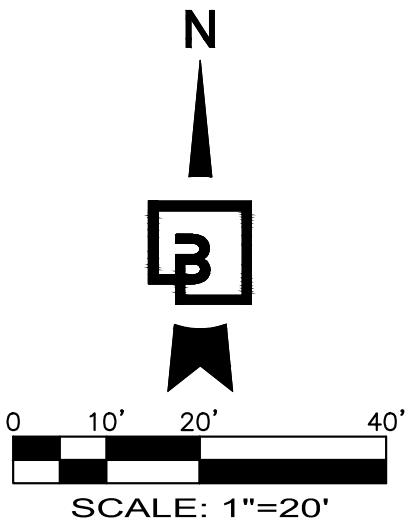
Drainage Basin Map

DRAINAGE BASIN EXHIBIT - EXISTING CONDITION



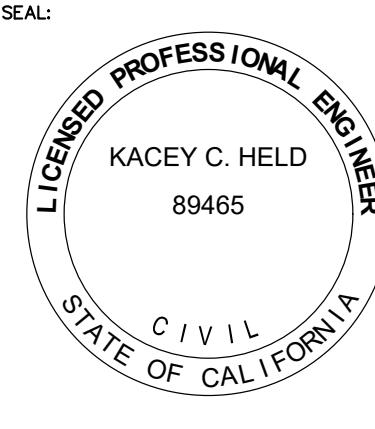
DRAINAGE MANAGEMENT AREA
SUMMARY TABLE

DMA #	TOTAL (SF)	PERVIOUS (SF)	IMPERVIOUS (SF)
1	65,449	65,449	0



Barghausen
Consulting Engineers, Inc.
18215 72nd Avenue South
Kent, WA 98032
425.251.6222
barghausen.com

NO.	DATE	REVISION DESCRIPTION
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		



DEVELOPMENT INFORMATION:
ARCO NTI
2900 am/pm
FUEL CANOPY w/ 6 MPD's
105' CAR WASH

SITE ADDRESS:
4221 MISSOURI FLAT RD
@ FORNI ROAD
PLACERVILLE, CALIFORNIA

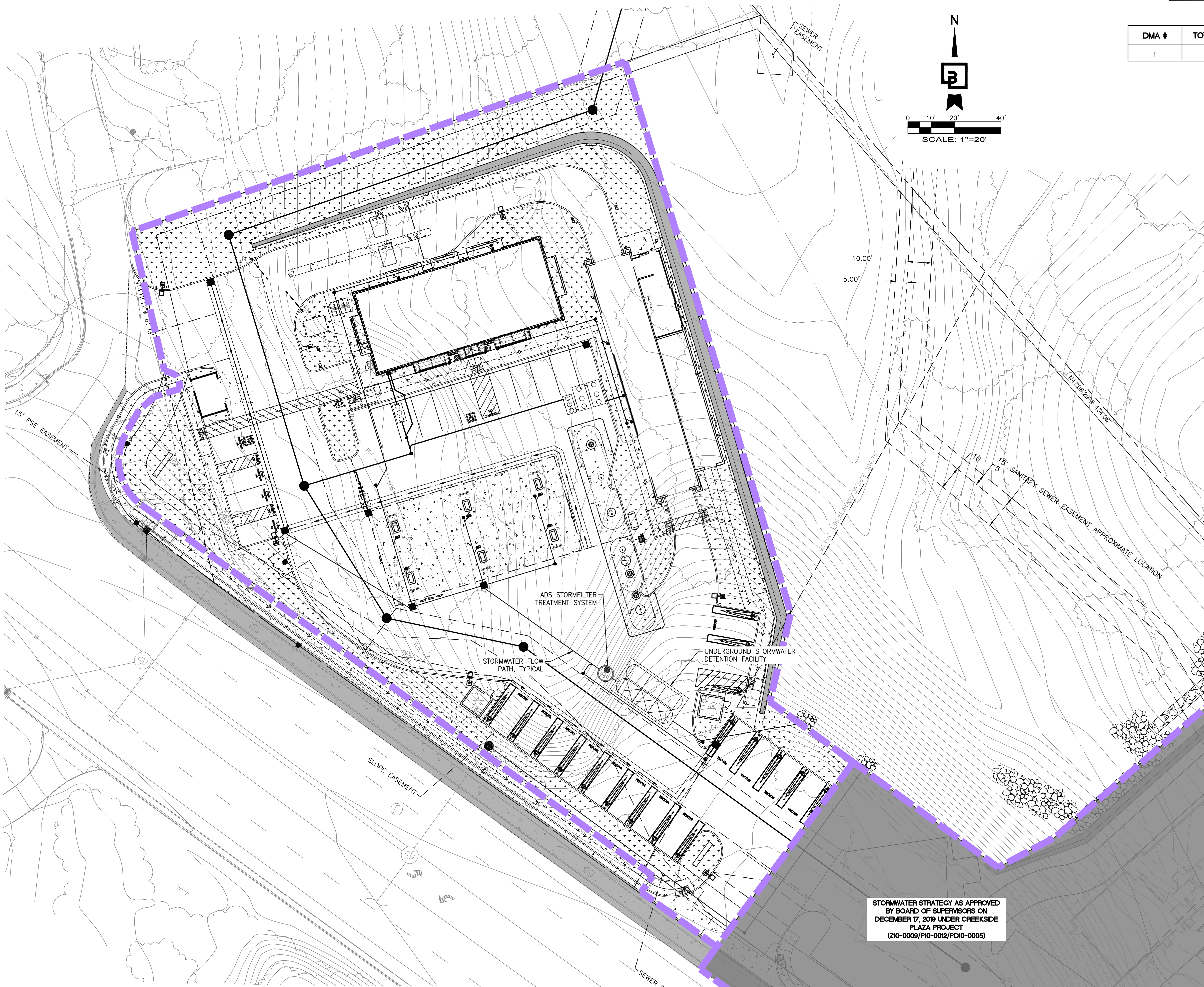
FACILITY #TBD

DESIGNED BY:	EVS	ALLIANCE ZADM:
CHECKED BY:	KCH	BP REPM:
DRAWN BY:	NW	ALLIANCE PM:
VERSION:		PROJECT NO:
		21517

DRAWING TITLE:
**DRAINAGE BASIN
EXHIBIT
EXISTING CONDITION**

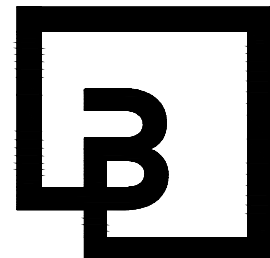
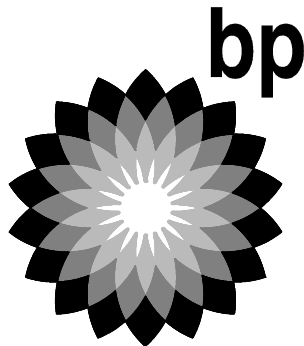
SHEET NO:
1 OF 2

DRAINAGE BASIN EXHIBIT - DEVELOPED CONDITION



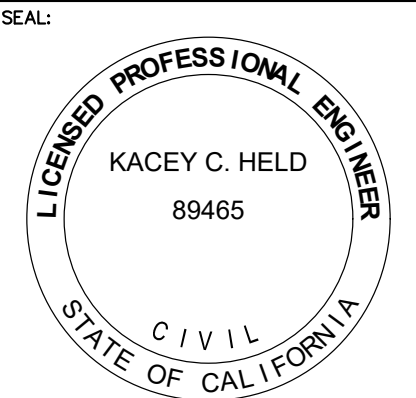
DRAINAGE MANAGEMENT AREA
SUMMARY TABLE

DMA #	TOTAL (SF)	PERVIOUS (SF)	IMPERVIOUS (SF)
1	65,449	18,162	47,287



Barghausen
Consulting Engineers, Inc.
18215 72nd Avenue South
Kent, WA 98032
425.251.6222
barghausen.com

NO.	DATE	REVISION DESCRIPTION
1		
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10		
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18		
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20		



DEVELOPMENT INFORMATION:
ARCO NTI
2900 am/pm
FUEL CANOPY w/ 6 MPD's
105' CAR WASH

SITE ADDRESS:
4221 MISSOURI FLAT RD
@ FORNI ROAD
PLACERVILLE, CALIFORNIA

FACILITY #TBD

DESIGNED BY:	EVS	ALLIANCE ZADM:	
CHECKED BY:	KCH	BP REPW:	
DRAWN BY:	NW	ALLIANCE PM:	
VERSION:		PROJECT NO:	21517

DRAWING TITLE:
**DRAINAGE BASIN
EXHIBIT
DEVELOPED CONDITION**

SHEET NO:

Appendix B

Precipitation Depths and Intensities

PD-R21-0002/CUP21-0004/P-E25-0001 CREEKSIDE PLAZA ARCO

EXHIBIT R - PRELIMINARY STORMWATER CONTROL PLAN

12/5/23, 4:53 PM

Precipitation Frequency Data Server



NOAA Atlas 14, Volume 6, Version 2
Location name **Placerville, California, USA**
Latitude **38.708** , Longitude **-120.8324**
Elevation **1740 ft**
* source: ESRI Maps
** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

[PF_tabular](#) | [PF_graphical](#) | [Maps & aerals](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.148 (0.131-0.170)	0.177 (0.155-0.203)	0.215 (0.189-0.247)	0.247 (0.215-0.287)	0.293 (0.247-0.352)	0.330 (0.272-0.405)	0.369 (0.296-0.464)	0.410 (0.320-0.531)	0.469 (0.351-0.633)	0.516 (0.373-0.722)
10-min	0.213 (0.187-0.244)	0.253 (0.223-0.291)	0.308 (0.270-0.355)	0.355 (0.309-0.412)	0.420 (0.354-0.505)	0.473 (0.390-0.581)	0.529 (0.425-0.665)	0.588 (0.459-0.761)	0.672 (0.502-0.907)	0.740 (0.534-1.04)
15-min	0.257 (0.227-0.295)	0.306 (0.269-0.351)	0.373 (0.327-0.429)	0.429 (0.373-0.498)	0.509 (0.428-0.611)	0.572 (0.471-0.702)	0.639 (0.513-0.804)	0.711 (0.555-0.920)	0.812 (0.608-1.10)	0.895 (0.646-1.25)
30-min	0.359 (0.316-0.411)	0.427 (0.376-0.490)	0.520 (0.456-0.599)	0.599 (0.521-0.695)	0.710 (0.597-0.852)	0.798 (0.657-0.980)	0.892 (0.716-1.12)	0.992 (0.774-1.28)	1.13 (0.848-1.53)	1.25 (0.901-1.75)
60-min	0.511 (0.450-0.586)	0.608 (0.535-0.698)	0.740 (0.649-0.852)	0.852 (0.741-0.989)	1.01 (0.849-1.21)	1.14 (0.935-1.39)	1.27 (1.02-1.60)	1.41 (1.10-1.83)	1.61 (1.21-2.18)	1.78 (1.28-2.48)
2-hr	0.748 (0.659-0.857)	0.888 (0.782-1.02)	1.08 (0.944-1.24)	1.23 (1.07-1.43)	1.44 (1.22-1.74)	1.61 (1.33-1.98)	1.79 (1.44-2.25)	1.97 (1.54-2.55)	2.22 (1.66-3.00)	2.42 (1.75-3.39)
3-hr	0.917 (0.808-1.05)	1.09 (0.956-1.25)	1.31 (1.15-1.51)	1.50 (1.30-1.74)	1.75 (1.47-2.10)	1.95 (1.60-2.39)	2.15 (1.73-2.71)	2.36 (1.84-3.06)	2.65 (1.98-3.58)	2.88 (2.08-4.02)
6-hr	1.35 (1.19-1.55)	1.60 (1.41-1.84)	1.92 (1.69-2.22)	2.19 (1.91-2.54)	2.55 (2.15-3.07)	2.83 (2.33-3.48)	3.12 (2.50-3.92)	3.41 (2.66-4.42)	3.81 (2.85-5.15)	4.13 (2.98-5.77)
12-hr	1.88 (1.66-2.16)	2.22 (1.96-2.55)	2.68 (2.35-3.09)	3.06 (2.66-3.55)	3.58 (3.01-4.30)	3.99 (3.29-4.90)	4.41 (3.54-5.55)	4.85 (3.79-6.28)	5.46 (4.08-7.37)	5.94 (4.29-8.30)
24-hr	2.68 (2.40-3.05)	3.20 (2.86-3.65)	3.90 (3.48-4.46)	4.48 (3.97-5.16)	5.28 (4.53-6.30)	5.92 (4.96-7.20)	6.57 (5.38-8.20)	7.26 (5.78-9.31)	8.21 (6.27-11.0)	8.97 (6.61-12.4)
2-day	3.46 (3.10-3.95)	4.29 (3.84-4.89)	5.36 (4.78-6.13)	6.23 (5.51-7.18)	7.39 (6.32-8.80)	8.27 (6.93-10.1)	9.16 (7.50-11.4)	10.1 (8.01-12.9)	11.3 (8.61-15.1)	12.2 (9.01-16.9)
3-day	4.03 (3.61-4.59)	5.12 (4.58-5.84)	6.50 (5.80-7.43)	7.59 (6.72-8.75)	9.03 (7.73-10.8)	10.1 (8.46-12.3)	11.2 (9.12-13.9)	12.2 (9.72-15.7)	13.6 (10.4-18.2)	14.7 (10.8-20.3)
4-day	4.50 (4.03-5.12)	5.76 (5.15-6.56)	7.34 (6.55-8.39)	8.58 (7.60-9.89)	10.2 (8.73-12.2)	11.4 (9.54-13.9)	12.5 (10.3-15.6)	13.7 (10.9-17.6)	15.2 (11.6-20.3)	16.3 (12.0-22.6)
7-day	5.56 (4.98-6.33)	7.07 (6.33-8.07)	8.95 (7.99-10.2)	10.4 (9.21-12.0)	12.3 (10.5-14.6)	13.6 (11.4-16.6)	14.9 (12.2-18.6)	16.2 (12.9-20.8)	17.8 (13.6-23.8)	19.0 (14.0-26.3)
10-day	6.42 (5.76-7.32)	8.14 (7.29-9.29)	10.3 (9.15-11.7)	11.9 (10.5-13.7)	13.9 (11.9-16.6)	15.4 (12.9-18.7)	16.8 (13.8-21.0)	18.2 (14.5-23.3)	19.9 (15.2-26.6)	21.2 (15.6-29.3)
20-day	8.74 (7.83-9.95)	11.1 (9.93-12.7)	13.9 (12.4-15.9)	16.1 (14.2-18.5)	18.7 (16.1-22.3)	20.6 (17.3-25.1)	22.4 (18.3-28.0)	24.1 (19.2-30.9)	26.2 (20.0-35.1)	27.8 (20.5-38.4)
30-day	10.5 (9.40-11.9)	13.4 (12.0-15.2)	16.8 (15.0-19.2)	19.3 (17.1-22.3)	22.5 (19.2-26.8)	24.7 (20.7-30.0)	26.7 (21.9-33.3)	28.7 (22.8-36.8)	31.1 (23.7-41.6)	32.8 (24.2-45.4)
45-day	12.9 (11.6-14.7)	16.5 (14.7-18.8)	20.7 (18.4-23.6)	23.8 (21.0-27.4)	27.6 (23.6-32.8)	30.2 (25.3-36.7)	32.6 (26.7-40.7)	34.9 (27.8-44.8)	37.8 (28.8-50.5)	39.7 (29.3-55.0)
60-day	15.3 (13.7-17.4)	19.5 (17.4-22.2)	24.4 (21.8-27.9)	28.0 (24.8-32.3)	32.4 (27.8-38.7)	35.5 (29.7-43.2)	38.3 (31.3-47.7)	40.9 (32.5-52.5)	44.1 (33.7-59.0)	46.3 (34.1-64.1)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.
Please refer to NOAA Atlas 14 document for more information.

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PF graphical

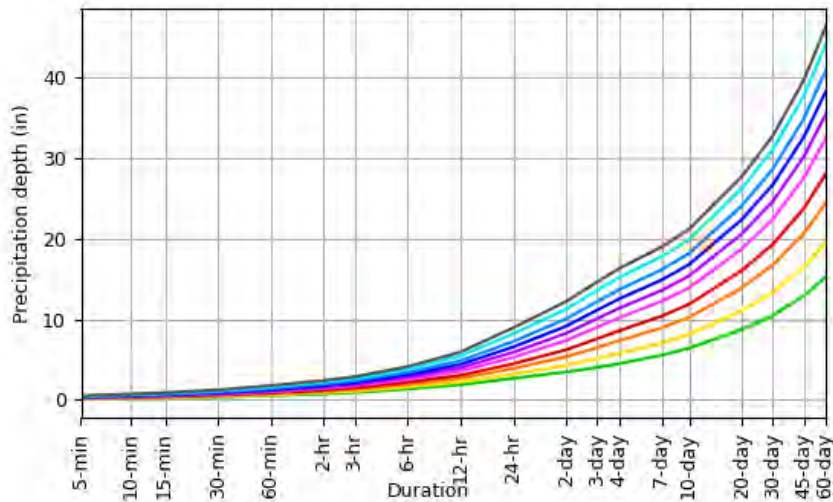
PD-R21-0002/CUP21-0004/P-E25-0001 CREEKSIDE PLAZA ARCO

EXHIBIT R - PRELIMINARY STORMWATER CONTROL PLAN

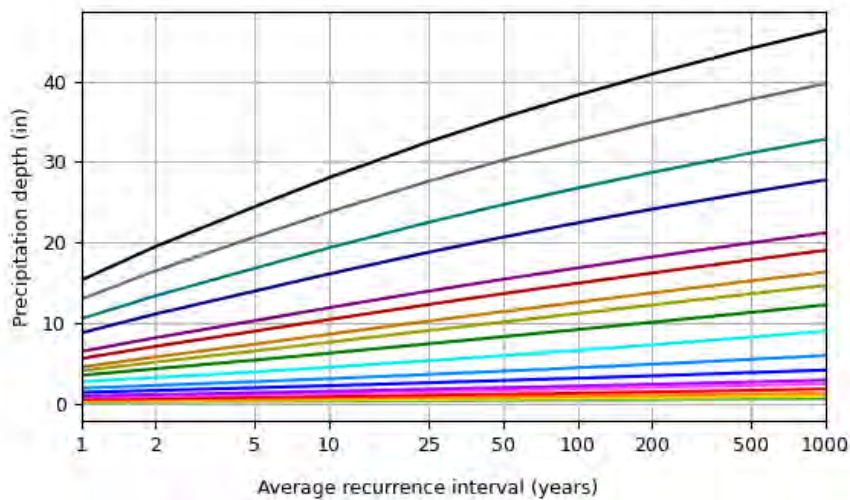
12/5/23, 4:53 PM

Precipitation Frequency Data Server

PDS-based depth-duration-frequency (DDF) curves
Latitude: 38.7080°, Longitude: -120.8324°



Average recurrence interval (years)
1
2
5
10
25
50
100
200
500
1000



Duration
5-min
10-min
15-min
30-min
60-min
2-hr
3-hr
6-hr
12-hr
24-hr
2-day
3-day
4-day
7-day
10-day
20-day
30-day
45-day
60-day

NOAA Atlas 14, Volume 6, Version 2

Created (GMT): Wed Dec 6 00:53:08 2023

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Maps aerials

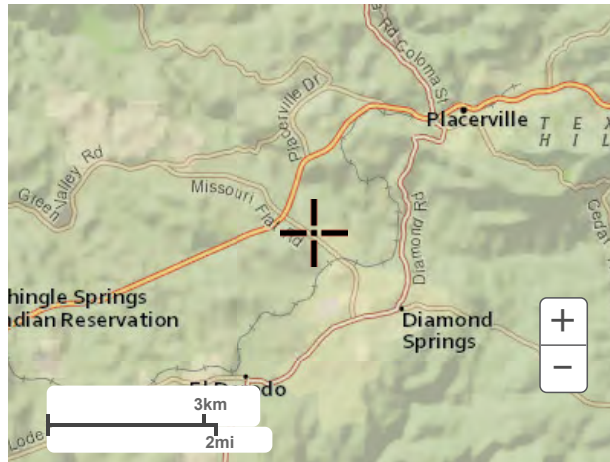
Small scale terrain

PD-R21-0002/CUP21-0004/P-E25-0001 CREEKSIDE PLAZA ARCO

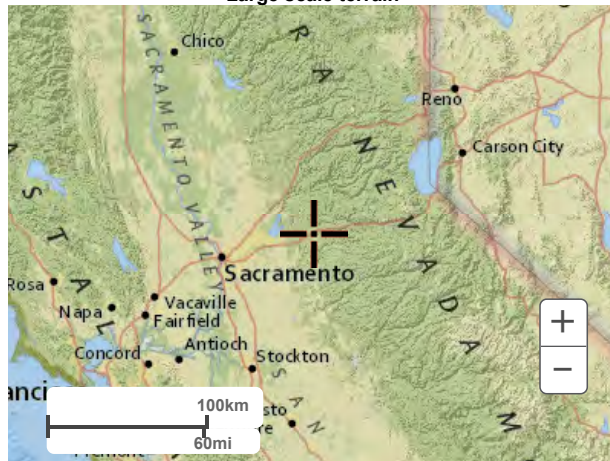
EXHIBIT R - PRELIMINARY STORMWATER CONTROL PLAN

12/5/23, 4:53 PM

Precipitation Frequency Data Server



Large scale terrain



Large scale map

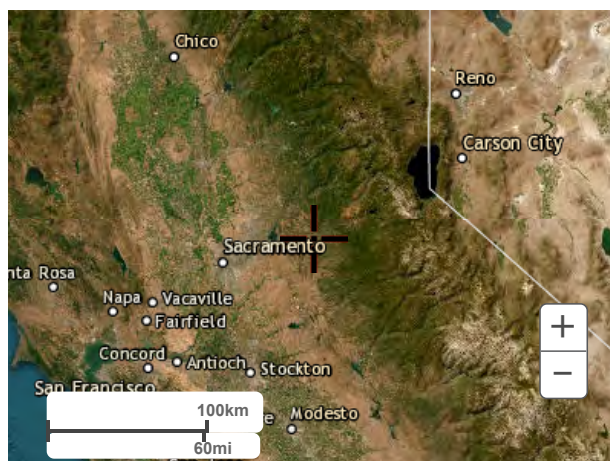


Large scale aerial

PD-R21-0002/CUP21-0004/P-E25-0001 CREEKSIDE PLAZA ARCO EXHIBIT R - PRELIMINARY STORMWATER CONTROL PLAN

12/5/23, 4:53 PM

Precipitation Frequency Data Server



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[National Oceanic and Atmospheric Administration](#)
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1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

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PD-R21-0002/CUP21-0004/P-E25-0001 CREEKSIDE PLAZA ARCO

EXHIBIT R - PRELIMINARY STORMWATER CONTROL PLAN

12/5/23, 3:26 PM

Precipitation Frequency Data Server



NOAA Atlas 14, Volume 6, Version 2
Location name Placerville, California, USA
Latitude 38.708 , Longitude -120.8324
Elevation 1740 ft
* source: ESRI Maps
** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

[PF_tabular](#) | [PF_graphical](#) | [Maps & aeriels](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	1.78 (1.57-2.04)	2.12 (1.86-2.44)	2.58 (2.27-2.96)	2.96 (2.58-3.44)	3.52 (2.96-4.22)	3.96 (3.26-4.86)	4.43 (3.55-5.57)	4.92 (3.84-6.37)	5.63 (4.21-7.60)	6.19 (4.48-8.66)
10-min	1.28 (1.12-1.46)	1.52 (1.34-1.75)	1.85 (1.62-2.13)	2.13 (1.85-2.47)	2.52 (2.12-3.03)	2.84 (2.34-3.49)	3.17 (2.55-3.99)	3.53 (2.75-4.57)	4.03 (3.01-5.44)	4.44 (3.20-6.21)
15-min	1.03 (0.908-1.18)	1.22 (1.08-1.40)	1.49 (1.31-1.72)	1.72 (1.49-1.99)	2.04 (1.71-2.44)	2.29 (1.88-2.81)	2.56 (2.05-3.22)	2.84 (2.22-3.68)	3.25 (2.43-4.39)	3.58 (2.58-5.00)
30-min	0.718 (0.632-0.822)	0.854 (0.752-0.980)	1.04 (0.912-1.20)	1.20 (1.04-1.39)	1.42 (1.19-1.70)	1.60 (1.31-1.96)	1.78 (1.43-2.24)	1.98 (1.55-2.57)	2.27 (1.70-3.06)	2.50 (1.80-3.49)
60-min	0.511 (0.450-0.586)	0.608 (0.535-0.698)	0.740 (0.649-0.852)	0.852 (0.741-0.989)	1.01 (0.849-1.21)	1.14 (0.935-1.39)	1.27 (1.02-1.60)	1.41 (1.10-1.83)	1.61 (1.21-2.18)	1.78 (1.28-2.48)
2-hr	0.374 (0.329-0.428)	0.444 (0.391-0.509)	0.537 (0.472-0.618)	0.615 (0.535-0.714)	0.722 (0.608-0.867)	0.807 (0.664-0.990)	0.894 (0.718-1.12)	0.985 (0.768-1.28)	1.11 (0.831-1.50)	1.21 (0.874-1.69)
3-hr	0.305 (0.269-0.349)	0.361 (0.318-0.415)	0.436 (0.383-0.502)	0.498 (0.433-0.578)	0.583 (0.490-0.700)	0.649 (0.534-0.796)	0.716 (0.575-0.901)	0.786 (0.614-1.02)	0.882 (0.660-1.19)	0.958 (0.692-1.34)
6-hr	0.225 (0.199-0.259)	0.267 (0.235-0.306)	0.321 (0.282-0.369)	0.365 (0.318-0.424)	0.426 (0.358-0.512)	0.473 (0.389-0.580)	0.520 (0.418-0.654)	0.569 (0.444-0.737)	0.636 (0.476-0.860)	0.689 (0.497-0.964)
12-hr	0.156 (0.137-0.178)	0.184 (0.162-0.211)	0.222 (0.195-0.256)	0.253 (0.221-0.294)	0.297 (0.250-0.357)	0.331 (0.272-0.406)	0.366 (0.294-0.460)	0.402 (0.314-0.521)	0.453 (0.338-0.611)	0.492 (0.355-0.688)
24-hr	0.111 (0.099-0.127)	0.133 (0.119-0.152)	0.162 (0.145-0.185)	0.186 (0.165-0.215)	0.220 (0.188-0.262)	0.246 (0.206-0.300)	0.273 (0.224-0.341)	0.302 (0.240-0.388)	0.342 (0.261-0.457)	0.373 (0.275-0.517)
2-day	0.072 (0.064-0.082)	0.089 (0.079-0.101)	0.111 (0.099-0.127)	0.129 (0.114-0.149)	0.153 (0.131-0.183)	0.172 (0.144-0.209)	0.190 (0.156-0.237)	0.209 (0.166-0.268)	0.235 (0.179-0.314)	0.254 (0.187-0.352)
3-day	0.056 (0.050-0.063)	0.071 (0.063-0.081)	0.090 (0.080-0.103)	0.105 (0.093-0.121)	0.125 (0.107-0.149)	0.140 (0.117-0.170)	0.154 (0.126-0.193)	0.169 (0.134-0.217)	0.188 (0.144-0.252)	0.203 (0.150-0.281)
4-day	0.046 (0.041-0.053)	0.059 (0.053-0.068)	0.076 (0.068-0.087)	0.089 (0.079-0.103)	0.106 (0.090-0.126)	0.118 (0.099-0.144)	0.130 (0.106-0.162)	0.142 (0.113-0.183)	0.158 (0.120-0.211)	0.169 (0.125-0.235)
7-day	0.033 (0.029-0.037)	0.042 (0.037-0.048)	0.053 (0.047-0.060)	0.061 (0.054-0.071)	0.072 (0.062-0.086)	0.081 (0.067-0.098)	0.088 (0.072-0.110)	0.096 (0.076-0.123)	0.106 (0.080-0.141)	0.113 (0.083-0.156)
10-day	0.026 (0.023-0.030)	0.033 (0.030-0.038)	0.042 (0.038-0.048)	0.049 (0.043-0.057)	0.058 (0.049-0.069)	0.064 (0.053-0.078)	0.070 (0.057-0.087)	0.075 (0.060-0.097)	0.083 (0.063-0.110)	0.088 (0.065-0.122)
20-day	0.018 (0.016-0.020)	0.023 (0.020-0.026)	0.029 (0.025-0.033)	0.033 (0.029-0.038)	0.039 (0.033-0.046)	0.042 (0.036-0.052)	0.046 (0.038-0.058)	0.050 (0.039-0.064)	0.054 (0.041-0.073)	0.057 (0.042-0.080)
30-day	0.014 (0.013-0.016)	0.018 (0.016-0.021)	0.023 (0.020-0.026)	0.026 (0.023-0.030)	0.031 (0.026-0.037)	0.034 (0.028-0.041)	0.037 (0.030-0.046)	0.039 (0.031-0.051)	0.043 (0.032-0.057)	0.045 (0.033-0.063)
45-day	0.011 (0.010-0.013)	0.015 (0.013-0.017)	0.019 (0.017-0.021)	0.022 (0.019-0.025)	0.025 (0.021-0.030)	0.027 (0.023-0.034)	0.030 (0.024-0.037)	0.032 (0.025-0.041)	0.034 (0.026-0.046)	0.036 (0.027-0.050)
60-day	0.010 (0.009-0.012)	0.013 (0.012-0.015)	0.016 (0.015-0.019)	0.019 (0.017-0.022)	0.022 (0.019-0.026)	0.024 (0.020-0.029)	0.026 (0.021-0.033)	0.028 (0.022-0.036)	0.030 (0.023-0.040)	0.032 (0.023-0.044)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.
Please refer to NOAA Atlas 14 document for more information.

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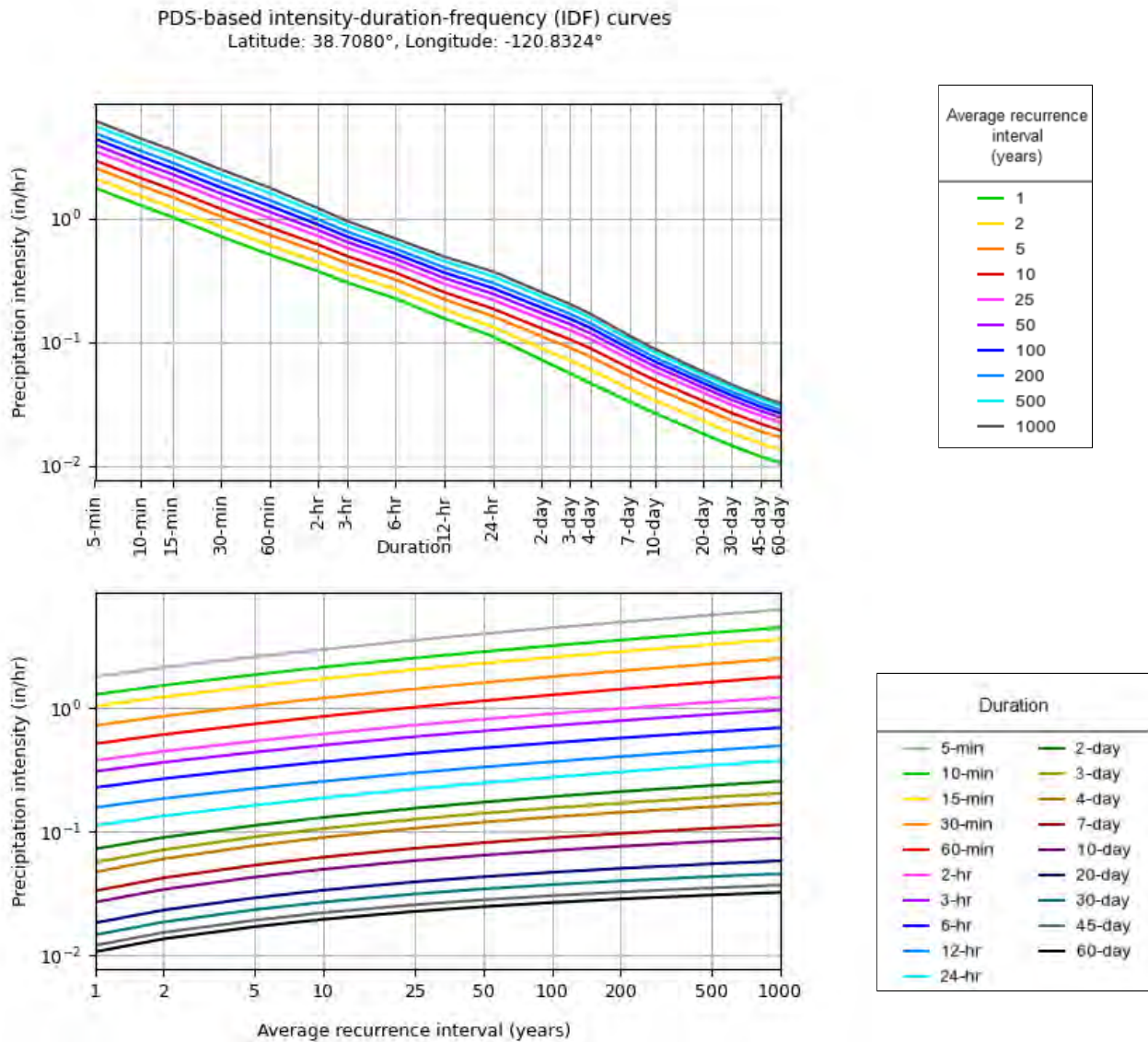
PF graphical

PD-R21-0002/CUP21-0004/P-E25-0001 CREEKSIDE PLAZA ARCO

EXHIBIT R - PRELIMINARY STORMWATER CONTROL PLAN

12/5/23, 3:26 PM

Precipitation Frequency Data Server



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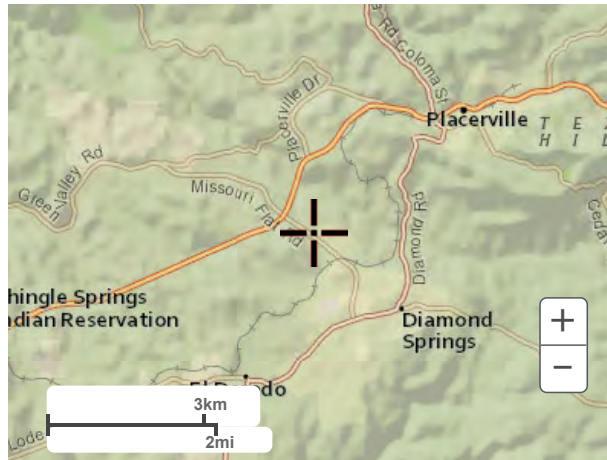
Maps **aerials**

Small scale terrain

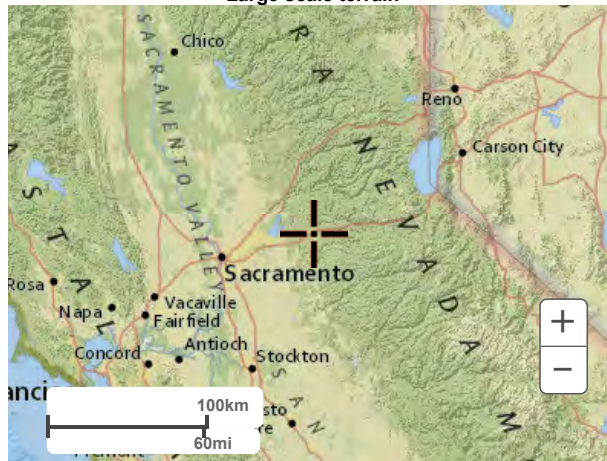
PD-R21-0002/CUP21-0004/P-E25-0001 CREEKSIDE PLAZA ARCO EXHIBIT R - PRELIMINARY STORMWATER CONTROL PLAN

12/5/23, 3:26 PM

Precipitation Frequency Data Server



Large scale terrain



Large scale map

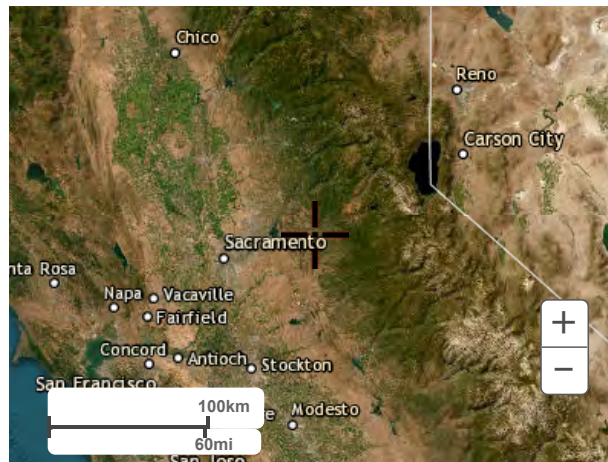


Large scale aerial

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Appendix C

Preliminary Calculations

PD-R21-0002/CUP21-0004/P-E25-0001 CREEKSIDE PLAZA ARCO
EXHIBIT R - PRELIMINARY STORMWATER CONTROL PLAN

Hydraflow Table of Contents

21517-Hydrograph-2023-12-08.gpw

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EXHIBIT R - PRELIMINARY STORMWATER CONTROL PLAN**

1

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	Rational	-----	-----	2.422	-----	-----	3.430	-----	-----	5.017	Developed - DMA#1
2	Rational	-----	-----	1.423	-----	-----	2.007	-----	-----	2.958	Existing - DMA#1
3	Reservoir	1	-----	0.065	-----	-----	0.134	-----	-----	0.196	Storage
<div> <div>Proj. file: 21517-Hydrograph-2023-12-08.gpw</div> <div>Friday, 12 / 8 / 2023</div> </div>											

**PD-R21-0002/CUP21-0004/P-E25-0001 CREEKSIDE PLAZA ARCO
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2

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	2.422	1	4	581	-----	-----	-----	Developed - DMA#1
2	Rational	1.423	1	12	1,025	-----	-----	-----	Existing - DMA#1
3	Reservoir	0.065	1	10	835	1	101.32	818	Storage
21517-Hydrograph-2023-12-08.gpw					Return Period: 2 Year			Friday, 12 / 8 / 2023	

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Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

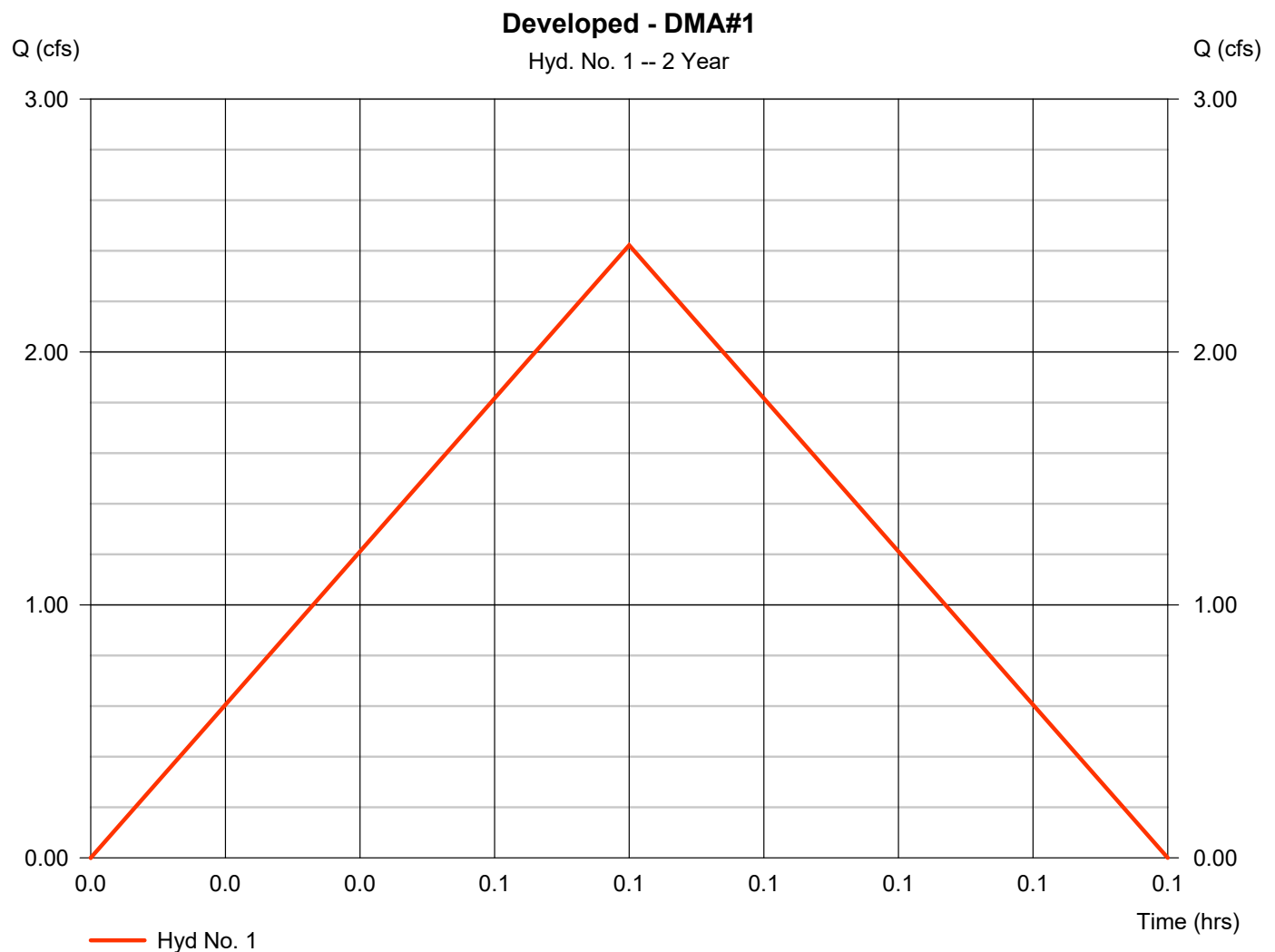
Friday, 12 / 8 / 2023

Hyd. No. 1

Developed - DMA#1

Hydrograph type	= Rational	Peak discharge	= 2.422 cfs
Storm frequency	= 2 yrs	Time to peak	= 0.07 hrs
Time interval	= 1 min	Hyd. volume	= 581 cuft
Drainage area	= 1.500 ac	Runoff coeff.	= 0.71*
Intensity	= 2.274 in/hr	Tc by TR55	= 4.00 min
IDF Curve	= SampleFHA.idf	Asc/Rec limb fact	= 1/1

* Composite (Area/C) = [(1.413 x 0.90) + (0.500 x 0.20)] / 1.500



**PD-R21-0002/CUP21-0004/P-E25-0001 CREEKSIDE PLAZA ARCO
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TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Hyd. No. 1

Developed - DMA#1

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>			
Sheet Flow							
Manning's n-value	= 0.011	0.011	0.011				
Flow length (ft)	= 300.0	0.0	0.0				
Two-year 24-hr precip. (in)	= 3.26	0.00	0.00				
Land slope (%)	= 1.15	0.00	0.00				
Travel Time (min)	= 3.61	+	0.00	+	0.00	=	3.61
Shallow Concentrated Flow							
Flow length (ft)	= 84.29	0.00	0.00				
Watercourse slope (%)	= 2.20	0.00	0.00				
Surface description	= Paved	Paved	Paved				
Average velocity (ft/s)	=3.02	0.00	0.00				
Travel Time (min)	= 0.47	+	0.00	+	0.00	=	0.47
Channel Flow							
X sectional flow area (sqft)	= 0.00	0.00	0.00				
Wetted perimeter (ft)	= 0.00	0.00	0.00				
Channel slope (%)	= 0.00	0.00	0.00				
Manning's n-value	= 0.015	0.015	0.015				
Velocity (ft/s)	=0.00	0.00	0.00				
Flow length (ft)	((0))0.0	0.0	0.0				
Travel Time (min)	= 0.00	+	0.00	+	0.00	=	0.00
Total Travel Time, Tc				4.00 min			

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Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

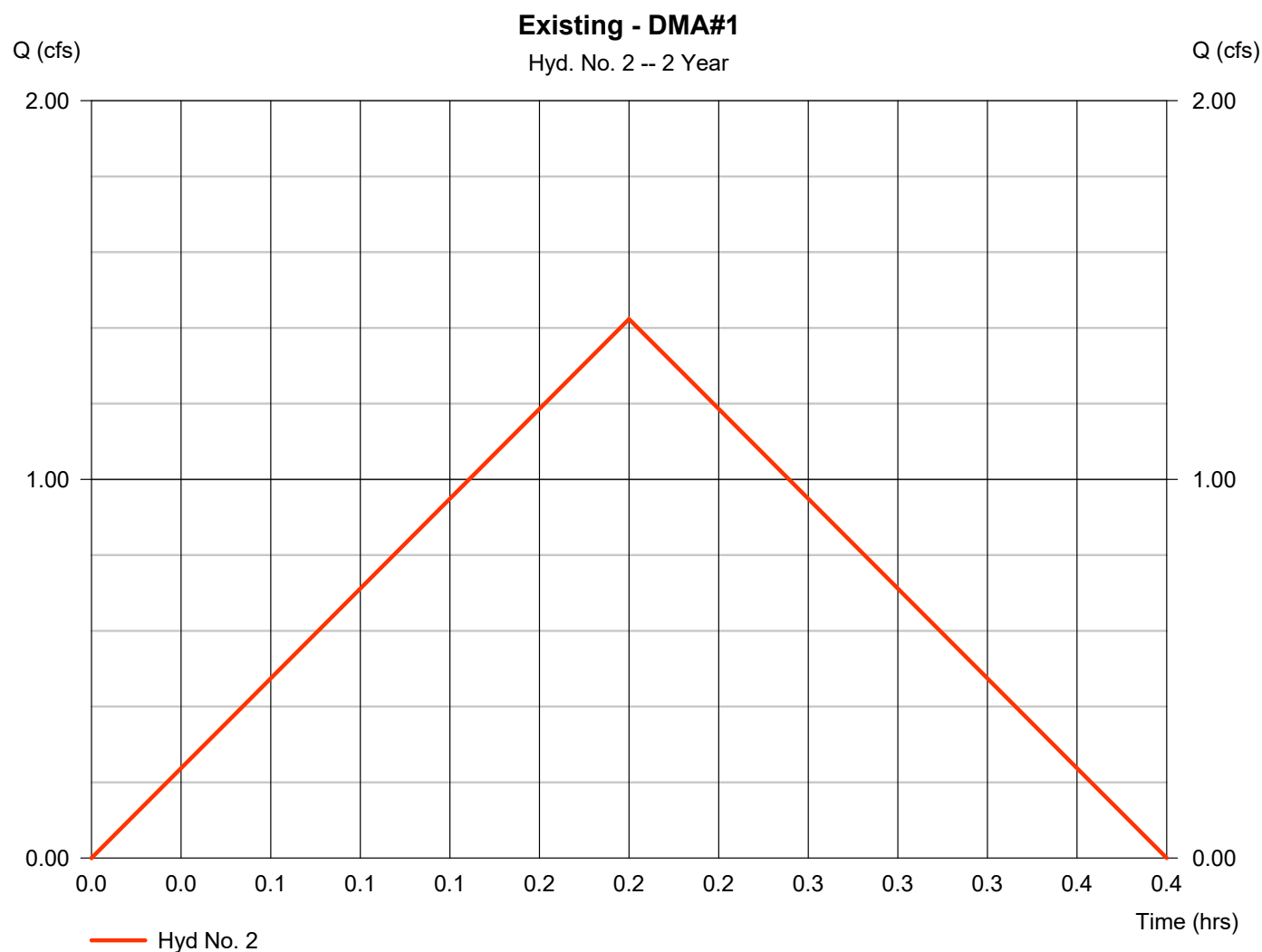
Friday, 12 / 8 / 2023

Hyd. No. 2

Existing - DMA#1

Hydrograph type	= Rational	Peak discharge	= 1.423 cfs
Storm frequency	= 2 yrs	Time to peak	= 0.20 hrs
Time interval	= 1 min	Hyd. volume	= 1,025 cuft
Drainage area	= 1.500 ac	Runoff coeff.	= 0.71*
Intensity	= 1.336 in/hr	Tc by TR55	= 12.00 min
IDF Curve	= SampleFHA.idf	Asc/Rec limb fact	= 1/1

* Composite (Area/C) = [(1.912 x 0.20)] / 1.500



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EXHIBIT R - PRELIMINARY STORMWATER CONTROL PLAN**

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TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Hyd. No. 2

Existing - DMA#1

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>			
Sheet Flow							
Manning's n-value	= 0.150	0.011	0.011				
Flow length (ft)	= 300.0	0.0	0.0				
Two-year 24-hr precip. (in)	= 3.26	0.00	0.00				
Land slope (%)	= 10.90	0.00	0.00				
Travel Time (min)	= 11.86	+	0.00	+	0.00	=	11.86
Shallow Concentrated Flow							
Flow length (ft)	= 81.87	0.00	0.00				
Watercourse slope (%)	= 3.90	0.00	0.00				
Surface description	= Unpaved	Paved	Paved				
Average velocity (ft/s)	=3.19	0.00	0.00				
Travel Time (min)	= 0.43	+	0.00	+	0.00	=	0.43
Channel Flow							
X sectional flow area (sqft)	= 0.00	0.00	0.00				
Wetted perimeter (ft)	= 0.00	0.00	0.00				
Channel slope (%)	= 0.00	0.00	0.00				
Manning's n-value	= 0.015	0.015	0.015				
Velocity (ft/s)	=0.00	0.00	0.00				
Flow length (ft)	(0)0.0	0.0	0.0				
Travel Time (min)	= 0.00	+	0.00	+	0.00	=	0.00
Total Travel Time, Tc				12.00 min			

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EXHIBIT R - PRELIMINARY STORMWATER CONTROL PLAN

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Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

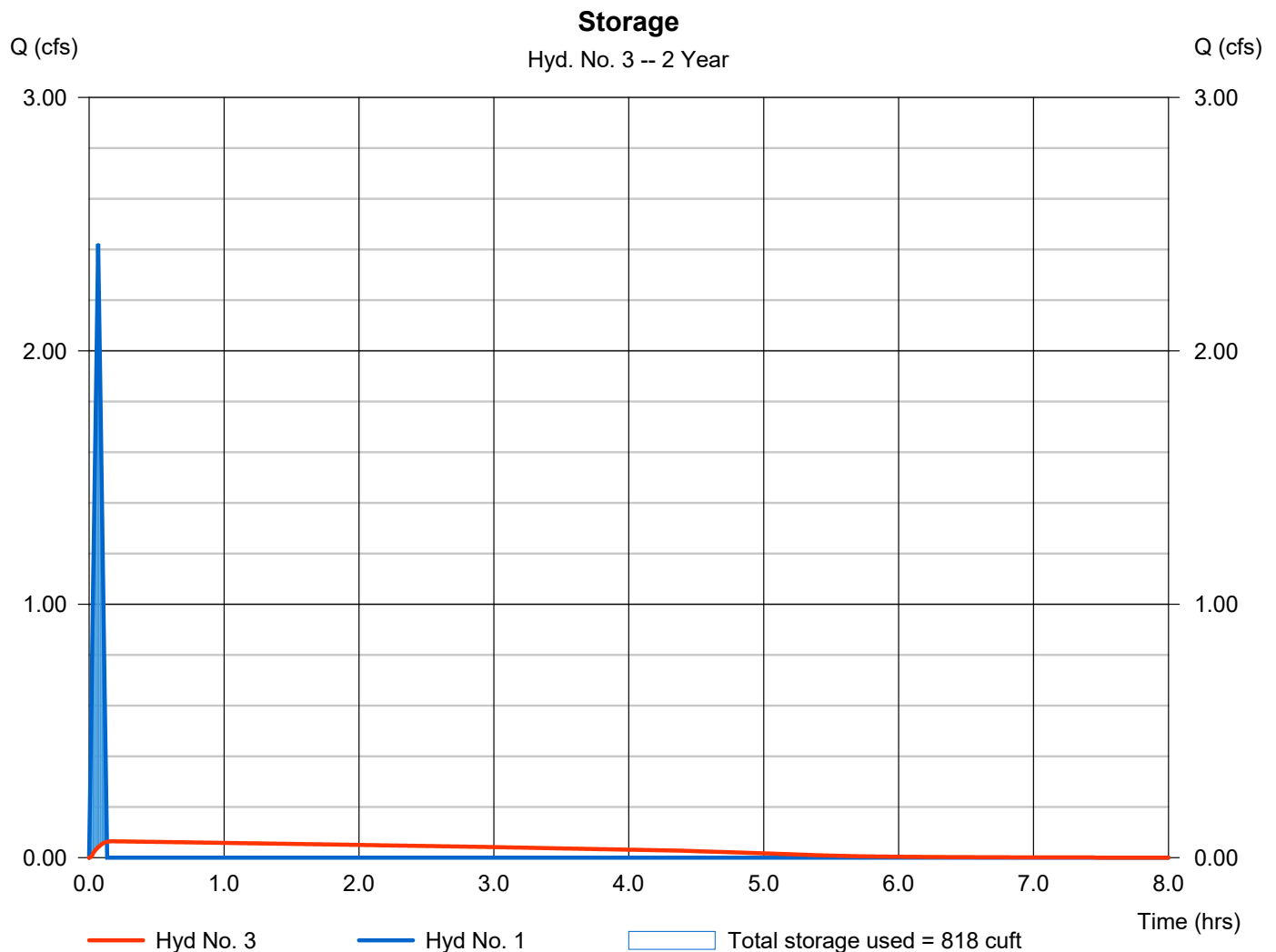
Friday, 12 / 8 / 2023

Hyd. No. 3

Storage

Hydrograph type	= Reservoir	Peak discharge	= 0.065 cfs
Storm frequency	= 2 yrs	Time to peak	= 0.17 hrs
Time interval	= 1 min	Hyd. volume	= 835 cuft
Inflow hyd. No.	= 1 - Developed - DMA#1	Max. Elevation	= 101.32 ft
Reservoir name	= Creekside Plaza	Max. Storage	= 818 cuft

Storage Indication method used.



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EXHIBIT R - PRELIMINARY STORMWATER CONTROL PLAN

Pond Report

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Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Friday, 12 / 8 / 2023

Pond No. 1 - Creekside Plaza

Pond Data

UG Chambers -Invert elev. = 100.00 ft, Rise x Span = 3.00 x 3.00 ft, Barrel Len = 45.38 ft, No. Barrels = 4, Slope = 0.00%, Headers = Yes

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	n/a	0	0
0.30	100.30	n/a	79	79
0.60	100.60	n/a	137	216
0.90	100.90	n/a	167	383
1.20	101.20	n/a	184	567
1.50	101.50	n/a	192	758
1.80	101.80	n/a	192	950
2.10	102.10	n/a	184	1,134
2.40	102.40	n/a	167	1,301
2.70	102.70	n/a	137	1,438
3.00	103.00	n/a	79	1,517

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	1.50	2.00	Inactive
Span (in)	= 12.00	1.50	2.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 100.00	100.00	101.32	0.00
Length (ft)	= 50.00	0.25	0.25	0.00
Slope (%)	= 2.00	0.50	0.50	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 1.00	Inactive	Inactive	Inactive
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.00	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	100.00	0.00	0.00	0.00	---	0.00	---	---	---	---	---	0.000
0.03	8	100.03	0.00 ic	0.00 ic	0.00	---	0.00 s	---	---	---	---	---	0.005
0.06	16	100.06	0.02 ic	0.00	0.00	---	0.00	---	---	---	---	---	0.017
0.09	24	100.09	0.04 ic	0.00	0.00	---	0.00	---	---	---	---	---	0.036
0.12	32	100.12	0.07 ic	0.00	0.00	---	0.00	---	---	---	---	---	0.067
0.15	40	100.15	0.10 ic	0.00	0.00	---	0.00	---	---	---	---	---	0.099
0.18	47	100.18	0.14 ic	0.00	0.00	---	0.00	---	---	---	---	---	0.140
0.21	55	100.21	0.19 ic	0.00	0.00	---	0.00	---	---	---	---	---	0.190
0.24	63	100.24	0.25 ic	0.00	0.00	---	0.00	---	---	---	---	---	0.250
0.27	71	100.27	0.31 ic	0.00	0.00	---	0.00	---	---	---	---	---	0.307
0.30	79	100.30	0.37 ic	0.00	0.00	---	0.00	---	---	---	---	---	0.372
0.33	93	100.33	0.44 ic	0.00	0.00	---	0.00	---	---	---	---	---	0.443
0.36	106	100.36	0.52 ic	0.00	0.00	---	0.00	---	---	---	---	---	0.521
0.39	120	100.39	0.60 ic	0.00	0.00	---	0.00	---	---	---	---	---	0.605
0.42	134	100.42	0.69 ic	0.00	0.00	---	0.00	---	---	---	---	---	0.695
0.45	148	100.45	0.79 ic	0.00	0.00	---	0.00	---	---	---	---	---	0.790
0.48	161	100.48	0.89 ic	0.00	0.00	---	0.00	---	---	---	---	---	0.889
0.51	175	100.51	0.99 ic	0.00	0.00	---	0.00	---	---	---	---	---	0.993
0.54	189	100.54	1.10 ic	0.00	0.00	---	0.00	---	---	---	---	---	1.100
0.57	202	100.57	1.19 ic	0.00	0.00	---	0.00	---	---	---	---	---	1.190
0.60	216	100.60	1.30 ic	0.00	0.00	---	0.00	---	---	---	---	---	1.301
0.63	233	100.63	1.41 ic	0.00	0.00	---	0.00	---	---	---	---	---	1.414
0.66	249	100.66	1.53 ic	0.00	0.00	---	0.00	---	---	---	---	---	1.526
0.69	266	100.69	1.64 ic	0.00	0.00	---	0.00	---	---	---	---	---	1.638
0.72	283	100.72	1.77 ic	0.00	0.00	---	0.00	---	---	---	---	---	1.767
0.75	299	100.75	1.87 ic	0.00	0.00	---	0.00	---	---	---	---	---	1.875
0.78	316	100.78	1.98 ic	0.00	0.00	---	0.00	---	---	---	---	---	1.979
0.81	333	100.81	2.09 ic	0.00	0.00	---	0.00	---	---	---	---	---	2.095
0.84	349	100.84	2.20 ic	0.00	0.00	---	0.00	---	---	---	---	---	2.203
0.87	366	100.87	2.31 ic	0.00	0.00	---	0.00	---	---	---	---	---	2.314
0.90	383	100.90	2.41 ic	0.00	0.00	---	0.00	---	---	---	---	---	2.413
0.93	401	100.93	2.50 ic	0.00	0.00	---	0.00	---	---	---	---	---	2.500

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Creekside Plaza

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.96	420	100.96	2.59 ic	0.00	0.00	---	0.00	---	---	---	---	---	2.587
0.99	438	100.99	2.66 ic	0.00	0.00	---	0.00	---	---	---	---	---	2.657
1.02	456	101.02	2.73 ic	0.00	0.00	---	0.00	---	---	---	---	---	2.727
1.05	475	101.05	2.80 ic	0.00	0.00	---	0.00	---	---	---	---	---	2.804
1.08	493	101.08	2.88 ic	0.00	0.00	---	0.00	---	---	---	---	---	2.880
1.11	511	101.11	2.95 ic	0.00	0.00	---	0.00	---	---	---	---	---	2.953
1.14	530	101.14	3.02 ic	0.00	0.00	---	0.00	---	---	---	---	---	3.025
1.17	548	101.17	3.10 ic	0.00	0.00	---	0.00	---	---	---	---	---	3.095
1.20	567	101.20	3.16 ic	0.00	0.00	---	0.00	---	---	---	---	---	3.164
1.23	586	101.23	3.23 ic	0.00	0.00	---	0.00	---	---	---	---	---	3.231
1.26	605	101.26	3.30 ic	0.00	0.00	---	0.00	---	---	---	---	---	3.296
1.29	624	101.29	3.36 ic	0.00	0.00	---	0.00	---	---	---	---	---	3.361
1.32	643	101.32	3.42 ic	0.00	0.00	---	0.00	---	---	---	---	---	3.424
1.35	663	101.35	3.49 ic	0.00	0.00	---	0.00	---	---	---	---	---	3.486
1.38	682	101.38	3.55 ic	0.00	0.00	---	0.00	---	---	---	---	---	3.547
1.41	701	101.41	3.61 ic	0.00	0.00	---	0.00	---	---	---	---	---	3.607
1.44	720	101.44	3.67 ic	0.00	0.00	---	0.00	---	---	---	---	---	3.666
1.47	739	101.47	3.72 ic	0.00	0.00	---	0.00	---	---	---	---	---	3.724
1.50	758	101.50	3.78 ic	0.00	0.00	---	0.00	---	---	---	---	---	3.781
1.53	778	101.53	3.84 ic	0.00	0.00	---	0.00	---	---	---	---	---	3.837
1.56	797	101.56	3.89 ic	0.00	0.00	---	0.00	---	---	---	---	---	3.893
1.59	816	101.59	3.95 ic	0.00	0.00	---	0.00	---	---	---	---	---	3.948
1.62	835	101.62	4.00 ic	0.00	0.00	---	0.00	---	---	---	---	---	4.002
1.65	854	101.65	4.05 ic	0.00	0.00	---	0.00	---	---	---	---	---	4.055
1.68	874	101.68	4.11 ic	0.00	0.00	---	0.00	---	---	---	---	---	4.107
1.71	893	101.71	4.16 ic	0.00	0.00	---	0.00	---	---	---	---	---	4.159
1.74	912	101.74	4.21 ic	0.00	0.00	---	0.00	---	---	---	---	---	4.211
1.77	931	101.77	4.26 ic	0.00	0.00	---	0.00	---	---	---	---	---	4.261
1.80	950	101.80	4.31 ic	0.00	0.00	---	0.00	---	---	---	---	---	4.311
1.83	969	101.83	4.36 ic	0.00	0.00	---	0.00	---	---	---	---	---	4.361
1.86	987	101.86	4.41 ic	0.00	0.00	---	0.00	---	---	---	---	---	4.410
1.89	1,005	101.89	4.46 ic	0.00	0.00	---	0.00	---	---	---	---	---	4.458
1.92	1,024	101.92	4.51 ic	0.00	0.00	---	0.00	---	---	---	---	---	4.506
1.95	1,042	101.95	4.55 ic	0.00	0.00	---	0.00	---	---	---	---	---	4.553
1.98	1,061	101.98	4.60 ic	0.00	0.00	---	0.00	---	---	---	---	---	4.600
2.01	1,079	102.01	4.65 ic	0.00	0.00	---	0.00	---	---	---	---	---	4.646
2.04	1,097	102.04	4.69 ic	0.00	0.00	---	0.00	---	---	---	---	---	4.692
2.07	1,116	102.07	4.74 ic	0.00	0.00	---	0.00	---	---	---	---	---	4.738
2.10	1,134	102.10	4.78 ic	0.00	0.00	---	0.00	---	---	---	---	---	4.783
2.13	1,151	102.13	4.83 ic	0.00	0.00	---	0.00	---	---	---	---	---	4.828
2.16	1,167	102.16	4.87 ic	0.00	0.00	---	0.00	---	---	---	---	---	4.872
2.19	1,184	102.19	4.92 ic	0.00	0.00	---	0.00	---	---	---	---	---	4.916
2.22	1,201	102.22	4.96 ic	0.00	0.00	---	0.00	---	---	---	---	---	4.959
2.25	1,217	102.25	5.00 ic	0.00	0.00	---	0.00	---	---	---	---	---	5.002
2.28	1,234	102.28	5.04 ic	0.00	0.00	---	0.00	---	---	---	---	---	5.045
2.31	1,251	102.31	5.09 ic	0.00	0.00	---	0.00	---	---	---	---	---	5.087
2.34	1,267	102.34	5.13 ic	0.00	0.00	---	0.00	---	---	---	---	---	5.129
2.37	1,284	102.37	5.17 ic	0.00	0.00	---	0.00	---	---	---	---	---	5.171
2.40	1,301	102.40	5.21 ic	0.00	0.00	---	0.00	---	---	---	---	---	5.212
2.43	1,314	102.43	5.25 ic	0.00	0.00	---	0.00	---	---	---	---	---	5.253
2.46	1,328	102.46	5.29 ic	0.00	0.00	---	0.00	---	---	---	---	---	5.294
2.49	1,342	102.49	5.33 ic	0.00	0.00	---	0.00	---	---	---	---	---	5.334
2.52	1,356	102.52	5.37 ic	0.00	0.00	---	0.00	---	---	---	---	---	5.374
2.55	1,369	102.55	5.41 ic	0.00	0.00	---	0.00	---	---	---	---	---	5.414
2.58	1,383	102.58	5.45 ic	0.00	0.00	---	0.00	---	---	---	---	---	5.453
2.61	1,397	102.61	5.49 ic	0.00	0.00	---	0.00	---	---	---	---	---	5.493
2.64	1,410	102.64	5.53 ic	0.00	0.00	---	0.00	---	---	---	---	---	5.531
2.67	1,424	102.67	5.57 ic	0.00	0.00	---	0.00	---	---	---	---	---	5.570
2.70	1,438	102.70	5.61 ic	0.00	0.00	---	0.00	---	---	---	---	---	5.608
2.73	1,446	102.73	5.65 ic	0.00	0.00	---	0.00	---	---	---	---	---	5.647
2.76	1,454	102.76	5.68 ic	0.00	0.00	---	0.00	---	---	---	---	---	5.684
2.79	1,461	102.79	5.72 ic	0.00	0.00	---	0.00	---	---	---	---	---	5.722
2.82	1,469	102.82	5.76 ic	0.00	0.00	---	0.00	---	---	---	---	---	5.759
2.85	1,477	102.85	5.80 ic	0.00	0.00	---	0.00	---	---	---	---	---	5.796
2.88	1,485	102.88	5.83 ic	0.00	0.00	---	0.00	---	---	---	---	---	5.833
2.91	1,493	102.91	5.87 ic	0.00	0.00	---	0.00	---	---	---	---	---	5.870
2.94	1,501	102.94	5.91 ic	0.00	0.00	---	0.00	---	---	---	---	---	5.906
2.97	1,509	102.97	5.94 ic	0.00	0.00	---	0.00	---	---	---	---	---	5.943
3.00	1,517	103.00	5.98 ic	0.00	0.00	---	0.00	---	---	---	---	---	5.979

...End

**PD-R21-0002/CUP21-0004/P-E25-0001 CREEKSIDE PLAZA ARCO
EXHIBIT R - PRELIMINARY STORMWATER CONTROL PLAN**

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Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	3.430	1	4	823	-----	-----	-----	Developed - DMA#1
2	Rational	2.007	1	12	1,445	-----	-----	-----	Existing - DMA#1
3	Reservoir	0.134	1	10	1,185	1	101.73	1,153	Storage
21517-Hydrograph-2023-12-08.gpw					Return Period: 10 Year			Friday, 12 / 8 / 2023	

PD-R21-0002/CUP21-0004/P-E25-0001 CREEKSIDE PLAZA ARCO
EXHIBIT R - PRELIMINARY STORMWATER CONTROL PLAN

11

Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

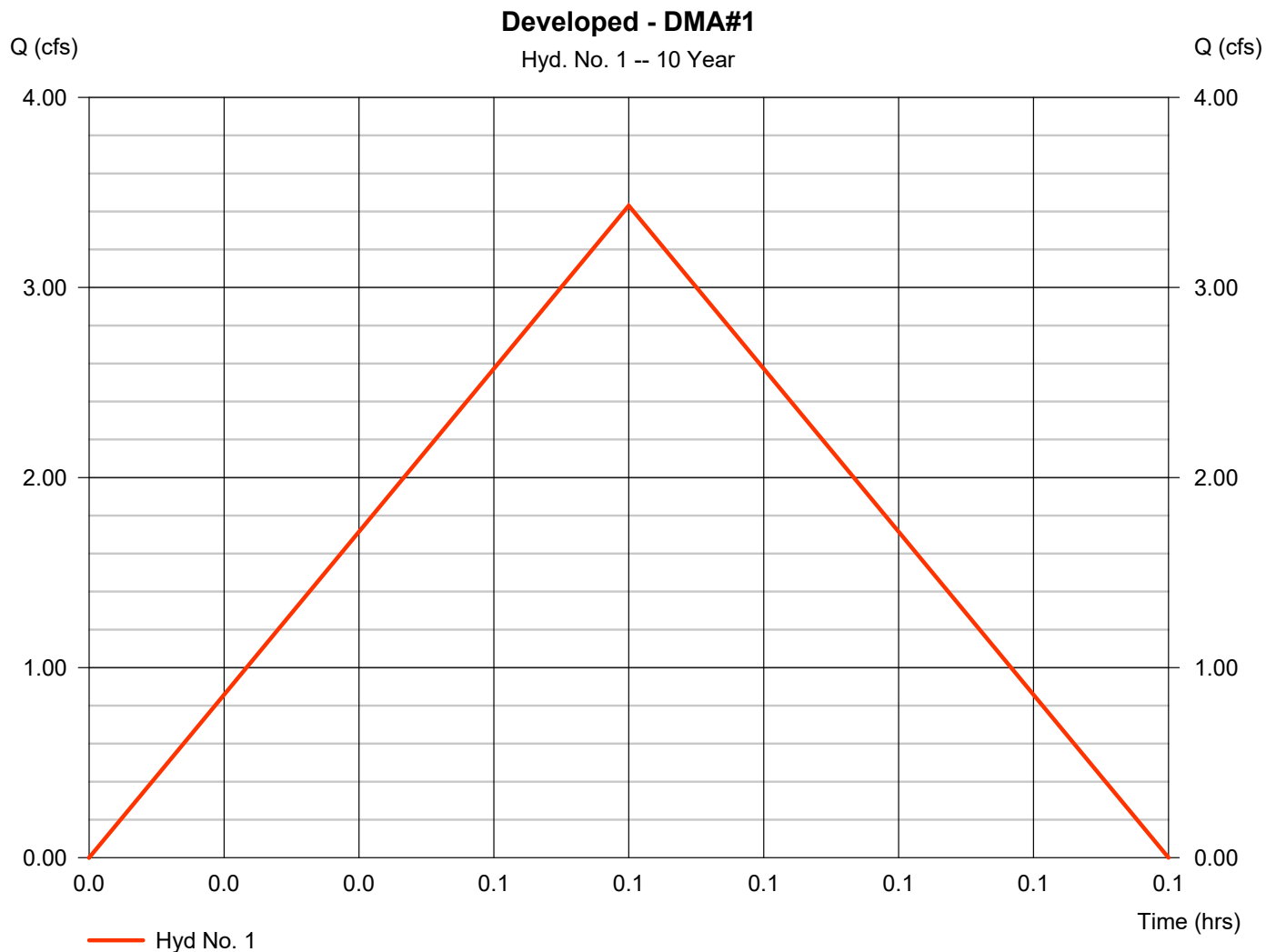
Friday, 12 / 8 / 2023

Hyd. No. 1

Developed - DMA#1

Hydrograph type	= Rational	Peak discharge	= 3.430 cfs
Storm frequency	= 10 yrs	Time to peak	= 0.07 hrs
Time interval	= 1 min	Hyd. volume	= 823 cuft
Drainage area	= 1.500 ac	Runoff coeff.	= 0.71*
Intensity	= 3.221 in/hr	Tc by TR55	= 4.00 min
IDF Curve	= SampleFHA.idf	Asc/Rec limb fact	= 1/1

* Composite (Area/C) = [(1.413 x 0.90) + (0.500 x 0.20)] / 1.500



PD-R21-0002/CUP21-0004/P-E25-0001 CREEKSIDE PLAZA ARCO
EXHIBIT R - PRELIMINARY STORMWATER CONTROL PLAN

12

Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

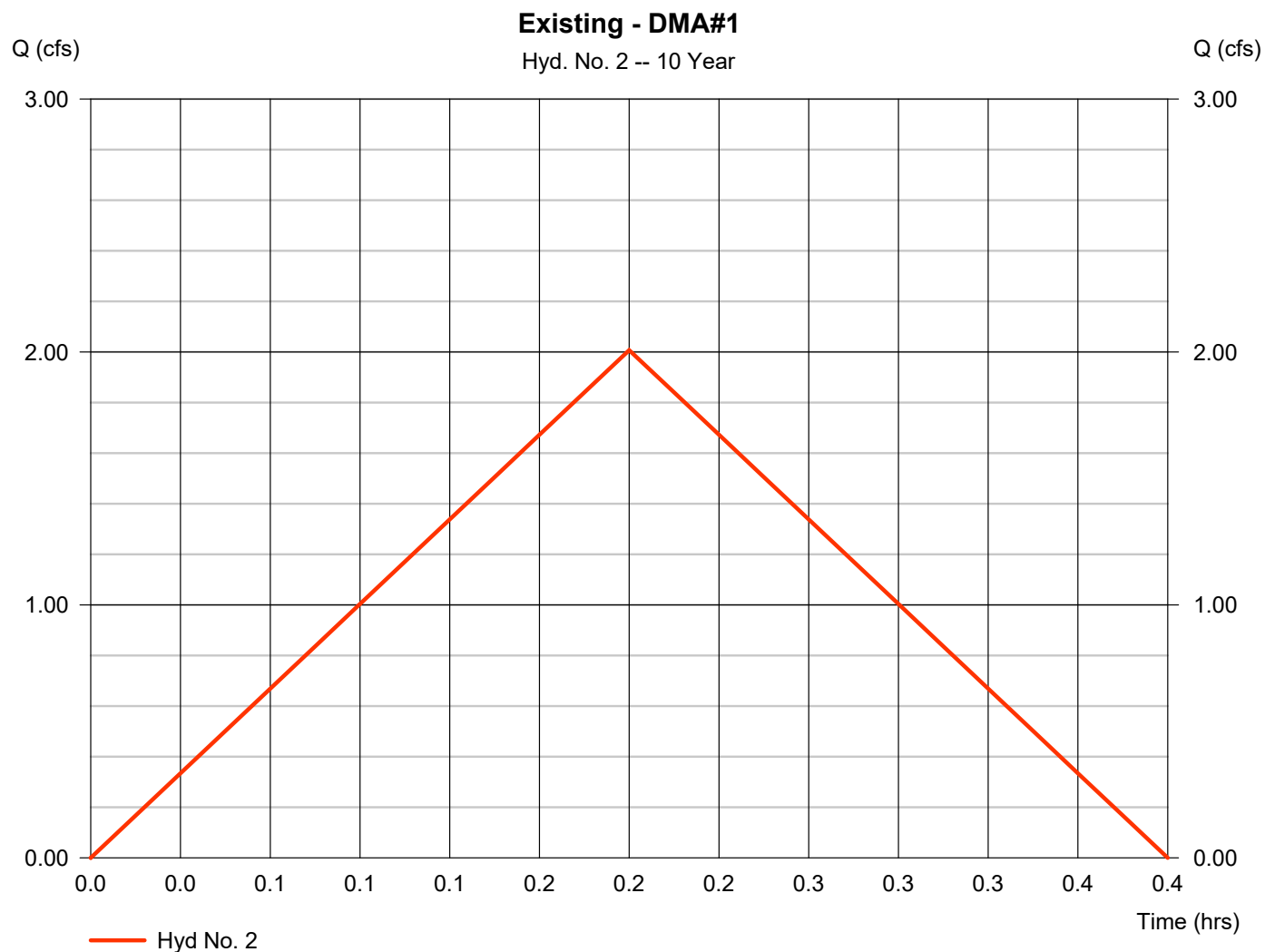
Friday, 12 / 8 / 2023

Hyd. No. 2

Existing - DMA#1

Hydrograph type	= Rational	Peak discharge	= 2.007 cfs
Storm frequency	= 10 yrs	Time to peak	= 0.20 hrs
Time interval	= 1 min	Hyd. volume	= 1,445 cuft
Drainage area	= 1.500 ac	Runoff coeff.	= 0.71*
Intensity	= 1.885 in/hr	Tc by TR55	= 12.00 min
IDF Curve	= SampleFHA.idf	Asc/Rec limb fact	= 1/1

* Composite (Area/C) = [(1.912 x 0.20)] / 1.500



PD-R21-0002/CUP21-0004/P-E25-0001 CREEKSIDE PLAZA ARCO
EXHIBIT R - PRELIMINARY STORMWATER CONTROL PLAN

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Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

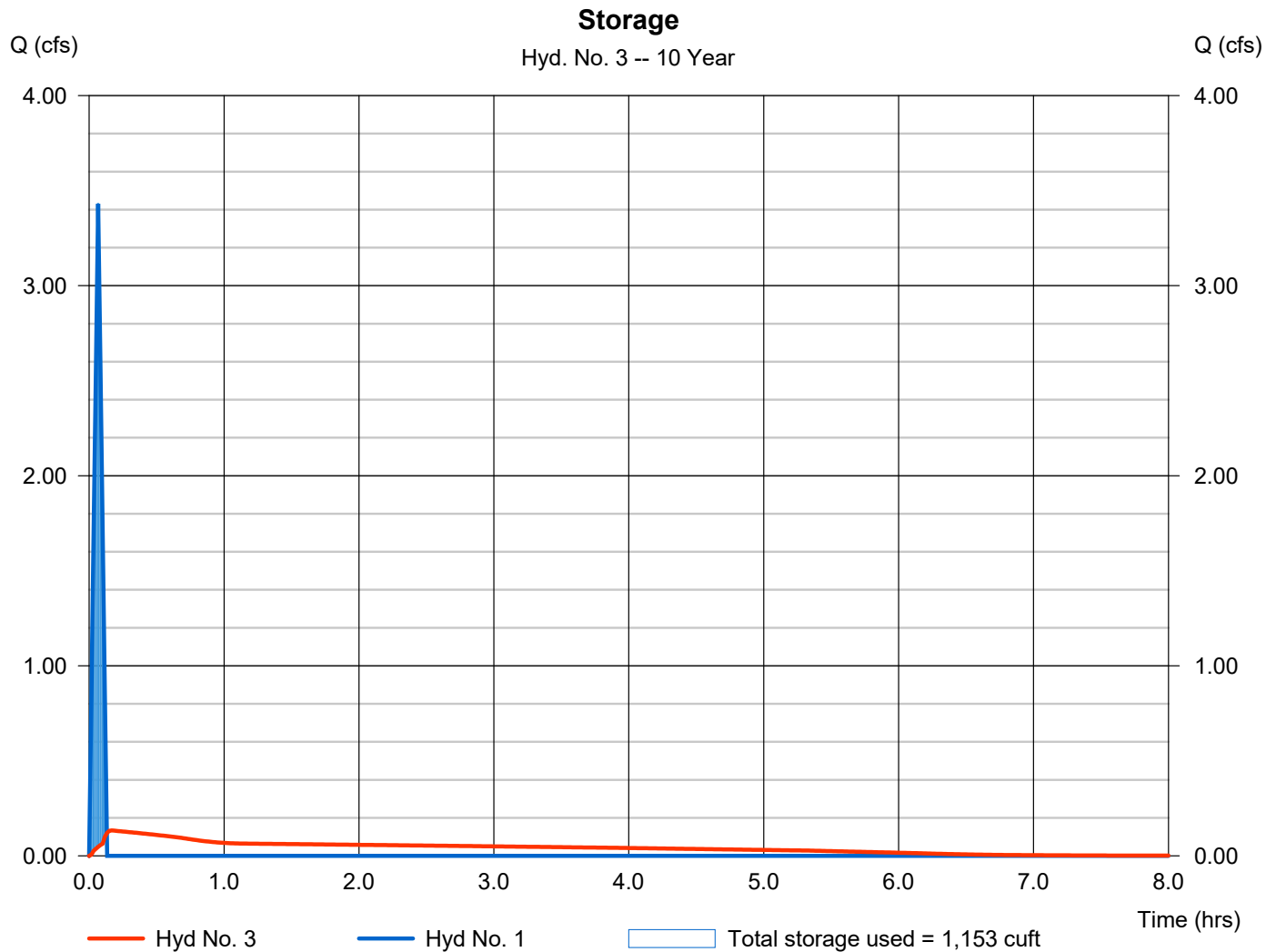
Friday, 12 / 8 / 2023

Hyd. No. 3

Storage

Hydrograph type	= Reservoir	Peak discharge	= 0.134 cfs
Storm frequency	= 10 yrs	Time to peak	= 0.17 hrs
Time interval	= 1 min	Hyd. volume	= 1,185 cuft
Inflow hyd. No.	= 1 - Developed - DMA#1	Max. Elevation	= 101.73 ft
Reservoir name	= Creekside Plaza	Max. Storage	= 1,153 cuft

Storage Indication method used.



**PD-R21-0002/CUP21-0004/P-E25-0001 CREEKSIDE PLAZA ARCO
EXHIBIT R - PRELIMINARY STORMWATER CONTROL PLAN**

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Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	5.017	1	4	1,204	-----	-----	-----	Developed - DMA#1
2	Rational	2.958	1	12	2,130	-----	-----	-----	Existing - DMA#1
3	Reservoir	0.196	1	10	1,740	1	102.46	1,688	Storage
21517-Hydrograph-2023-12-08.gpw					Return Period: 100 Year			Friday, 12 / 8 / 2023	

PD-R21-0002/CUP21-0004/P-E25-0001 CREEKSIDE PLAZA ARCO
EXHIBIT R - PRELIMINARY STORMWATER CONTROL PLAN

15

Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

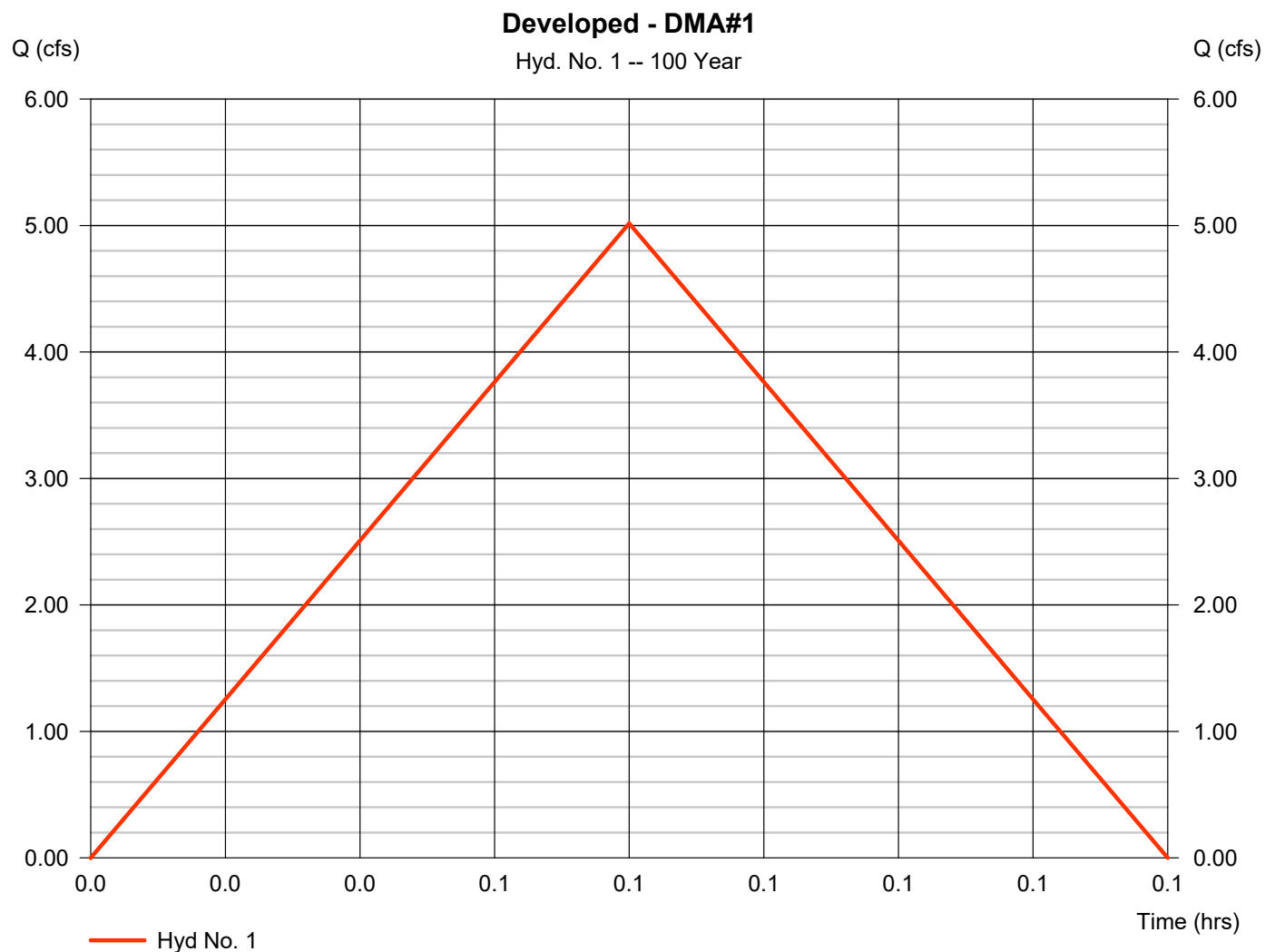
Friday, 12 / 8 / 2023

Hyd. No. 1

Developed - DMA#1

Hydrograph type	= Rational	Peak discharge	= 5.017 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.07 hrs
Time interval	= 1 min	Hyd. volume	= 1,204 cuft
Drainage area	= 1.500 ac	Runoff coeff.	= 0.71*
Intensity	= 4.711 in/hr	Tc by TR55	= 4.00 min
IDF Curve	= SampleFHA.idf	Asc/Rec limb fact	= 1/1

* Composite (Area/C) = [(1.413 x 0.90) + (0.500 x 0.20)] / 1.500



PD-R21-0002/CUP21-0004/P-E25-0001 CREEKSIDE PLAZA ARCO
EXHIBIT R - PRELIMINARY STORMWATER CONTROL PLAN

16

Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

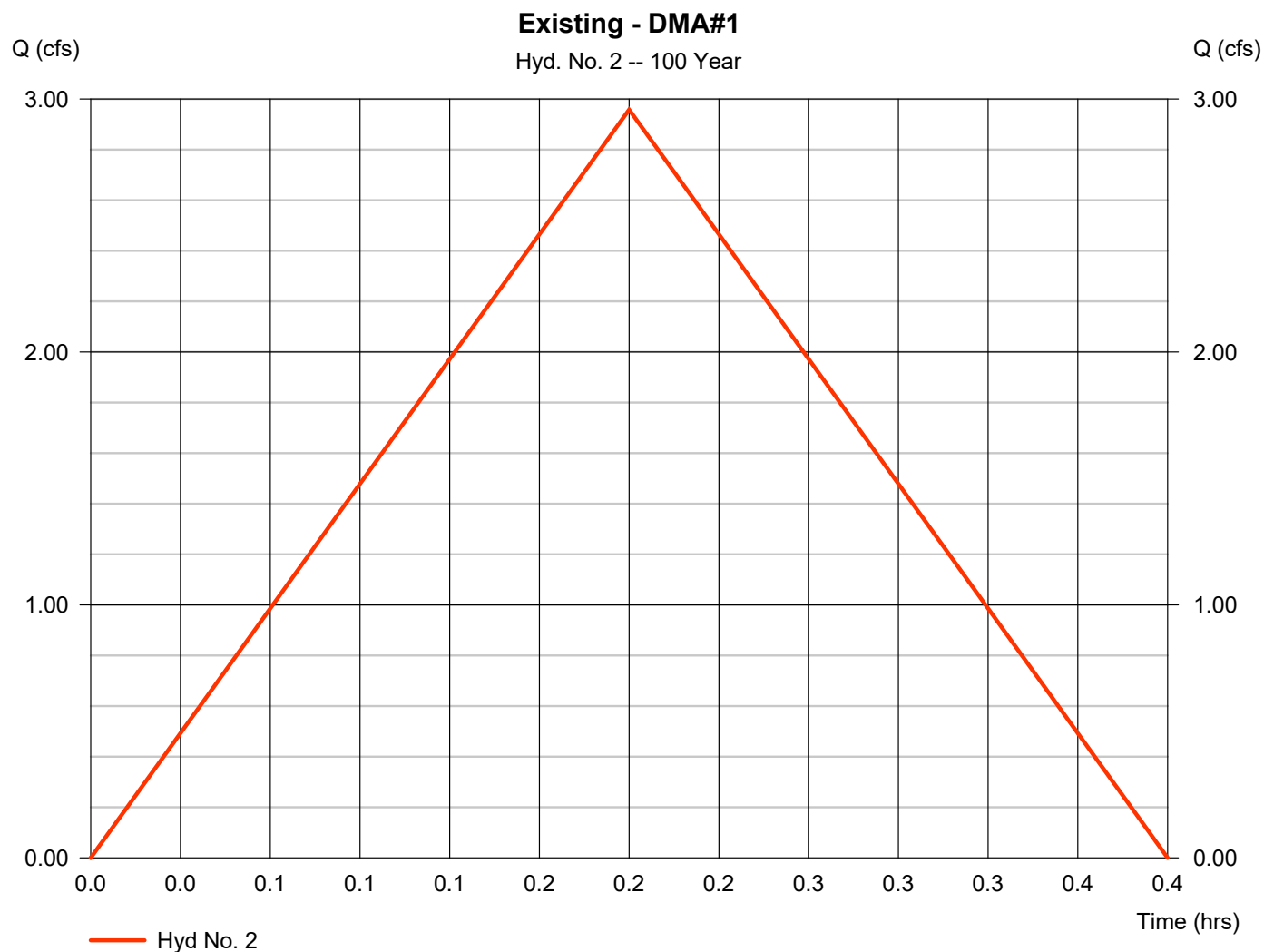
Friday, 12 / 8 / 2023

Hyd. No. 2

Existing - DMA#1

Hydrograph type	= Rational	Peak discharge	= 2.958 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.20 hrs
Time interval	= 1 min	Hyd. volume	= 2,130 cuft
Drainage area	= 1.500 ac	Runoff coeff.	= 0.71*
Intensity	= 2.777 in/hr	Tc by TR55	= 12.00 min
IDF Curve	= SampleFHA.idf	Asc/Rec limb fact	= 1/1

* Composite (Area/C) = [(1.912 x 0.20)] / 1.500



PD-R21-0002/CUP21-0004/P-E25-0001 CREEKSIDE PLAZA ARCO
EXHIBIT R - PRELIMINARY STORMWATER CONTROL PLAN

17

Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

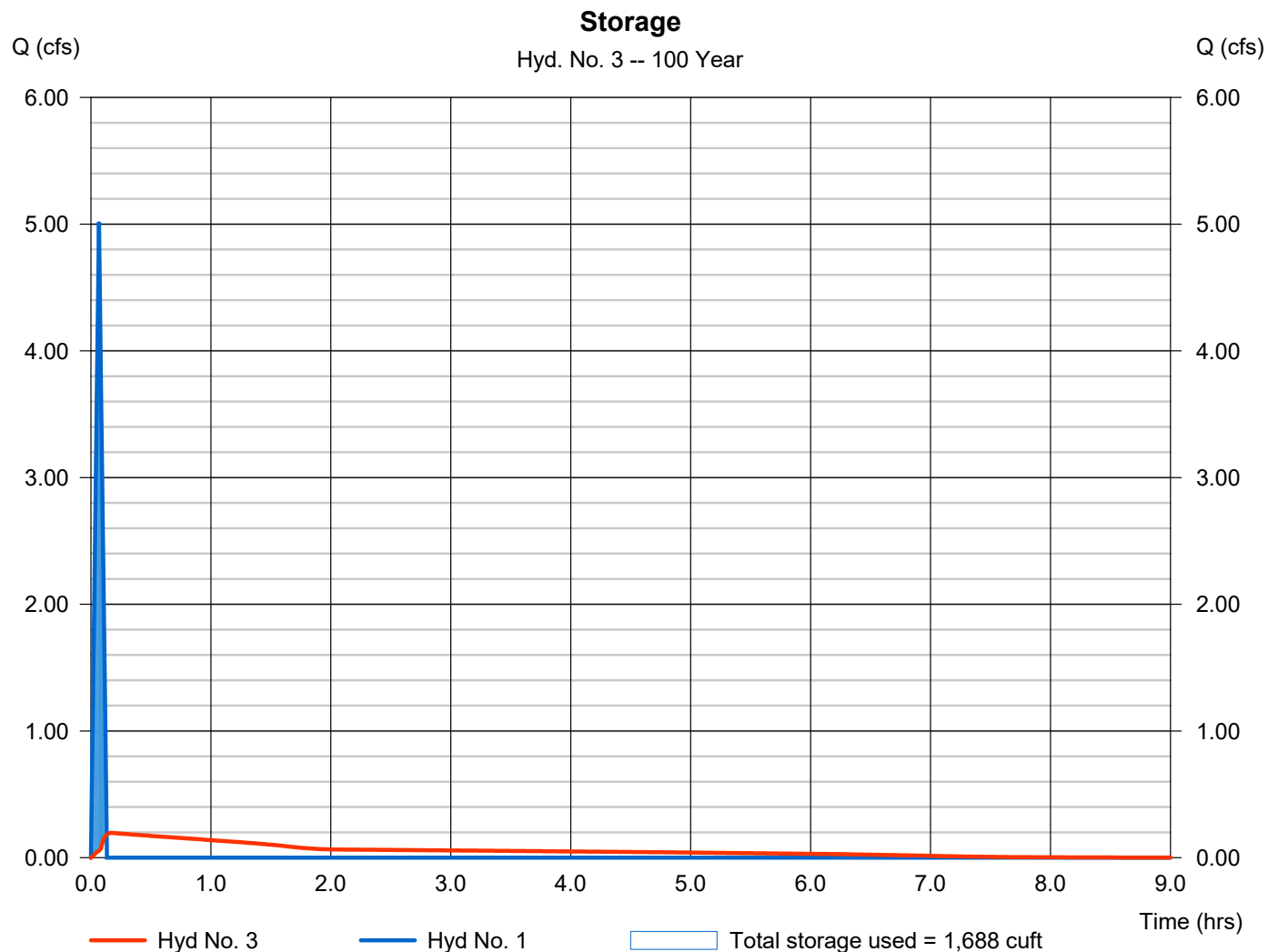
Friday, 12 / 8 / 2023

Hyd. No. 3

Storage

Hydrograph type	= Reservoir	Peak discharge	= 0.196 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.17 hrs
Time interval	= 1 min	Hyd. volume	= 1,740 cuft
Inflow hyd. No.	= 1 - Developed - DMA#1	Max. Elevation	= 102.46 ft
Reservoir name	= Creekside Plaza	Max. Storage	= 1,688 cuft

Storage Indication method used.



Appendix D

Proprietary System Design

PD-R21-0002/CUP21-0004/P-E25-0001 CREEKSIDE PLAZA ARCO

EXHIBIT R - PRELIMINARY STORMWATER CONTROL PLAN



User Inputs

Chamber Model:	MC-3500
Outlet Control Structure:	No
Project Name:	ARCO Creekside Plaza
Engineer:	Elizabeth Swing
Project Location:	California
Measurement Type:	Imperial
Required Storage Volume:	1275 cubic ft.
Stone Porosity:	40%
Stone Foundation Depth:	9 in.
Stone Above Chambers:	12 in.
Average Cover Over Chambers:	18 in.
Design Constraint Dimensions:	(25 ft. x 35 ft.)

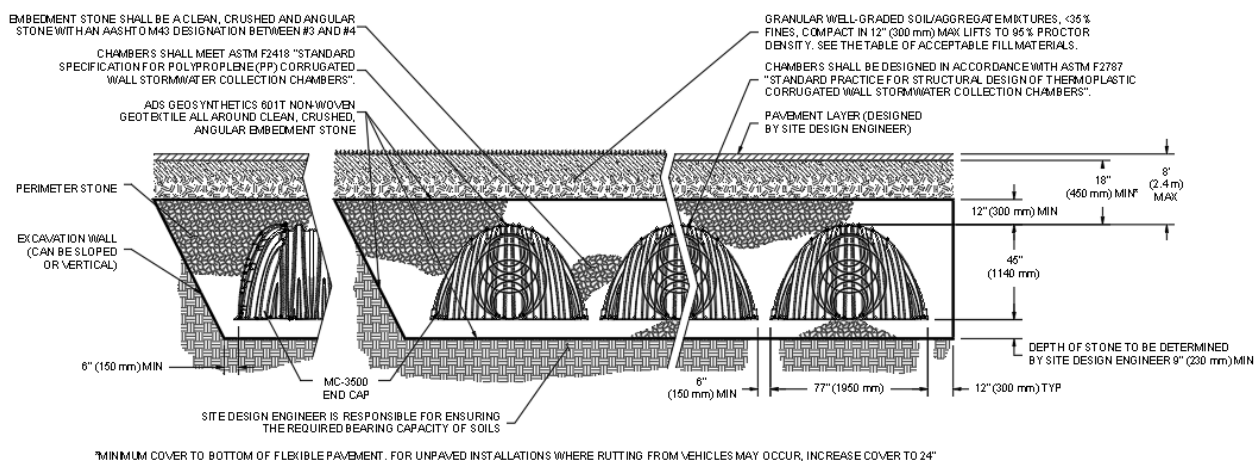
Results

System Volume and Bed Size

Installed Storage Volume:	1483.25 cubic ft.
Storage Volume Per Chamber:	109.90 cubic ft.
Number Of Chambers Required:	6
Number Of End Caps Required:	4
Chamber Rows:	2
Maximum Length:	31.18 ft.
Maximum Width:	15.33 ft.
Approx. Bed Size Required:	478.11 square ft.

System Components

Amount Of Stone Required:	71 cubic yards
Volume Of Excavation (Not Including Fill):	98 cubic yards
Total Non-woven Geotextile Required:	196 square yards
Woven Geotextile Required (excluding Isolator Row):	17 square yards
Woven Geotextile Required (Isolator Row):	30 square yards
Total Woven Geotextile Required:	47 square yards
Impervious Liner Required:	0 square yards



PD-R21-0002/CUP21-0004/P-E25-0001 CREEKSIDE PLAZA ARCO
EXHIBIT R - PRELIMINARY STORMWATER CONTROL PLAN



Arco - Placerville
Placerville- CA

BAYSAVER BAYFILTER SPECIFICATIONS

PRODUCTS

- A. **INTERNAL COMPONENTS:** ALL COMPONENTS INCLUDING CONCRETE STRUCTURE(S), PVC MANIFOLD PIPING AND FILTER CARTRIDGES, SHALL BE PROVIDED BY BAYSAVER TECHNOLOGIES LLC, 1030 DEER HOLLOW DRIVE, MOUNT AIRY, MD (800.229.7283).
- B. **PVC MANIFOLD PIPING:** ALL INTERNAL PVC PIPE AND FITTINGS SHALL MEET ASTM D1785. MANIFOLD PIPING SHALL BE PROVIDED TO THE CONTRACTOR PARTIALLY PRE-CUT AND PRE-ASSEMBLED.
- C. **FILTER CARTRIDGES:** EXTERNAL SHELL OF THE FILTER CARTRIDGES SHALL BE SUBSTANTIALLY CONSTRUCTED OF POLYETHYLENE OR EQUIVALENT MATERIAL ACCEPTABLE TO THE MANUFACTURER. FILTRATION MEDIA SHALL BE ARRANGED IN A SPIRAL LAYERED FASHION TO MAXIMIZE AVAILABLE FILTRATION AREA. AN ORIFICE PLATE SHALL BE SUPPLIED WITH EACH CARTRIDGE TO RESTRICT THE FLOW RATE TO A MAXIMUM OF 45 GPM.
- D. **FILTER MEDIA:** FILTER MEDIA SHALL BE BY BAYSAVER TECHNOLOGIES LLC AND SHALL CONSIST OF THE FOLLOWING MIX: A BLEND OF ZEOLITE, PERLITE AND ACTIVATED ALUMINA.
- E. **PRECAST CONCRETE VAULT:** CONCRETE STRUCTURES SHALL BE PROVIDED ACCORDING TO ASTM C. THE MATERIALS AND STRUCTURAL DESIGN OF THE DEVICES SHALL BE PER ASTM C478, C857 AND C858. PRECAST CONCRETE SHALL BE PROVIDED BY BAYSAVER TECHNOLOGIES, LLC.

PERFORMANCE

- A. THE STORMWATER FILTER SYSTEM SHALL BE AN OFFLINE DESIGN CAPABLE OF TREATING 100% OF THE REQUIRED TREATMENT FLOW AT FULL SEDIMENT LOAD CONDITIONS.
- B. THE STORMWATER FILTER SYSTEM'S CARTRIDGES SHALL HAVE NO MOVING PARTS.
- C. THE STORMWATER TREATMENT UNIT SHALL BE DESIGNED TO REMOVE AT LEAST 85% OF SUSPENDED SOLIDS, 65% OF TOTAL PHOSPHORUS, 65% OF TURBIDITY, 40% OF TOTAL COPPER, AND 40% OF TOTAL ZINC BASED ON FIELD DATA COLLECTED IN COMPLIANCE WITH THE TECHNOLOGY ACCEPTANCE RECIPROCITY PARTNERSHIP TIER II TEST PROTOCOL.
- D. THE STORMWATER FILTRATION SYSTEM SHALL REDUCE INCOMING TURBIDITY (MEASURED AS NTUs) BY 50% OR MORE AND SHALL NOT HAVE ANY COMPONENTS THAT LEACH NITRATES OR PHOSPHATES.
- E. THE STORMWATER FILTRATION CARTRIDGE SHALL BE EQUIPPED WITH A HYDRODYNAMIC BACKWASH MECHANISM TO EXTEND THE FILTER'S LIFE AND OPTIMIZE ITS PERFORMANCE.
- F. THE STORMWATER FILTRATION SYSTEM SHALL BE DESIGNED TO REMOVE A MINIMUM OF 65% OF THE INCOMING TOTAL PHOSPHORUS (TP) LOAD.
- G. THE STORMWATER FILTRATION SYSTEM'S CARTRIDGES SHALL HAVE A TREATED SEDIMENT CAPACITY FOR 80% TSS REMOVAL BETWEEN 150-350 LBS.

BAYFILTER MAINTENANCE

THE BAYFILTER SYSTEM REQUIRES PERIODIC MAINTENANCE TO CONTINUE OPERATING AT ITS PEAK EFFICIENCY DESIGN. THE MAINTENANCE PROCESS COMPRISES THE REMOVAL AND REPLACEMENT OF EACH BAYFILTER CARTRIDGE AND THE CLEANING OF THE VAULT OR MANHOLE WITH A VACUUM TRUCK. FOR BEST RESULTS, BAYFILTER MAINTENANCE SHOULD BE PERFORMED BY A CERTIFIED MAINTENANCE CONTRACTOR. A QUICK CALL TO AN ADS ENGINEER OR CUSTOMER SERVICE REPRESENTATIVE WILL PROVIDE YOU WITH A LIST OF RELIABLE CONTRACTORS IN YOUR AREA.

WHEN BAYFILTER IS INITIALLY INSTALLED, WE RECOMMEND THAT AN INSPECTION BE PERFORMED ON THE SYSTEM IN THE FIRST SIX (6) MONTHS. AFTER THAT, THE INSPECTION CYCLE TYPICALLY FALLS INTO A BIENNIAL PATTERN GIVEN NORMAL STORM OCCURRENCE AND ACTUAL SOLIDS LOADS.

WHEN BAYFILTER EXHIBITS FLOWS BELOW DESIGN LEVELS, THE SYSTEM SHOULD BE INSPECTED AND MAINTAINED AS SOON AS PRACTICAL. REPLACING A BAYFILTER CARTRIDGE SHOULD BE CONSIDERED AT OR ABOVE THE LEVEL OF THE MANIFOLD.

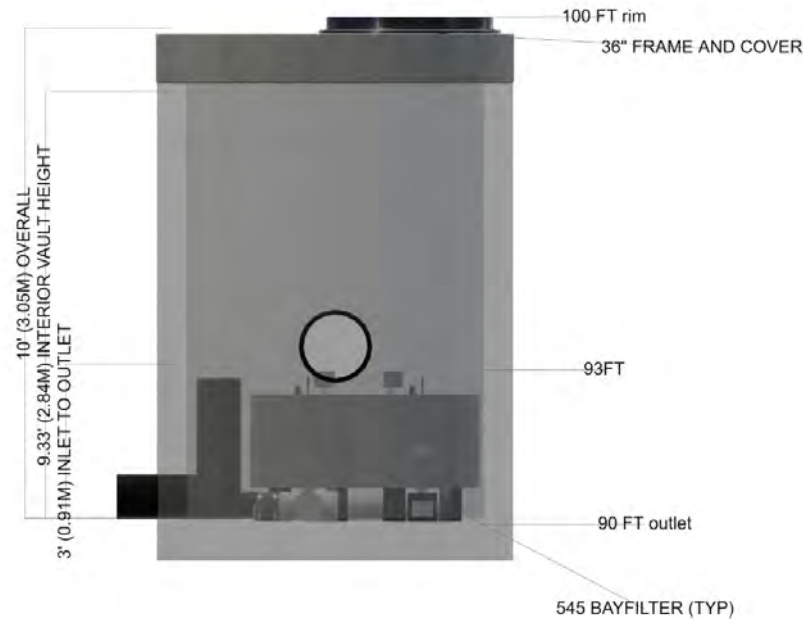
MAINTENANCE PROCEDURES

1. REMOVE THE MANHOLE COVERS AND OPEN ALL ACCESS HATCHES.
2. BEFORE ENTERING THE SYSTEM MAKE SURE THE AIR IS SAFE PER OSHA STANDARDS OR USE A BREATHING APPARATUS. USE LOW O2, HIGH CO, OR OTHER APPLICABLE WARNING DEVICES PER REGULATORY REQUIREMENTS.
3. USING A VACUUM TRUCK, REMOVE ANY LIQUID AND SEDIMENTS THAT CAN BE REMOVED PRIOR TO ENTRY.
4. USING A SMALL LIFT OR THE BOOM OF THE VACUUM TRUCK, REMOVE THE USED CARTRIDGES BY LIFTING THEM OUT.
5. ANY CARTRIDGES THAT CANNOT BE READILY LIFTED CAN BE EASILY SLID ALONG THE FLOOR TO A LOCATION THEY CAN BE LIFTED VIA A BOOM LIFT.
6. WHEN ALL THE CARTRIDGES HAVE BEEN REMOVED, IT IS NOW PRACTICAL TO REMOVE THE BALANCE OF THE SOLIDS AND WATER. LOOSEN THE STAINLESS CLAMPS ON THE FERNCO COUPLINGS FOR THE MANIFOLD AND REMOVE THE DRAINPIPES AS WELL. CAREFULLY CAP THE MANIFOLD AND THE FERNCO'S AND RINSE THE FLOOR, WASHING AWAY THE BALANCE OF ANY REMAINING COLLECTED SOLIDS.
7. CLEAN THE MANIFOLD PIPES, INSPECT, AND REINSTALL.
8. INSTALL THE EXCHANGE CARTRIDGES AND CLOSE ALL COVERS.
9. THE USED CARTRIDGES MUST BE SENT BACK TO ADS FOR EXCHANGE/RECYCLING AND CREDIT ON UNDAMAGED UNITS.

BAYFILTER INSTALLATION NOTES

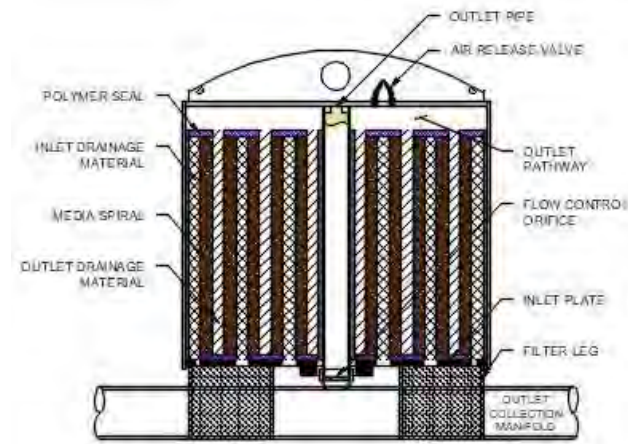
1. CONTACT UTILITY LOCATOR TO MARK ANY NEARBY UNDERGROUND UTILITIES AND MAKE SURE IT IS SAFE TO EXCAVATE.
2. REFERENCE THE SITE PLAN AND STAKE OUT THE LOCATION OF THE BAYFILTER VAULT.
3. EXCAVATE THE HOLE, PROVIDING ANY SHEETING AND SHORING NECESSARY TO COMPLY WITH ALL FEDERAL, STATE AND LOCAL SAFETY REGULATIONS.
4. LEVEL THE SUB—GRADE TO THE PROPER ELEVATION. VERIFY THE ELEVATION AGAINST THE MANHOLE DIMENSIONS, THE INVERT ELEVATIONS, AND THE SITE PLANS. ADJUST THE BASE AGGREGATE, IF NECESSARY.
5. HAVE THE SOIL BEARING CAPACITY VERIFIED BY A LICENSED/ENGINEER FOR THE REQUIRED LOAD BEARING CAPACITY. ON SOLID SUB—GRADE, SET THE FIRST SECTION OF THE BAYFILTER PRE—CAST VAULT.
6. CHECK THE LEVEL AND ELEVATION OF THE FIRST SECTION TO ENSURE IT IS CORRECT BEFORE ADDING ANY RISER SECTIONS.
7. IF ADDITIONAL SECTION(S) ARE REQUIRED, ADD A WATERTIGHT SEAL TO THE FIRST SECTION OF THE BAYFILTER VAULT. SET ADDITIONAL SECTION(S) OF THE VAULT, ADDING A WATERTIGHT SEAL TO EACH JOINT.
8. INSTALL THE PVC OUTLET MANIFOLD.
9. INSTALL THE PVC OUTLET PIPE IN BAYFILTER VAULT.
10. INSTALL THE INLET PIPE TO THE BAYFILTER VAULT.
11. AFTER THE SITE IS STABILIZED, REMOVE ANY ACCUMULATED SEDIMENT OR DEBRIS FROM THE VAULT AND INSTALL THE FLOW DISKS, DRAINDOWN MODULES (IF APPLICABLE), AND THE BAYFILTER CARTRIDGES.
12. PLACE FULL SET OF HOLD DOWN BARS AND BRACKETS INTO PLACE.

PD-R21-0002/CUP21-0004/P-E25-0001 CREEKSIDE PLAZA ARCO
EXHIBIT R - PRELIMINARY STORMWATER CONTROL PLAN



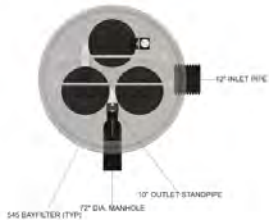
SECTION A-A
SCALE: N.T.S.

NOTE: THIS DETAIL SHOWS A FUNCTIONAL FILTER DESIGN PER SITE SPECIFIC INFORMATION PROVIDED. THE FINAL APPROVED PRECAST DRAWINGS WILL DETERMINE THE FINAL SIZE, INCLUDING BUT NOT LIMITED TO; OVERALL DIMENSIONS, RISER SIZE, RISER TYPE & HEIGHT AND FRAMES & COVERS BEING PROVIDED.



545BAYFILTER	WQU-1
WATER QUALITY FLOW RATE	0.22 cfs
DRAINAGE AREA	
CARTRIDGE DESIGN FLOW RATE	45 GPM
# BAYFILTER CARTRIDGES	3
TREATED SEDIMENT CAPACITY	1050 lbs

THE BAYFILTER STORMWATER MANAGEMENT SYSTEM IS A STORMWATER FILTRATION DEVICE DESIGNED TO REMOVE FINE SEDIMENTS, HEAVY METALS, AND PHOSPHORUS. THE BAYFILTER SYSTEM RELIES ON A SPIRAL WOUND MEDIA FILTER CARTRIDGE WITH APPROXIMATELY 90 SQUARE FEET OF FILTRATION AREA. THE FILTER CARTRIDGES ARE HOUSED IN A CONCRETE STRUCTURE THAT EVENLY DISTRIBUTES THE FLOW BETWEEN CARTRIDGES. THE SYSTEM IS OFFLINE WITH AN EXTERNAL BYPASS THAT ROUTES HIGH INTENSITY STORMS AROUND THE SYSTEM. THE FILTER CARTRIDGES REMOVE POLLUTANTS FROM RUNOFF BY FILTRATION (INTERCEPTION/ATTACHMENT) AND ADSORPTION.



PLAN VIEW
SCALE: N.T.S.

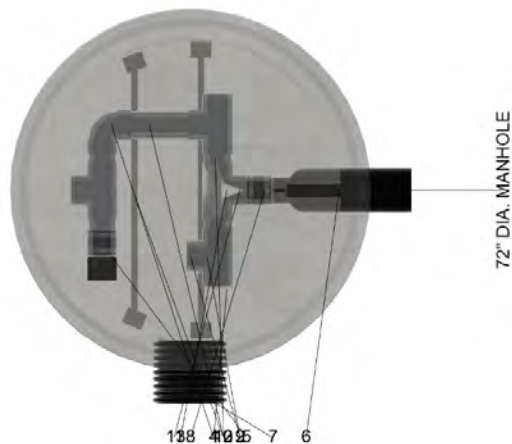
4640 TRUEMAN BLVD HILLIARD, OH 43026 ADS	NOT TO SCALE	Arco - Placerville	
		Placerville - CA	
		DATE: 12/6/23	DRAWN: XXX
		PROJECT #: S#####	CHECKED: XXX
		THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER OR OTHER PROJECT REPRESENTATIVE. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.	
2 SHEET OF 2			

**PD-R21-0002/CUP21-0004/P-E25-0001 CREEKSIDE PLAZA ARCO
EXHIBIT R - PRELIMINARY STORMWATER CONTROL PLAN**



Arco - Placerville

BAYFILTER 545 – 72" BILL OF MATERIALS



PART NUMBER	QUANTITY	DESCRIPTION
1	1	6-IN PVC ELBOW
2	3	6-IN PVC TEE WITH 1.5-IN FLOWDISK
3	1	6-IN PVC TEE
4	3	545 CARTRIDGES

**PD-R21-0002/CUP21-0004/P-E25-0001 CREEKSIDE PLAZA ARCO
EXHIBIT R - PRELIMINARY STORMWATER CONTROL PLAN**

5	1	DRAINDOWN
6	1	10" STANDPIPE
7	1	INLET PIPE
8	1	6-IN FLEXIBLE COUPLER
9	4	6-IN PVC PLUG
10	2	HOLD DOWN BAR
11	1	6-IN PVC 7" LONG
12	3	6-IN PVC 8" LONG
13	1	6-IN PVC 20" LONG



BAYFILTER™ INSPECTION AND MAINTENANCE MANUAL

The BayFilter system requires periodic maintenance to continue operating at the design efficiency. The maintenance process is comprised of the removal and replacement of each BayFilter cartridge, vertical drain down module; and the cleaning of the vault or manhole with a vacuum truck.

The maintenance cycle of the BayFilter system will be driven mostly by the actual solids load on the filter. The system should be periodically monitored to be certain it is operating correctly. Since stormwater solids loads can be variable, it is possible that the maintenance cycle could be more or less than the projected duration.

BayFilter systems in volume-based applications are designed to treat the WQv in 24 to 48 hours initially. Late in the operational cycle of the BayFilter, the flow rate will diminish as a result of occlusion. When the drain down exceeds the regulated standard, maintenance should be performed.

When a BayFilter system is first installed, it is recommended that it be inspected every six (6) months. When the filter system exhibits flows below design levels the system should be maintained. Filter cartridge replacement should also be considered when sediment levels are at or above the level of the manifold system. Please contact the BaySaver Technologies Engineering Department for maintenance cycle estimations or assistance at **1.800.229.7283**.



BayFilter System Cleanout



Vactor Truck Maintenance



Jet Vactoring Through Access Hatch

PD-R21-0002/CUP21-0004/P-E25-0001 CREEKSIDE PLAZA ARCO

EXHIBIT R - PRELIMINARY STORMWATER CONTROL PLAN



Maintenance Procedures

1. Contact BaySaver Technologies for replacement filter cartridge pricing and availability at 1-800-229-7283.
2. Remove the manhole covers and open all access hatches.
3. Before entering the system make sure the air is safe per OSHA Standards or use a breathing apparatus. Use low O₂, high CO, or other applicable warning devices per regulatory requirements.
4. Using a vacuum truck remove any liquid and sediments that can be removed prior to entry.
5. Using a small lift or the boom of the vacuum truck, remove the used cartridges by lifting them out.
6. Any cartridges that cannot be readily lifted can be easily slid along the floor to a location they can be lifted via a boom lift.
7. When all the cartridges have been removed, it is not practical to remove the balance of the solids and water. Loosen the stainless clamps on the Fernco couplings for the manifold and remove the drain pipes as well. Carefully cap the manifold and the Ferncos and rinse the floor, washing away the balance of any remaining collected solids.
8. Clean the manifold pipes, inspect, and reinstall.
9. Install the exchange cartridges and close all covers.
10. The used cartridges may be sent back to BaySaver Technologies for recycling.



Manifold Tee View of a Cleaned System



Cartridge Hoist Point

For more information please see the BaySaver website at www.baysaver.com or contact 1-800-229-7283.

THE MOST **ADVANCED** NAME IN WATER MANAGEMENT SOLUTIONS™

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