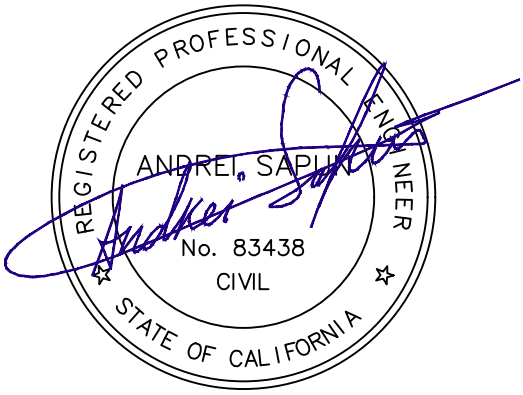
LEVEL 3 DRAINAGE STUDY
FOR
BEECH AVE & ROLOFF WAY TENTATIVE PARCEL MAP

Prepared for:
Toni Conners
P.O. Box 725
Orangevale, CA 95662

APN:
261-0250-032 and 033



8/19/2024

Planning Application Number:
PLNP2022-00180

Prepared by:
Andrei Sapun, P.E., QSD
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7478 Sandalwood Drive, Suite 400
Citrus Heights, CA 95621

Job Number:
21068

Preparation Date:
September 2022

Last Updated On:
August 19, 2024

Vertical Datum: NAVD88
Watershed: Arcade Creek

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1.0 INTRODUCTION

1.1 PROJECT DESCRIPTION AND EXISTING CONDITIONS

This drainage study is prepared to support Beech Avenue and Roloff Way Tentative Parcel Map (TPM). Vicinity map and TPM are provided in the Appendix 1. Project objective is to split existing parcel and an adjacent vacant parcel into four lots with remainder lot. Remainder lot will include existing house at 6018 Roloff Way.

Existing conditions include 0.37-acre parcel # 261-0250-033 with existing house (estimated impervious area is 40%) and 2.26-acre vacant parcel # 261-0250-032 (estimated impervious area is 2%). Project is not located in the FEMA floodplain hazard area. According to USDA-NRCS soil survey data, project soil consists of 25% Orangevale, 6% Kaseburg, 20% Urban Land, 40% Fiddyment, 6% Xerarents, and 3% unknown soil profiles. Orangevale is considered as Type B soil, however, Kaseburg, Urban Land and Fiddyment are type D hydrologic groups.

1.2 APPLICABLE STANDARDS

The design computations shall be in conformance with Sections 9 of the Sacramento County Improvement Standards and Volume 2 of the Sacramento City/County Drainage Manual. LID measures shall comply with Stormwater Quality Design Manual for Sacramento Region.

1.3 PREVIOUS STUDIES

No previous studies are available for the project area.

1.4 STUDY OBJECTIVES

Per Sacramento County Department of Water Resources request dated August 4, 2022, the current study analyses the following list of items:

1. On-site and off-site drainage shed maps. Based on existing topography it seems like some of the western portion of Beech Avenue would drain towards the property. Please verify and include or not include in the off-site drainage shed map as necessary.
2. A discussion of existing conditions and proposed conditions on the project site.
3. Provide an evaluation of the impacts of the increase in 100-year runoff due to the change in land use and the proposed development. The report should summarize that there are no significant impacts, with mitigation as necessary.
4. A 100-year runoff analysis will be required to determine how the drainage will be affected by the proposed development of the project site. Use SacCalc for hydrologic calculations and provide the SacCalc model files with the study submittal.
5. An analysis and discussion of overland release flow and point(s) of discharge off the project site.
    a. The site should release runoff at the project boundaries without impacting upstream or downstream properties.

b. Minimum pad elevations will need to be above the overland release control elevation.

6. Provide a preliminary grading and drainage plan. Where are the lots proposed to drain? If the lots will drain to the roads and be picked up by the existing storm drain systems, the project will need to analyze the existing systems capacity (this can be done at a design-level Level 4 study prior to improvement plan submittal). If the lots will utilize the public storm drain pipe to the west, then the project will likely need to upsize the public storm drain line, which lies in the backyards of multiple properties to the west. This will likely be a complicated option and would require an analysis now (in this Level 3 study). A drainage facility map is attached for your reference.

2.0 EXISTING CONDITIONS

2.1 HISTORICAL LAND USE AND TOPOGRAPHY

The existing project land use is LDR (Low Density Residential). Total project area is 2.6± acres. Existing topography varies from 2% to 8% slopes. The current drainage generally runs from east to west as shown in the Existing Shed Map in Appendix 3. Existing shed map is determined using Sacramento County LIDAR information. The project site does have two watersheds that drain to the west and to the south. The first watershed drains to the west towards Illinois Avenue via the existing 15' drainage easement and the second watershed drains to the south towards Kevmich Way.

2.2 EXISTING CONDITIONS MODELING

Hydrologic modeling for existing conditions was made using Sacramento Hydrologic Calculator (SacCalc), a Microsoft Windows application developed for Sacramento County. SacCalcs model of existing watershed schematics is provided in Figures 1 below.

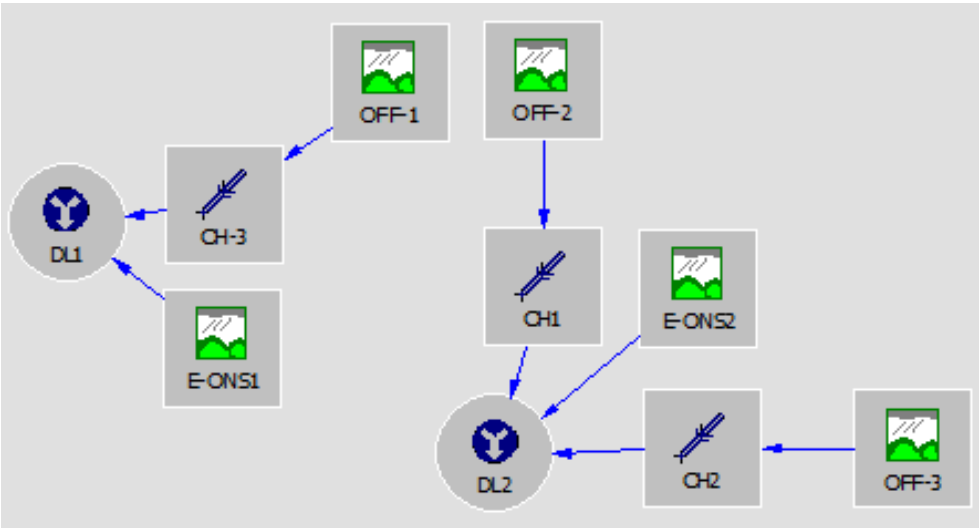


Figure 1 - SacCalcs Model Schematics for Existing Conditions

The existing project site has two discharge locations: to the west (DL-1) towards existing drain inlet and overland release easement, and to the south (DL-2) towards Kevmich Way. OFF-1 represents a 0.17-acre offsite watershed that drains from Rollof Way into the project site. E-ONS1 represents the existing 1.12-acre watershed which drains to the west towards Illinois Avenue. It consists of 0.19-acre of developed portion of parcel with APN 261-0250-033. OFF-2 represents a 2.44-acre offsite watershed area that drains to the site consisted of RD10 and RD4 zoning areas. E-ONS2 represents 1.54-acre project site area with the majority of the developed parcel with APN 261-0250-033 and vacant project site area. OFF-3 represents 0.25-acre offsite shed from developed RD-4 zone. CH1, CH2 and CH3 represent the distance that offsite watersheds have to flow through project site before reaching the discharge locations.

The soil type for all watersheds was selected as Type 'D' since it is the prevailing soil type as stated in USGS soil map for the area.

Lag transformation and infiltration loss rate are selected to be computed. All watersheds are selected as developed except for the vacant portions of the project site. Developed watershed portion consists of RD-4 and RD-10 zoning. 100-year peak for 24-hour flows were calculated using Zone 3 for the Sacramento Method (100-year event). Modeling results are summarized in Table below and Modeling Report is provided in Appendix 5.

Table 1 - Sacramento Method Results for Existing Conditions

Watershed, ID	Area, ac	Peak flow, (cfs)	Time of Peak (hours)
E-ONS1	1.12	3.9	12:03
E-ONS2	1.54	4.1	12:07
OFF-1	0.17	0.6	12:02
OFF-2	2.44	9.0	12:02
OFF-3	0.25	0.9	12:02
CH1	2.44	8.8	12:04
CH2	0.25	0.9	12:07
CH3	0.17	0.6	12:04
DL1	1.29	4.5	12:03
DL2	4.23	13.0	12:03

3.0 PROPOSED CONDITIONS

3.1 PROPOSED LAND USE

The vacant project site is proposed to split into 4 lots on a 2.63-acre project area. For the design purposes, all resultant lots are assumed to be developed to RD-4 zone density. However, no lots of improvements are proposed at this point and the existing topography will remain. No pads grading is proposed under the current application and current drainage patterns will remain as in existing conditions. The proposed shed map is provided in Appendix 3. Any lot grading and

improvement plans will be done separately by future owner or owners. Ultimately, when all parcels will be developed, it will be a minor shift in drainage: offsite watershed north of remainder parcel and remain parcel itselft will drain south towards Kevmich Way due to the road, that will connect Roloff Way and Kevmich Way.

3.2 PROPOSED CONDITIONS MODELING

A public road is proposed to connect Roloff Way and Kevmich Way. Because of the road, some of the runoff which was draining towards the west in existing conditions, will drain south instead. Therefore, the drainage to the west will be reduced, but drainage to the south will be increased after development. Hydrologic modeling schematics for the proposed conditions are provided in Figures 2 below.

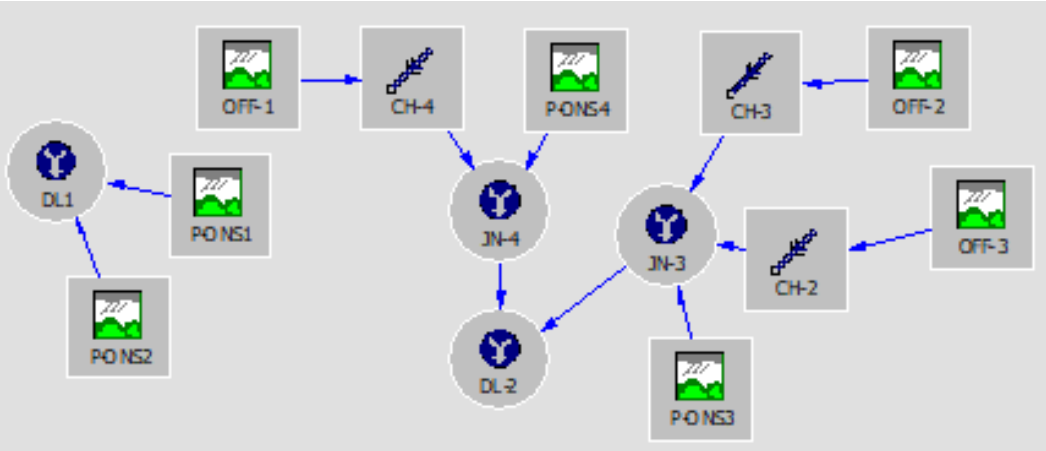


Figure 2 - SacCalcs Model Schematics for Proposed Conditions

OFF-1, 2 and 3 represent offsite watersheds which were discussed previously. CH-2 and 3 represent overland release routes for the offsite watersheds through the project site. CH-4 represents the proposed public road. P-ONS1, 2, 3 and 4 represent proposed parcels as shown in the TPM.

Land use for all project site watersheds is selected as RD-4. Even so the proposed Parcel 4 is larger than 1 acre and the Remainder Parcel area will be almost half an acre, an ultimate development of RD-4 is used which will allow future splits into RD-4 lots without any drainage impacts analysis for the impacts. Proposed drainage patterns are provided in the Overland Release Exhibit in the Attachment 4. Soil type for all watersheds as well as zoning assumptions were kept the same as in existing conditions. Lag transformation and infiltration loss rate are selected to be computed automatically. Modeling results are summarized in the Table below.

Table 2 - Sacramento Method Results for Proposed Conditions

Watershed, ID	Area, ac	Peak flow, (cfs)	Time of Peak (hours)
P-ONS1	0.36	1.3	12:02
P-ONS2	0.40	1.5	12:02
P-ONS3	1.24	4.2	12:03
P-ONS4	0.67	2.5	12:03
OFF-1	0.17	0.6	12:02
OFF-2	2.44	9.0	12:02
OFF-3	0.25	0.9	12:02
CH-2	2.69	0.9	12:04
CH-3	2.44	8.9	12:03
CH-4	0.17	0.6	12:03
JN-3	3.93	14	12:03
JN-4	0.84	3.1	12:02
DL1	0.76	2.8	12:02
DL2	4.77	17.0	12:03

3.3 ANALYSIS

Project area (2.67 acres) watershed is relatively small part of the existing watershed (28.5 acres) that drains to the Windshire Lane where drainage runoff from both project discharge locations, described in previous section, are merging together as shown in the Existing Watershed Map. Based on the SacCalc modeling results, runoff towards DL1 for 100-year event will be reduced in peak discharge from 4.5 cfs to 2.8 cfs due to smaller shed draining to the west after development as described in Section 3.1. However, due to the increase in its watershed area and due to proposed development, peak runoff towards Kevmich Way will be increased from 13 cfs to 17 cfs. This increase lasts only for 6 minutes (from 12:01 to 12:07). Sacramento County does allow an increase of water surface elevation (WSE) up to 0.1 ft. Existing and proposed conditions WSE were analyzed using Hydroflow Express software comparing existing and proposed project scenarios in form of open channel calculations for the Kevmich Way road. Design reports for Kevmich Way at the discharge location will be increased from 239.3 ft to 239.32 ft, see Figures 3 and 4 below. A 0.02 ft increase of WSE is an acceptable range by the County.

Project will have insignificant impact downstream at Windshire Lane due to its relative size and County's acceptable runoff increase. However, to address existing drainage concerns, the project was further analyzed for possible storage onsite to meet existing drainage volume after development. See next sections for onsite storage modeling.

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Friday, Aug 16 2024

100-YR PEAK DISHARGE THROUGH KEVMICH WAY AT EXISTING CONDITIONS

User-defined		Highlighted	
Invert Elev (ft)	= 238.93	Depth (ft)	= 0.37
Slope (%)	= 2.00	Q (cfs)	= 13.00
N-Value	= 0.016	Area (sqft)	= 4.43
		Velocity (ft/s)	= 2.94
Calculations		Wetted Perim (ft)	= 36.52
Compute by:	Known Q	Crit Depth, Yc (ft)	= 0.42
Known Q (cfs)	= 13.00	Top Width (ft)	= 36.40
		EGL (ft)	= 0.50

(Sta, El, n)-(Sta, El, n)...

(96.00, 241.28)-(116.00, 239.28, 0.016)-(120.00, 239.23, 0.016)-(120.83, 238.93, 0.016)-(123.00, 239.08, 0.016)-(136.00, 239.34, 0.016)-(149.00, 239.08, 0.016)-(151.17, 238.93, 0.016)-(152.00, 239.23, 0.016)-(156.00, 239.28, 0.016)-(176.00, 241.28, 0.016)

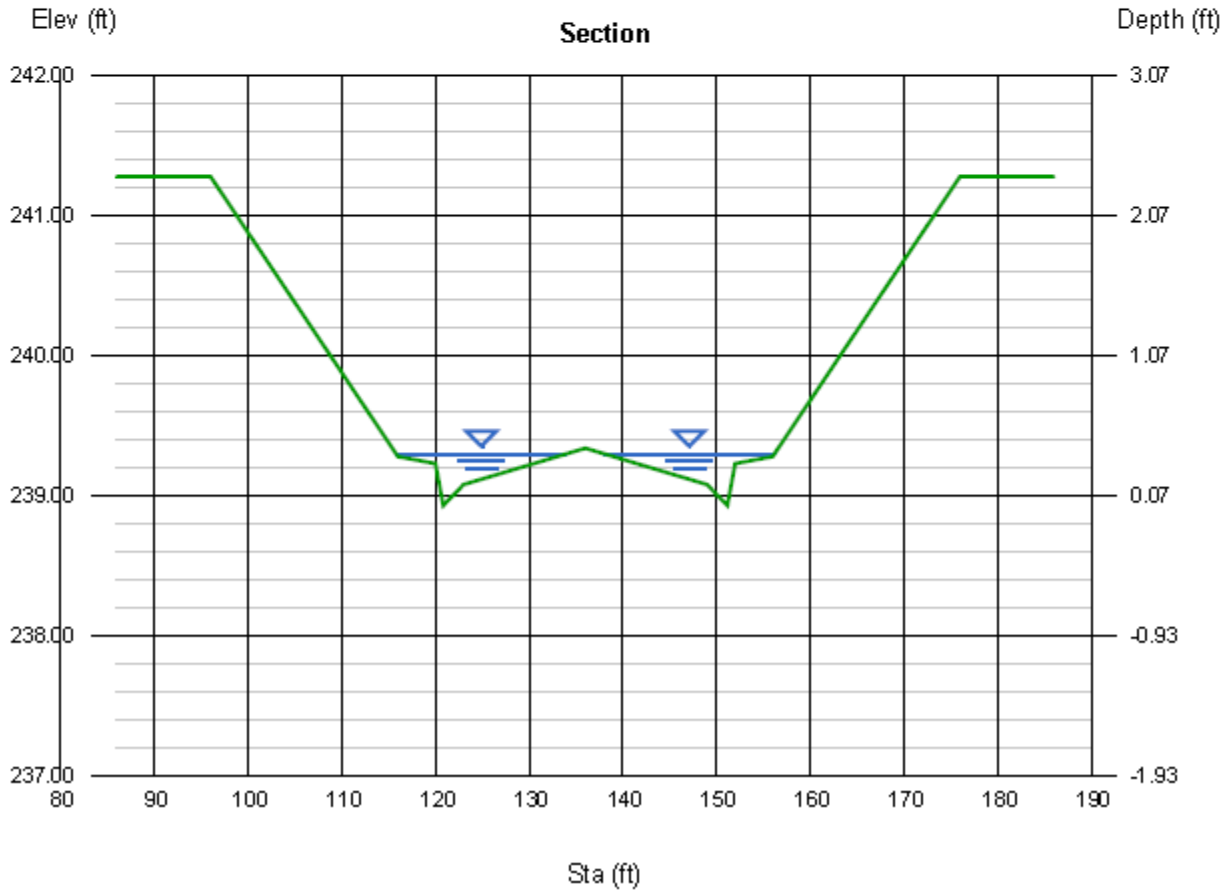


Figure 3 - 100-yr WSE for Existing Conditions

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Friday, Aug 16 2024

100-YR PEAK DISHARGE THROUGH KEVMICH WAY AT PROPOSED CONDITIONS

User-defined		**Highlighted**	
Invert Elev (ft)	= 238.93	Depth (ft)	= 0.39
Slope (%)	= 2.00	Q (cfs)	= 17.00
N-Value	= 0.016	Area (sqft)	= 5.18
		Velocity (ft/s)	= 3.28
Calculations		Wetted Perim (ft)	= 38.92
Compute by:	Known Q	Crit Depth, Yc (ft)	= 0.44
Known Q (cfs)	= 17.00	Top Width (ft)	= 38.80
		EGL (ft)	= 0.56

(Sta, El, n)-(Sta, El, n)...

(96.00, 241.28)-(116.00, 239.28, 0.016)-(120.00, 239.23, 0.016)-(120.83, 238.93, 0.016)-(123.00, 239.08, 0.016)-(136.00, 239.34, 0.016)-(149.00, 239.08, 0.016)-(151.17, 238.93, 0.016)-(152.00, 239.23, 0.016)-(156.00, 239.28, 0.016)-(176.00, 241.28, 0.016)

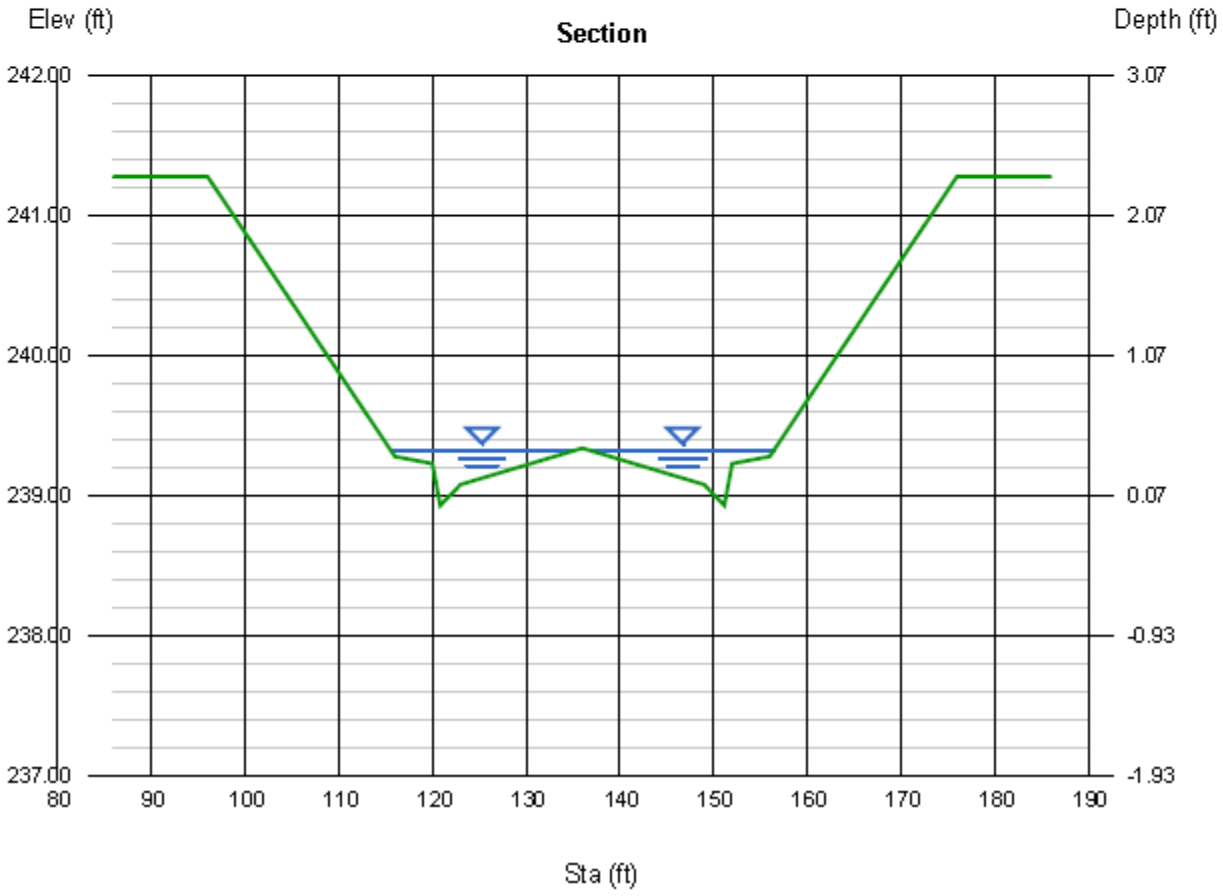


Figure 4 - 100-yr WSE for Proposed Conditions

3.4 100-YR RUNOFF STORAGE

Project can provide onsite storage in public street as long as its ponding will be below 1 ft. Due to significant elevation difference between Roloff Way and Kevmich Way, maximum storage in the proposed street is estimated around 670 cf which will not be enough to meet pre-development levels. However, if additional storage will be applied at Parcel 4, then project development runoff can match and be even lower than at existing conditions at Kevmich Way. This storage can be achieved via private road at Parcel 4 in case it will be further subdivided to match RD-4 zoning or via onsite storage. Since further subdivision of Parcel 4 and its analysis goes beyond proposed Tentative Map, a basic rectangular storage was modeled to show effect of storage to the proposed runoff volume. A hydrograph information from SacCalc model which flows through Pacel 4 was routed via a rectangular storage of 30ft by 50ft with 3 to 1 side slope and 2.5ft depth (watersheds P-ONS3, OFF-2 and OFF-3). Pond discharge was modeled using box inlet (2ft by 2ft) as pond riser, 12" pipe that will connect private inlet to public drain system and 20 ft wide weir on top of the pond with elevation at 239.0 ft. Street storage was modeled based on the assumption that it is a sage with incremental storage of 9 cf for 0.1 ft depth, 140 cf for 0.4 ft depth, and 785 cf for 0.9 ft depth. The result of onsite storage and street storage is that post-development peak runoff can be reduced below existing volume (13.0 cf at existing conditions and 11.22 at post development). Please note, the project does not volunteer to reduce below existing volume. The intent of parcel 4 storage modeling is to show that project development impacts can be completely achieved. Hydrology Studio report is provided in Appendix 6.

NOTE: If parcel 4 will not be subdivided and no onsite storage will be placed on parcel 4, current project development still does not have a significant impact on downstream properties as described in Section 3.3. However, if parcel 4 will be subdivided in future, then there is a potential possibility to mitigate development impacts completely, which will have to be further analyzed under level 4 study.

4.0 REGIONAL FLOOD CONTROL

4.1 OVERLAND RELEASE DISCHARGE LOCATION

Project will have two overland release discharge locations as in existing conditions. The first discharge location will be located in the middle of the west boundary line at the east corner of parcels 261-0250-041 and 051. 100-yr runoff should be conveyed to Windshire Lane via an existing 15' wide drainage easement per subdivision map for Windsor Park (259 RM 10). The second discharge location is Kevmich Way as shown in the Overland Release Exhibit in Appendix 4.

4.2 UPSTREAM AND DOWNSTREAM IMPACTS

No obstruction of flow is proposed for the offsite upstream drainage patterns therefore no impact to the upstream properties is anticipated. Also, there is no downstream impact to the west discharge location. There is an increase in flow to the south discharge location at Kevmich Way but it will not increase WSE significantly. However, there is a potential to reduce or lower post-development runoff via street storage or future onsite storage on parcel 4.

4.3 MINIMUM FINISH FLOOR

The minimum finish floor elevation for the proposed parcels should be set to provide 1.5 ft clearance above flooding elevation. The minimum certified pads elevation should be set at 1.2 ft above the flooding elevations. For the proposed parcels 1, 2, 3 and 4 will be determined by either future road design or by overland release discharge elevation. Future level 4 study, that will be required to supplement the improvement plans, will set min elevation for the future houses.

5.0 WATER QUALITY

5.1 PROPOSED LAND USE

No rezoning is proposed for the project. The existing vacant project site will be split into residential lots. RD-4 land use is assumed for all parcels which will allow future parcels subdivision into RD-4 lots without any impact assessment. Proposed Tentative Parcel Map in Appendix 1.

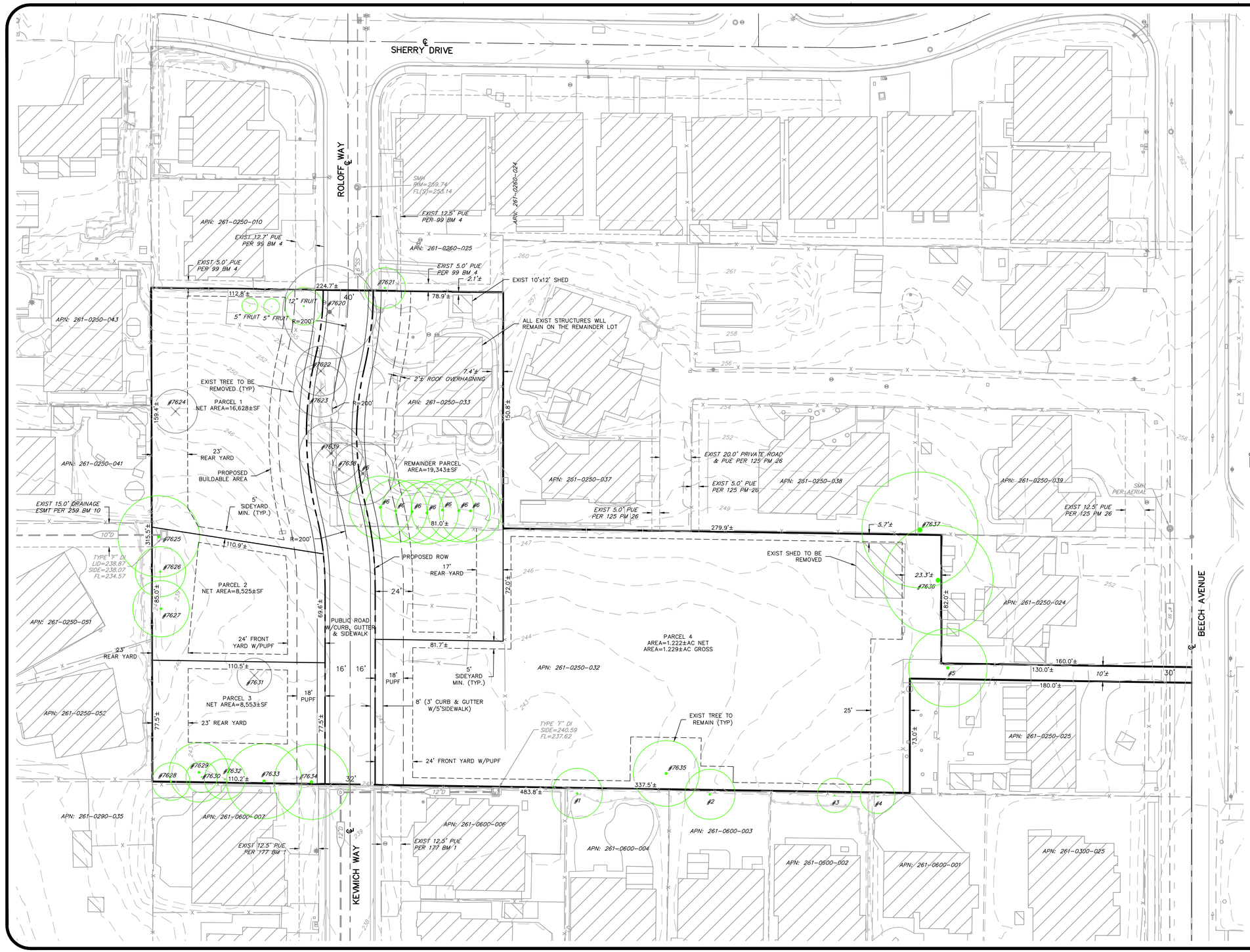
5.2 LOW IMPACT DEVELOPMENT

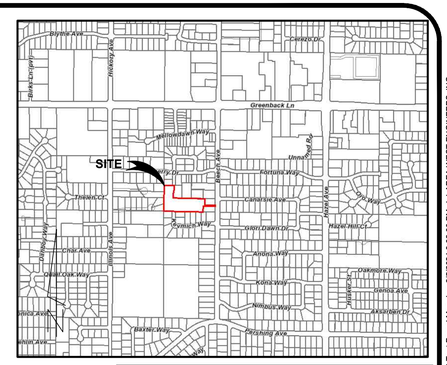
Single family residential projects with more than 1 acre of impervious area are required to include Low Impact Development (LID) control measures. The proposed Project impervious area includes 10,150 square feet of public right of way. About 30,000 sqft is reserved for future four houses, axillary structures and driveways. Since the total area is below 1 acre, the LID control measures are not applicable for the current project.

6.0 SUMMARY OF FINDINGS AND CONCLUSIONS

Current drainage study was prepared to support Beech Avenue and Roloff Way TPM application. The proposed project does not have significant impacts to the existing storm drain systems or properties upstream or downstream from the development. Water surface elevation downstream or upstream will not increase beyond the County acceptable range. However, at the ultimate conditions, implementation of the runoff storage via proposed roads or onsite storage can reduce runoff to pre-existing conditions. LID requirements are not applicable to the proposed project. No grading prosed at this time since the project owner does not have plans to build houses right now. Land split is done for the future and separate grading plan for all parcels or for each parcel individually will be submitted separately for the review in the future. All supported calculations and reference documents are provided in the Appendices below.

Appendix 1 - Project Vicinity Map and TPM Exhibit





VICINITY MAP (NOT TO SCALE)

NORTH
AREA WEST ENGINEERS, INC.

SCALE: 1" = 30'

GRAPHIC SCALE
0 15 30 60
(IN FEET)

TENTATIVE MAP INFORMATION

APPLICANT: TONI CONNERS
P.O. BOX 725
ORANGEVALE, CA 95662

OWNER: TONI CONNERS
P.O. BOX 725
ORANGEVALE, CA 95662

ENGINEER: AREA WEST ENGINEERS, INC.
7478 SANDALWOOD DRIVE, SUITE 400
CITRUS HEIGHTS, CA 95621
ATTN: RICHARD ROZUMOWICZ

ASSESSOR'S PARCEL NO: 261-0250-032 & 261-0250-033

EXISTING ZONING: RD-4
PROPOSED ZONING: RD-4

EXISTING PROJECT AREA: 2.69± AC GROSS
2.689± AC NET

EXISTING NUMBER OF LOTS: 2

EXISTING DENSITY: 2 PARCELS ON 2.69± AC OR
0.74 PARCELS PER 1 AC GROSS

PROPOSED NUMBER OF LOTS: 4 + 1 REMAINDER

PROPOSED DENSITY: 5 PARCELS ON 2.69± AC OR
2 PARCELS PER 1 AC GROSS

PROPOSED PARCEL 1 AREA: 16,628± SF (NET)
PROPOSED PARCEL 2 AREA: 8,525± SF (NET)
PROPOSED PARCEL 3 AREA: 8,553± SF (NET)
PROPOSED PARCEL 4 AREA: 1.22±AC(NET); 1.23±AC (GR)
PROPOSED REMAINDER AREA: 19,343± SF (NET)

SERVICE PROVIDERS:
SCHOOL DISTRICT: SAN JUAN UNIFIED
PARKS DISTRICT: ORANGEVALE
FIRE DISTRICT: SACRAMENTO METROPOLITAN FIRE
STORM DRAIN: SACRAMENTO COUNTY
SEWER DISTRICT: SACRAMENTO AREA SEWER DISTRICT
WATER DISTRICT: ORANGE VALE WATER COMPANY
ELECTRICITY: SMUD

LEGAL DESCRIPTION

A PORTION OF LOT 264 AS SHOWN ON 3 BM 20, SACRAMENTO COUNTY RECORDS.

BOUNDARY NOTE:

THIS MAP IS NOT AN OFFICIAL BOUNDARY SURVEY OF THE LAND DEPICTED HEREON AND SHOULD NOT BE RELIED ON FOR ANY PURPOSE OTHER THAN PLANNING PURPOSES. ALL BOUNDARY MARKERS, PROPERTY LINES AND EASEMENTS, IF SHOWN, ARE DRAWN USING EXISTING COUNTY RECORDED MAPS AND/OR DOCUMENTS.

TENTATIVE MAP NOTES

1. PARCEL LINES AND PARCEL AREAS MAY BE ADJUSTED AT THE TIME OF THE PARCEL MAP, PROVIDED NO ADDITIONAL PARCELS ARE CREATED AND SUBJECT TO THE APPROVAL OF THE SACRAMENTO COUNTY.

LICENSED LAND SURVEYOR
CHARLES J. CZAMANSKY
No. 8297
STATE OF CALIFORNIA
PRELIMINARY

FOR REVIEW AND COMMENT ONLY

G:\LDD_2\PROJ\21068\dwg\Final Dwgs\21068 Tent Parcel Map.dwg 6/5/2024 3:02:00 PM, 1:1 AREA WEST ENGINEERS, INC.

awe
AREA WEST ENGINEERS, INC.
ENGINEERING - SURVEYING - PLANNING
7478 SANDALWOOD DRIVE, SUITE 400
CITRUS HEIGHTS, CA 95621
(916) 725-5551 (916) 725-5808 (FAX)
AWE@AREAWESTENG.COM

TENTATIVE PARCEL MAP
FOR
6001 BEECH AVENUE & 6018 ROLOFF WAY
APN's: 261-0250-032 & 033
SACRAMENTO COUNTY STATE OF CALIFORNIA

REVISIONS
1 02/09/2023 – ADDED PUBLIC CUL-DE-SAC FROM ROLOFF WAY
2 03/15/2023 – REVISED PARCEL AREAS, ADDED SETBACK LINES
3 05/05/2023 – REVISED SETBACK LINE FOR PARCELS 3 AND 4
4 08/15/2023 – MINOR LOT LINE ADJUSTMENT BETWEEN PARCELS 1 & 2
5 06/05/2024 – REVISED LOT CONFIGURATION, RETAIN EXISTING TREES ON PARCEL 2

DATE:	JOB NO.
JUNE 2024	21068
SCALE: 1"=30'	SHEET 1 OF 1

Appendix 2 – Project Soil Map Exhibit

United States Department of Agriculture

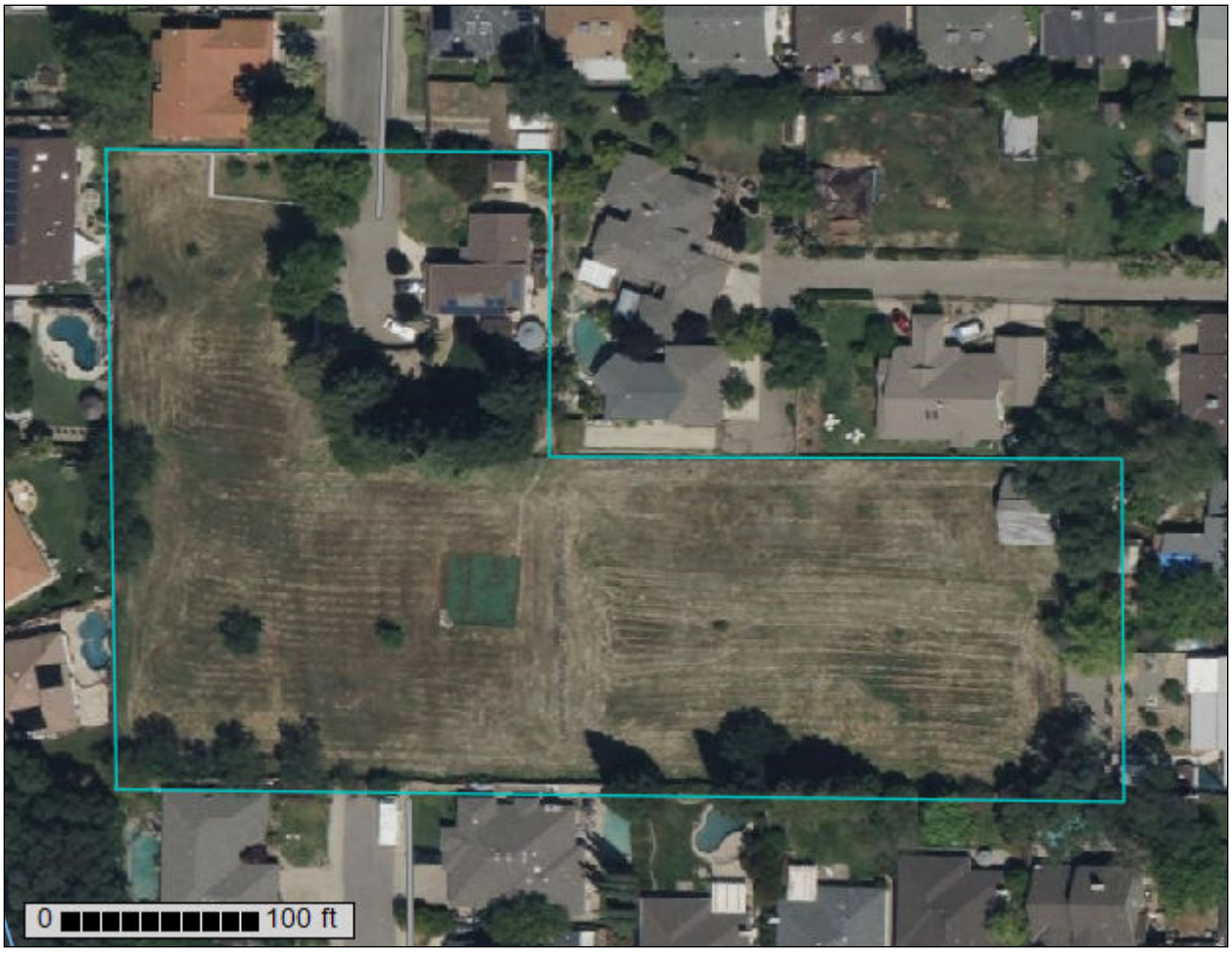
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Sacramento County, California

6001 Beech Ave (21068)



September 2, 2022

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:861 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 10 20 40 60

Feet: 0 40 80 160 240

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Sacramento County, California
Survey Area Data: Version 20, Sep 3, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 23, 2022—Apr 24, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
148	Fiddyment-Orangevale-Urban land complex, 2 to 8 percent slopes	2.8	100.0%
Totals for Area of Interest		**2.8**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Sacramento County, California

148—Fiddyment-Orangevale-Urban land complex, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: hhmr
Elevation: 50 to 280 feet
Mean annual precipitation: 19 to 22 inches
Mean annual air temperature: 61 degrees F
Frost-free period: 230 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Fiddyment and similar soils: 40 percent
Orangevale and similar soils: 25 percent
Urban land: 20 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Fiddyment

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from sedimentary rock

Typical profile

H1 - 0 to 8 inches: fine sandy loam
H2 - 8 to 15 inches: loam
H3 - 15 to 28 inches: sandy clay loam
H4 - 28 to 40 inches: indurated
H5 - 40 to 44 inches: weathered bedrock

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: 28 to 40 inches to duripan; 40 to 44 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: R017XY902CA - Duripan Vernal Pools
Hydric soil rating: No

Description of Orangevale

Setting

Landform: Terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 15 inches: coarse sandy loam
H2 - 15 to 20 inches: coarse sandy loam
H3 - 20 to 72 inches: sandy clay loam
H4 - 72 to 80 inches: coarse sandy loam

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Hydric soil rating: No

Description of Urban Land

Typical profile

H1 - 0 to 6 inches: variable

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

Minor Components

Xerarents

Percent of map unit: 6 percent
Hydric soil rating: No

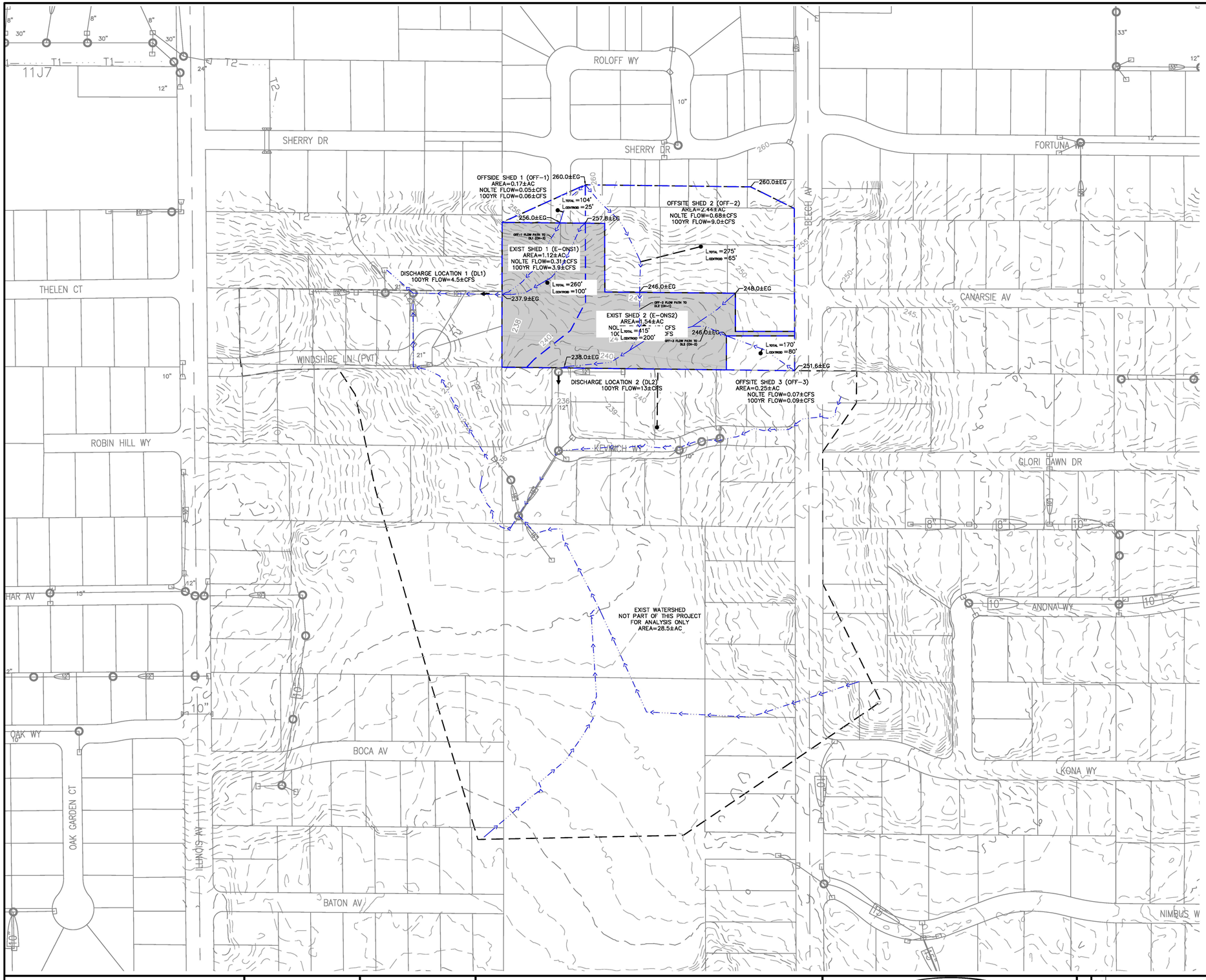
Kaseberg

Percent of map unit: 6 percent
Hydric soil rating: No

Unnamed, steeper slopes

Percent of map unit: 3 percent
Hydric soil rating: No

Appendix 3 – Existing and Proposed Shed Maps



Nolte method results
(Project: 21068)
(Hydrologic zone 1)

ID	Drainage area (acres)	Impervious area (%)	Design Q (cfs)
E-ONS1	1.12	23.40	0.31
OFF-1	0.17	55.00	0.05
DL1	1.29	27.56	0.36
E-ONS2	1.54	21.80	0.43
OFF-2	2.44	45.70	0.68
OFF-3	0.25	40.00	0.07
DL2	4.23	36.66	1.18

Sacramento method results
(Project: 21068)
(100-year, 1-day rainfall)

ID	Peak flow (cfs)	Time of peak (hours)	Basin area (sq. mi)	Peak stage (feet)	Peak storage (ac-ft)	Diversion volume (ac-ft)
E-ONS1	3.9	12:03	.00			
OFF-1	.6	12:02	.00			
CH-3	.6	12:04	.00			
DL1	4.5	12:03	.00			
E-ONS2	4.1	12:07	.00			
OFF-2	9.0	12:02	.00			
CH1	8.8	12:04	.00			
OFF-3	.9	12:02	.00			
CH2	.9	12:07	.00			
DL2	13.	12:04	.01			

WATERSHEDS LAND USE TABLE

LAND USE	IMPERV. AREA	E-ONS1	E-ONS2	OFF1	OFF2	OFF3
RESIDENTIAL, RD-8 TO RD-10	60%	0%	0%	50%	19%	0%
RESIDENTIAL, RD-4	40%	17%	9%	50%	81%	100%
OPEN SPACE	2%	83%	91%	0%	0%	0%
TOTAL		100%	100%	100%	100%	100%

SHED MAP LEGEND

- SHED BOUNDARY
- PROJECT SITE
- LONGEST WATER PATH
- SHED CENTROID

PREPARED UNDER THE DIRECTION OF:
REGISTERED PROFESSIONAL ENGINEER
ANDRE SAMUN
No. 55438
CIVIL
STATE OF CALIFORNIA
NOTE: DO NOT USE FOR CONSTRUCTION UNLESS SIGNED BY THE ENGINEER

PRELIMINARY

BENCHMARK N/A ELEVATION N/A
SACRAMENTO COUNTY LIDAR CONTOURS.

RECORD DRAWINGS
ENGR. INIT. DATE

DESIGNED BY: AS
DRAFTED BY: AS
CHECKED BY: RR

DRAINAGE STUDY
FOR
BEECH AVE & ROLOFF WAY TPM
EXISTING SHED MAP
SACRAMENTO COUNTY STATE OF CALIFORNIA

AREA WEST ENGINEERS, INC.
ENGINEERING - SURVEYING - PLANNING
7478 SANDALWOOD DRIVE, SUITE 400
CITRUS HEIGHTS, CA 95621
(916) 725-5551 (916) 725-5808 (FAX)
AWE@AREAWESTENG.COM

REVISIONS

#	DESCRIPTION	ENGR. INIT.	APPROVAL APPROVED BY	APPROVAL DATE

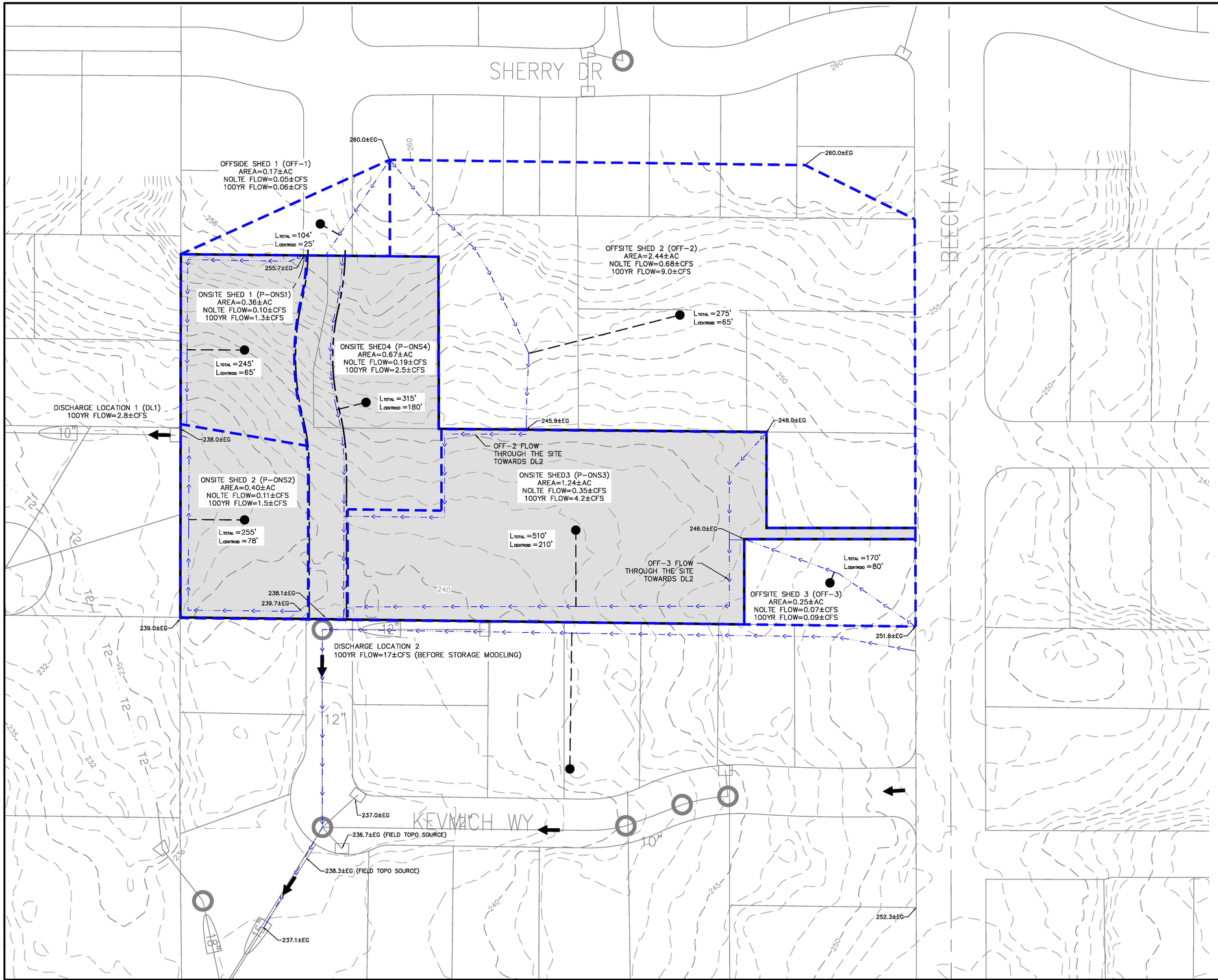
SCALE
HORIZ.: 1"=100'
VERT.: N/A
DATE: AUGUST 2024

JOB NO.
21068

SHEET 1 OF 1

NOT FOR CONSTRUCTION : FOR REVIEW AND COMMENT ONLY

G:\LDD_2\PROJ\21068\Drainage\CAD Dwgs\21068 EXISTING SHED MAP.dwg 8/15/2024 3:29:00 PM, 1:1 AREA WEST ENGINEERS, INC.



NORTH

AREA WEST ENGINEERS, INC.

SCALE: 1" = 40'

GRAPHIC SCALE

0 20 40 80

(IN FEET)

Nolte method results
(Project: 21068)
(Hydrologic zone 1)

ID	Drainage area (acres)	Impervious area (%)	Design Q (cfs)
P-ONS1	0.36	40.00	0.10
P-ONS2	0.40	40.00	0.11
DL1	0.76	40.00	0.21
P-ONS3	1.24	40.00	0.35
OFF-3	0.25	40.00	0.07
OFF-2	2.44	45.70	0.68
JN-3	3.93	43.54	1.10
OFF-1	0.17	55.00	0.05
P-ONS4	0.67	40.00	0.19
JN-4	0.84	43.04	0.24
DL-2	4.77	43.45	1.34

Sacramento method results
(Project: 21068)
(100-year, 1-day rainfall)

ID	Peak flow (cfs)	Time of peak (hours)	Basin area (sq. mi)	Peak stage (feet)	Peak storage (ac-ft)	Diversion volume (ac-ft)
P-ONS1	1.3	12:02	.00			
P-ONS2	1.5	12:02	.00			
DL1	2.8	12:02	.00			
P-ONS3	4.2	12:03	.00			
OFF-3	.9	12:02	.00			
CH-2	.9	12:04	.00			
OFF-2	9.0	12:02	.00			
CH-3	8.9	12:03	.00			
JN-3	14.	12:03	.01			
OFF-1	.6	12:02	.00			
CH-4	.6	12:03	.00			
P-ONS4	2.5	12:02	.00			
JN-4	3.1	12:02	.00			
DL-2	17.	12:03	.01			

SHED MAP LEGEND

- SHED BOUNDARY
- PROJECT SITE
- LONGEST WATER PATH
- SHED CENTROID

PREPARED UNDER THE DIRECTION OF:

REGISTERED PROFESSIONAL ENGINEER
ANDREI SAPUN
No. 86438
CIVIL
STATE OF CALIFORNIA

NOTE: DO NOT USE FOR CONSTRUCTION UNLESS SIGNED BY THE ENGINEER

PRELIMINARY

BENCHMARK N/A ELEVATION N/A
SACRAMENTO COUNTY LIDAR CONTOURS.

RECORD DRAWINGS

ENGR. INIT. DATE

DESIGNED BY: AS
DRAFTED BY: AS
CHECKED BY: RR

DRAINAGE STUDY
FOR
BEECH AVE & ROLOFF WAY TPM
PROPOSED SHED MAP

SACRAMENTO COUNTY STATE OF CALIFORNIA

AREA WEST ENGINEERS, INC.
ENGINEERING - SURVEYING - PLANNING
7478 SANDALWOOD DRIVE, SUITE 400
CITRUS HEIGHTS, CA 95621
(916) 725-5551 (916) 725-5808 (FAX)
AWE@AREAWESTENG.COM

REVISIONS

#	DESCRIPTION	ENGR. INIT.	APPROVAL APPROVED BY	APPROVAL DATE

SCALE
HORIZ.: 1"=40'
VERT.: N/A
DATE: AUGUST 2024

JOB NO. 21068
SHEET 1 OF 1

NOT FOR CONSTRUCTION : FOR REVIEW AND COMMENT ONLY

G:\LDD_2\PROJ\21068\Drainage\CAD Dwgs\21068 PROPOSED SHED MAP.dwg 8/16/2024 12:26:21 PM, 1:1 AREA WEST ENGINEERS, INC.

Appendix 4 – Overland Release Exhibit

NORTH
AREA WEST ENGINEERS, INC.

SCALE: 1" = 30'

GRAPHIC SCALE

0 15 30 60

(IN FEET)

G:\LDD_2019\PROJ\21068\dwg\21068 PFG.dwg 8/19/2024 12:43:16 PM, 1:1 AREA WEST ENGINEERS, INC.

ROLOFF WAY

BEECH AVENUE

KEWMICH WAY

APN: 261-0250-010

APN: 261-0250-043

APN: 261-0250-041

APN: 261-0250-051

APN: 261-0250-052

APN: 261-0250-033

APN: 261-0250-037

APN: 261-0250-038

APN: 261-0250-039

APN: 261-0250-024

APN: 261-0250-025

APN: 261-0250-032

APN: 261-0290-035

APN: 261-0600-007

APN: 261-0600-006

APN: 261-0600-004

APN: 261-0600-003

APN: 261-0600-002

APN: 261-0600-001

APN: 261-0300-025

EXIST 12.5' PUE PER 99 BM 4

EXIST 5.0' PUE PER 99 BM 4

EXIST 12.5' PUE PER 99 BM 4

EXIST 5.0' PUE PER 99 BM 4

EXIST 20.0' PRIVATE ROAD & PUE PER 125 PM 26

EXIST 5.0' PUE PER 125 PM 26

EXIST 5.0' PUE PER 125 PM 26

EXIST 12.5' PUE PER 125 PM 26

EXIST 15.0' DRAINAGE ESMT PER 289 BM 10

EXIST 12.5' PUE PER 177 BM 1

SMH PIM=259.74 FL(S)=255.14

SMH PER AERIAL

PARCEL 1
NET AREA=16,628±SF

MIN PAD ELEVATION WILL BE DETERMINED DURING LEVEL 4 STUDY

100-YR CONTROLLING ELEV=238.1. MAY BE REVISED PER CHANNEL RESTORATION ON PARCEL 261-0250-057

23' REAR YARD

SIDEYARD MIN. (TYP.)

PARCEL 2
NET AREA=8,525±SF

MIN PAD ELEVATION WILL BE DETERMINED DURING LEVEL 4 STUDY

24' FRONT YARD W/PUPF

PARCEL 3
NET AREA=8,553±SF

MIN PAD ELEVATION WILL BE DETERMINED DURING LEVEL 4 STUDY

100-YR HIGH WSE=239.30

23' REAR YARD

REMAINDER PARCEL
AREA=19,343±SF

17' REAR YARD

PARCEL 4
AREA=1.222±AC NET
AREA=1.229±AC GROSS

MIN PAD ELEVATION WILL BE DETERMINED DURING LEVEL 4 STUDY

5' SIDEYARD MIN. (TYP.)

18' PUPF

8' (3' CURB & GUTTER W/5'SIDEWALK)

30'X50' DETENTION POND FOR MODELING ONLY. CAN BE REPLACED BY OTHER STORAGE SOLUTION UNDER LEVEL 4 STUDY

TYPE "X" LID=238.87 SIDE=238.07 FL=234.57

TYPE "C" DI SIDE=240.59 FL=237.62

PROPOSED LOT LINES

EXIST SHED TO BE REMOVED

PROPOSED OVERLAND RELEASE DIRECTION (TYP)

PROJECT SITE BOUNDARY

SEE FIGURES 3 & 4 IN THE DRAIN REPORT FOR CROSS-SECTIONS BEFORE AND AFTER PROJECT DEVELOPEMENT. 100-YR CONTROLLING ELEV=239.30 PER STORAGE CALCULATIONS AT THE CUL-DE-SAC

#7620 #7621 #7622 #7623 #7624 #7625 #7626 #7627 #7628 #7629 #7630 #7631 #7632 #7633 #7634 #7635 #7636 #7637 #1 #2 #3 #4 #5 #6

PREPARED UNDER THE DIRECTION OF:

REGISTERED PROFESSIONAL ENGINEER
ANDREI SAPUN
No. 83438
CIVIL
STATE OF CALIFORNIA

NOTE: DO NOT USE FOR CONSTRUCTION UNLESS SIGNED BY THE ENGINEER

PRELIMINARY

NOT FOR CONSTRUCTION : FOR REVIEW AND COMMENT ONLY

BENCHMARK _____ ELEVATION _____

RECORD DRAWINGS

ENGR. INIT. DATE

DESIGNED BY: AS

DRAFTED BY: AS

CHECKED BY: RR

DRAINAGE STUDY
FOR
BEECH AVE & ROLOFF WAY TPM
OVERLAND RELEASE EXHIBIT

SACRAMENTO COUNTY STATE OF CALIFORNIA

AREA WEST ENGINEERS, INC.
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REVISIONS

#	DESCRIPTION	ENGR. INIT.	APPROVAL	
			APPROVED BY	DATE

SCALE
HORIZ.: 1"=30'
VERT.: N/A
DATE: AUGUST 2024

JOB NO. 21068

SHEET 1 OF 1

Appendix 5 – SacCalc Design Reports and Results

View HEC-1 output

Sacramento method results
(Project: 21068)
(100-year, 1-day rainfall)

ID	Peak flow (cfs)	Time of peak (hours)	Basin area (sq. mi)	Peak stage (feet)	Peak storage (ac-ft)	Diversion volume (ac-ft)
E-ONS1	3.9	12:03	.00			
OFF-1	.6	12:02	.00			
CH-3	.6	12:04	.00			
DL1	4.5	12:03	.00			
E-ONS2	4.1	12:07	.00			
OFF-2	9.0	12:02	.00			
CH1	8.8	12:04	.00			
OFF-3	.9	12:02	.00			
CH2	.9	12:07	.00			
DL2	13.	12:04	.01			

Sacramento Hydrologic Calculator Report

December 29, 2023 13:55

Project Title: 21068
Method: Sacramento County HEC-1 method
Comments: EXISTING MODEL (Beech Ave and Roloff Way). REVISION DATE - 12/29/2023
Date: 9/1/2022
Prepared by: AWE

Watershed Hydrologic Summary Data

Watershed	Area (acres)	Mean Elevation (ft)	Lag Times		Basin "n"		Loss Rates		Percent Impervious	
			Method	Lag Time (min)	Method	Basin "n"	Method	Loss Rate (in/hr)	Method	Impervious Area (%)
E-ONS1	1.12	248	Basin "n"	-	Computed	-	Computed	-	Computed	-
E-ONS2	1.54	243	Basin "n"	-	Computed	-	Computed	-	Computed	-
OFF-1	0.17	258	Basin "n"	-	Computed	-	Computed	-	Computed	-
OFF-2	2.44	253	Basin "n"	-	Computed	-	Computed	-	Computed	-
OFF-3	0.25	249	Basin "n"	-	Computed	-	Computed	-	Computed	-

Basin "n" Method Data for Lag Time Computation

Watershed	Channel Length (ft)	Centroid Length (ft)	Slope (ft/ft)	Channelization	Land Use Impervious Area Percent (% or acres)																
					95	90	85	80	75	70	60	50	40	30	25	20	15	10	5	2	1	1*
E-ONS1	234	100	0.08	Undeveloped									0							83		
				Developed									17							0		
E-ONS2	375	200	0.024	Undeveloped									0							91		
				Developed									9							0		
OFF-1	94	25	0.035	Undeveloped							0		0									
				Developed							50		50									
OFF-2	248	59	0.05	Undeveloped							0		0									
				Developed							19		81									
OFF-3	153	80	0.035	Undeveloped									0									
				Developed									100									

Refer to the Drainage manual for Land Use Impervious Area Percent

*Dense Oaks, Shrubs, Vines

Infiltration Loss Rate Data

Watershed	Soil Cover Group	Land Use Impervious Area Percent (% or acres)																	
		95	90	85	80	75	70	60	50	40	30	25	20	15	10	5	2	1	1*
E-ONS1	B																		
	C																		
	D									17							83		
E-ONS2	B																		
	C																		
	D									9							91		
OFF-1	B																		
	C																		
	D							50		50									
OFF-2	B																		
	C																		
	D							19		81									
OFF-3	B																		
	C																		
	D									100									

Refer to the help file for Land Use Impervious Area Percent

*Dense Oaks, Shrubs, Vines

Hydrograph Routing – Kinematic Wave

Routing ID	Route From	Route To	Channel Type	Length (ft)	Slope (ft/ft)	Width or Diameter (ft)	Side Slope (H:V)	Mannings "n"
CH1	OFF-2	DL2	Trapezoidal	285	0.028	15	10:1	0.060
CH2	OFF-3	DL2	Trapezoidal	380	0.021	15	10:1	0.060
CH-3	OFF-1	DL1	Trapezoidal	205	0.08	15	10:1	0.060

View HEC-1 output

Sacramento method results
(Project: 21068)
(100-year, 1-day rainfall)

ID	Peak flow (cfs)	Time of peak (hours)	Basin area (sq. mi)	Peak stage (feet)	Peak storage (ac-ft)	Diversion volume (ac-ft)
P-ONS1	1.3	12:02	.00			
P-ONS2	1.5	12:02	.00			
DL1	2.8	12:02	.00			
P-ONS3	4.2	12:03	.00			
OFF-3	.9	12:02	.00			
CH-2	.9	12:04	.00			
OFF-2	9.0	12:02	.00			
CH-3	8.9	12:03	.00			
JN-3	14.	12:03	.01			
OFF-1	.6	12:02	.00			
CH-4	.6	12:03	.00			
P-ONS4	2.5	12:02	.00			
JN-4	3.1	12:02	.00			
DL-2	17.	12:03	.01			

Sacramento Hydrologic Calculator Report

August 19, 2024 13:14

Project Title: 21068
Comments: PROPOSED MODEL (Beech Ave and Roloff Way). REVISION DATE - 08/16/2024
Prepared by: AWE
Method: Sacramento County HEC-1 method
Date: 9/1/2022

Watershed Hydrologic Summary Data

Watershed	Area (acres)	Mean Elevation (ft)	Lag Times		Basin "n"		Loss Rates		Percent Impervious	
			Method	Lag Time (min)	Method	Basin "n"	Method	Loss Rate (in/hr)	Method	Impervious Area (%)
P-ONS1	0.36	247	Basin "n"	-	Computed	-	Computed	-	Computed	-
P-ONS3	1.24	243	Basin "n"	-	Computed	-	Computed	-	Computed	-
OFF-1	0.17	258	Basin "n"	-	Computed	-	Computed	-	Computed	-
OFF-2	2.44	253	Basin "n"	-	Computed	-	Computed	-	Computed	-
OFF-3	0.25	249	Basin "n"	-	Computed	-	Computed	-	Computed	-
P-ONS2	0.4	239	Basin "n"	-	Computed	-	Computed	-	Computed	-
P-ONS4	0.67	243	Basin "n"	-	Computed	-	Computed	-	Computed	-

Basin “n” Method Data for Lag Time Computation

Watershed	Channel Length (ft)	Centroid Length (ft)	Slope (ft/ft)	Channelization	Land Use Impervious Area Percent (% or acres)																
					95	90	85	80	75	70	60	50	40	30	25	20	15	10	5	2	1	1*
P-ONS1	220	65	0.07	Undeveloped									0									
				Developed									100									
P-ONS3	460	210	0.020	Undeveloped									0									
				Developed									100									
OFF-1	94	25	0.035	Undeveloped							0		0									
				Developed							50		50									
OFF-2	248	65	0.05	Undeveloped							0		0									
				Developed							19		81									
OFF-3	153	80	0.035	Undeveloped									0									
				Developed									100									
P-ONS2	230	78	0.01	Undeveloped									0									
				Developed									100									
P-ONS4	284	180	0.05	Undeveloped									0									
				Developed									100									

Refer to the Drainage manual for Land Use Impervious Area Percent

*Dense Oaks, Shrubs, Vines

Infiltration Loss Rate Data

Watershed	Soil Cover Group	Land Use Impervious Area Percent (% or acres)																	
		95	90	85	80	75	70	60	50	40	30	25	20	15	10	5	2	1	1*
P-ONS1	B																		
	C																		
	D									100									
P-ONS3	B																		
	C																		
	D									100									
OFF-1	B																		
	C																		
	D							50		50									
OFF-2	B																		
	C																		
	D							19		81									
OFF-3	B																		
	C																		
	D									100									
P-ONS2	B																		
	C																		
	D									100									
P-ONS4	B																		
	C																		
	D									100									

Refer to the help file for Land Use Impervious Area Percent

*Dense Oaks, Shrubs, Vines

Hydrograph Routing – Kinematic Wave

Routing ID	Route From	Route To	Channel Type	Length (ft)	Slope (ft/ft)	Width or Diameter (ft)	Side Slope (H:V)	Mannings "n"
CH-2	OFF-3	JN-3	Trapezoidal	410	.019	10	2:1	0.030
CH-3	OFF-2	JN-3	Trapezoidal	310	.027	5	3:1	0.060
CH-4	OFF-1	JN-4	Trapezoidal	315	.06	30	50:1	0.016

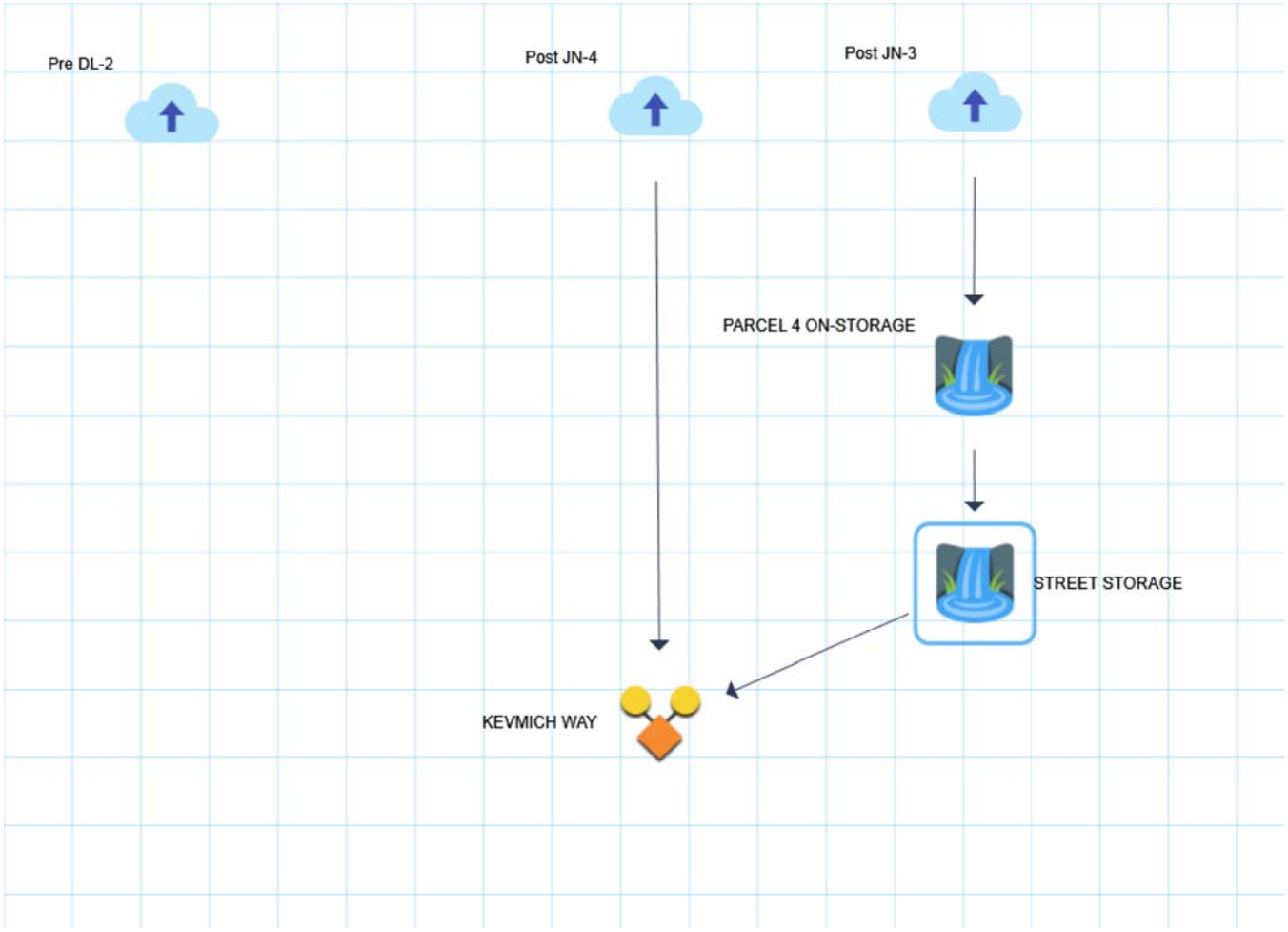
Appendix 6 – Hydrology Studio Reports On-site Storage

Basin Model

Hydrology Studio v 3.0.0.32

Project Name:

08-16-2024



Hydrograph Report

Project Name:

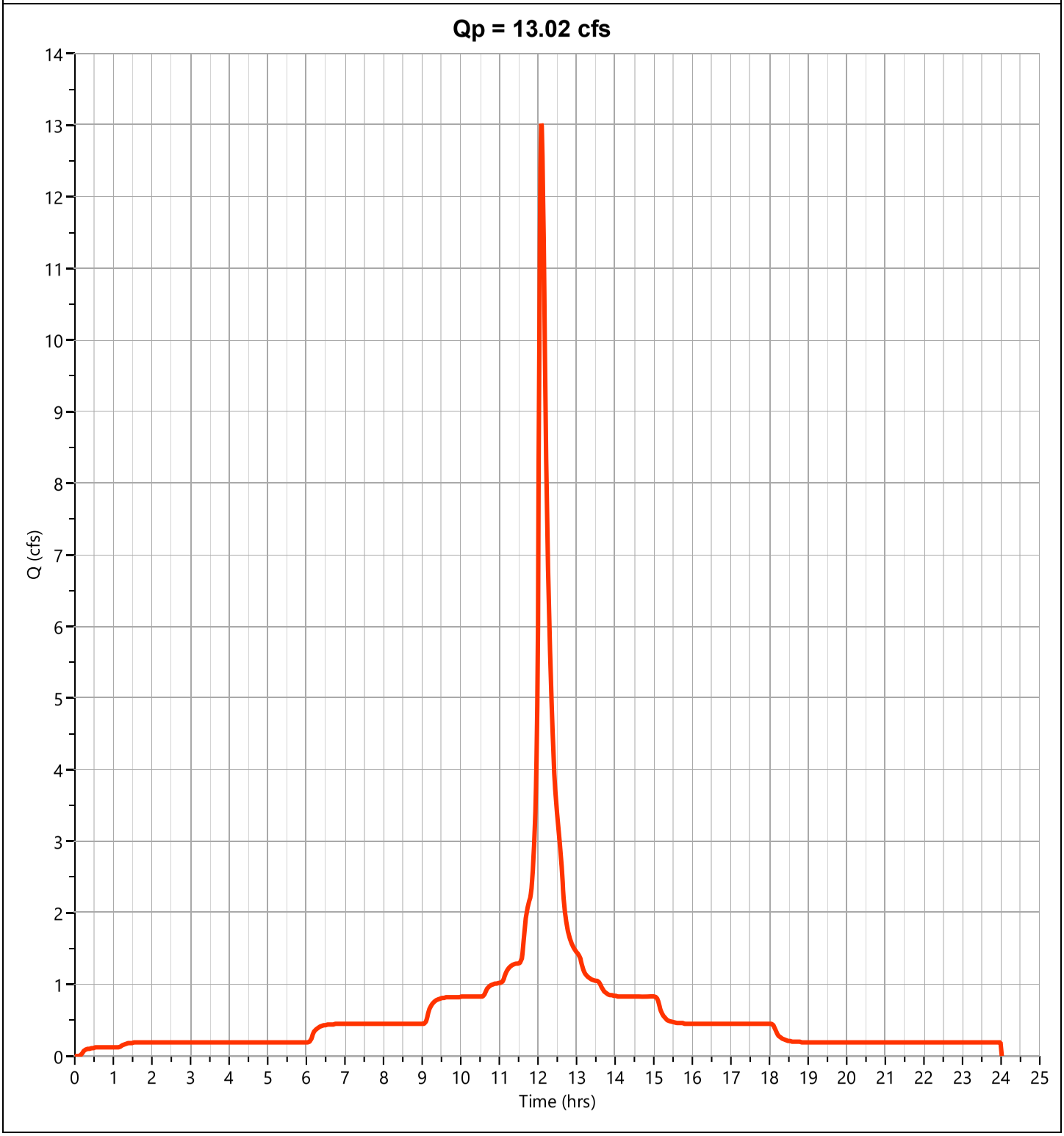
Hydrology Studio v 3.0.0.32

08-16-2024

Pre DL-2

Hyd. No. 1

Hydrograph Type	= Manual	Peak Flow	= 13.02 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.08 hrs
Time Interval	= 1 min	Hydrograph Volume	= 54,151 cuft



Hydrograph Report

Project Name:

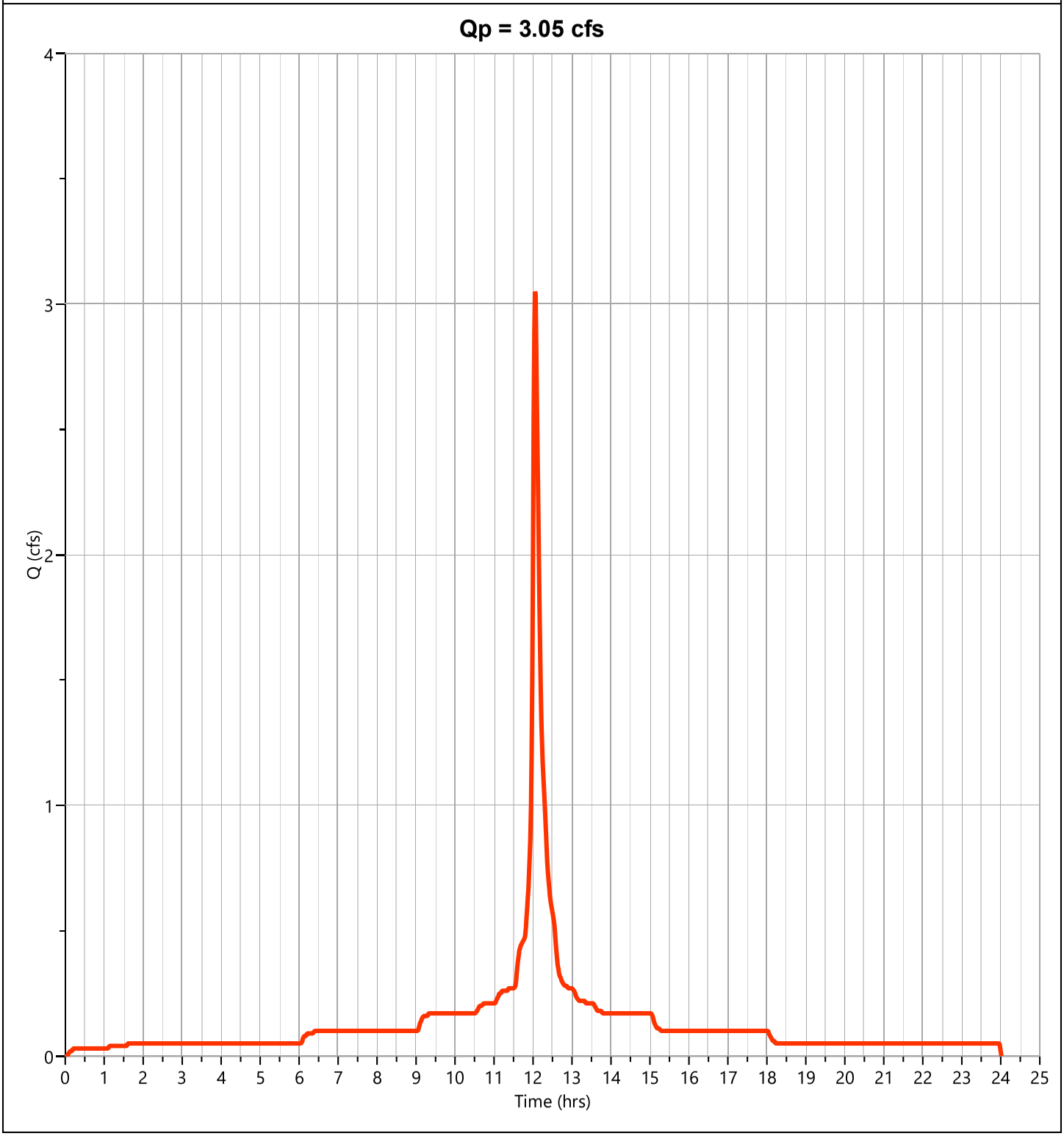
Hydrology Studio v 3.0.0.32

08-16-2024

Post JN-4

Hyd. No. 2

Hydrograph Type	= Manual	Peak Flow	= 3.050 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.05 hrs
Time Interval	= 1 min	Hydrograph Volume	= 11,611 cuft



Hydrograph Report

Project Name:

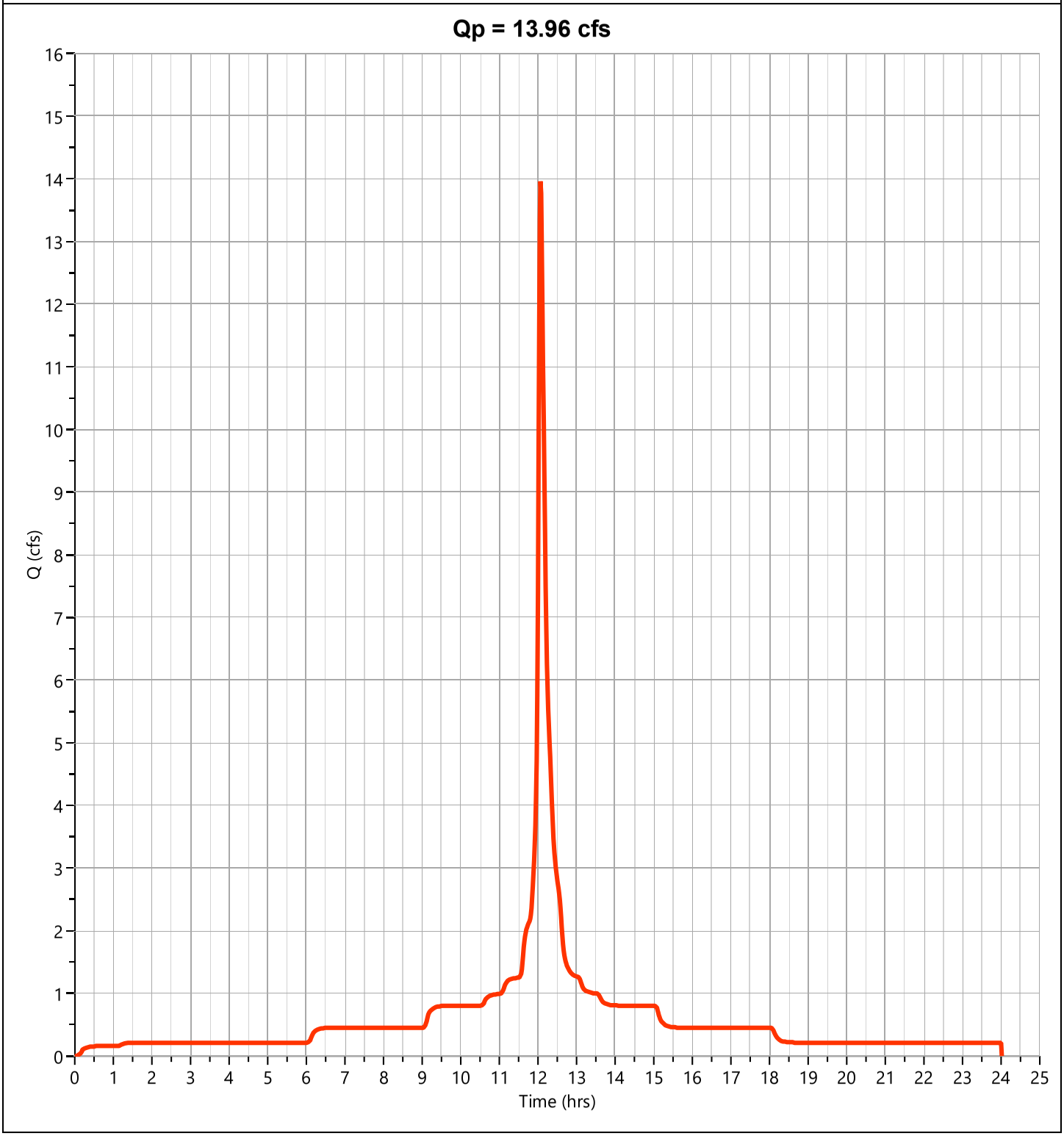
Hydrology Studio v 3.0.0.32

08-16-2024

Post JN-3

Hyd. No. 3

Hydrograph Type	= Manual	Peak Flow	= 13.96 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.07 hrs
Time Interval	= 1 min	Hydrograph Volume	= 53,250 cuft



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.32

08-16-2024

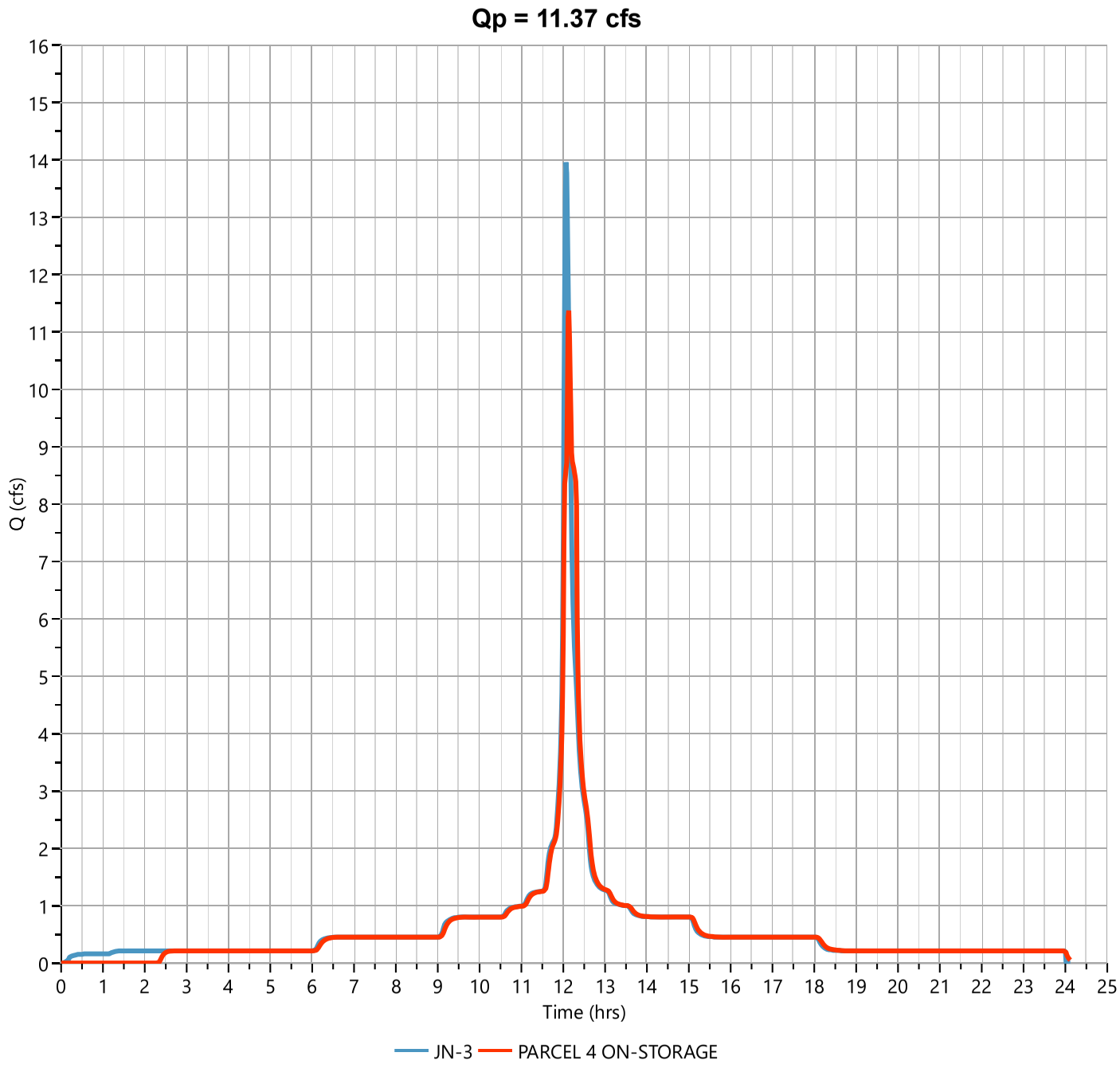
PARCEL 4 ON-STORAGE

Hyd. No. 4

Hydrograph Type	= Pond Route	Peak Flow	= 11.37 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Hydrograph Volume	= 51,827 cuft
Inflow Hydrograph	= 3 - JN-3	Max. Elevation	= 239.12 ft
Pond Name	= PARCEL 4 STORAGE	Max. Storage	= 3,587 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 21 min



Pond Report

Project Name:

Hydrology Studio v 3.0.0.32

08-16-2024

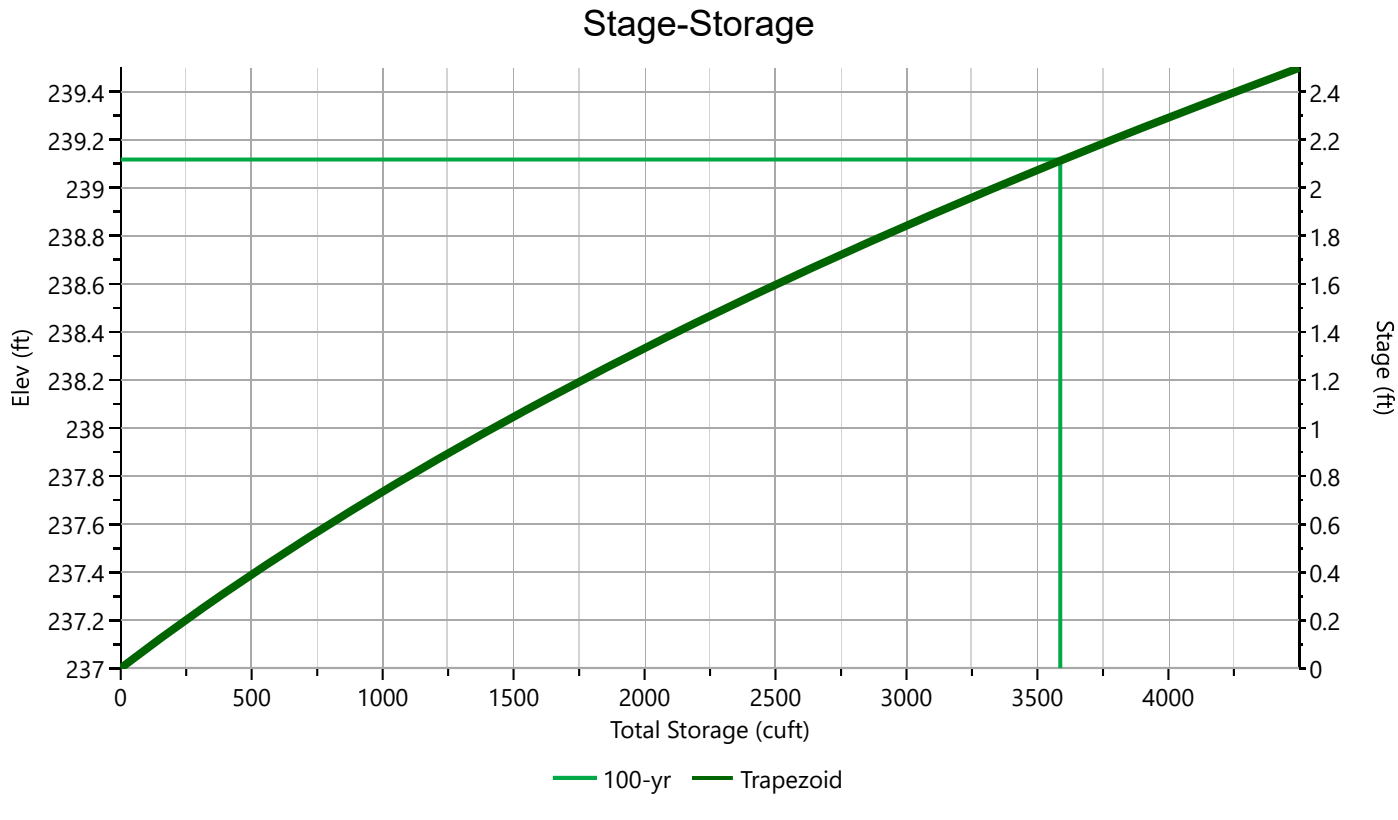
PARCEL 4 STORAGE

Stage-Storage

Trapezoid	
Description	**Input**
Bottom Elevation, ft	237.00
Bottom Length, ft	40.00
Bottom Width, ft	30.00
Side Slope, H:1	3.00
Total Depth, ft	2.50
Voids (%)	100.00

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	237.00	1,200	0.000	0.000
0.13	237.13	1,253	153	153
0.25	237.25	1,307	160	313
0.38	237.38	1,363	167	480
0.50	237.50	1,419	174	654
0.63	237.63	1,477	181	835
0.75	237.75	1,535	188	1,023
0.88	237.88	1,595	196	1,219
1.00	238.00	1,656	203	1,422
1.13	238.13	1,718	211	1,633
1.25	238.25	1,781	219	1,852
1.38	238.38	1,846	227	2,078
1.50	238.50	1,911	235	2,313
1.63	238.63	1,978	243	2,556
1.75	238.75	2,045	251	2,807
1.88	238.88	2,114	260	3,067
2.00	239.00	2,184	269	3,336
2.13	239.13	2,255	277	3,613
2.25	239.25	2,327	286	3,900
2.38	239.38	2,401	295	4,195
2.50	239.50	2,475	305	4,500



Pond Report

Project Name:

Hydrology Studio v 3.0.0.32

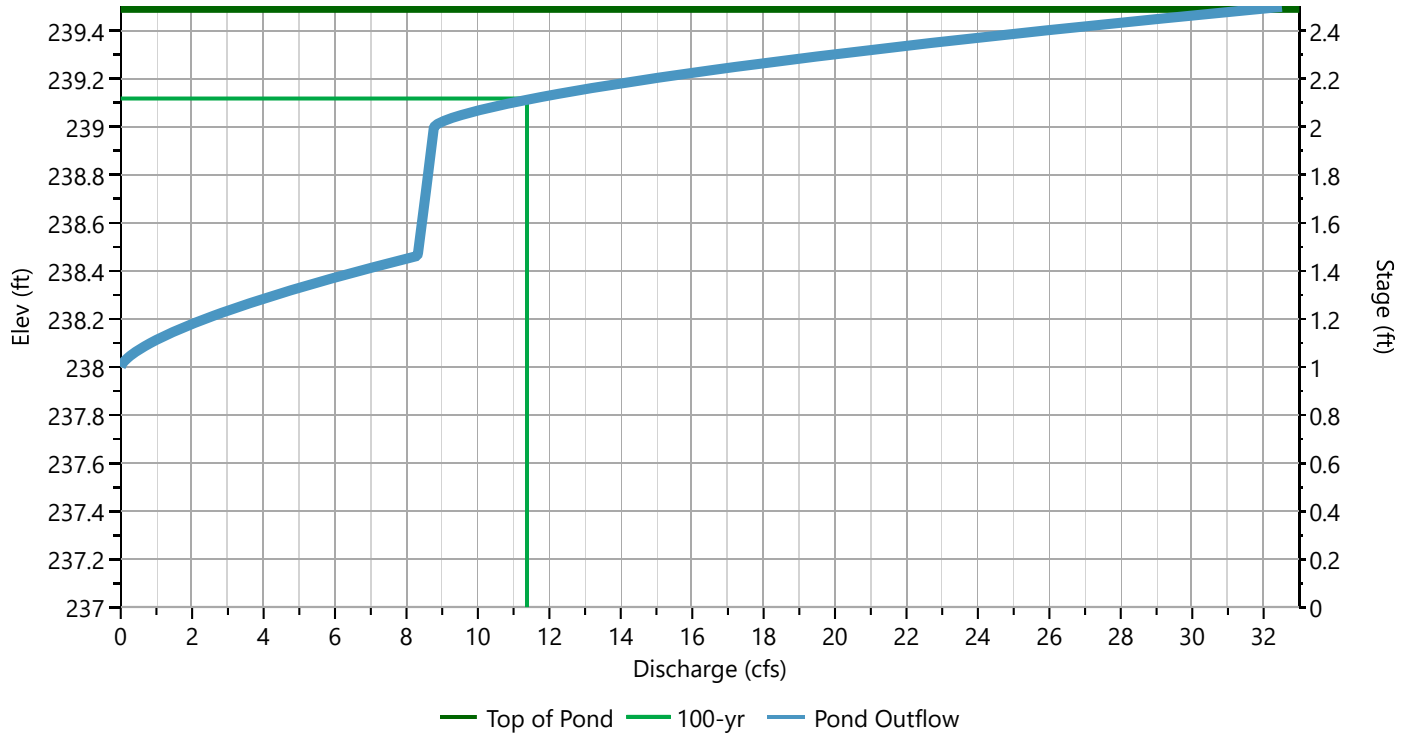
08-16-2024

PARCEL 4 STORAGE

Stage-Discharge

Culvert / Orifices	Culvert	Orifice			Orifice Plate	
		1	2	3		
Rise, in	12				Orifice Dia, in	
Span, in	12				No. Orifices	
No. Barrels	1				Invert Elevation, ft	
Invert Elevation, ft	233.00				Height, ft	
Orifice Coefficient, Co	0.60				Orifice Coefficient, Co	
Length, ft	30					
Barrel Slope, %	1					
N-Value, n	0.015					
Weirs	**Riser**	**Weir**			**Ancillary**	
		1 (i)	2	3		
Shape / Type	Box	Rectangular			Exfiltration, in/hr	
Crest Elevation, ft	238	239				
Crest Length, ft	8	20				
Angle, deg						
Weir Coefficient, Cw	3.3	3.3				

m = Flows through Culvert, i = Independent



Pond Report

Project Name:

Hydrology Studio v 3.0.0.32

08-16-2024

PARCEL 4 STORAGE

Stage-Storage-Discharge Summary

Stage (ft)	Elev. (ft)	Storage (cuft)	Culvert (cfs)	Orifices, cfs			Riser (cfs)	Weirs, cfs			Pf Riser (cfs)	Exfil (cfs)	User (cfs)	Total (cfs)
				1	2	3		1	2	3				
0.00	237.00	0.000	0.000				0.000	0.000						0.000
0.13	237.13	153	0.000 oc				0.000	0.000						0.000
0.25	237.25	313	0.000 oc				0.000	0.000						0.000
0.38	237.38	480	0.000 oc				0.000	0.000						0.000
0.50	237.50	654	0.000 oc				0.000	0.000						0.000
0.63	237.63	835	0.000 oc				0.000	0.000						0.000
0.75	237.75	1,023	0.000 oc				0.000	0.000						0.000
0.88	237.88	1,219	0.000 oc				0.000	0.000						0.000
1.00	238.00	1,422	0.000 oc				0.000	0.000						0.000
1.13	238.13	1,633	1.167 oc				1.167	0.000						1.167
1.25	238.25	1,852	3.300 oc				3.300	0.000						3.300
1.38	238.38	2,078	6.062 oc				6.062	0.000						6.062
1.50	238.50	2,313	8.345 oc				0.000	0.000						8.345
1.63	238.63	2,556	8.453 oc				0.000	0.000						8.453
1.75	238.75	2,807	8.560 oc				0.000	0.000						8.560
1.88	238.88	3,067	8.665 oc				0.000	0.000						8.665
2.00	239.00	3,336	8.769 oc				0.000	0.000						8.769
2.13	239.13	3,613	8.872 oc				0.000	2.917						11.79
2.25	239.25	3,900	8.973 oc				0.000	8.250						17.22
2.38	239.38	4,195	9.074 oc				0.000	15.16						24.23
2.50	239.50	4,500	9.173 oc				0.000	23.33						32.51

Suffix key: ic = inlet control, oc = outlet control, s = submerged weir

Pond Report

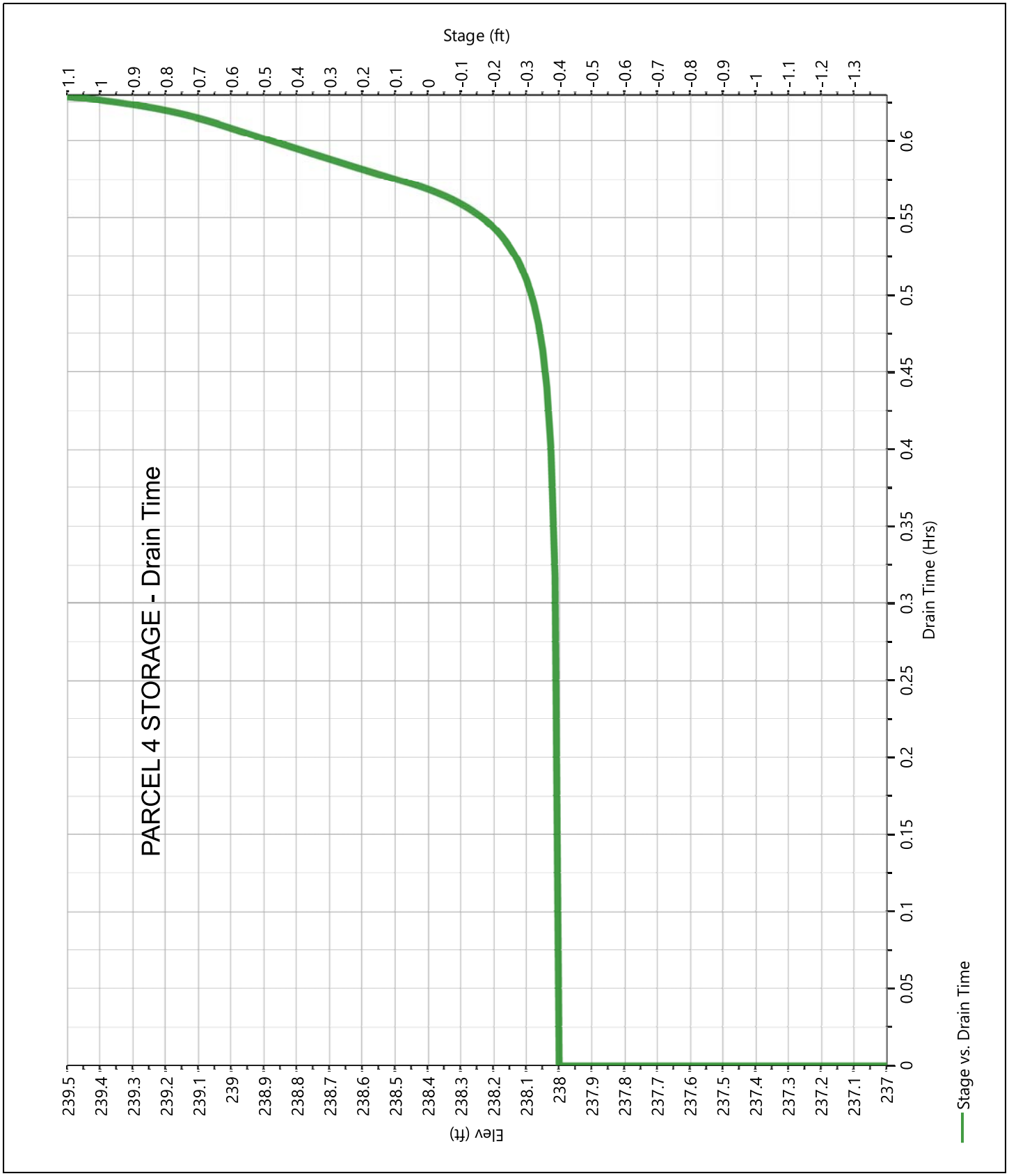
Project Name:

Hydrology Studio v 3.0.0.32

08-16-2024

PARCEL 4 STORAGE

Pond Drawdown



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.32

08-16-2024

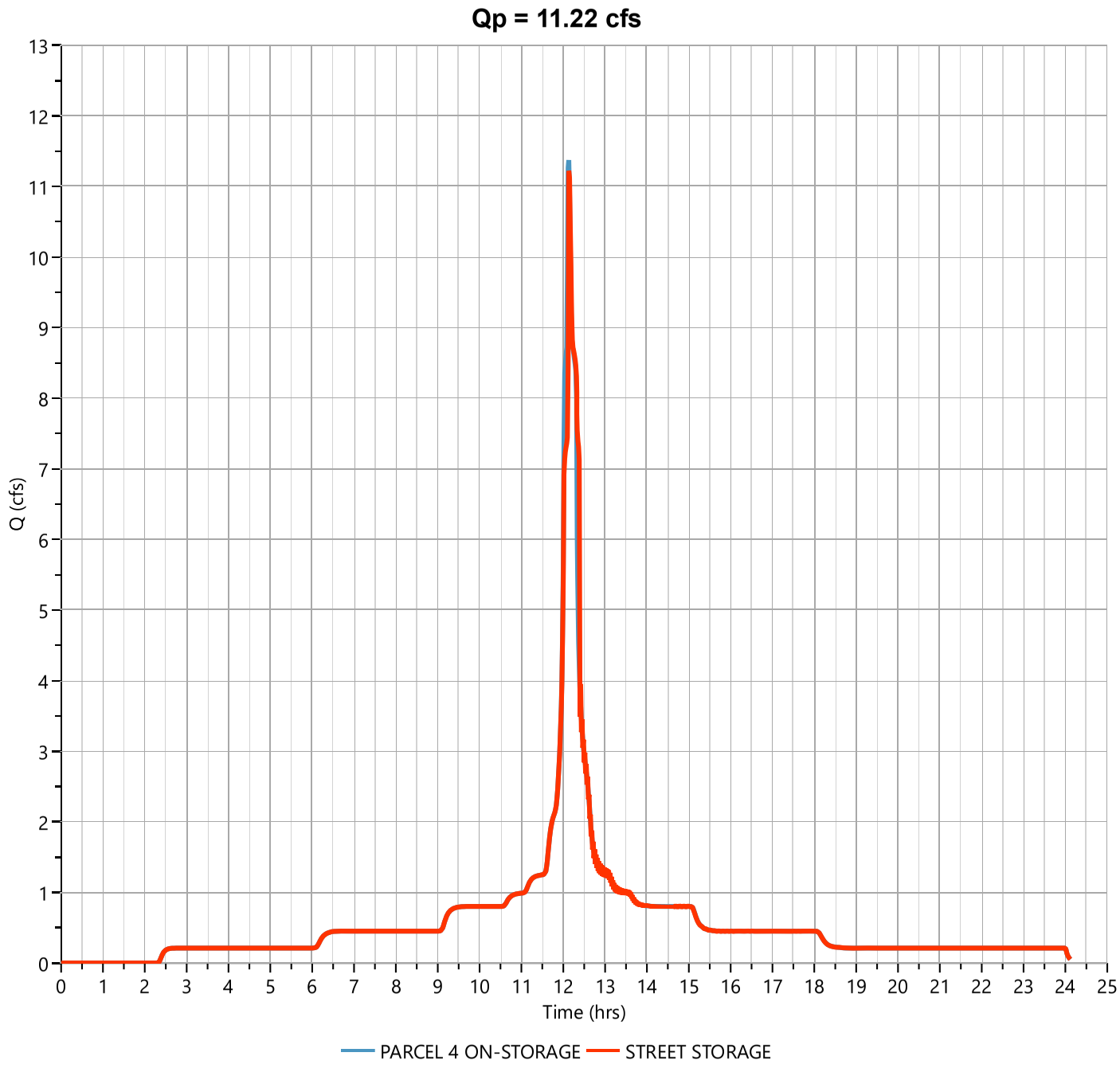
STREET STORAGE

Hyd. No. 5

Hydrograph Type	= Pond Route	Peak Flow	= 11.22 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Hydrograph Volume	= 51,827 cuft
Inflow Hydrograph	= 4 - PARCEL 4 ON-STORAGE	Max. Elevation	= 239.21 ft
Pond Name	= STREET STORAGE	Max. Storage	= 668 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 0 min



Pond Report

Project Name:

Hydrology Studio v 3.0.0.32

08-16-2024

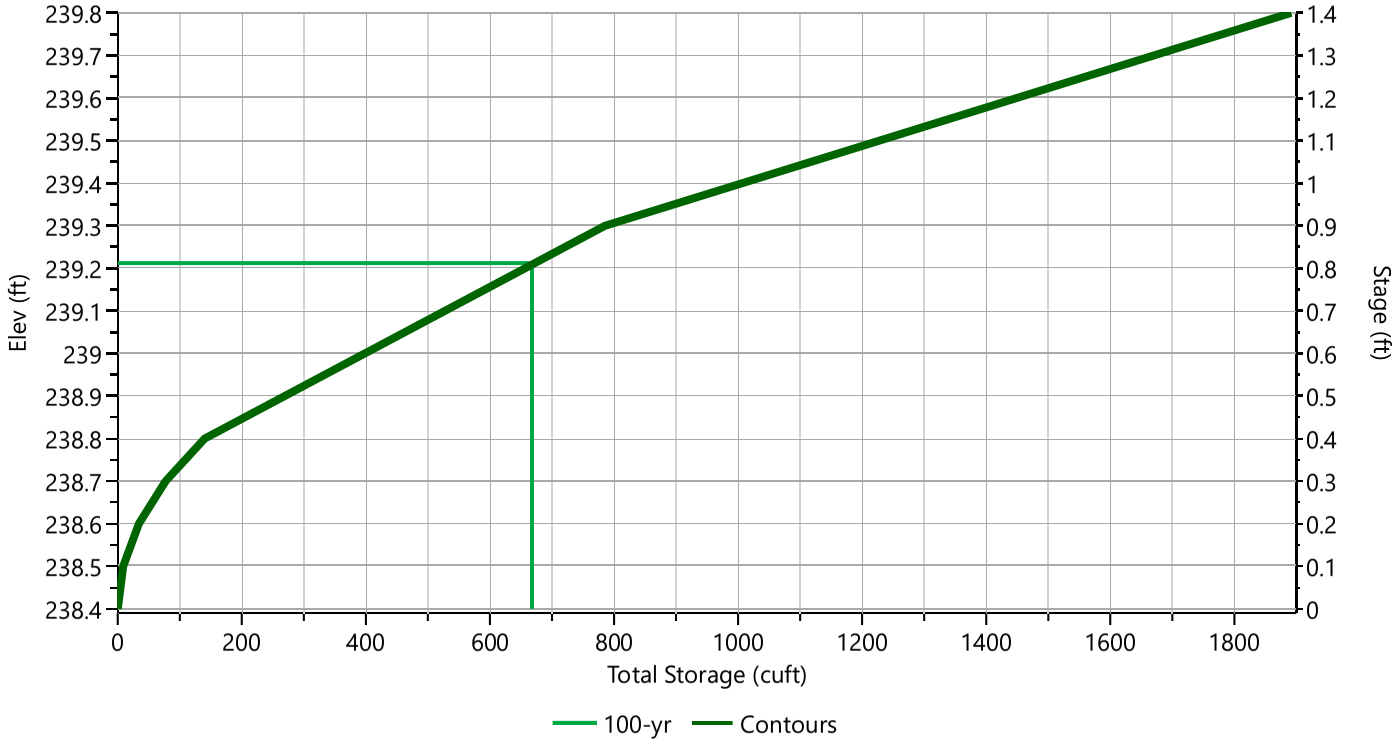
STREET STORAGE

Stage-Storage

User Defined Contours	
Description	**Input**
Bottom Elevation, ft	238.40
Voids (%)	100.00
Volume Calc	Ave End Area

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	238.40	10	0.000	0.000
0.10	238.50	166	8.80	8.80
0.20	238.60	337	25.2	34.0
0.30	238.70	528	43.3	77.2
0.40	238.80	728	62.8	140
0.90	239.30	1,854	645	785
1.40	239.80	2,570	1,106	1,892



Pond Report

Project Name:

Hydrology Studio v 3.0.0.32

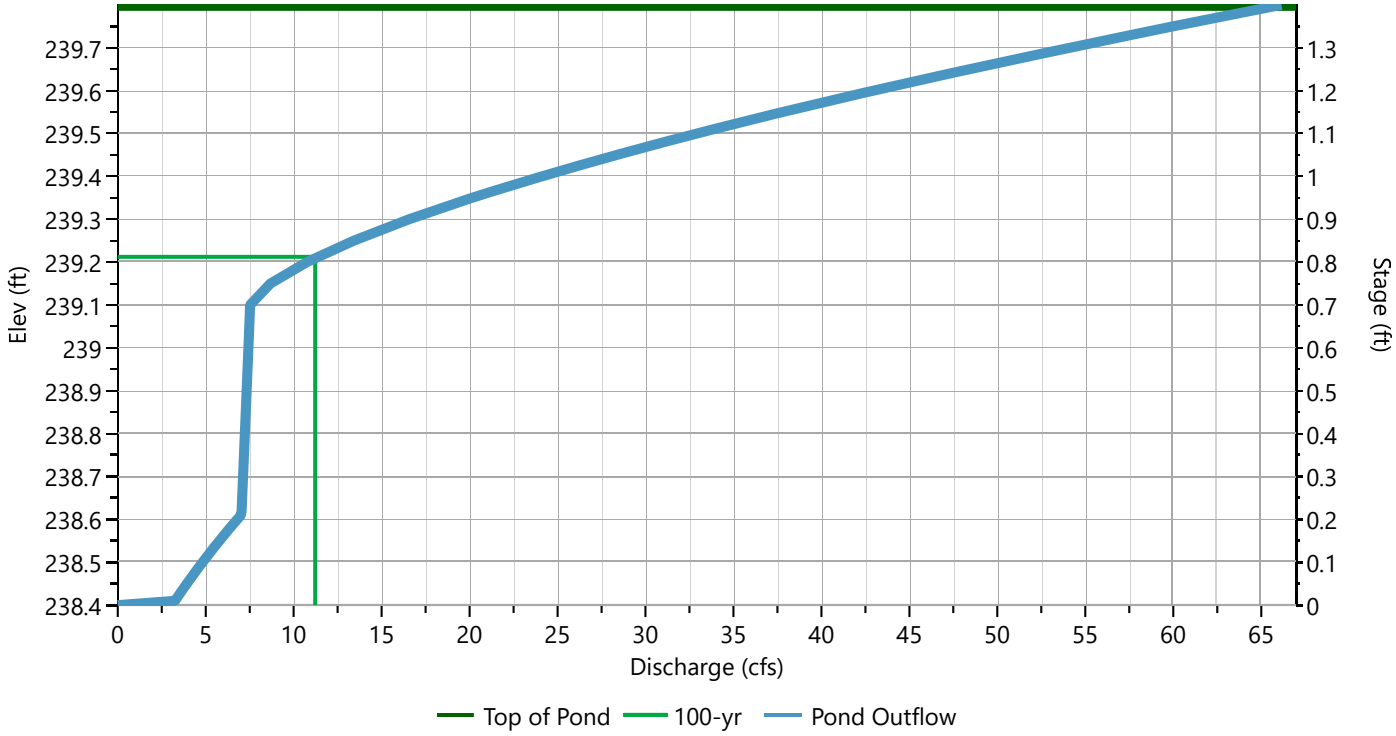
08-16-2024

STREET STORAGE

Stage-Discharge

Culvert / Orifices	Culvert	Orifice			Orifice Plate	
		1	2	3		
Rise, in	12				Orifice Dia, in	
Span, in	12				No. Orifices	
No. Barrels	1				Invert Elevation, ft	
Invert Elevation, ft	234.50				Height, ft	
Orifice Coefficient, Co	0.60				Orifice Coefficient, Co	
Length, ft	30					
Barrel Slope, %	1					
N-Value, n	0.015					
Weirs	**Riser**	**Weir**			**Ancillary**	
		1 (i)	2	3		
Shape / Type	Box	Rectangular			Exfiltration, in/hr	
Crest Elevation, ft	238.11	239.1				
Crest Length, ft	6	30				
Angle, deg						
Weir Coefficient, Cw	3.3	3.3				

m = Flows through Culvert, i = Independent



Pond Report

Project Name:

Hydrology Studio v 3.0.0.32

08-16-2024

STREET STORAGE

Stage-Storage-Discharge Summary

Stage (ft)	Elev. (ft)	Storage (cuft)	Culvert (cfs)	Orifices, cfs			Riser (cfs)	Weirs, cfs			Pf Riser (cfs)	Exfil (cfs)	User (cfs)	Total (cfs)
				1	2	3		1	2	3				
0.00	238.40	0.000	0.000				0.000	0.000						0.000
0.10	238.50	8.80	4.822 oc				4.822	0.000						4.822
0.20	238.60	34.0	6.791 oc				6.791	0.000						6.791
0.30	238.70	77.2	7.126 oc				0.000	0.000						7.126
0.40	238.80	140	7.227 oc				0.000	0.000						7.227
0.90	239.30	785	7.713 oc				0.000	8.854						16.57
1.40	239.80	1,892	8.169 oc				0.000	57.98						66.15

Suffix key: ic = inlet control, oc = outlet control, s = submerged weir

Pond Report

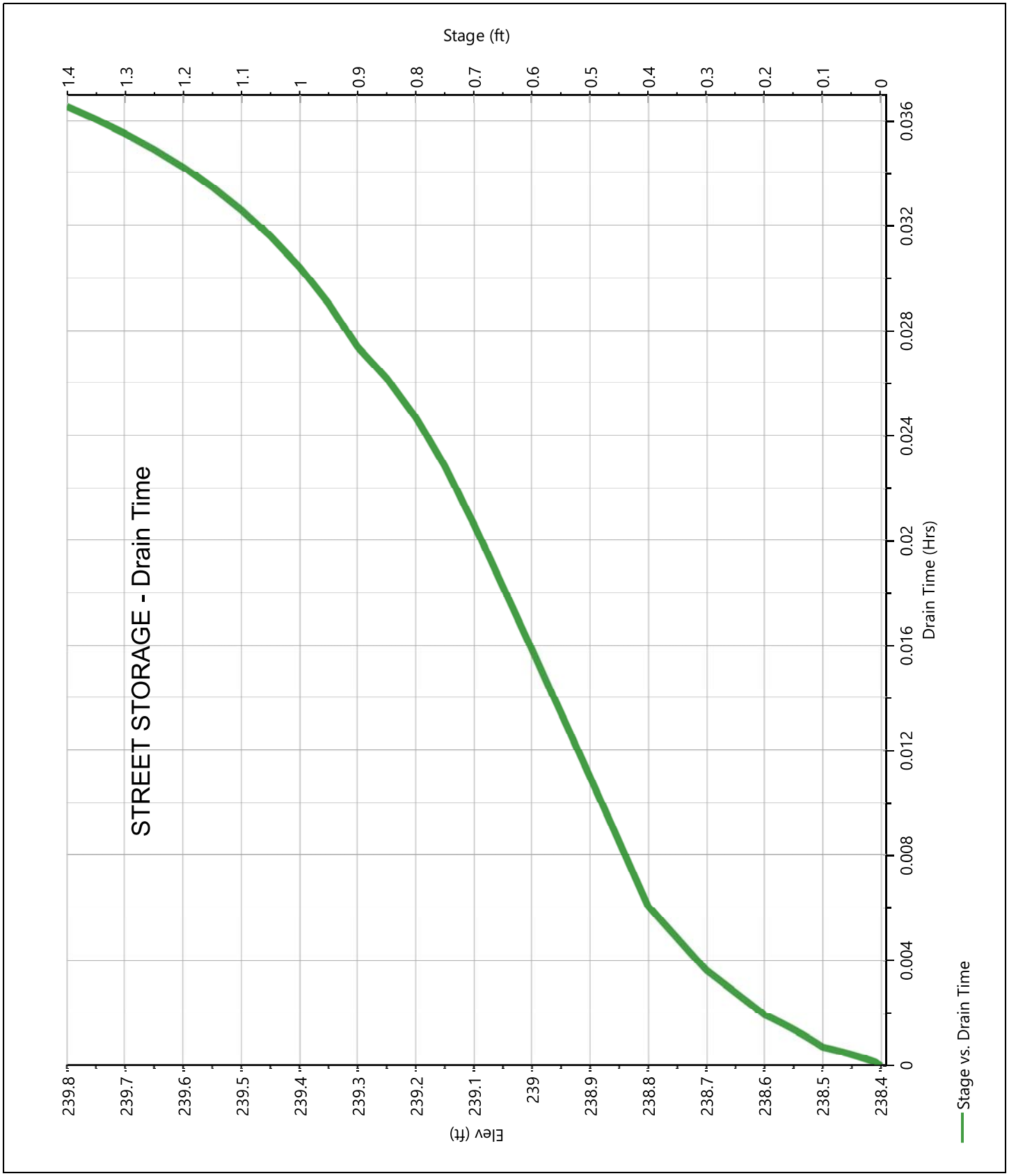
Project Name:

Hydrology Studio v 3.0.0.32

08-16-2024

STREET STORAGE

Pond Drawdown



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.32

08-16-2024

KEVMICH WAY

Hyd. No. 6

Hydrograph Type	= Junction	Peak Flow	= 11.24 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Hydrograph Volume	= 63,107 cuft
Inflow Hydrographs	= 2, 5	Total Contrib. Area	= 0.0 ac