ONSITE AND OFFSITE DRAINAGE REPORT

230TH STREET COMMUNITY SOLAR AND BATTERY ENERGY STORAGE SYSTEM PROJECT

SE Corner of W Avenue C 8 and 230th St W

Los Angeles County, CA 93536

CUP PLAN CASE NO. PRJ2023-002405

HYDROLOGY PLAN CASE NO. ESTU 2023000704

PREPARED FOR

HYDROLOGY STUDY APPROVED

REVIEWED BY: _____ DATE 10/24/2024

APPROVED BY: _____ DATE 10/28/2024

COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION

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October 2024

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1 INTRODUCTION

1.1 PROJECT BACKGROUND

Kimley-Horn was retained by RPCA Solar 12, LLC to conduct a hydrologic analysis for the flow entering the proposed Solar Photovoltaic (PV) Generation Facility, 230th Street Community Solar and Battery Energy Storage System Project, in unincorporated Los Angeles (LA) County, California (Figure 1). The purpose of this report is to provide the results of the drainage analysis, evaluate the potential impacts, and provide recommendations associated with storm runoff.

The 230th Street Community Solar (Project) is a utility-scale Solar Generation Facility and optional battery energy storage system (BESS) that will generate, charge, store, and discharge renewable solar electricity with minimal environmental impacts. The Project facilities will operate year-round, producing electric power during daytime hours and discharging stored electric power at night. The Project would have a generating capacity of up to 6.4 megawatts (MW) alternating current (AC).

PV solar module arrays will be installed on a single-axis tracker racking system that is mounted on piles driven into the ground. These arrays, along with string inverters and project equipment, will be enclosed by a chain link perimeter fence with a barbed wire top. The subject tract will include at-grade perimeter and internal access roads. Access to the subject tract will be provided along 230th Street West. Offsite transmission will consist of interconnecting to the existing distribution grid and are thus not included in this study.

1.2 SUBJECT TRACT DESCRIPTION

The subject tract is approximately 31 acres and located in unincorporated Los Angeles County, CA. The subject tract is bounded by W Avenue C 8 to the north, 227th Street W to the east, residential units and W Avenue D (Highway 138) to the south, and 230th Street W to the west.

Stormwater runoff from the San Gabriel Mountain range generally flows northwest and passes through the subject tract. The California Aqueduct is located at the foothills of the San Gabriel Mountains, but drainage can pass above and below via existing above-grade concrete channels and underground culverts.

The subject tract drains to from the southwest to northeast corner of the subject tract, with slopes ranging from less than 1% to 3% throughout the subject tract. The subject tract is surrounded by farmland, undeveloped land, and a nearby solar farm to the northeast.

The subject tract is within FEMA Flood Zone X (unshaded) and adjacent to Flood Zone A (Figure 2). Zone A is defined as special flood hazard areas (SFHA's) subject to inundation by the 1% annual chance flood, with no base flood elevations determined. FEMA Flood Zone X (unshaded) is defined as areas outside the 0.2% annual chance floodplain as identified by FEMA Effective Flood Insurance Rate Map (FIRM) for Los Angeles County (Panel 06037C0100F, Effective 09/26/2008). The project will avoid any grading and development activities within the Flood Zone A footprint.

2 METHODOLOGY

2.1 HYDROLOGY

Onsite hydrologic calculations were performed based on the Modified Rational Method using the LA County HydroCalc software to determine peak flow rates for 2, 5, 10, 25, and 50-year storm events based on the LA County Hydrology Manual. Primary inputs for this program include precipitation depth, LA County soil classification, drainage area, impervious coverage, flow path length and slope.

2.2 LID MITIGATION REQUIREMENTS

This report will demonstrate compliance with the two main goals of Los Angeles County Department of Public Works (LACDPW) as conveyed by the Land Development Division. The first goal is to eliminate downstream impacts of development by affecting downstream flow characteristics, including flow width, depth, velocity, rate, and discharge volume. The second goal is to comply with Low Impact Development (LID) requirements per the LID Standards Manual, 2014 (LID Manual) per County Code §12.84.440.

The subject tract is approximately 31 acres in size. Due to the assumption of 10% post-developed impervious area required by LACDPW, the assumed impervious area is approximately 2.89 acres, or about 125,888 square feet. These criteria exceed the thresholds defined in LID Manual section 2.1 as follow: “over 1 acre disturbed and adding over 10,000 square feet of impervious surface.” Therefore, The Project is categorized as a Designated Project.

Mitigation of peak flow and runoff volume follows the LID Manual. Section 8 of the LID Manual discusses hydromodification requirements; Section 8.3 requires “hydrology and hydraulic frequency analyses for LID, 2-, 5-, 10-, 25-, and 50-year storm events per the LACDPW Hydraulic and Hydrology manuals”. For this application, hydromodification requires that post-development runoff conditions of the required storm events do not exceed pre-development runoff conditions of the same storm events. Per Section 6.2 of the LID Manual, the volume-based LID storm event, or stormwater quality design volume (SWQDv), is defined as the 85th percentile, 24-hour storm dictated by LA County or the 0.75-inch, 24-hour storm applied across the tributary watershed, whichever is greater. This analysis of multiple storm events was performed for onsite drainage areas only.

Per the direction of LACDPW, Kimley-Horn understands the following design assumptions were made to match the input parameters of LID design on previous solar sites in LA County:

1. Required retention: any incremental runoff (flow rate and hydrograph volume) from the 2-, 5-, 10-, 25-, and 50-year storm events (unburned and unbulked).
2. Required minimum assumed proposed percent impervious in Array Fields: 10%
3. Requested maximum ponding depth in retention basins without fencing: 18-inches
4. Requested basin location: middle of the subject tract or adequately upstream of the subject tract outflow point to promote normalization of discharge to sheet flow (or pre-development flow condition) prior to discharging from the subject tract to neighboring properties; basins may not be located along the downstream edge of the subject tract adjacent to neighboring properties.

3 ONSITE AND OFFSITE DRAINAGE ANALYSIS

3.1 DRAINAGE CONDITIONS

The contributing offsite drainage watershed for the subject tract is approximately 6.39 mi^2 (~4,089 acres). An offsite drainage analysis was performed using a 2D hydraulic model. The Q_{50} noted on the civil plans was developed using the offsite analysis. At the request of the County, the detailed discussion was removed from this report since the County is only reviewing onsite impacts at this time.

All horizontal coordinates are based on NAD 83, California State Plane, Zone V, US foot. All orthometric heights are based on NAVD 88. Onsite basins were delineated using onsite surveyed topo.

Runoff generated onsite, generally flows from west to east and exits The subject tract as sheet and shallow-concentrated flow. The subject tract is generally flat with most slopes under 2% and none exceeding 3%.

3.2 ONSITE DRAINAGE ANALYSIS

The onsite hydrologic analyses were completed following the methods outlined in the Los Angeles County Department of Public Works Hydrology Manual dated January 2006 and referencing the County of Los Angeles Department of Public Works Low Impact Development Standards Manual dated February 2014. Los Angeles County's HydroCalc software was used to estimate times of concentration, peak flows, and unit hydrograph volumes generated from storms up to the 50-year storm event for existing and proposed conditions. Drainage area delineation, flow path length and slope, and imperviousness were calculated using survey data and Construction Documents. The 50-year rainfall depth, soil type, and fire factor were determined using the Los Angeles County Hydrology GIS map.

4 PROPOSED MITIGATIONS

4.1.1 VOLUME

LID Manual section 6 requires that the Stormwater Quality Design Volume (SWQDv) be retained onsite and is defined as the greater of the 0.75-inch, 24-hour rain event or the 85th percentile, 24-hour rain event. The 85th percentile depth is X in, so the 0.75 inch event will govern for LID design. See Table 2 for the onsite SWQDv summary. LID Manual section 8 requires hydromodification mitigation for the 2-, 5-, 10-, 25-, and 50-year storm events and requires that any increase in runoff volume (delta) between pre- and post-development conditions be retained onsite to mitigate adverse impacts downstream. As demonstrated in the calculation summary in Table 3 below and Appendix C, the 50-year event controls volumetric retention required for onsite drainage areas because it results in the greatest delta of required events. The stormwater quality control measure of Infiltration Basin (RET-2) is recommended for the subject tract. The basin(s) were sized to retain the delta as shown on Figure 3. There are no natural drainage systems tributary to the subject tract with capital flood flow rates greater than 5,000 cfs. Therefore, sediment transport analysis is not required and was not prepared in this study.

All onsite drainage areas generally flow southwest to northeast across the subject tract and are under 40 acres. DA-1 remained generally unchanged from pre-development conditions and under 40 acres. The retention basins will be sized to retain the SWQDv from the subject tract, as shown in Table 4 and 5. The basins will be generally located on the downstream end of the subject tract,

and swales will be used as necessary to direct flow to the basins. Full calculations are in Appendix C.

Onsite infiltration basins will be excavated below existing grade per the detail shown on Figure 3. Spoils from basin excavation shall be relocated onsite, maintaining flow paths and inundation limits. Basins will be constructed perpendicular to the direction of flow in order to capture runoff from the upper portion of the subject tract.

A conservative design infiltration rate of 0.66 inches per hour was confirmed by a Supplemental Infiltration Testing Memorandum completed by Salem Engineering Group, Inc. dated March 13, 2024. A factor of safety of 1.5 was applied to the measured double ring infiltration rate to obtain the 0.66 inches per hour rate. Infiltration will be feasible and consistent with the most recent Geotechnical and Materials Engineering Division (GMED) Policy GS 200.1. The maximum drawdown time per LID Manual Stormwater Quality Control Measure Fact Sheet *RET-2: Infiltration Basin* is 96 hours. The maximum depth of water that can be infiltrated for that design infiltration rate is 5.3 ft. As shown on the detail sheet in Figure 3, proposed retention basins are sized assuming a ponding depth of 18-inches, which would result in an expected drawdown time of roughly 27.3 hours. See Table 6 for the drawdown time summary of the proposed basin. Actual ponding depths will be determined during final design but will not result in drawdown times greater than 96 hours. Additional infiltration testing may be required if basin bottoms are excavated lower than the depth of infiltration field testing (field testing was done at 12 inches below grade), pursuant to GS 200.1.

Table 2 – Onsite Hydromod Water Quality Volume (WQDv)

Subarea	Area (ac)	Impervious	Isohyetal (in)	Peak Q (cfs)	Volume (cf)
DA-1	31.02	0.10	0.75	0.58	15,082
Total	31.02			0.58	15,082

Table 3 – Onsite Proposed Hydromod Volume Comparison

Subarea	Area (ac)	Freq.	50-Year Isohyetal (in)	Impervious		Peak Q (cfs)		Volume (cf)		
				Ex.	Prop.	Ex.	Prop.	Ex.	Prop.	Delta
DA-1	31.02	2-yr	5.20	0.01	0.10	1.73	2.89	24,271	40,451	16,180
Total	31.02								Subtotal	16,180
DA-1	31.02	5-yr	5.20	0.01	0.10	2.62	4.36	36,626	61,043	24,417
Total	28.20								Subtotal	24,417
DA-1	31.02	10-yr	5.20	0.01	0.10	3.20	5.33	44,779	74,632	29,853
Total	31.02								Subtotal	29,853
DA-1	31.02	25-yr	5.20	0.01	0.10	3.93	6.55	55,064	91,774	36,710
Total	31.02								Subtotal	36,710
DA-1	31.02	50-yr	5.20	0.01	0.10	6.16	8.99	64,039	105,729	41,690
Total	31.02								Subtotal	41,690

Table 4 – Retention Volume Required

Subarea	SWQDv Required (cf)	Pre vs Post Delta Volume for 50-yr (cf)	Existing Retention Volume (cf)	Required Retention Volume (cf)
DA-1	15,082	41,690	0	41,690
			Total Required Retention Volume	41,690

Table 5 – Proposed Basin Summary

Basins	Area	SWQDv (cf)	50-yr Mitigation Volume (cf)	Required Retention Volume (cf)	Design Length (ft)	Design Width (ft)	Design Area (sf)	Design Depth (ft)	Design Volume (cf)	$V_{design} > V_{required}$?
1-6	DA-1	13,710	41,690	41,690	1,203	65	27,793	1.5	42,336	YES
Total Required Retention Volume				41,690	Total Designed Volume				42,336	

Table 6 – Infiltration Basin Drawdown

Basin	Ponding Depth (ft)	Infiltration Rate (in/hr)	Factor of Safety	Design Infiltration Rate (in/hr)	Drawdown Time (hr)
1	1.5	1	1.5	0.66	27.3

See figure 3 for comprehensive tables and depiction of onsite runoff conditions pre/post development.

4.1.2 Flow Rate, Depth, and Velocity

The analysis shows that post-development peak flow rates exceed pre-development conditions. Consequently, post-development flow depths and velocities would also exceed pre-development conditions when conveyed across original grade. The proposed infiltration retention basins compensates for changes in runoff volume as discussed above and attenuates peak flows in a similar manner; see Figure 3 for basin locations. The analysis shows no increases in runoff flow rates nor discharge volumes. Therefore, negligible increases are anticipated to depths and velocities exiting the subject tract from each onsite drainage area. The mitigation effects of the basins for the 50-year storm are consistent with LACDPW Hydromodification requirements.

4.1.3 Flow Type

Each onsite retention basin is to be constructed from existing materials in the approximate location shown unless otherwise approved by LACDPW. This design will serve to promote the normalization of excess runoff during storm events exceeding the design capacity of the basins.

4.1.4 Source Control measures

Source control measures are designated to prevent pollutants from contacting stormwater runoff or prevent discharge of contaminated stormwater runoff to the storm drain system and/or receiving water. The subject tract will be an unmanned solar facility with no proposed regularly occupied

buildings or designated parking and will not feature underground storm drain systems. The following source control measures detailed in the LID Manual are recommended for this subject tract during and/or after construction if determined to be applicable during final design:

- S-2 – Outdoor Material Storage Area
- S-3 – Trash Storage/Waste Handling Area
- S-5 – Outdoor Vehicle/Equipment Repair/Maintenance Area
- S-6 – Outdoor Vehicle/Equipment/Accessory Wash Area
- S-7 – Fuel & Maintenance Area
- S-8 – Landscape Irrigation Practices
- S-9 – Building Materials

5 DISCUSSION OF POTENTIAL IMPACTS

5.1 GENERAL IMPACTS

The proposed Project is a utility-scale Solar Generation Facility and Optional battery energy storage system (BESS) that will generate, charge, store, and discharge renewable solar electricity. The improvements to the subject tract will include the solar panels, at-grade earth perimeter and internal access roads, and the associated electrical equipment. The subject tract will be surrounded by a chain link security fence with barbed wire top.

The impacts of solar facilities on the hydrologic process and methods to quantify any impact have not been widely documented in the civil engineering industry. A study published in the Journal of Hydrologic Engineering researched the hydrologic impacts of utility scale solar generating facilities. The study utilized a model to simulate runoff from pre- and post-solar panel conditions. The study showed that the solar panels themselves have very little impact on runoff volumes or rates (Cook and McCuen, 2013). Increases in runoff were found from other well-documented causes such as increased imperviousness or significant reduction in vegetative cover. However, per LACDPW direction, this analysis conservatively assumed 10% impervious area in the post-developed condition for LID and hydromodification design.

Increases in imperviousness for the subject tract will be minimal. Onsite access roads will be gravel and/or compacted native soils. The subject tract has very little vegetation and only minor grading is proposed with minimal changes to the existing subject tract drainage patterns. However, in order to comply with LACDPW LID and hydromodification requirements, retention basins will be excavated onsite in order to attenuate assumed increases to peak flow and volume leaving the subject tract. Spoils from the basin excavation will be distributed onsite and will not substantially alter pre-development drainage patterns in order to balance earthwork on the subject tract.

6 REFERENCES

Cook, L.M. and McCuen, R.H. 2013. Hydrologic Response of Solar Impacts. Journal of Hydrologic Engineering, 18(5), 536-541.

Los Angeles County Department of Public Works, Water Resources Division. 2006. Los Angeles County Hydrology Manual. January 2006.

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online at the following link: https://websoilsurvey.sc.egov.usda.gov/. Accessed 1/2017.

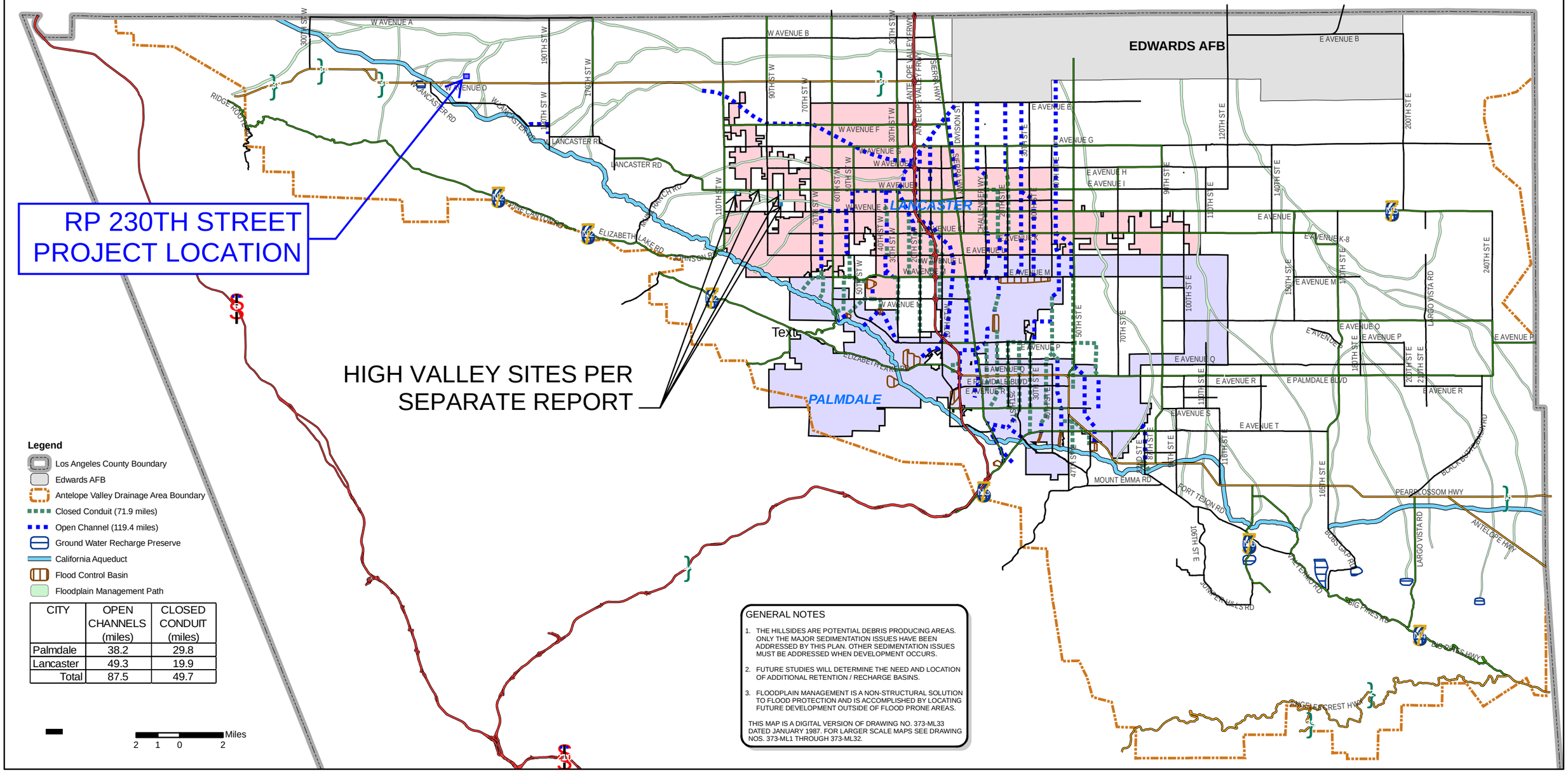
US Department of Agriculture, Natural Resource Conservation Service. 1986. Urban Hydrology for Small Watersheds, TR-55. June 1986.

U.S. Geological Survey (USGS). 2013. The National Elevation Dataset.

Appendix A – Figures

FIGURE 1

ANTELOPE VALLEY
Comprehensive Plan of Flood Control and Water Conservation



Legend

- Los Angeles County Boundary
- Edwards AFB
- Antelope Valley Drainage Area Boundary
- Closed Conduit (71.9 miles)
- Open Channel (119.4 miles)
- Ground Water Recharge Preserve
- California Aqueduct
- Flood Control Basin
- Floodplain Management Path

CITY	OPEN CHANNELS (miles)	CLOSED CONDUIT (miles)
Palmdale	38.2	29.8
Lancaster	49.3	19.9
Total	87.5	49.7

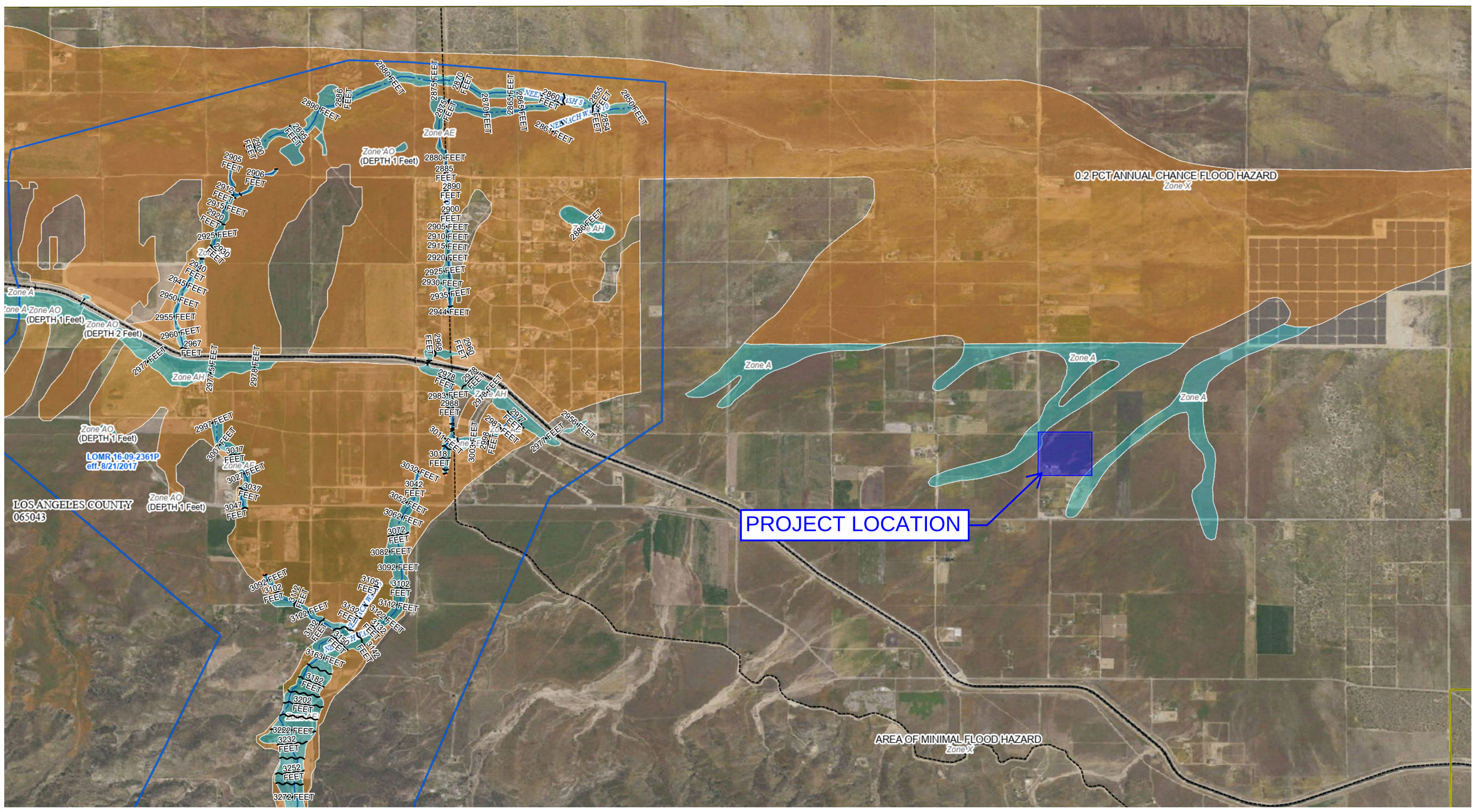
2 1 0 2 Miles

GENERAL NOTES

1. THE HILLSIDES ARE POTENTIAL DEBRIS PRODUCING AREAS. ONLY THE MAJOR SEDIMENTATION ISSUES HAVE BEEN ADDRESSED BY THIS PLAN. OTHER SEDIMENTATION ISSUES MUST BE ADDRESSED WHEN DEVELOPMENT OCCURS.
2. FUTURE STUDIES WILL DETERMINE THE NEED AND LOCATION OF ADDITIONAL RETENTION / RECHARGE BASINS.
3. FLOODPLAIN MANAGEMENT IS A NON-STRUCTURAL SOLUTION TO FLOOD PROTECTION AND IS ACCOMPLISHED BY LOCATING FUTURE DEVELOPMENT OUTSIDE OF FLOOD PRONE AREAS.

THIS MAP IS A DIGITAL VERSION OF DRAWING NO. 373-ML33 DATED JANUARY 1987. FOR LARGER SCALE MAPS SEE DRAWING NOS. 373-ML1 THROUGH 373-ML32.

FIGURE 2



118°29'58.33"W 34°42'51.7"N

FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR DRAFT FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee See Notes *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary

NOTES TO USERS

For information and questions about this Flood Insurance Rate Map (FIRM), available products associated with this FIRM, including historic versions, the current map date for each FIRM panel, how to order products, or the National Flood Insurance Program (NFIP) in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Flood Map Service Center website at https://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.

For community and countywide map dates, refer to the Flood Insurance Study Report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Basemap information shown on this FIRM was provided in digital format by USDA, Farm Service Agency (FSA). This information was derived from NAIP, dated April 11, 2018.

This map was exported from FEMA's National Flood Hazard Layer (NFHL) on **7/11/2024 2:35 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time. For additional information, please see the Flood Hazard Mapping Updates Overview Fact Sheet at https://www.fema.gov/media-library/assets/documents/118418

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards. This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date.

SCALE

Map Projection:
GCS, Geodetic Reference System 1980;
Vertical Datum: NAVD88
For information about the specific vertical datum for elevation features, datum conversions, or vertical monuments used to create this map, please see the Flood Insurance Study (FIS) Report for your community at https://msc.fema.gov

N

1 inch = 2,000 feet 1:24,000

0 1,000 2,000 4,000 6,000 8,000 Feet

0 210 420 840 1,260 1,680 Meters



NATIONAL FLOOD INSURANCE PROGRAM

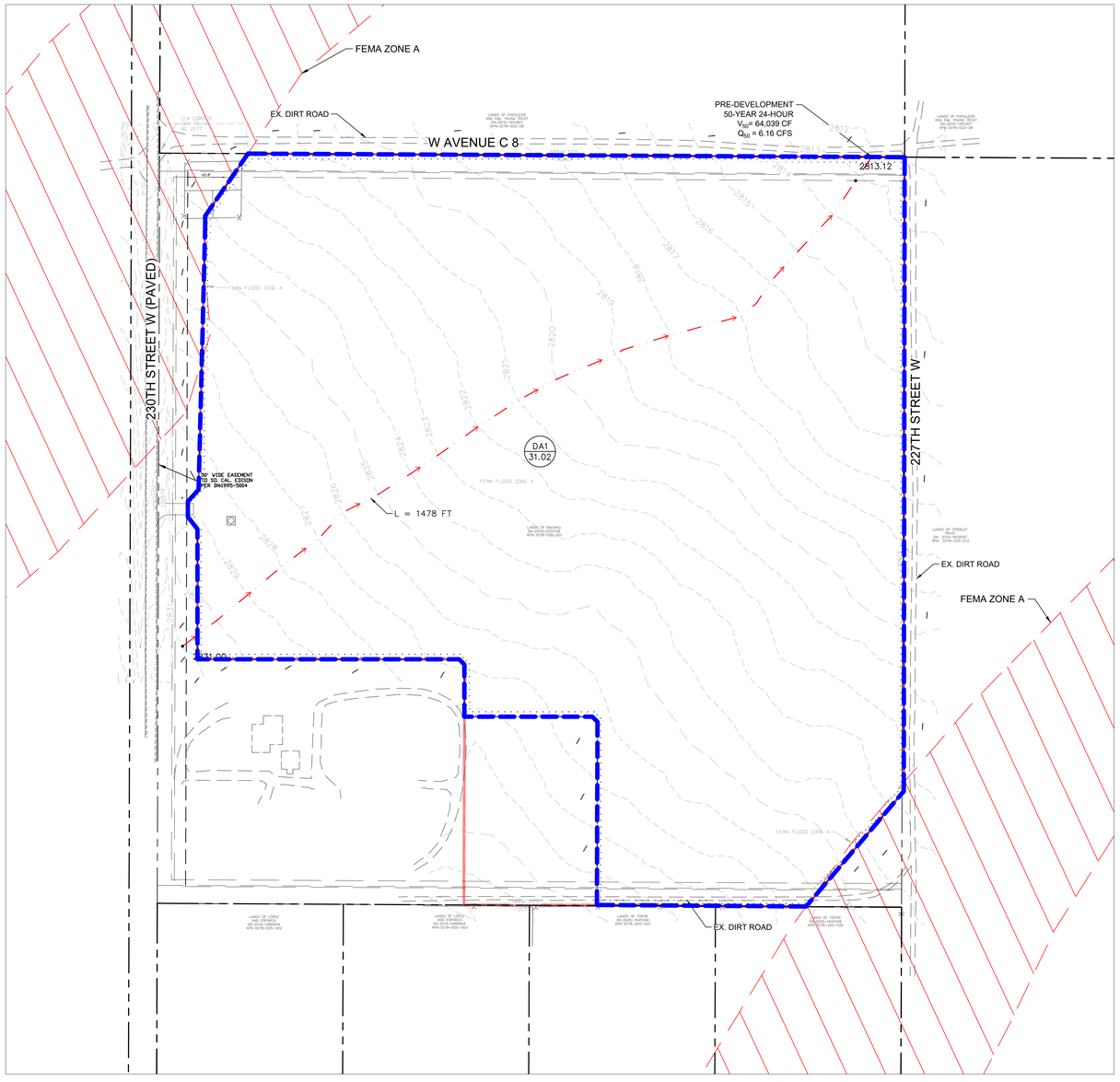
FLOOD INSURANCE RATE MAP

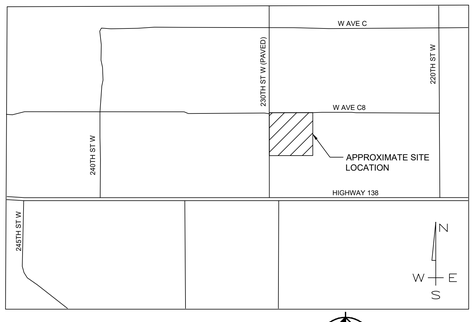
PANEL **100** OF **2204**

Panel Contains:

COMMUNITY	NUMBER	PANEL
LOS ANGELES COUNTY	065043	0100
KERN COUNTY	060075	0100

MAP NUMBER
06037C0100F
EFFECTIVE DATE
September 26, 2





VICINITY MAP
NTS
NORTH

LEGEND

- EXISTING PROPERTY LINE
- APPROXIMATE LEASE LIMITS
- PARCEL LINE
- EASEMENT LINE
- ROAD CENTERLINE
- (2700) EXISTING GRADE CONTOUR
- DA1 X.XX ONSITE DRAINAGE AREA WITH APPROXIMATE ACREAGE
- ONSITE DRAINAGE AREA LIMIT
- ONSITE DRAINAGE AREA FLOW PATH

NOTES

PROJECT SIZE: 31 AC

FLOOD ZONE: BY GRAPHIC PLOTTING ONLY, THE PROPERTY IS IN ZONE "X" OF THE FLOOD INSURANCE RATE MAP, PANEL NO. 06043010OF, DATED SEPTEMBER 26, 2008. THIS PROPERTY IS NOT LOCATED IN AN AREA WHERE FLOOD HAZARDS EXIST AS DETERMINED BY FEMA NOR IN A COUNTY ADOPTED FLOODWAY.

HYDROLOGIC CALCULATION INPUTS

INPUT PARAMETER	VALUE
PARAMETER APPLICATION	ONSITE BASIN SIZING
DEVELOPMENT CONDITIONS	EXISTING
STORM FREQUENCY	2-YEAR, 5-YEAR, 10-YEAR, 25-YEAR, 50-YEAR
RAINFALL DEPTH (50-YEAR, 24-HOUR)	5.2 INCHES
85TH PERCENTILE, 24-HOUR	0.75 INCHES
SOIL TYPE	134
FIRE FACTOR	0.34
PERCENT IMPERVIOUS	1%
HYDROMOD SIZING CRITERIA	2-YEAR, 5-YEAR, 10-YEAR, 25-YEAR 50-YEAR
DPA ZONE	11
BURN FACTOR[1]	N/A
BULKING FACTOR[1]	N/A

NOTES: N/A

1. PROJECT SITE IS NOT LOCATED IN THE COUNTY OF LOS ANGELES CANYONS OR MOUNTAINOUS AREAS WHICH ARE SUBJECT TO BURNING AND BULKING REQUIREMENTS.

HYDROLOGY STUDY APPROVED
REVIEWED BY: _____ DATE 10/24/2024
APPROVED BY: _____ DATE 10/28/2024
COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION

TABLE 2: ONSITE FLOW AND VOLUME FOR 2-, 5-, 10-, 25-, AND 50-YR 24-HOUR STORM EVENTS

ONSITE DA ID	AREA (AC)	FLOW PATH LENGTH (LF)	START ELEVATION (FT)	END ELEVATION (FT)	FLOW PATH SLOPE (FT/FT)	2-YEAR, 24-HOUR		5-YEAR, 24-HOUR		10-YEAR, 24-HOUR		25-YEAR, 24-HOUR		50-YEAR, 24-HOUR	
						FLOW (CFS)	VOLUME (CF)	FLOW (CFS)	VOLUME (CF)	FLOW (CFS)	VOLUME (CF)	FLOW (CFS)	VOLUME (CF)	FLOW (CFS)	VOLUME (CF)
DA-1	31.02	1478	2831	2813.12	0.012	1.73	24271	2.61	36626	3.20	44779.00	3.93	55064	6.16	64039
SUBTOTAL						1.73	24271	2.61	36626	3.20	44779	3.93	55064	6.16	64039

* OFFSITE FLOWS SHOWN WERE DEVELOPED USING THE ARMY CORP OF ENGINEERS HEC-RAS (V5.0.7) MAPPER 2D FEATURE. THE PROFILE FEATURE WITHIN RAS-MAPPER WAS UTILIZED TO FIND MAX OFFSITE FLOWS PASSING THROUGH EACH ONSITE DRAINAGE AREA. PLEASE SEE REPORT NARRATIVE FOR DETAILS.

NORTH

GRAPHIC SCALE IN FEET
0 50 100 200
1"=100' WHEN PLOTTED ON 30"x42"

REVISIONS: No. | DATE | BY

Kimley»Horn
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REGISTERED PROFESSIONAL ENGINEER — CIVIL — MATTHEW J. MONTGOMERY — No. 87882 — STATE OF CALIFORNIA
EXPIRES: 09/30/2025

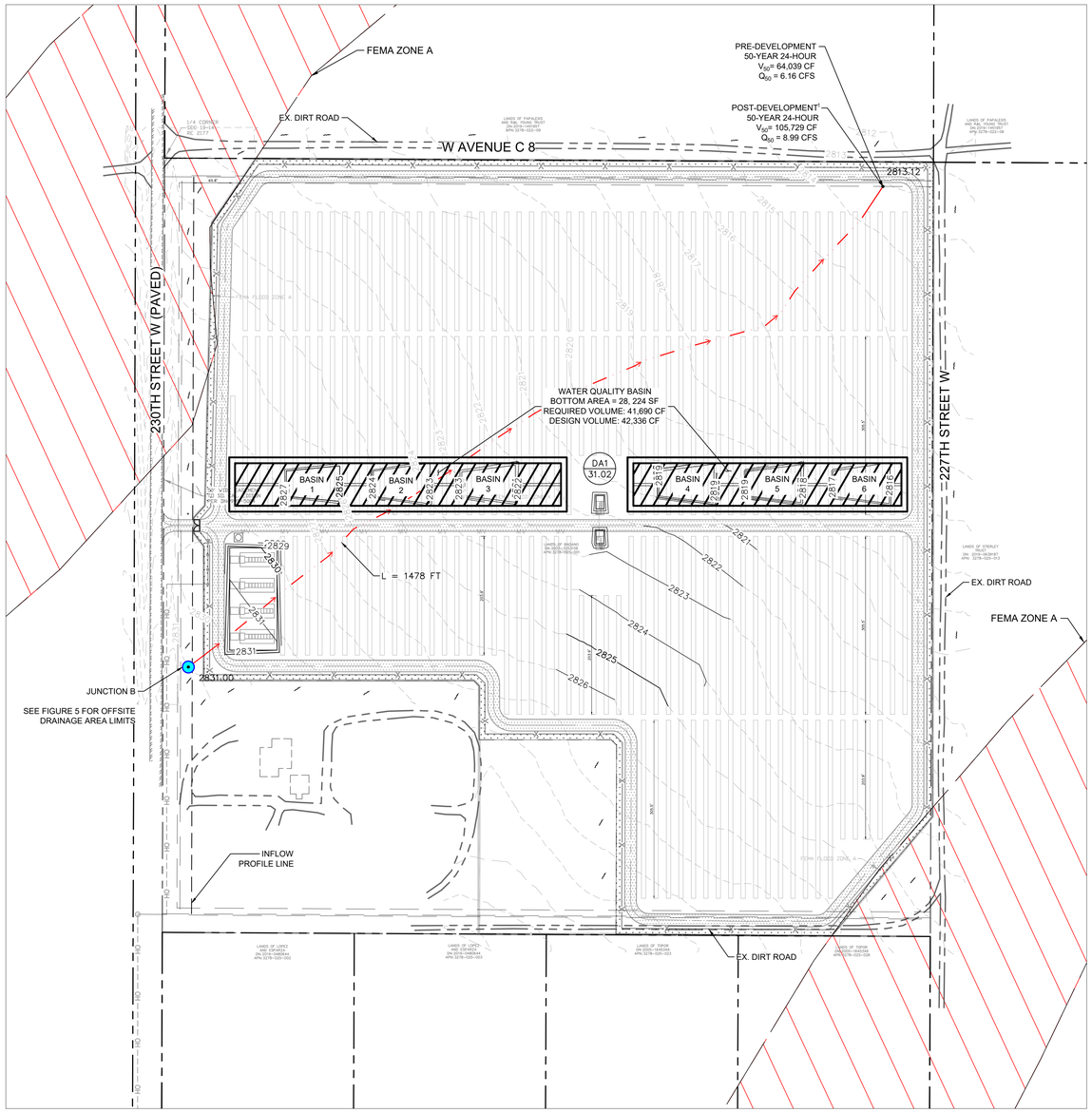
KHA PROJECT 099950006
DATE 10/23/2024
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DESIGNED BY BY
DRAWN BY BY
CHECKED BY CY

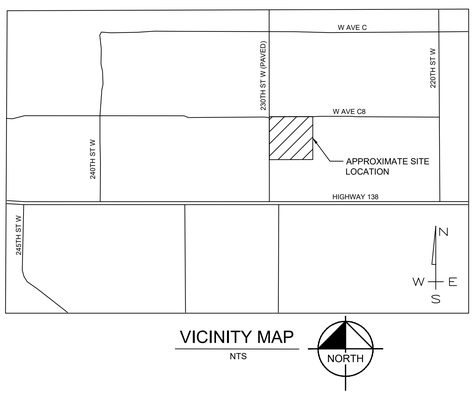
230TH STREET SOLAR
PREPARED FOR RPCA
CALIFORNIA
LOS ANGELES COUNTY

EXISTING CONDITIONS ONSITE HYDROLOGY MAP
CUP CASE NO. PRJ2023-002405

SHEET NUMBER
FIG-7

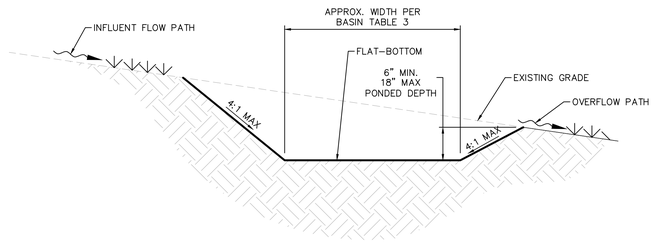
Plotted By: Young, Chris Sheet Set: Kho Layout: CONCEPTUAL SITE PLAN October 24, 2024 01:44:33pm K:\LDT_ENERGY\RPCA Ground-mount\099997002_RCPA_230th St Exhibit E\08_H&H\Dwg\Exhibits\230th Existing Hydrology.dwg
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VICINITY MAP
NTS

NORTH



NOTES:
1. THIS DETAIL REPRESENTS GENERAL INTENT; BASINS TO BE FURTHER DETAILED DURING FINAL DESIGN.
2. SPOILS FROM BASIN EXCAVATION ARE TO REMAIN ON-SITE, SHOULD BE PLACED ON RIDGELINES WHERE POSSIBLE.
3. BASINS TO BE CONSTRUCTED IN ELONGATED RECTANGULAR LAYOUT AS SHOWN PER PLAN.
4. PROPOSED ONSITE ACCESS ROADS SHALL REMAIN AT EXISTING GRADE, ELEVATED ABOVE BASIN INUNDATION ELEVATIONS IN ORDER TO DISCOURAGE INUNDATION OF TRAVELED WAY.
5. EARTHWORK REQUIRED FOR BASIN GRADING AND DAYLIGHT SLOPES MAY EXCEED THE MINIMUM REQUIRED STORAGE OR RETENTION VOLUME AND IS SUBJECT TO CHANGE DURING THE FINAL DESIGN
6. GENERAL MAINTENANCE IS REQUIRED FOR INFILTRATION BASINS TO FUNCTION PROPERLY AND MAY INCLUDE INSPECTIONS, TRASH REMOVAL, VEGETATION MAINTENANCE, ETC.

TYPICAL INFILTRATION RETENTION BASIN
N.T.S.

LEGEND

- EXISTING PROPERTY LINE
- APPROXIMATE LEASE LIMITS
- PARCEL LINE
- EASEMENT LINE
- ROAD CENTERLINE
- EXISTING GRADE CONTOUR (2700)
- PROPOSED GRADE CONTOUT 2700
- MODULE SAT ROW
- PROPOSED CHAIN LINK FENCE
- PROPOSED GEN TIE LINE
- 20' ALL WEATHER ACCESS ROAD
- PROPERTY LINE SETBACK
- 20' SITE ACCESS GATE
- ONSITE DRAINAGE AREA WITH APPROXIMATE ACREAGE (DA1 / X.XX)
- ONSITE DRAINAGE AREA LIMIT
- ONSITE DRAINAGE AREA FLOW PATH
- FEMA ZONE A
- RETENTION BASIN

TABLE 1: HYDROLOGIC CALCULATION INPUTS

INPUT PARAMETER	VALUE
PARAMETER APPLICATION	ONSITE BASIN SIZING
DEVELOPMENT CONDITIONS	PROPOSED
STORM FREQUENCY	0.75-INCH, 2-YEAR, 5-YEAR, 10-YEAR, 25-YEAR, 50-YEAR
RAINFALL DEPTH (50-YEAR, 24-HOUR)	5.2 INCHES
85TH PERCENTILE, 24-HOUR	0.75 INCHES
SOIL TYPE	134
FIRE FACTOR	0.34
PERCENT IMPERVIOUS	10%
HYDROMOD SIZING CRITERIA	2-YEAR, 5-YEAR, 10-YEAR, 25-YEAR 50-YEAR
DPA ZONE	11
BURN FACTOR[1]	N/A
BULKING FACTOR[1]	N/A

NOTES: N/A

1. PROJECT SITE IS NOT LOCATED IN THE COUNTY OF LOS ANGELES CANYONS OR MOUNTAINOUS AREAS WHICH ARE SUBJECT TO BURNING AND BULKING REQUIREMENTS.

APPROXIMATE BASIN CAPACITY

BASIN	ELEVATION	DEPTH (FT)	AREA (SF)	VOLUME (CF)	CUMULATIVE VOLUME (CF)	CUMULATIVE VOLUME (ACFT)
1	2824.40	1.50	4328	6492		
2	2822.30	1.43	4792	6853	13345	0.30
3	2821.00	1.38	4792	6612	19957	0.45
4	2818.70	1.50	4792	7188	27145	0.62
5	2816.82	1.50	5143	7715	34860	0.80
6	2815.30	1.50	4984	7476	42336	0.97
				TOTAL VOLUME	42336	0.97

HYDROLOGY STUDY APPROVED
REVIEWED BY: _____ DATE 10/24/2024
APPROVED BY: _____ DATE 10/28/2024
COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION

TABLE 2A: PRE-DEVELOPED ONSITE FLOW AND VOLUME FOR 2-, 5-, 10-, 25-, AND 50-YR 24-HOUR STORM

ONSITE DA ID	AREA (AC)	FLOW PATH LENGTH (LF)	START ELEVATION (FT)	END ELEVATION (FT)	FLOW PATH SLOPE (FT/FT)	2-YEAR, 24-HOUR		5-YEAR, 24-HOUR		10-YEAR, 24-HOUR		25-YEAR, 24-HOUR		50-YEAR, 24-HOUR	
						FLOW (CFS)	VOLUME (CF)	FLOW (CFS)	VOLUME (CF)	FLOW (CFS)	VOLUME (CF)	FLOW (CFS)	VOLUME (CF)	FLOW (CFS)	VOLUME (CF)
DA-1	31.02	1478	2831	2813.12	0.012	1.73	24271	2.61	36626	3.20	44779.00	3.93	55064	6.16	64039
SUBTOTAL						1.73	24271	2.61	36626	3.20	44779	3.93	55064	6.16	64039

TABLE 2B: POST-DEVELOPED ONSITE FLOW AND VOLUME FOR 2-, 5-, 10-, 25-, AND 50-YR 24-HOUR STORM

ONSITE DA ID	AREA (AC)	FLOW PATH LENGTH (LF)	START ELEVATION (FT)	END ELEVATION (FT)	FLOW PATH SLOPE (FT/FT)	2-YEAR, 24-HOUR		5-YEAR, 24-HOUR		10-YEAR, 24-HOUR		25-YEAR, 24-HOUR		50-YEAR, 24-HOUR	
						FLOW (CFS)	VOLUME (CF)	FLOW (CFS)	VOLUME (CF)	FLOW (CFS)	VOLUME (CF)	FLOW (CFS)	VOLUME (CF)	FLOW (CFS)	VOLUME (CF)
DA-1	31.02	1478	2831	2813.12	0.012	2.89	40451	4.34	61043	5.33	74632	6.55	91774	8.99	105729
SUBTOTAL						2.89	40451	4.34	61043	5.33	74632	6.55	91774	8.99	105729

TABLE 3: SWQDV AND RETENTION REQUIREMENTS

Basin	Tributary DA	Project Design Storm (in)	SWQDv (cf)	50-yr Event Mitigation Volume (cf)	Existing Retention Volume (cf)	Required Retention Volume (cf)	Design Length (ft)	Design Width (ft)	Design Area (sf)	Design Depth (ft)	Design Volume (cf)
1	DA-1	0.75	15082	41690	0	41690	1203	23	28224	1.5	42336
					Total Required Retention Volume	41690			Total Designed Volume		42336

TABLE 4: SITE SPECIFIC DESIGN INFILTRATION RATES

BASIN	DESIGN DEPTH (FT)	INFILTRATION RATE (IN/HR)	FACTOR OF SAFETY	DESIGN INFILTRATION RATE (IN/HR)	DRAWDOWN TIME (HR)	COUNTY REQUIRED DRAWDOWN TIME (HR)	REQUIRED DRAWDOWN TIME MET?
1	1.5	1	1.5	0.66	27.3	96	YES

NOTES

PROJECT SIZE: 31 AC.

FLOOD ZONE: BY GRAPHIC PLOTTING ONLY, THE PROPERTY IS IN ZONE "X" OF THE FLOOD INSURANCE RATE MAP, PANEL NO. 06504301 00F, DATED SEPTEMBER 26, 2008. THIS PROPERTY IS NOT LOCATED IN AN AREA WHERE FLOOD HAZARDS EXIST AS DETERMINED BY FEMA.

1. BY REQUEST OF THE LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS, POST-DEVELOPMENT FLOW RATE AND VOLUME CALCULATIONS CONSERVATIVELY ASSUME 10% IMPERVIOUS AREA ACROSS THE SITE. INCREASES IN THESE VALUES ARE MITIGATED BY ONSITE RETENTION INFILTRATION BASINS LOCATED NEAR THE CENTER OF THE SITE AS SHOWN HEREON. THEREFORE THE PROPOSED FACILITIES WILL NOT IMPACT OFFSITE FLOWS AND DRAINAGE PATTERNS. POST-DEVELOPMENT CONDITION RUNOFF CHARACTERISTICS ARE EXPECTED TO MATCH OR BE LESS THAN EXISTING CONDITIONS.
2. ONSITE RETENTION BASINS ARE DESIGNED TO PROVIDE LOW-IMPACT-DEVELOPMENT (LID) TREATMENT FOR WATER QUALITY AND MITIGATE FOR HYDROMODIFICATION BASED ON ASSUMED INCREASES IN SITE RUNOFF AS DISCUSSED IN THE "ONSITE AND OFFSITE DRAINAGE REPORT FOR RP 230TH STREET" PREPARED BY KIMLEY-HORN AND ASSOCIATES DATED OCTOBER 2023. REFER TO REPORT FOR MORE INFORMATION.
3. REFER TO GEOTECHNICAL INVESTIGATION INFILTRATION REPORT FOR PROPOSED STORM WATER INFILTRATION BASINS, DATED OCTOBER 2023 AND ANY SUBSEQUENT REVISIONS OR ADDENDA FOR MORE INFORMATION ON GEOTECHNICAL EXPLORATION AND TESTING. DESIGN INFILTRATION RATE WAS CONFIRMED TO EXCEED THE MINIMUM RATE OF 0.3 IN/HR SET BY GS.200.2 AND THE LID MANUAL.
4. REFER TO THE CUP SITE AND LANDSCAPE PLANS PRODUCED BY KIMLEY-HORN AND ASSOCIATES DATED OCTOBER 2023 OR ANY REVISIONS THEREAFTER FOR ADDITIONAL INFORMATION AND DETAILS ON PROPOSED SITE IMPROVEMENTS.
5. ACCORDING TO THE LOS ANGELES COUNTY COMPREHENSIVE FLOODPLAIN MANAGEMENT PLAN APPENDIX G, LOS ANGELES COUNTY FLOODWAY MAPS, AND FEMA, THE PROJECT SITE IS NOT LOCATED IN COUNTY OR FEDERAL ADOPTED FLOODWAY.
6. FOR THE POST-DEVELOPMENT 50-YEAR STORM EVENT EXITING THE PROJECT, THE PEAK FLOW RATES (Q 50) INCREASED BY A MAXIMUM OF 24%, AND THE VOLUMES (V 50) INCREASED BY A MAXIMUM OF 65% SIMILAR INCREASES ARE ANTICIPATED FOR THE DEPTHS AND VELOCITIES DUE TO THE SMALL INCREASE IN PEAK FLOW RATES (<24%). THESE REPRESENT NEGLIGIBLE INCREASES FROM THE PRE-DEVELOPMENT CONDITION. THE POST-DEVELOPMENT DOES NOT INCLUDE THE MITIGATION EFFECTS OF THE BASINS. SEE IMPACT ANALYSIS CALCULATIONS.
7. DRAINAGE IMPROVEMENTS NOT TO BE MAINTAINED BY LACFCD.
8. FOR THE POST-DEVELOPMENT 50-YEAR STORM EVENT EXITING THE PROJECT, NEGLIGIBLE INCREASES ARE ANTICIPATED FOR THE DEPTHS AND VELOCITIES DUE TO THE NEGLIGIBLE INCREASE IN PEAK FLOW RATES. THESE REPRESENT NEGLIGIBLE INCREASES FROM THE PRE-DEVELOPMENT CONDITIONS. THESE POST-DEVELOPMENT CALCULATIONS DO NOT INCLUDE THE MITIGATION EFFECTS ON THE BASIN. (TYP.)
9. A GRADING AND DRAINAGE PLAN WILL BE SUBMITTED TO PUBLIC WORKS FOR REVIEW AND APPROVAL.

NORTH

GRAPHIC SCALE IN FEET
0 50 100 200
1"=100' WHEN PLOTTED ON 30"x42"

No.	REVISIONS	DATE	BY

Kimley»Horn
© 2024 KIMLEY-HORN AND ASSOCIATES, INC.
660 S. FIGUEROA STREET, SUITE 2050, LOS ANGELES, CA 90017
PHONE: 213-261-4040
WWW.KIMLEY-HORN.COM

REGISTERED PROFESSIONAL ENGINEER
NICHOLAS MONTGOMERY
No. C 94106
CIVIL
STATE OF CALIFORNIA
EXPIRES: 09/30/2025

KHA PROJECT 099950006
DATE 10/23/2024
SCALE AS SHOWN
DESIGNED BY BY
DRAWN BY BY
CHECKED BY CY

230TH STREET SOLAR
PREPARED FOR
RPCA
CALIFORNIA
LOS ANGELES COUNTY

PROPOSED CONDITIONS ONSITE HYDROLOGY MAP
CUP CASE NO. PRJ2023-002405

SHEET NUMBER
FIG-4

Plotted By: Young, Chris Sheet Set: Kha Layout: CONCEPTUAL SITE PLAN October 24, 2024 01:50:41pm K:\LDT_ENERGY\RPCA Ground-mount\099997002 RCPA 230th St Exhibit E\08_Hdrl\Dwg\Exhibits\230th Proposed Hydrology.dwg
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Legend
- Drainage Areas
- FEMA Zone A
- 10 ft Contours
- Longest Flow Path
- Project Extents

DESIGN:	RR
DRAWN:	BR
REVIEW:	VAT

Kimley»Horn
660 S FIGUEROA ST, SUITE 2050
LOS ANGELES, CA 90017
PHONE: 213-261-4100

Ü
1 inch = 1,000 feet

230TH STREET SOLAR
LOS ANGELES COUNTY, CA

DRAINAGE AREA MAP

DATE
OCTOBER 2023

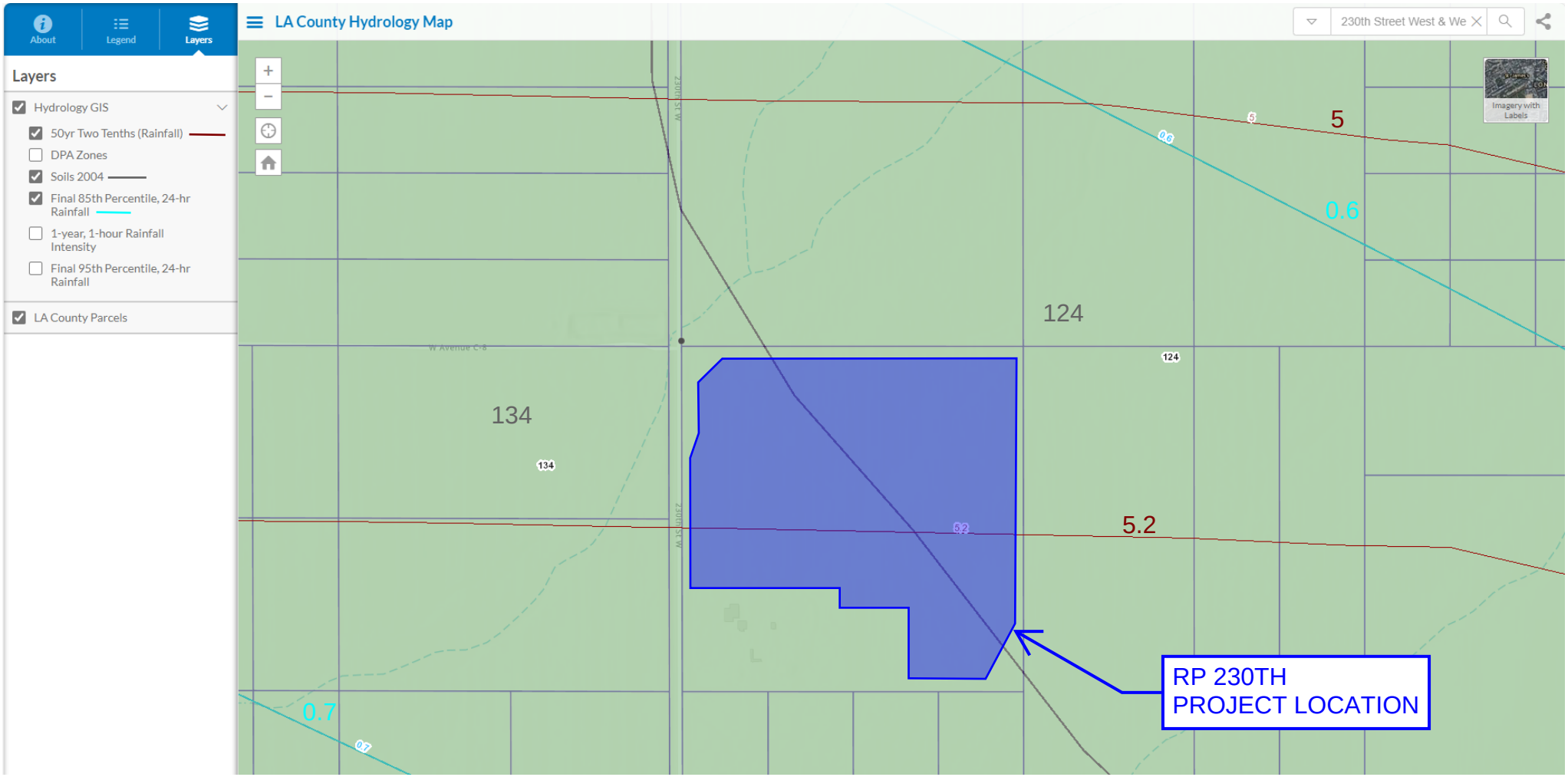
PROJECT NO.
099997002

SHEET NUMBER
FIG-5

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Appendix B – Onsite Hydrologic Calculations

Rainfall Depths, Soil Type



Based on LA County data the project offsite drainage areas have the following parameters:

50-yr, 24-hr rainfall depth: 5.2 inches (Incorporated in HEC-HMS as SCS storm)
85th percentile, 24-hr rainfall depth: 0.7 inch (0.75-inch storm > 85th percentile)
Soil Type: 134 and 124

On-Site Hydromod Volume (WQDv) (Post-Development; 85th percentile)						
Subarea	Area	Frequency	IMP	Isoheytal (in)	Peak Q (CFS)	Volume (CF)
DA-1	31.02	0.75 inch storm	0.10	0.75	0.58	15,082.00
					Total	15,082

On-Site Hydromod Volume

Subarea	Area (ac)	Freq.	Isoheytal (in)	%IMP		Peak Q (CFS)		Volume (CF)		
				Existing	Proposed	Existing	Proposed	Existing	Proposed	Delta
DA-1	31.02	2-yr	5.20	0.01	0.10	1.73	2.89	24,271	40,451	16,180
									Subtotal	16,180
DA-1	31.02	5-yr	5.20	0.01	0.10	2.62	4.36	36,626	61,043	24,417
									Subtotal	24,417
DA-1	31.02	10-yr	5.20	0.01	0.10	3.20	5.33	44,779	74,632	29,853
									Subtotal	29,853
DA-1	31.02	25-yr	5.20	0.01	0.10	3.93	6.55	55,064	91,774	36,710
									Subtotal	36,710
DA-1	31.02	50-yr	5.20	0.01	0.10	6.16	8.99	64,039	105,729	41,690
									Subtotal	41,690

Peak Flow Hydrologic Analysis

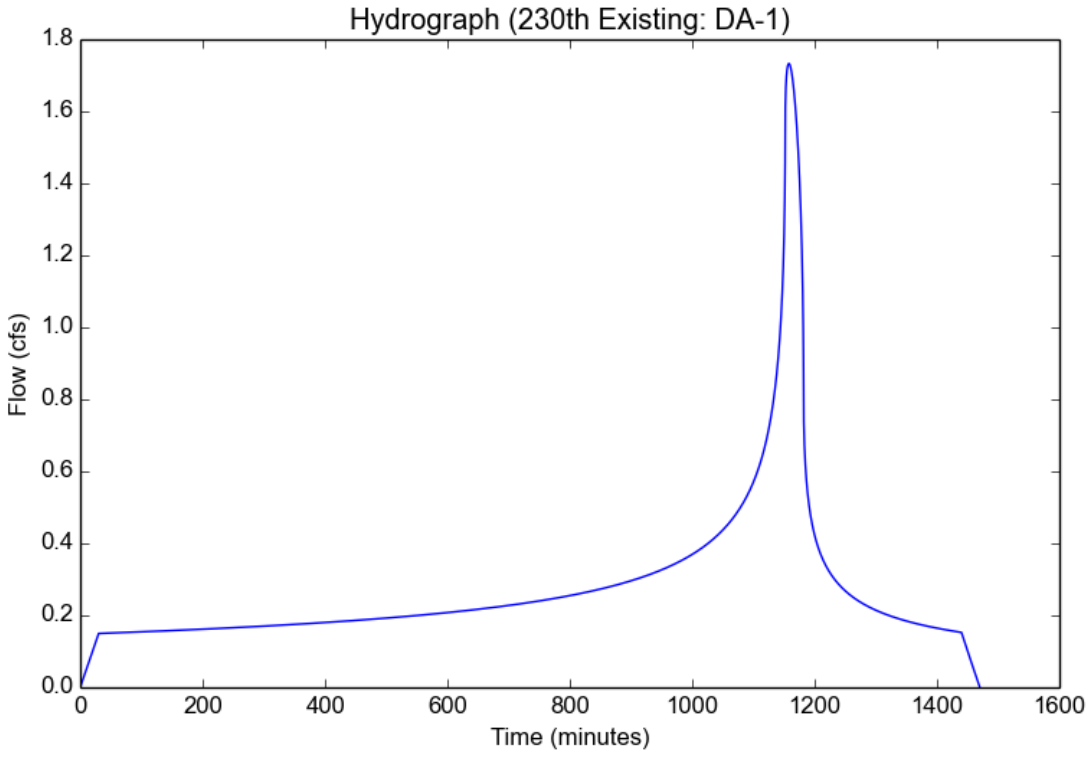
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	230th Existing
Subarea ID	DA-1
Area (ac)	31.02
Flow Path Length (ft)	1478.0
Flow Path Slope (vft/hft)	0.012097429
50-yr Rainfall Depth (in)	5.2
Percent Impervious	0.01
Soil Type	134
Design Storm Frequency	2-yr
Fire Factor	0.34
LID	False

Output Results

Modeled (2-yr) Rainfall Depth (in)	2.0124
Peak Intensity (in/hr)	0.5172
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	1.7328
Burned Peak Flow Rate (cfs)	3.0754
24-Hr Clear Runoff Volume (ac-ft)	0.5572
24-Hr Clear Runoff Volume (cu-ft)	24270.9818



Peak Flow Hydrologic Analysis

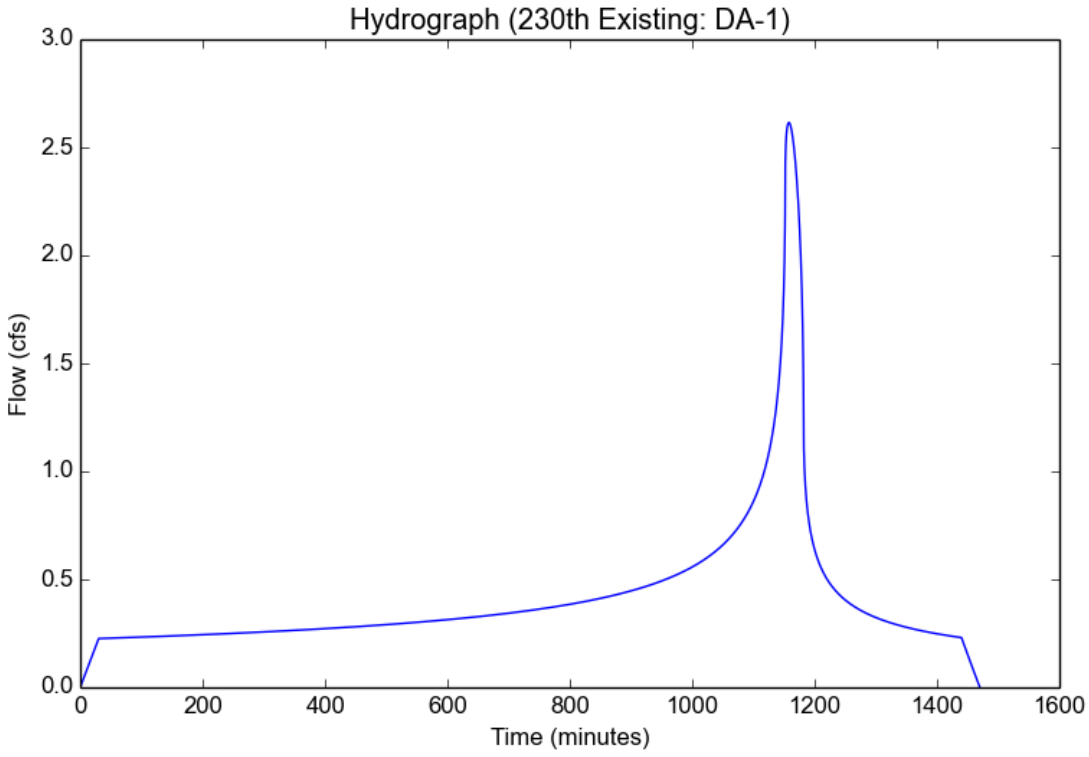
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Input Parameters

Project Name	230th Existing
Subarea ID	DA-1
Area (ac)	31.02
Flow Path Length (ft)	1478.0
Flow Path Slope (vft/hft)	0.012097429
50-yr Rainfall Depth (in)	5.2
Percent Impervious	0.01
Soil Type	134
Design Storm Frequency	5-yr
Fire Factor	0.34
LID	False

Output Results

Modeled (5-yr) Rainfall Depth (in)	3.0368
Peak Intensity (in/hr)	0.7805
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	2.6149
Burned Peak Flow Rate (cfs)	4.8594
24-Hr Clear Runoff Volume (ac-ft)	0.8408
24-Hr Clear Runoff Volume (cu-ft)	36625.9777



Peak Flow Hydrologic Analysis

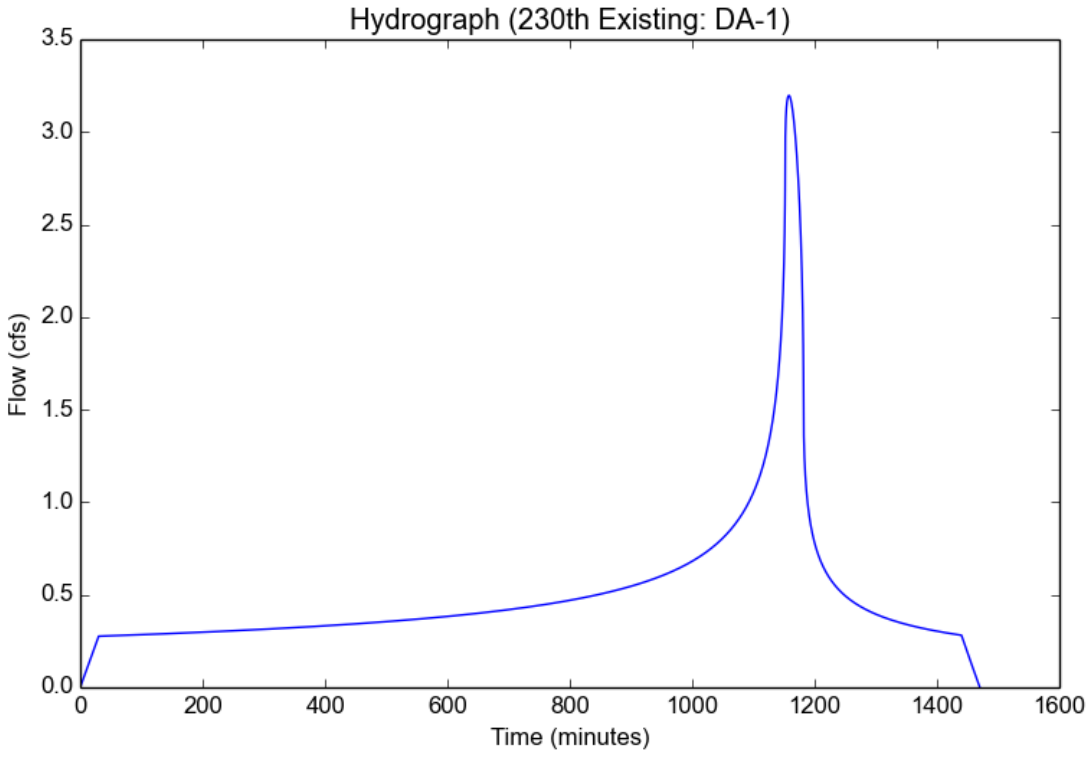
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Input Parameters

Project Name	230th Existing
Subarea ID	DA-1
Area (ac)	31.02
Flow Path Length (ft)	1478.0
Flow Path Slope (vft/hft)	0.012097429
50-yr Rainfall Depth (in)	5.2
Percent Impervious	0.01
Soil Type	134
Design Storm Frequency	10-yr
Fire Factor	0.34
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	3.7128
Peak Intensity (in/hr)	0.9543
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	3.197
Burned Peak Flow Rate (cfs)	6.0676
24-Hr Clear Runoff Volume (ac-ft)	1.028
24-Hr Clear Runoff Volume (cu-ft)	44779.0207



Peak Flow Hydrologic Analysis

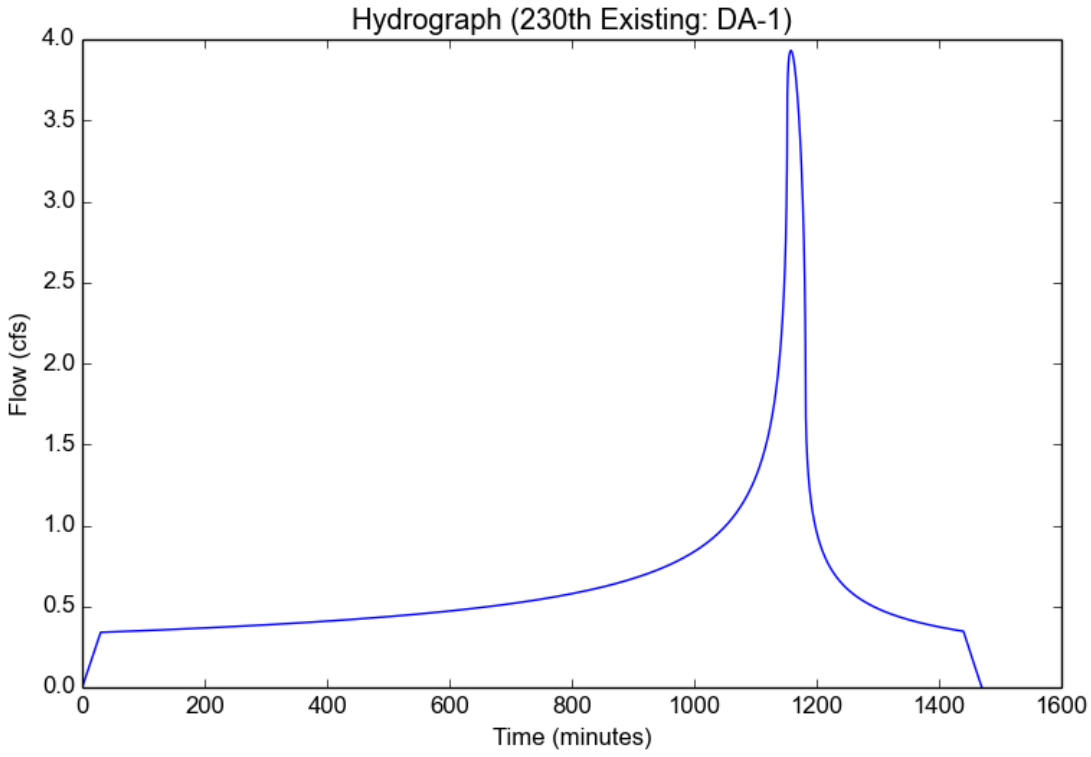
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Input Parameters

Project Name	230th Existing
Subarea ID	DA-1
Area (ac)	31.02
Flow Path Length (ft)	1478.0
Flow Path Slope (vft/hft)	0.012097429
50-yr Rainfall Depth (in)	5.2
Percent Impervious	0.01
Soil Type	134
Design Storm Frequency	25-yr
Fire Factor	0.34
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	4.5656
Peak Intensity (in/hr)	1.1735
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	3.9313
Burned Peak Flow Rate (cfs)	7.6181
24-Hr Clear Runoff Volume (ac-ft)	1.2641
24-Hr Clear Runoff Volume (cu-ft)	55064.398



Peak Flow Hydrologic Analysis

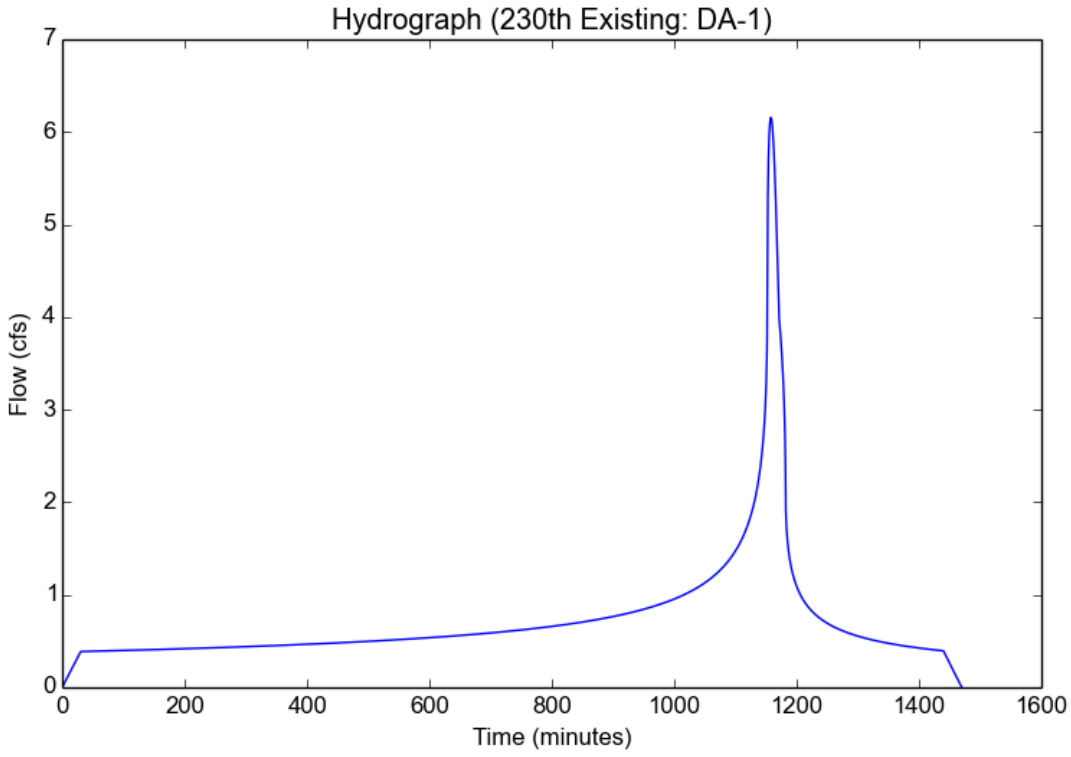
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Input Parameters

Project Name	230th Existing
Subarea ID	DA-1
Area (ac)	31.02
Flow Path Length (ft)	1478.0
Flow Path Slope (vft/hft)	0.012097429
50-yr Rainfall Depth (in)	5.2
Percent Impervious	0.01
Soil Type	134
Design Storm Frequency	50-yr
Fire Factor	0.34
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	5.2
Peak Intensity (in/hr)	1.3365
Undeveloped Runoff Coefficient (Cu)	0.1409
Developed Runoff Coefficient (Cd)	0.1485
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	6.157
Burned Peak Flow Rate (cfs)	10.2708
24-Hr Clear Runoff Volume (ac-ft)	1.4701
24-Hr Clear Runoff Volume (cu-ft)	64039.1753



Peak Flow Hydrologic Analysis

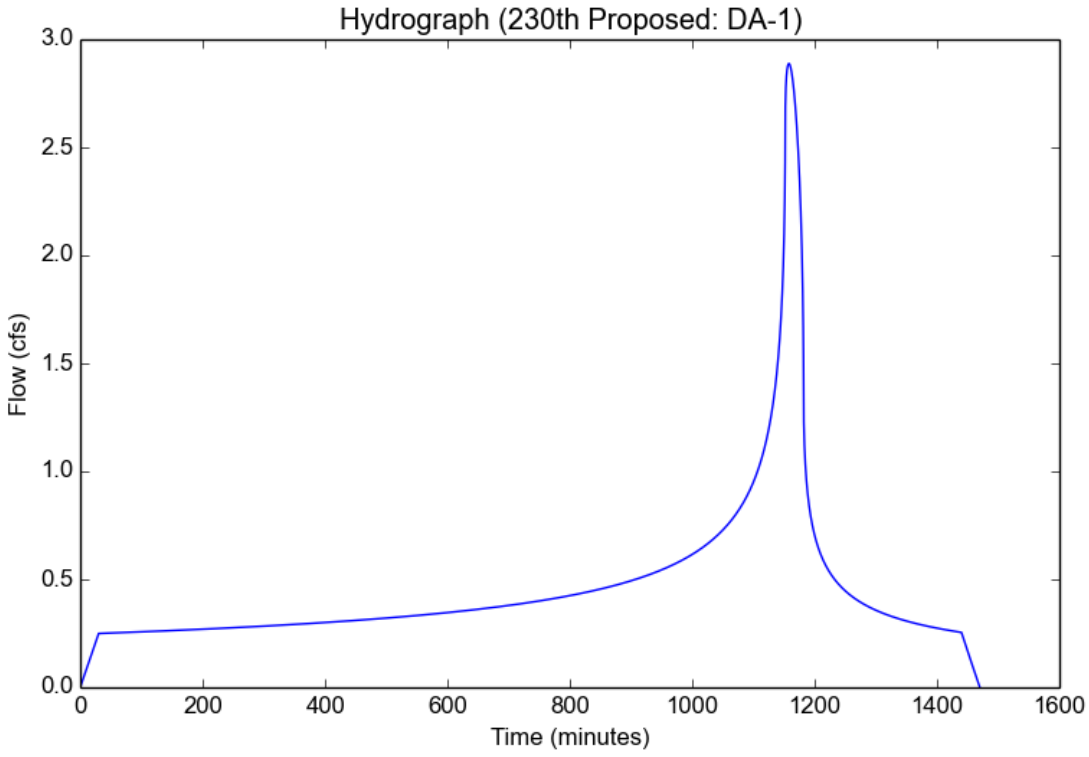
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	230th Proposed
Subarea ID	DA-1
Area (ac)	31.02
Flow Path Length (ft)	1478.0
Flow Path Slope (vft/hft)	0.012097429
50-yr Rainfall Depth (in)	5.2
Percent Impervious	0.1
Soil Type	134
Design Storm Frequency	2-yr
Fire Factor	0.34
LID	False

Output Results

Modeled (2-yr) Rainfall Depth (in)	2.0124
Peak Intensity (in/hr)	0.5172
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.18
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	2.888
Burned Peak Flow Rate (cfs)	4.1222
24-Hr Clear Runoff Volume (ac-ft)	0.9286
24-Hr Clear Runoff Volume (cu-ft)	40451.6363



Peak Flow Hydrologic Analysis

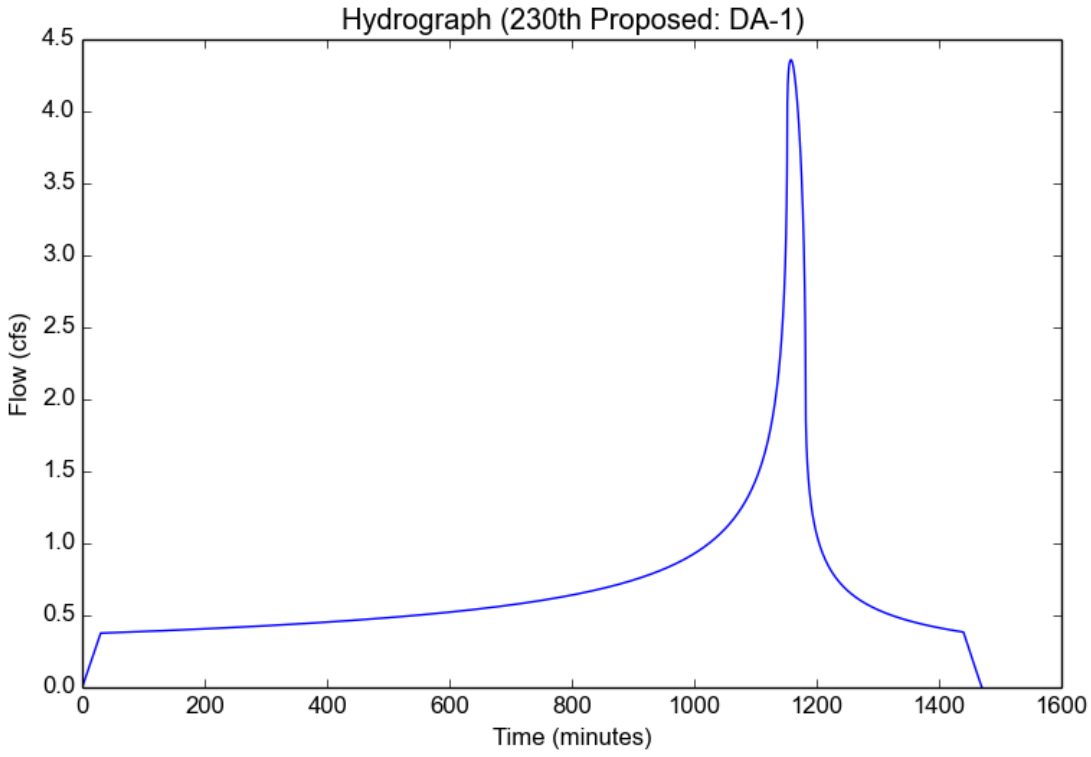
File location: K:/LDT_ENERGY/RPCA Ground-mount/099997002_RCPA_230th St Exhibit E/08_H&H/Hydrology/Calculations/Proposed Conditions Outpu
Version: HydroCalc 1.0.3

Input Parameters

Project Name	230th Proposed
Subarea ID	DA-1
Area (ac)	31.02
Flow Path Length (ft)	1478.0
Flow Path Slope (vft/hft)	0.012097429
50-yr Rainfall Depth (in)	5.2
Percent Impervious	0.1
Soil Type	134
Design Storm Frequency	5-yr
Fire Factor	0.34
LID	False

Output Results

Modeled (5-yr) Rainfall Depth (in)	3.0368
Peak Intensity (in/hr)	0.7805
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.18
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	4.3582
Burned Peak Flow Rate (cfs)	6.4215
24-Hr Clear Runoff Volume (ac-ft)	1.4014
24-Hr Clear Runoff Volume (cu-ft)	61043.2962



Peak Flow Hydrologic Analysis

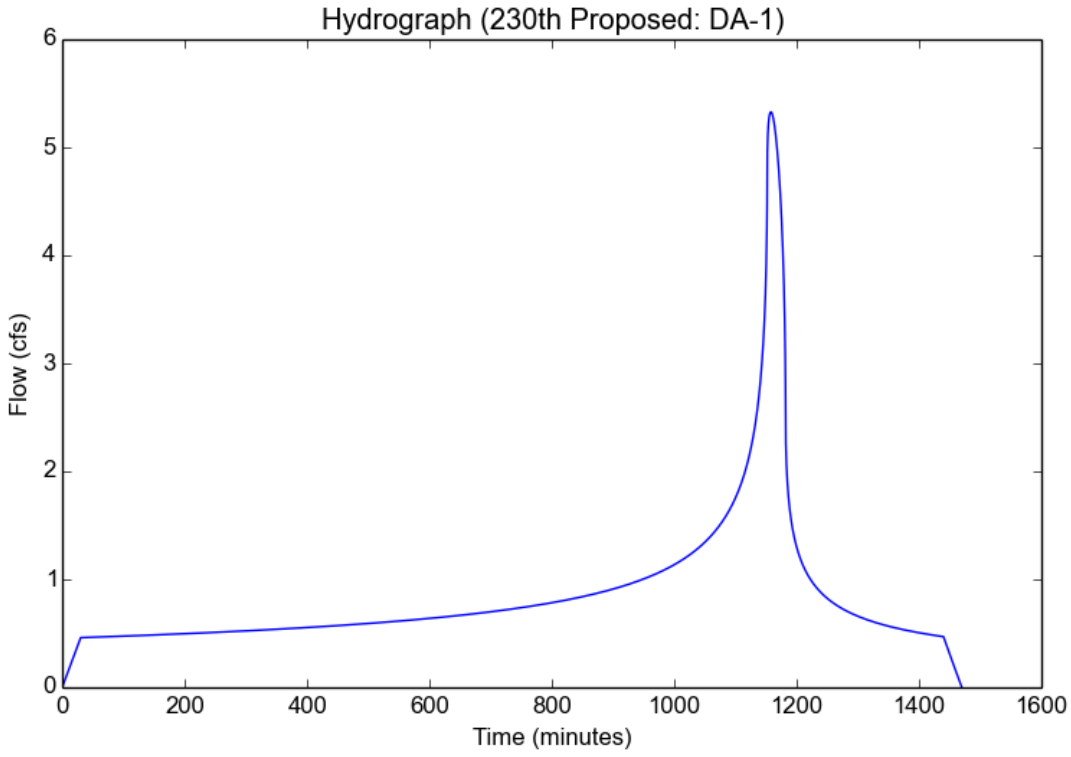
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	230th Proposed
Subarea ID	DA-1
Area (ac)	31.02
Flow Path Length (ft)	1478.0
Flow Path Slope (vft/hft)	0.012097429
50-yr Rainfall Depth (in)	5.2
Percent Impervious	0.1
Soil Type	134
Design Storm Frequency	10-yr
Fire Factor	0.34
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	3.7128
Peak Intensity (in/hr)	0.9543
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.18
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	5.3283
Burned Peak Flow Rate (cfs)	7.9673
24-Hr Clear Runoff Volume (ac-ft)	1.7133
24-Hr Clear Runoff Volume (cu-ft)	74631.7012



Peak Flow Hydrologic Analysis

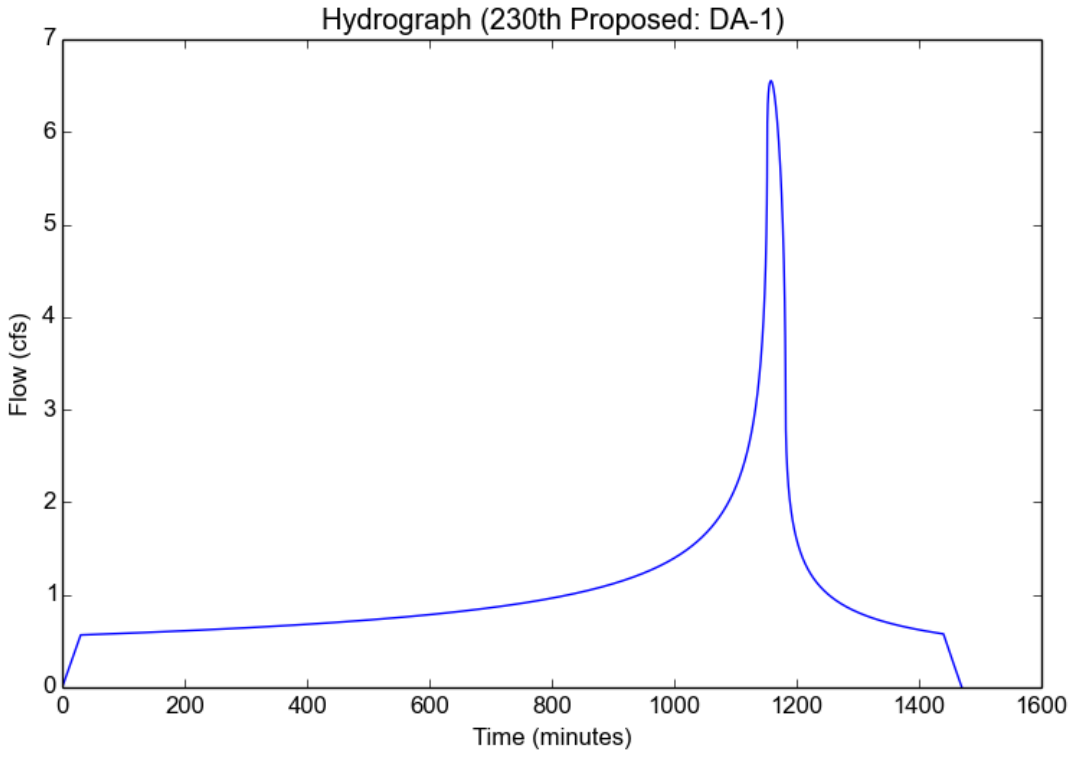
File location: K:/LDT_ENERGY/RPCA Ground-mount/099997002_RCPA_230th St Exhibit E/08_H&H/Hydrology/Calculations/Proposed Conditions Outpu
Version: HydroCalc 1.0.3

Input Parameters

Project Name	230th Proposed
Subarea ID	DA-1
Area (ac)	31.02
Flow Path Length (ft)	1478.0
Flow Path Slope (vft/hft)	0.012097429
50-yr Rainfall Depth (in)	5.2
Percent Impervious	0.1
Soil Type	134
Design Storm Frequency	25-yr
Fire Factor	0.34
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	4.5656
Peak Intensity (in/hr)	1.1735
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.18
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	6.5522
Burned Peak Flow Rate (cfs)	9.9413
24-Hr Clear Runoff Volume (ac-ft)	2.1068
24-Hr Clear Runoff Volume (cu-ft)	91773.9967



Peak Flow Hydrologic Analysis

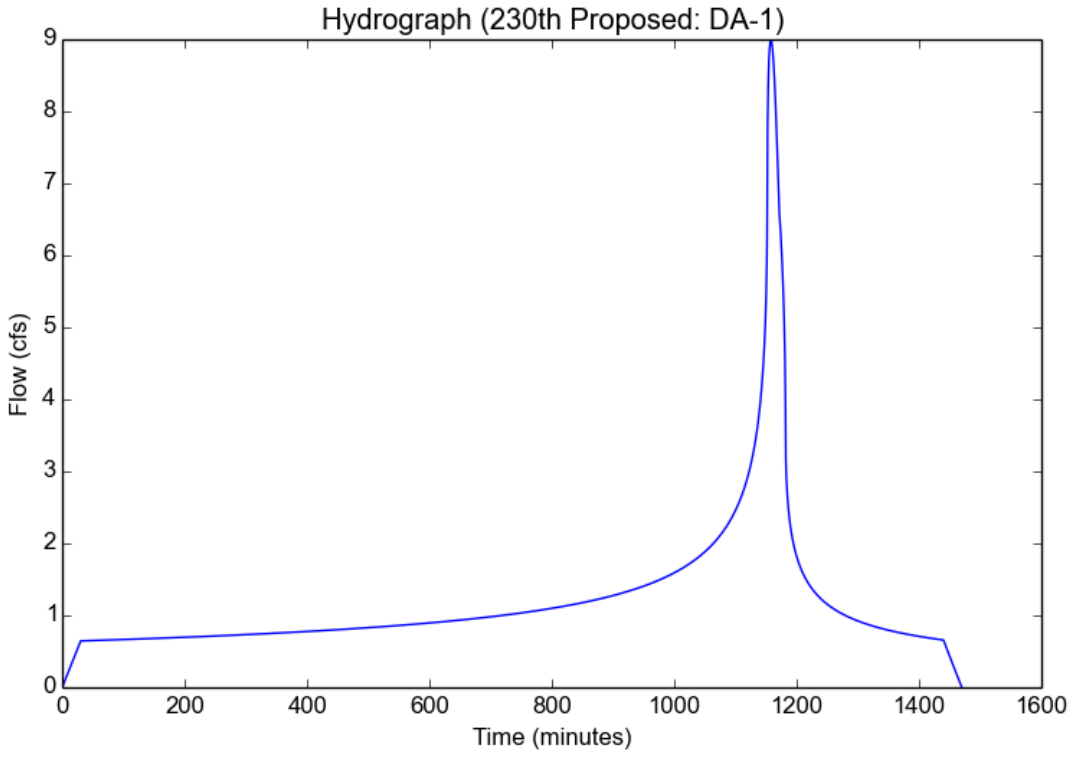
File location: K:/LDT_ENERGY/RPCA Ground-mount/099997002_RCPA_230th St Exhibit E/08_H&H/Hydrology/Calculations/Proposed Conditions Outpu
Version: HydroCalc 1.0.3

Input Parameters

Project Name	230th Proposed
Subarea ID	DA-1
Area (ac)	31.02
Flow Path Length (ft)	1478.0
Flow Path Slope (vft/hft)	0.012097429
50-yr Rainfall Depth (in)	5.2
Percent Impervious	0.1
Soil Type	134
Design Storm Frequency	50-yr
Fire Factor	0.34
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	5.2
Peak Intensity (in/hr)	1.3365
Undeveloped Runoff Coefficient (Cu)	0.1409
Developed Runoff Coefficient (Cd)	0.2168
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	8.9894
Burned Peak Flow Rate (cfs)	12.7731
24-Hr Clear Runoff Volume (ac-ft)	2.4272
24-Hr Clear Runoff Volume (cu-ft)	105729.3376



Peak Flow Hydrologic Analysis

File location: K:/LDT_ENERGY/RPCA Ground-mount/099997002_RCPA_230th St Exhibit E/08_H&H/Hydrology/Calculations/Proposed Conditions Outpu
Version: HydroCalc 1.0.3

Input Parameters

Project Name	230th Proposed
Subarea ID	DA-1
Area (ac)	31.02
Flow Path Length (ft)	1478.0
Flow Path Slope (vft/hft)	0.012097429
0.75-inch Rainfall Depth (in)	0.75
Percent Impervious	0.1
Soil Type	134
Design Storm Frequency	0.75 inch storm
Fire Factor	0.34
LID	True

Output Results

Modeled (0.75 inch storm) Rainfall Depth (in)	0.75
Peak Intensity (in/hr)	0.0863
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.18
Time of Concentration (min)	166.0
Clear Peak Flow Rate (cfs)	0.4817
Burned Peak Flow Rate (cfs)	0.5792
24-Hr Clear Runoff Volume (ac-ft)	0.3462
24-Hr Clear Runoff Volume (cu-ft)	15081.5352

