Appendix H

Surface Hydrology and Water Quality Technical Memorandum

ESA

PSOMAS

De Soto Ave. & Burbank Blvd. Project
Surface Hydrology and Water Quality
Technical Memorandum

May 19, 2019

Prepared by:

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Adler Realty

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1.0 Introduction

1.1 Project Description

The De Soto Ave. & Burbank Blvd. Project is a mixed-use transit-oriented development consisting of ten structures varying in height from five to 24 stories, consisting of residential, office, retail, restaurant and hotel uses, with supporting open space and amenities, and vehicle and bicycle parking on a 24-acre site. The site is currently occupied by 12 one- to three-story office buildings, surface parking lots and landscape areas. The Project Site, is bounded by De Soto Avenue to the east, and Burbank Blvd on the south. Warner Center Lane (a private street) connects De Soto Avenue with Burbank Blvd.

The existing one- to three-story buildings will be demolished in phases. Access to the proposed project will occur via Warner Center Lane on De Soto and Burbank Blvd. and two additional driveways on Burbank Blvd.

1.2 Scope of Work

This report provides a description of the surface water hydrology and surface water quality at the Project Site and an analysis of the Project's potential significance related to the impact on surface water hydrology and surface water quality.

2.0 Surface Water Hydrology

2.1 General Approach

The watershed of the project was identified and characterized for the proposed condition. Computer modeling was used to estimate the runoff flow rate for the 85th % storm (SUSMP/LID), 5-,10-, 25-, 50-, and 100-year storm events.

2.2 Data Sources

The primary sources of data are the *LACDPW Hydrology / Sedimentation Manual and Appendices* (LACDPW 2006), and the Los Angeles County *Standard Urban Stormwater Mitigation Plan* (September 2002).

Rainfall and soil characteristics for the Project Site are given in Isohyetal Map Figure LACDPW 1-HI.26 Canoga Park (Section 4). A copy of the map is provided in Section 6.0. The 50-year (24-hour) rainfall isohyet nearest the project area is approximately 7.4-inches. The isohyets for all of the storm events, based on factors from the LA County Hydrology Manual in Table 5.3.1, are as listed:

- 5-Year 24-Hour: 4.32-inches
- 10-Year 24-Hour: 5.28-inches
- 25-Year 24-Hour: 6.49-inches
- 50-Year 24-Hour: 7.40-inches

- 100-Year 24-Hour: 8.30-inches

As shown on the Isohyetal Map, the soil classification of the project site falls predominantly into Soil Type 016. The project area to be disturbed is approximately 24 acres.

2.3 Existing Site Conditions

The existing Project Site is comprised of 12 one- to three-story office buildings, surface parking lots and landscape areas totaling 24.4ac with an average of 75% impervious area (about 796,000 sf). The Project Site, is bounded by De Soto Avenue to the east, and Burbank Blvd on the south. Warner Center Lane (a private street) connects De Soto Avenue with Burbank Blvd.

The existing site drainage sheet flows north at about 1% slope towards catch basins located in the parking lots and Warner Center Lane. Those catch basins are connected to the existing 144"x62" reinforced concrete box (RCB) storm drain that enters the site at the southwest corner and exits the site at the northerly property line. The RCB storm drain is owned by the City of Los Angeles and it discharges into to the Los Angeles River Reach 6 through an open channel and storm drain owned by the County of Los Angeles.

2.4 Proposed Project Site Conditions

The proposed project will consist of ten structures varying in height from five to 24 stories, with residential, office, retail, restaurant and hotel uses, and vehicle and bicycle parking. The average imperviousness of the proposed Project Site will be approximately 83%, an increase from approximately 75% in existing conditions. The proposed stormwater flows will continue to drain to the Warner Center Lane and to on-site catch basins. Those catch basins are connected to the existing 144"x62" RCB storm drain. Each lot will have one or more underground rainwater harvesting cisterns constructed as a waterproofed space part of the building structure. The cisterns will be sized to detain the LID volume. The location and number of the cisterns will be determined as part of the construction documents for each lot.

2.5 Hydrology Results

Table below summarizes the hydrology results:

Table 1. Existing and Proposed Peak Runoff Flows

	Existing	Proposed*	
Storm Event	**Q_{Total} [cfs]**	**Q_{Total} [cfs]**	**% Reduction**
5-Yr	34.67	33.24	**4%**
10-Yr	47.05	43.69	**7%**
25-Yr	63.29	57.94	**8%**
50-Yr	76.91	69.46	**9%**
100-Yr	86.69	79.81	**8%**

* Does not includes reduction from LID implementation (the 85th Percentile storm flow)

Expected peak runoff flows for the 5-, 10-, 25-, 50- and 100-year storm events for the Project are shown in Table 1. This table contains a comparison of the existing and proposed peak runoff flows at the property line of the Project Site. It demonstrates that the Project will not exceed the existing stormwater flows when compared to a common tributary point in the RCB storm drain at the north

property line. This reduction in flow is due to the increase time of concentration of storm water onsite. In other words, rainwater falling on the site will take a longer period of time to flow to the RCB storm drain at the north property line, thus reducing the peak flow at any given time. The Low Impact Development (LID) measures will require to capture and reuse of 85th percentile storm event implementation will further reduce the stormwater runoff. The Project will include the installation of catch basins, planter drains, and roof downspouts throughout the Project Site to collect roof and site runoff, and direct stormwater to the LID system through a series of underground storm drain pipes. This onsite stormwater conveyance system would serve to prevent onsite flooding and nuisance water build-up on the Project Site. With implementation of a stormwater capture and re-use system (i.e. harvesting cisterns or tanks for on-site irrigation use), the volume of water leaving the Project Site will be reduced from the existing flows. Each lot will have one or more underground cisterns to collect the 85th percentile storm event volume that is required to be treated per LID requirements.

3.0 Surface Water Quality

3.1 General Approach

The project falls under the jurisdiction of the City of Los Angeles Department of Public Works, which follows the 2009 Low Impact Development (LID) Manual design guidelines. The purpose of this surface water quality report is:

- To meet City of Los Angeles Department of Public Works requirements;
- To document that the Los Angeles County LID requirements will be met;
- To determine the proposed development's impact on existing hydrologic conditions;
- To identify the pollutants of concern and provide BMPs that will mitigate those pollutants of concern; and
- To provide sufficient detailed information to support detailed hydraulic design of stormwater treatment systems.

3.2 Site Characterization for Water Quality Review

Current Property Use: Office buildings, surface parking lots and landscape areas.
Proposed Property Use: Mixed-use: residential, office and commercial development.

Soils: The soil of the watershed is classified as Type 016, as shown in the Hydrology Map from the Los Angeles County Department of Public Works (LACDPW) website (see section 6.0 for map).

Receiving Waters: The Project Site is tributary to the Los Angeles River Reach 6.

The Los Angeles River Reach 6 is listed on the 2012 CWA Section 303(d) list (approved by SWRCB June 30, 2015) as impaired due to the prevalence of the pollutants shown in Table 2, which is excerpted from the State Water Resources Control Board, "Quality Limited Segments" article dated June 9, 2016. Currently, this waterway's existing beneficial uses include ground water recharge, warm freshwater habitat, wildlife habitat, and non-contact water recreation; potential uses include municipal and domestic supply, industrial service supply.

Table 2: Receiving Waters for Urban Runoff from Site[1]

Receiving Waters	303(d) List Impairments[2]	Designated Beneficial Uses	Proximity to RARE Uses
Los Angeles River Reach 6	Coliform Bacteria, Selenium	Ground water recharge, warm freshwater habitat, wildlife habitat, and non-contact water recreation	No

3.3 Pollutants of Concern

Table 3 lists the pollutants anticipated to be generated by the Project's proposed land uses. Because the Project falls under the category of commercial development, the following pollutants could potentially be generated: sediment/turbidity, nutrients, trash and debris, oxygen demanding substances, bacteria and viruses, oil and grease and pesticides.

Table 3: Potential Pollutants Generated by Land Use Type[3]

Type of Development (Land Use)	Sediment /Turbidity	Nutrients	Organic Compounds	Trash & Debris	Oxygen Demanding Substances	Bacteria & Viruses	Oil & Grease	Pesticides	Metals
Commercial Development	P(1)	P(1)	P(4)	P	P(4)	P(3)	P	P(1)	N
Residential	P	P	N	P	P(1)	P	P(2)	P	N

Abbreviations: P=Potential N=Not expected

Notes:
(1) A potential pollutant if landscaping or open area exists on the Project site
(2) A potential pollutant if land use involves animal waste
(3) Specifically, petroleum hydrocarbons
(4) Bacterial indicators are routinely detected in pavement runoff.

A comparison of the pollutants existing in the Los Angeles River Reach 6 based on the State 303(d) list and pollutants associated with the planned land use activities on the Project Site show

[1] State Water Resources Control Board, Los Angeles Region. *Water Quality Control Plan Los Angeles Region*. June 13, 1994.
[2] Los Angeles Regional Water Quality Control Board. 2010 CWA Section 303(d*) List of Water Quality Limited Segments*. October 11, 2011.
[3] Riverside County Flood Control and Conservation District, Riverside County Water Quality Management Plan for Urban Runoff, July 24, 2006. Note: This source is utilized because the Los Angeles County Flood Control District has not established a table that outlines pollutants of concern.

an overlap of **bacteria & viruses** as pollutants. These common pollutants are considered the pollutants of concern. Stormwater best management practices (BMP) proposed for the Project will be designed to address these pollutants of concern. Table 4 summarizes the efficiency of general categories of BMPs in treating different types of pollutants.

The City of Los Angeles requires LID compliance for this Project. As noted above, the LID concept for this project is a stormwater capture and use system. The runoff within the cisterns will be pumped up for irrigation of the landscape around the Project Site. High flow outlets for the cisterns will be routed to discharge as per proposed conditions, as described in section 2.4.

Table 4: Treatment Control BMP Selection Matrix[4]

Los Angeles River Pollutant of Concern (Yes/No)	**Treatment Control BMP Categories**							
	Veg. Swale /Veg. Filter Strips	Detention Basins	**Planter Box / Harvesting /Infiltration Basins & Trenches**	Wet Ponds or Wetlands	Sand Filter or Filtration	**Water Quality Inlets**	Hydro-dynamic Separator Systems	Manufactured / Proprietary Devices
Sediment/Turbidity	H/M	M	H/M	H/M	H/M	L	H/M (L for turbidity)	U
Yes			✓			✓		
Nutrients	L	M	H/M	H/M	L/M	L	L	U
No								
Organic Compounds	U	U	U	U	H/M	L	L	U
No								
Trash & Debris	L	M	U	U	H/M	M	H/M	U
Yes			✓			✓		
Oxygen Demanding Substances	L	M	H/M	H/M	H/M	L	L	U
No								
Bacteria & Viruses	U	U	H/M	U	H/M	L	L	U
Yes			✓			✓		
Oils & Grease	H/M	M	U	U	H/M	M	L/M	U
No								
Pesticides (non-soil bound)	U	U	U	U	U	L	L	U
No								
Metals	H/M	M	H	H	H	L	L	U
No								

Abbreviations:
L: Low removal efficiency H/M: High or medium removal efficiency U: Unknown removal efficiency

[4] Riverside County Flood Control and Conservation District, Riverside County Water Quality Management Plan for Urban Runoff, July 24, 2006. Note: This table is utilized because the Los Angeles County Flood Control District has not established a table that summarizes each BMP's efficiency for treating pollutants of concern.

3.4 Best Management Practices

Source and Treatment Control Best Management Practices (BMPs) are required for this Project under the LA County Standard Urban Stormwater Mitigation Plan (SUSMP) and City of Los Angeles Low Impact Development (LID) Standards Manual.

3.4.1 Site Design BMPs

3.4.1.1 Minimize Stormwater Pollutants of Concern

The Project will minimize pollutants of concern by maximizing the reduction of pollutant loadings to the Maximum Extent Practicable. The pollutants of concern – namely, sediment, trash, and bacteria & viruses– will be addressed through a pre-treatment settlement device connected to the cisterns within each of the Project Site buildings. Building roof run-off, which comprises of the majority of the site, will be collected via roof drains and routed internally through the building and plumbed into the harvesting tank. Prior to connection to the harvesting tank, downspout filters will be installed to remove any debris that enters the on-site piping system. All other stormwater run-off will be collected via catch basins or trench drains fitted with an insert to collect debris and sediment and routed to the stormwater tank.

3.4.1.2 Conserve Natural Areas

The existing Project Site consist 12 office buildings, surface parking lots and landscape areas. The proposed development includes ten buildings and landscape areas. The proposed development will modify the site but will provide water quality treatment not previously provided in the existing condition.

3.4.2 Source Control BMPs

3.4.2.1 Protect Slopes and Channels

There are no unprotected slopes or unlined channels onsite. The entire area to be developed will be either vegetated or hardscaped.

3.4.2.2 Provide Storm Drain System Stenciling and Signage

Stenciling will be provided for public storm drains catch basins within the project limits.

3.4.2 Treatment Control BMPs

3.4.3.1 Mitigation Design (Volumetric or Flow based)

Volume-based or flow-based design standards may be used separately or in combination. Volume-based criteria are used in the sizing of the cisterns. The LID requirements, approved by the Regional Water Quality Control Board, call for the treatment of the peak mitigation flow rate or volume of runoff produced either by a 0.75" 24-hr or the 85th percentile rainfall event, whichever is greater. The rainfall intensity of the 85th percentile rainfall is 1.03 inch, therefore the 85th percentile rainfall event governs.

The LID calculation methodology was used to calculate the required treatment volumes for each of the discharge points from the site. LID Calculations are provided in section 6.0. The results are summarized in the tables below.

Table 5. Proposed Condition SUSMP Results

Project Site Area [ac]	BMP Type	85th percentile
		*V_M [ft³]
24	Stormwater Capture and Use	67,647

*The total volume (Vm) of stormwater runoff to be mitigated was calculated by analyzing the project area as one area. Using this Vm and the appropriate BMP calculation from the City of LA LID manual, Table 6 shows the requirements for the area.

Table 6. Summary SUSMP / LID Mitigation BMPs

Area	Area [ac]	Impervious Area [ac]	Required Storage Tank V_M [ft³]	BMP Type	Provided Treatment V_M [ft³]	% Treated	Impervious Area Untreated [ac]
1[5]	24	0.87	67,467	Harvesting Tanks (cisterns)	67,700	100	0
Total Percent Treatment						**100%**	

The proposed BMP in place is able to provide the full 85th percentile storm treatment. The selected BMP for the site has the capacity to capture and reuse more than the required baseline volume of 67,647 ft³. The total provided treatment volume is 67,700 ft³.

4.0 Significance Thresholds

4.1 Surface Water Hydrology

The City of Los Angeles CEQA Thresholds Guide states that a project would normally have a significant impact on surface water hydrology if it would:

- Cause flooding during the projected 50-year developed storm event, which would have the potential to harm people or damage property or sensitive biological resources;

[5] BMP required calculation based on City of LA LID manual.

- Substantially reduce or increase the amount of surface water in a water body; or
- Result in permanent, adverse change to the movement of surface water sufficient to produce a substantial change in the current or direction of water flow.

4.2 Surface Water Quality

The City of Los Angeles CEQA Thresholds Guide states that a project would normally have a significant impact on surface water quality if discharges associated with the project would create pollution, contamination or nuisance, as defined in Section 13050 of the California Water Code (CWC) or that cause regulatory standards to be violated, as defined in the applicable NPDES stormwater permit or Water Quality Control Plan for the receiving water body. The CEQA Thresholds Guide and CWC include the following definitions:

"Pollution" means an alteration of the quality of waters of the state to a degree which unreasonably affects either the following: 1) the waters for beneficial uses or 2) facilities which serve these beneficial uses. "Pollution" may include "Contamination."

"Contamination" means an impairment of the quality of the waters of the state by waste to a degree, which creates a hazard to the public health through poisoning or through the spread of disease. "Contamination" includes any equivalent effect resulting from the disposal of waste, whether or not waters of the state are affected.

"Nuisance" means anything which meets all of the following requirements: 1) is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property; 2) affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extend of the annoyance or damage inflicted upon individuals may be unequal; and 3) occurs during, or as a result of the treatment or disposal of wastes. [6]

5.0 Construction Activities

5.1 Construction General Permit

In 2003, the California State Water Resources Control board (SWRCB) adopted the General Construction Activity Stormwater Permit (CGP)[7], which is "…required for all storm water discharges associated with construction activity where clearing, grading, and excavation results in a land disturbance of one or more acres." Under the CGP, the following Permit Registration Documents must be submitted to SWRCB through the SMARTS website: a Notice of Intent (NOI), a Storm Water Pollution Prevention Plan (SWPPP), and other compliance related

[6] City of Los Angeles. LA CEQA Thresholds Guides. 2006

[7] Construction General Permit Water Quality Order 2009-0009-DWQ, Fact Sheet, website: http://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/constpermits/wqo_2009_0009_complete.pdf, accessed October 25, 2016.

documents required by this CGP and mail the appropriate permit fee to the SWRCB. Because the land disturbance for the Project Site is over one acre, the requirements mentioned above will need to be implemented.

The CGP requires all SWPPPs be written, amended, and certified by a Qualified SWPPP Developer, emphasizing BMPs, which are defined as "schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States." The SWPPP has two major objectives:

- to help identify the sources of sediment and other pollutants that affect the quality of stormwater discharges; and
- to describe and ensure the implementation of BMPs to reduce or eliminate sediment and other pollutants in storm water and non-storm water discharges. The SWPPP must include BMPs that address source control, BMPs that address pollutant control, and BMPs that address treatment control.

Furthermore, the CGP requires that a project are enrolled for more than one continuous three-month period to submit information and annually certify that their site is in compliance with these requirements. The primary purpose of this requirement is to provide information needed for overall program evaluation and pubic information. The CGP requires that key personnel (e.g., Qualified SWPPP Developers, inspectors, etc.) have specific training or certifications to ensure their level of knowledge and skills are adequate to ensure their ability to design and evaluate project specifications that will comply with CGP requirements. Erosion control and drainage devices are required to be provided in accordance with the CGP and SWPPP as well as the MS4 Permit. Dewatering activities during construction will need to be implemented through BMPs targeting sediment specific pollutants such as Sediment Treatment, Sediment Basin, Sediment Trap, and other BMPs listed on CASQA's NS-2 Dewatering Operations[8].

6.0 Level of Significance

6.1 Significance Summary – Surface Water Hydrology

Based on the above, the Project would not result in an incremental impact for flooding on either on-site or off-site areas during a 50-year storm event, it would not substantially increase the amount of surface water in a water body, and it will not result in a permanent adverse change to the movement of surface water that would result in an incremental effect on the capacity of the existing storm drain system. Therefore, the development of the Project would result in less than significant impact on surface water hydrology.

6.2 Significance Summary – Surface Water Quality

Due to the nature of the proposed development mixed-use residential and commercial development, the Project will result in a reduction of potential types of pollutants. As detailed in Section 3.0, a comparison between the potential pollutant based on land use and the 303(d) list

[8] California Stormwater BMP Handbook Construction, Fact Sheet NS-2 Dewatering Operations, July 2012.

for Los Angeles River Reach 6 indicates that the pollutants of concern are **Coliform Bacteria.** This pollutant of concern will be addressed through the proposed stormwater BMPs in order to comply with Los Angeles County's Standard Urban Stormwater Mitigation Plan (SUSMP) and City of Los Angeles' Low Impact Development Ordinance. These BMPs include elements such as permeable pavement, rainwater harvesting, and an increase of landscape area. During construction of the project, a SWPPP written by a Qualified SWPPP Developer will be prepared to implement temporary control measures throughout the construction phase. Based on the analysis contained in this report, there are no significant impacts for surface water quality as a result of the Project. With compliance under the SWPPP, SUSMP, and the City's LID Ordinance, construction and operational water quality impacts would be less than significant.

7.0 Groundwater

According to Geosoils Consultants, INC geotechnical report, the groundwater table is approximately 21 to 25 feet below the existing surface.

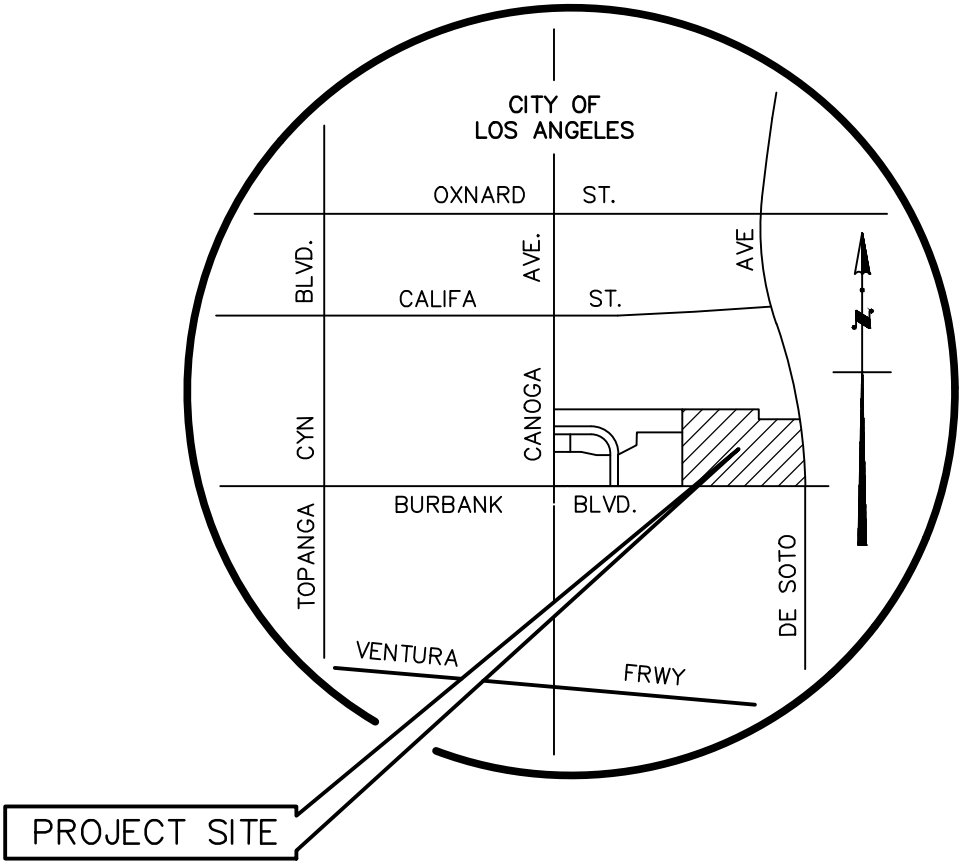
The following table illustrates the depth of the proposed building basements with respect to the (historic high) groundwater table. This table elevations does not include the underground cisterns for storm water capture and reuse.

Building	Lowest Finish Floor Elevation	Approximate Depth of Groundwater	Approximate Depth of Groundwater above Lowest Floor
1	847.0	827.0	Groundwater below Lowest Floor
2	839.0	826.6	Groundwater below Lowest Floor
3	838.0	826.6	Groundwater below Lowest Floor
4	833.3	833.0	0.3 feet
5	843.0	828.7	Groundwater below Lowest Floor
6	840.8	836	Groundwater below Lowest Floor
7	820.5	836	15.5 feet
8	833.5	836	2.5 feet
9	833.5	836	2.5 feet

Since proposed building 4, 7, 8 and 9 have exposure to the (historic high) groundwater elevation, the long term, post construction operational needs of the building basements need to be considered. As the project design progresses, one of three approaches to the ground water table at these buildings will be implemented:

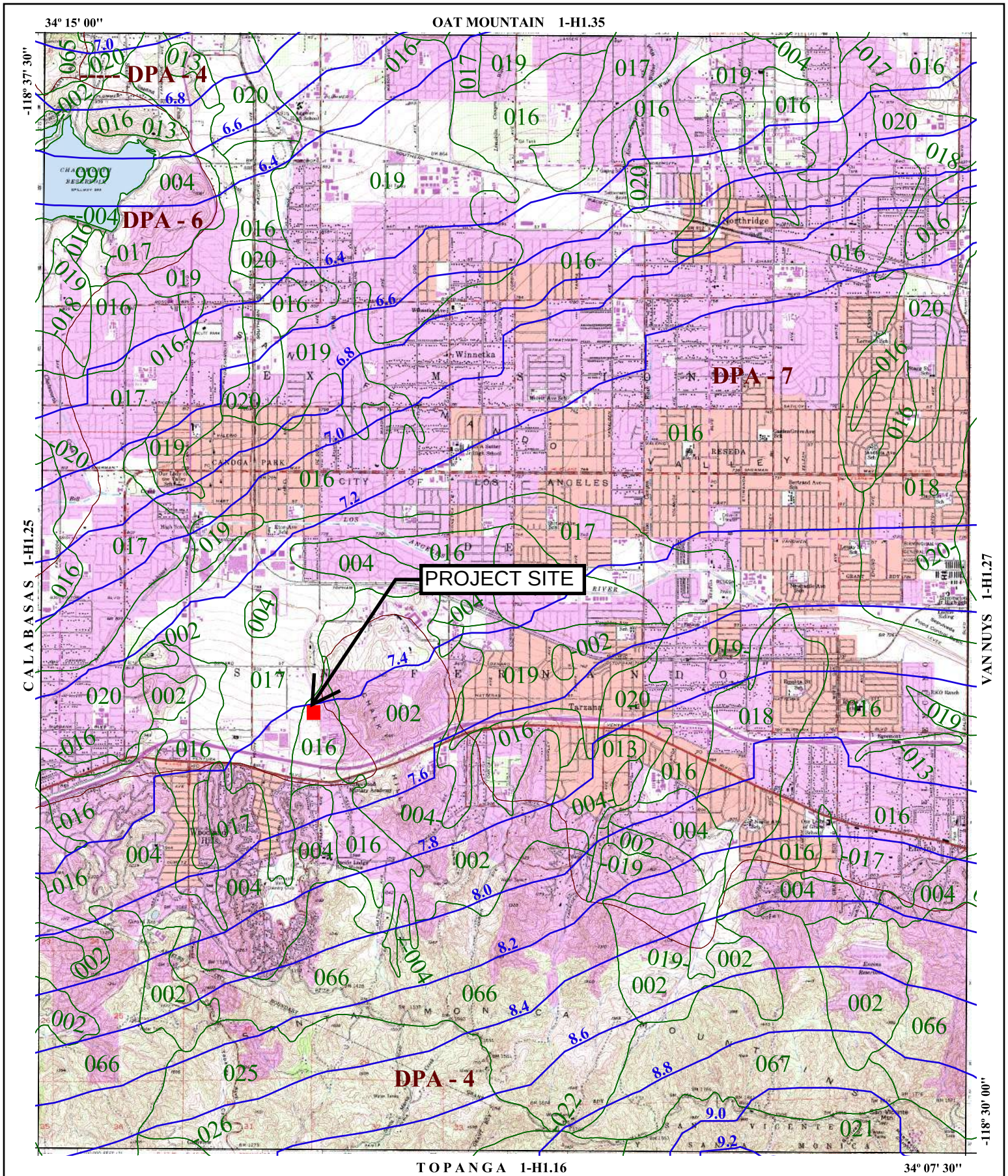
- Design the proposed building basements to structurally resist the hydrostatic pressure of the ground water table
- Pumping water to a beneficial use on site (landscaping, decorative fountains or lakes, toilet flushing, cooling towers)
- Returning water to the groundwater basin by an injection well.

8.0 Calculations and Site Plan



VICINITY MAP

NOT TO SCALE



016 SOIL CLASSIFICATION AREA

7.2 INCHES OF RAINFALL

DPA - 6 DEBRIS POTENTIAL AREA

N W E S

1 0 1 2 Miles

25-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.878
10-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.714

CANOGA PARK
50-YEAR 24-HOUR ISOHYET

1-H1.26

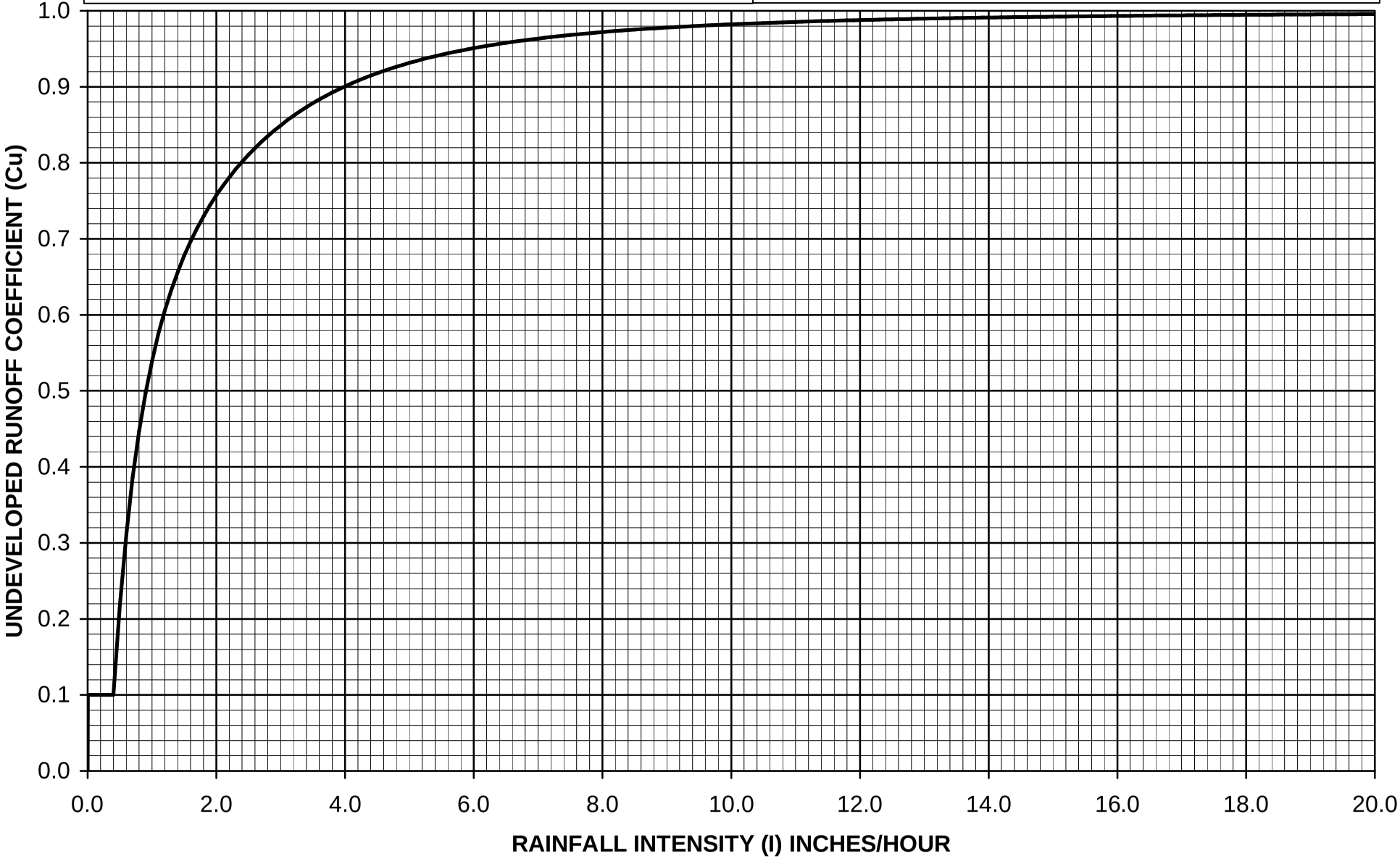
LOS ANGELES COUNTY PUBLIC WORKS Public Service That Works

$C_D = (0.9 * IMP) + (1.0 - IMP) * C_U$

Where: C_D = Developed Runoff Coefficient
IMP = Proportion Impervious
C_U = Undeveloped runoff coefficient

Los Angeles County Department of Public Works

RUNOFF COEFFICIENT CURVE
SOIL TYPE NO. 016



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Hydrology Map

A GIS viewer application to view the data for the hydrology manual.

LAYERS

- [ ] 50yr Two Tenths (Rainfall)
- [ ] DPA Zones
- [ ] Soils 2004
- [ ] TG Page
- [x] Final 85th Percentile, 24-hr Rainfall
- [ ] Final 95th Percentile, 24-hr Rainfall
- [ ] 1-year, 1-hour Rainfall Intensity

SEARCH

Zoom to TG Page:

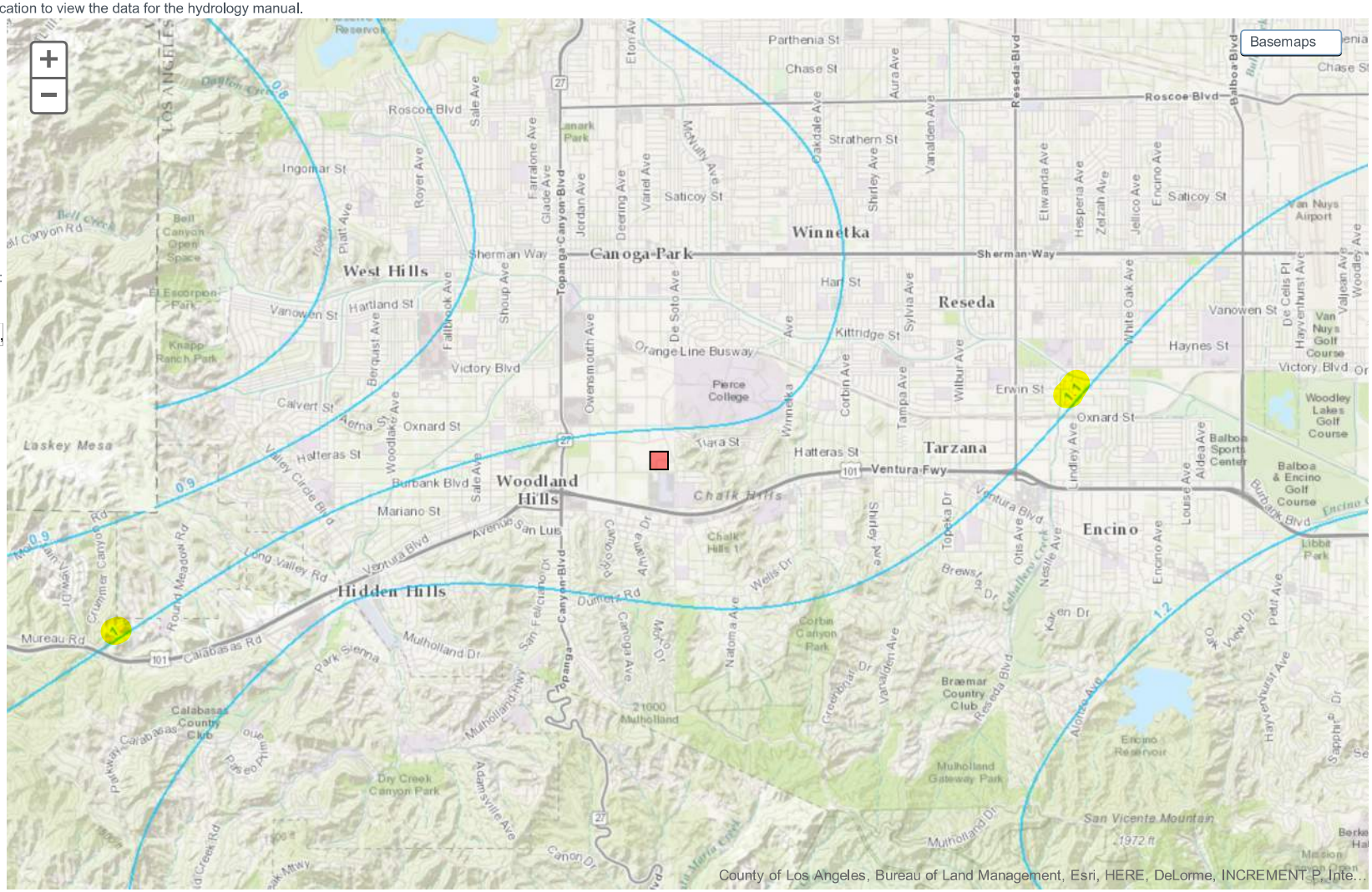
Enter Address, Cross Street, or Parcel No.:
(ex: 900 S. Fremont Ave., Fremont@Valley, 5342005904)

20970 Warner Center Ln, Woodland Hills,

Search

Address Search Results:

20970 Warner Center Ln Woodland Hills CA 91367



County of Los Angeles, Bureau of Land Management, Esri, HERE, DeLorme, INCREMENT P, Inte...

Map Tips

Peak Flow Hydrologic Analysis

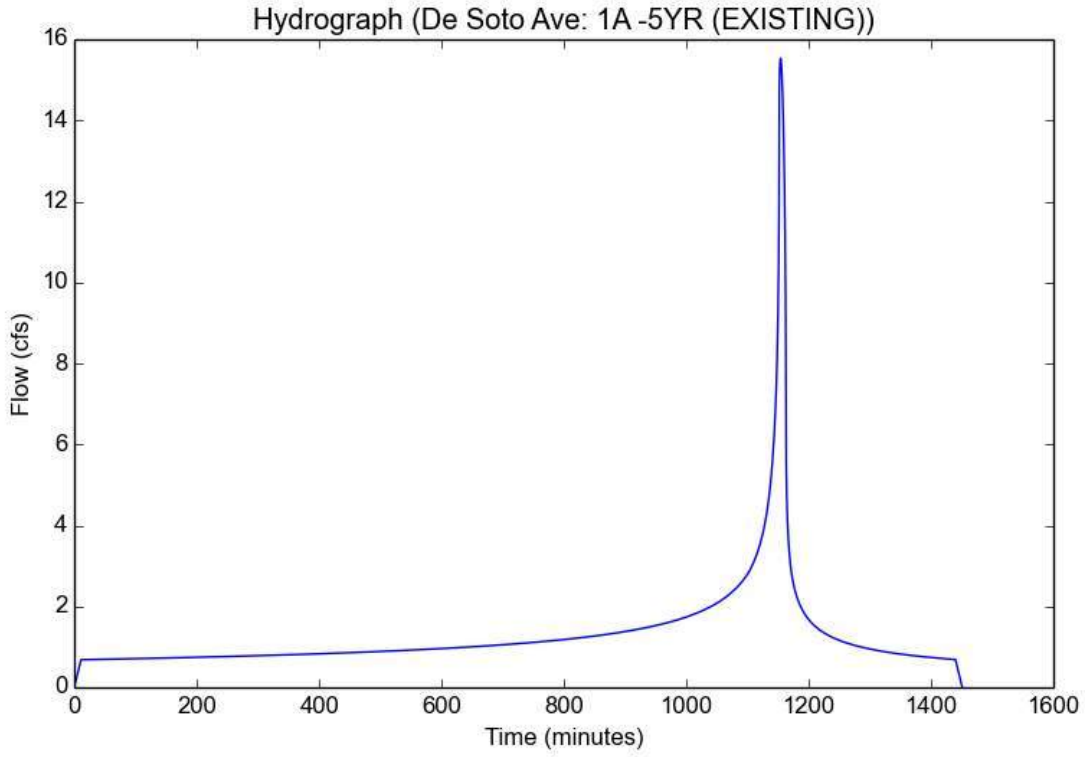
File location: C:/Users/Ion/Documents/Work/17-0727 Files/DeSoto/HydroCalcs/Existing/De Soto Ave - 1A -5YR (EXISTING).pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	De Soto Ave
Subarea ID	1A -5YR (EXISTING)
Area (ac)	10.2
Flow Path Length (ft)	674.0
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	7.4
Percent Impervious	0.75
Soil Type	16
Design Storm Frequency	5-yr
Fire Factor	0
LID	False

Output Results

Modeled (5-yr) Rainfall Depth (in)	4.3216
Peak Intensity (in/hr)	1.78
Undeveloped Runoff Coefficient (Cu)	0.7223
Developed Runoff Coefficient (Cd)	0.8556
Time of Concentration (min)	11.0
Clear Peak Flow Rate (cfs)	15.5336
Burned Peak Flow Rate (cfs)	15.5336
24-Hr Clear Runoff Volume (ac-ft)	2.6108
24-Hr Clear Runoff Volume (cu-ft)	113724.4153



Peak Flow Hydrologic Analysis

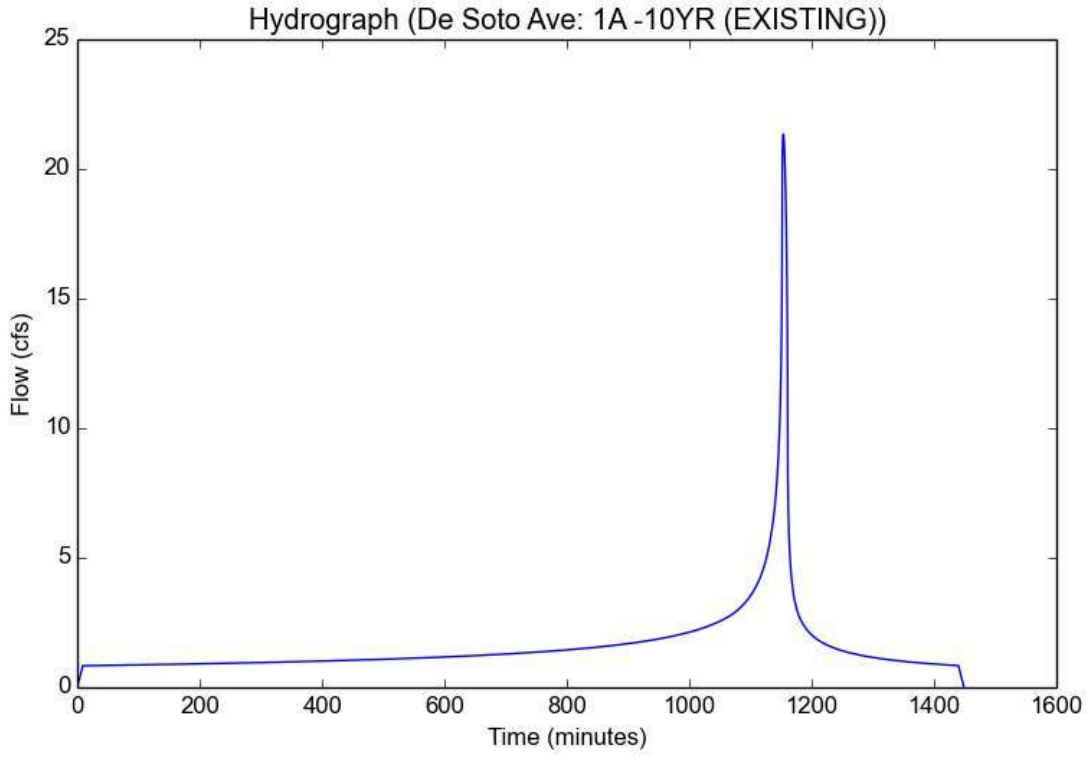
File location: C:/Users/Ion/Documents/Work/17-0727 Files/DeSoto/HydroCalcs/Existing/De Soto Ave - 1A -10YR (EXISTING).pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	De Soto Ave
Subarea ID	1A -10YR (EXISTING)
Area (ac)	10.2
Flow Path Length (ft)	674.0
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	7.4
Percent Impervious	0.75
Soil Type	16
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	5.2836
Peak Intensity (in/hr)	2.3914
Undeveloped Runoff Coefficient (Cu)	0.7991
Developed Runoff Coefficient (Cd)	0.8748
Time of Concentration (min)	9.0
Clear Peak Flow Rate (cfs)	21.3382
Burned Peak Flow Rate (cfs)	21.3382
24-Hr Clear Runoff Volume (ac-ft)	3.2124
24-Hr Clear Runoff Volume (cu-ft)	139932.273



Peak Flow Hydrologic Analysis

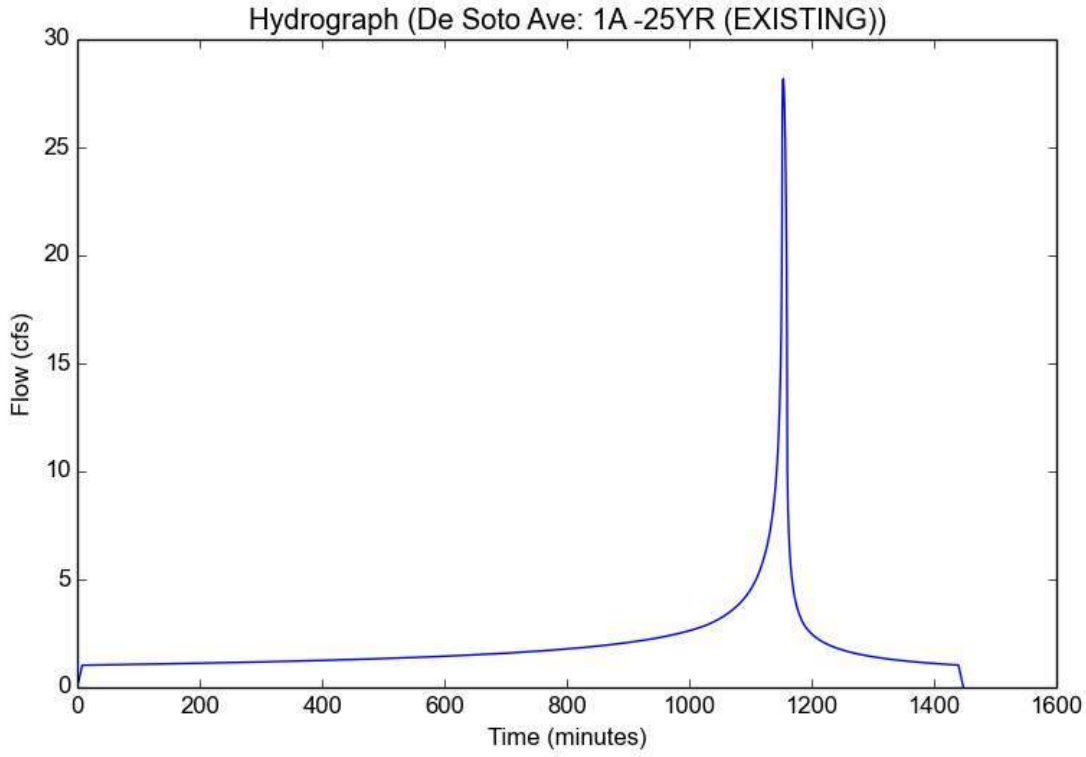
File location: C:/Users/Ion/Documents/Work/17-0727 Files/DeSoto/HydroCalcs/Existing/De Soto Ave - 1A -25YR (EXISTING).pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	De Soto Ave
Subarea ID	1A -25YR (EXISTING)
Area (ac)	10.2
Flow Path Length (ft)	674.0
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	7.4
Percent Impervious	0.75
Soil Type	16
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	6.4972
Peak Intensity (in/hr)	3.1081
Undeveloped Runoff Coefficient (Cu)	0.8549
Developed Runoff Coefficient (Cd)	0.8887
Time of Concentration (min)	8.0
Clear Peak Flow Rate (cfs)	28.1751
Burned Peak Flow Rate (cfs)	28.1751
24-Hr Clear Runoff Volume (ac-ft)	3.9821
24-Hr Clear Runoff Volume (cu-ft)	173458.2198



Peak Flow Hydrologic Analysis

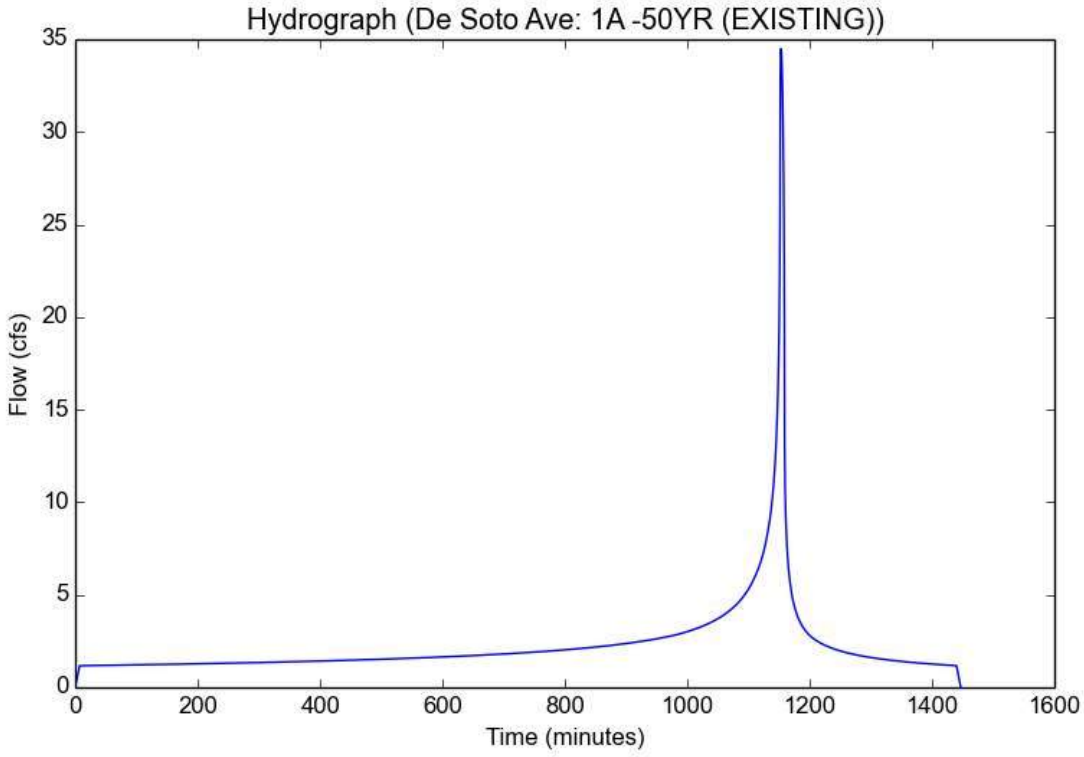
File location: C:/Users/Ion/Documents/Work/17-0727 Files/DeSoto/HydroCalcs/Existing/De Soto Ave - 1A -50YR (EXISTING).pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	De Soto Ave
Subarea ID	1A -50YR (EXISTING)
Area (ac)	10.2
Flow Path Length (ft)	674.0
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	7.4
Percent Impervious	0.75
Soil Type	16
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.4
Peak Intensity (in/hr)	3.7692
Undeveloped Runoff Coefficient (Cu)	0.8888
Developed Runoff Coefficient (Cd)	0.8972
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	34.4944
Burned Peak Flow Rate (cfs)	34.4944
24-Hr Clear Runoff Volume (ac-ft)	4.5626
24-Hr Clear Runoff Volume (cu-ft)	198746.015



Peak Flow Hydrologic Analysis

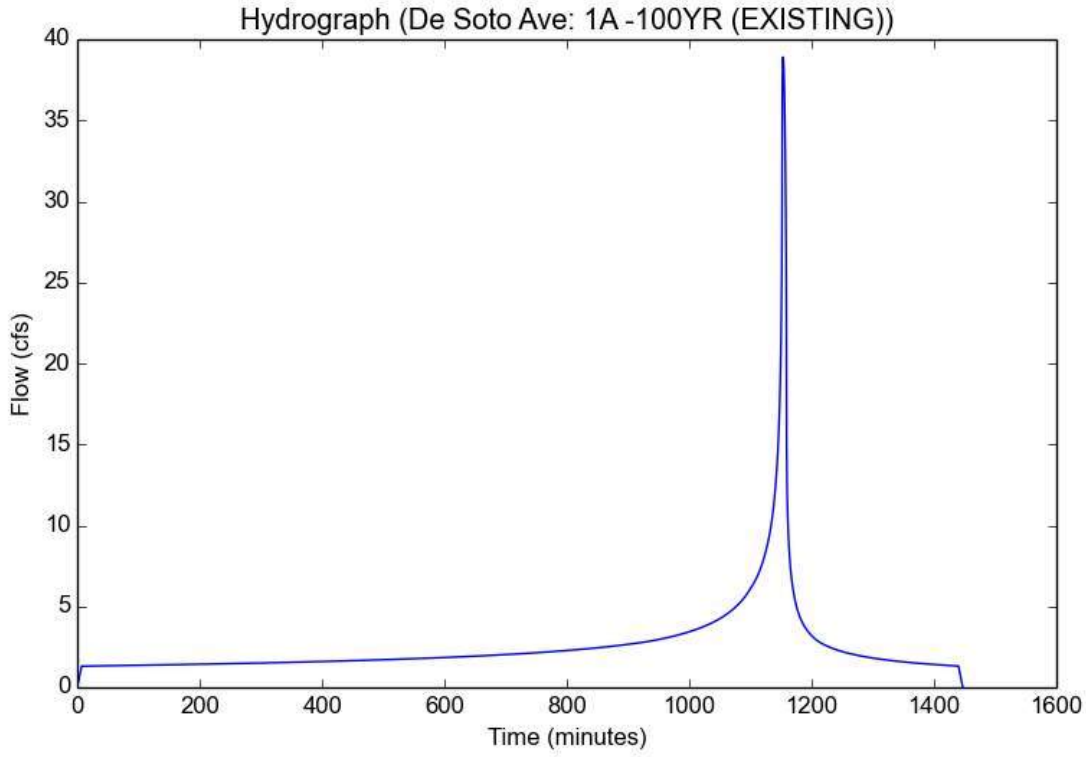
File location: C:/Users/Ion/Documents/Work/17-0727 Files/DeSoto/HydroCalcs/Existing/De Soto Ave - 1A -100YR (EXISTING).pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	De Soto Ave
Subarea ID	1A -100YR (EXISTING)
Area (ac)	10.2
Flow Path Length (ft)	674.0
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	7.4
Percent Impervious	0.75
Soil Type	16
Design Storm Frequency	100-yr
Fire Factor	0
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	8.3028
Peak Intensity (in/hr)	4.2291
Undeveloped Runoff Coefficient (Cu)	0.9077
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	38.8231
Burned Peak Flow Rate (cfs)	38.8231
24-Hr Clear Runoff Volume (ac-ft)	5.1501
24-Hr Clear Runoff Volume (cu-ft)	224339.9918



Peak Flow Hydrologic Analysis

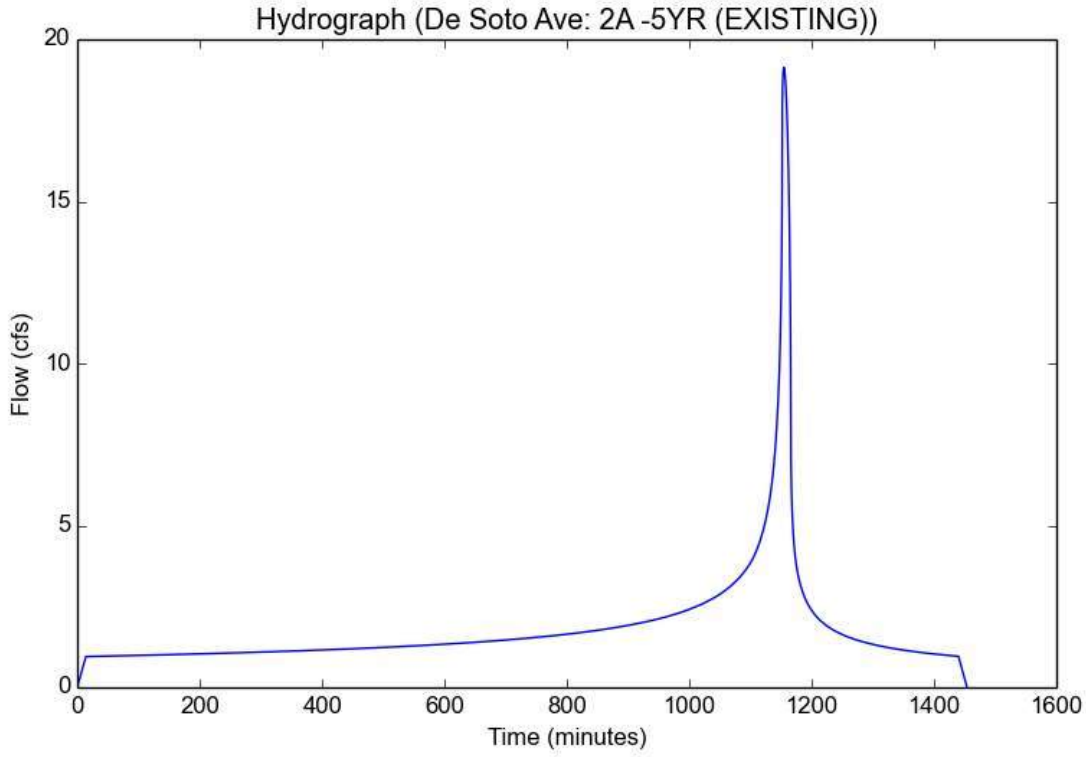
File location: C:/Users/Ion/Documents/Work/17-0727 Files/DeSoto/HydroCalcs/Existing/De Soto Ave - 2A -5YR (EXISTING).pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	De Soto Ave
Subarea ID	2A -5YR (EXISTING)
Area (ac)	14.2
Flow Path Length (ft)	1042.0
Flow Path Slope (vft/hft)	0.011
50-yr Rainfall Depth (in)	7.4
Percent Impervious	0.75
Soil Type	16
Design Storm Frequency	5-yr
Fire Factor	0
LID	False

Output Results

Modeled (5-yr) Rainfall Depth (in)	4.3216
Peak Intensity (in/hr)	1.5892
Undeveloped Runoff Coefficient (Cu)	0.692
Developed Runoff Coefficient (Cd)	0.848
Time of Concentration (min)	14.0
Clear Peak Flow Rate (cfs)	19.1366
Burned Peak Flow Rate (cfs)	19.1366
24-Hr Clear Runoff Volume (ac-ft)	3.6339
24-Hr Clear Runoff Volume (cu-ft)	158292.573



Peak Flow Hydrologic Analysis

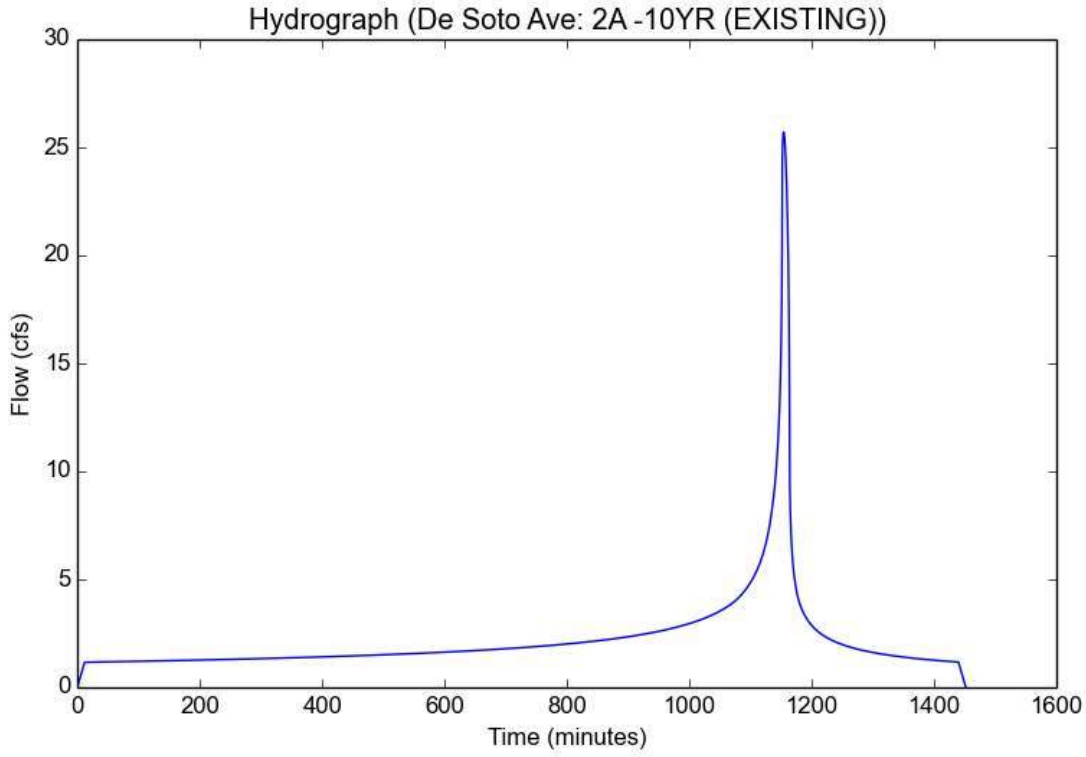
File location: C:/Users/Ion/Documents/Work/17-0727 Files/DeSoto/HydroCalcs/Existing/De Soto Ave - 2A -10YR (EXISTING).pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	De Soto Ave
Subarea ID	2A -10YR (EXISTING)
Area (ac)	14.2
Flow Path Length (ft)	1042.0
Flow Path Slope (vft/hft)	0.011
50-yr Rainfall Depth (in)	7.4
Percent Impervious	0.75
Soil Type	16
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	5.2836
Peak Intensity (in/hr)	2.089
Undeveloped Runoff Coefficient (Cu)	0.7668
Developed Runoff Coefficient (Cd)	0.8667
Time of Concentration (min)	12.0
Clear Peak Flow Rate (cfs)	25.7097
Burned Peak Flow Rate (cfs)	25.7097
24-Hr Clear Runoff Volume (ac-ft)	4.4714
24-Hr Clear Runoff Volume (cu-ft)	194774.4574



Peak Flow Hydrologic Analysis

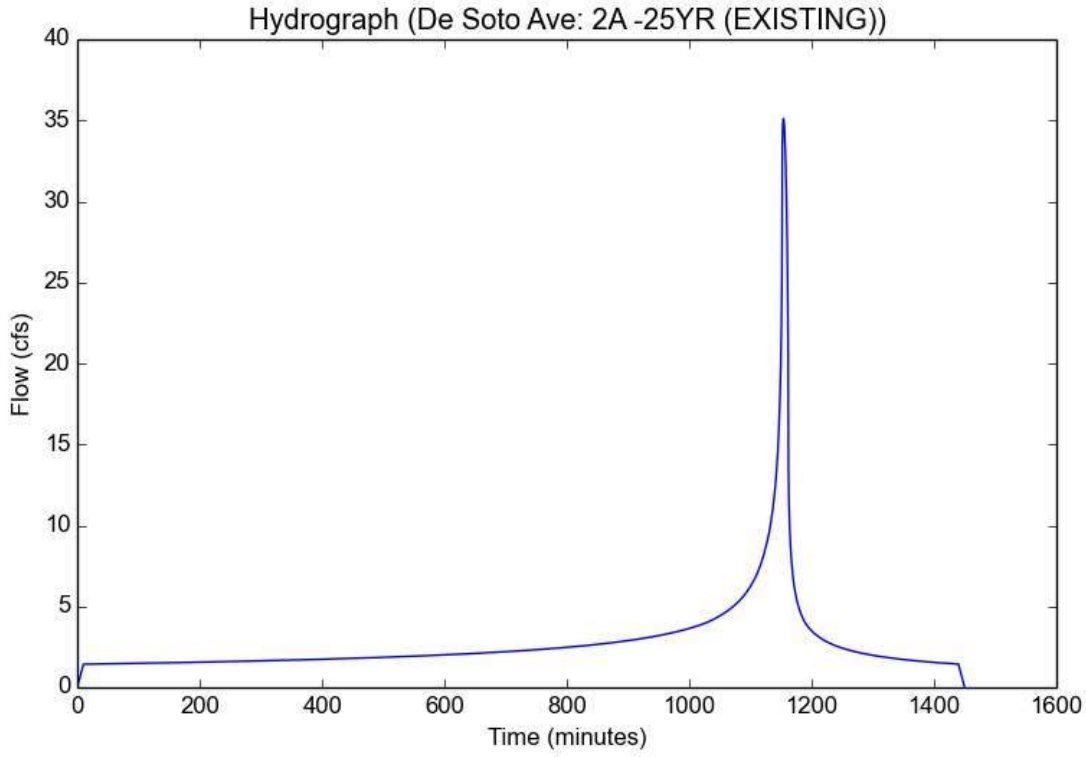
File location: C:/Users/Ion/Documents/Work/17-0727 Files/DeSoto/HydroCalcs/Existing/De Soto Ave - 2A -25YR (EXISTING).pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	De Soto Ave
Subarea ID	2A -25YR (EXISTING)
Area (ac)	14.2
Flow Path Length (ft)	1042.0
Flow Path Slope (vft/hft)	0.011
50-yr Rainfall Depth (in)	7.4
Percent Impervious	0.75
Soil Type	16
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	6.4972
Peak Intensity (in/hr)	2.7986
Undeveloped Runoff Coefficient (Cu)	0.8338
Developed Runoff Coefficient (Cd)	0.8835
Time of Concentration (min)	10.0
Clear Peak Flow Rate (cfs)	35.1091
Burned Peak Flow Rate (cfs)	35.1091
24-Hr Clear Runoff Volume (ac-ft)	5.5431
24-Hr Clear Runoff Volume (cu-ft)	241456.0597



Peak Flow Hydrologic Analysis

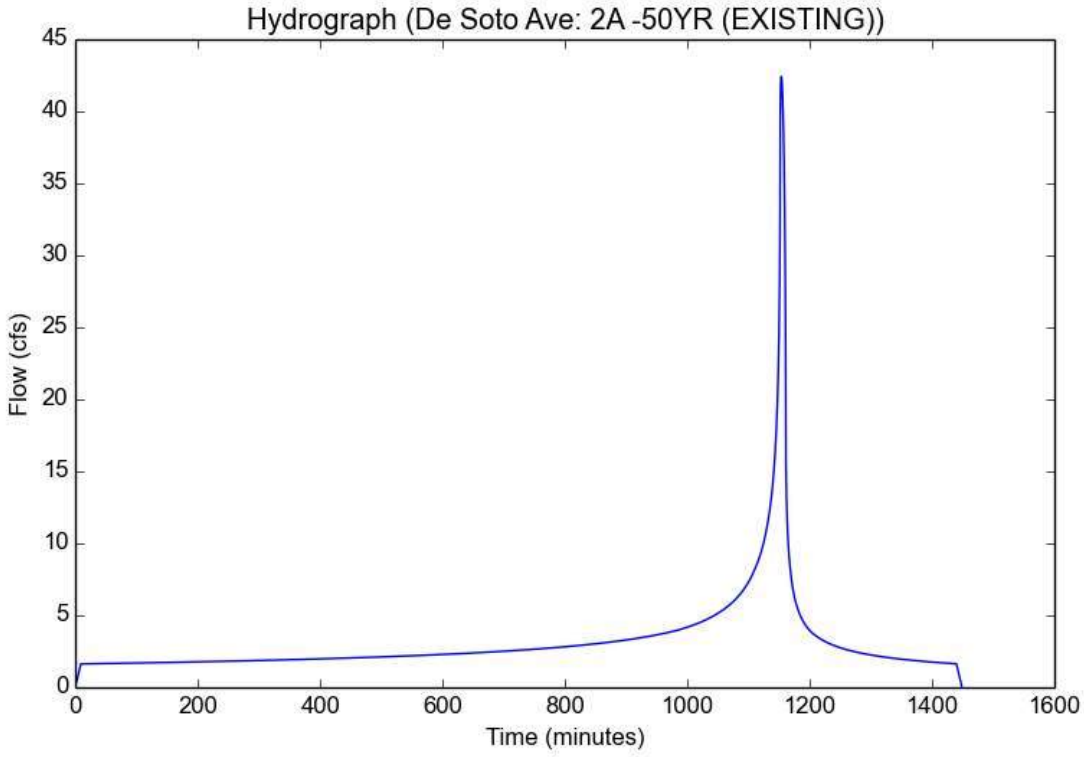
File location: C:/Users/Ion/Documents/Work/17-0727 Files/DeSoto/HydroCalcs/Existing/De Soto Ave - 2A -50YR (EXISTING).pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	De Soto Ave
Subarea ID	2A -50YR (EXISTING)
Area (ac)	14.2
Flow Path Length (ft)	1042.0
Flow Path Slope (vft/hft)	0.011
50-yr Rainfall Depth (in)	7.4
Percent Impervious	0.75
Soil Type	16
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.4
Peak Intensity (in/hr)	3.3493
Undeveloped Runoff Coefficient (Cu)	0.8673
Developed Runoff Coefficient (Cd)	0.8918
Time of Concentration (min)	9.0
Clear Peak Flow Rate (cfs)	42.4156
Burned Peak Flow Rate (cfs)	42.4156
24-Hr Clear Runoff Volume (ac-ft)	6.3513
24-Hr Clear Runoff Volume (cu-ft)	276664.5797



Peak Flow Hydrologic Analysis

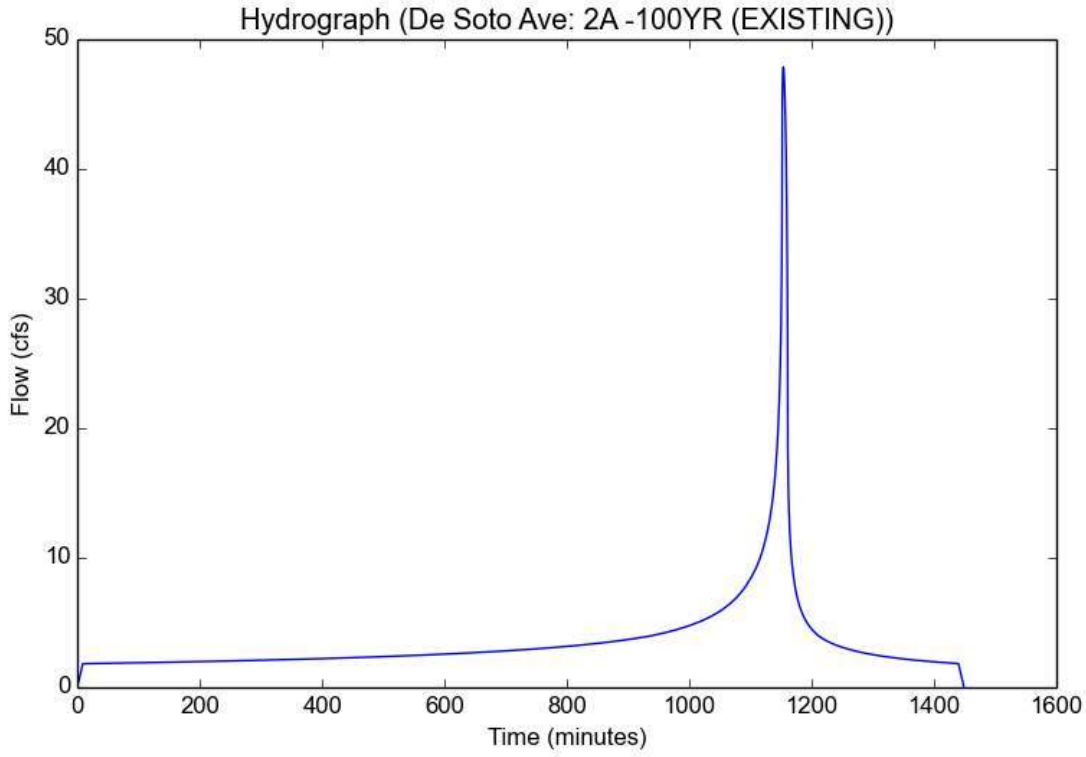
File location: C:/Users/Ion/Documents/Work/17-0727 Files/DeSoto/HydroCalcs/Existing/De Soto Ave - 2A -100YR (EXISTING).pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	De Soto Ave
Subarea ID	2A -100YR (EXISTING)
Area (ac)	14.2
Flow Path Length (ft)	1042.0
Flow Path Slope (vft/hft)	0.011
50-yr Rainfall Depth (in)	7.4
Percent Impervious	0.75
Soil Type	16
Design Storm Frequency	100-yr
Fire Factor	0
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	8.3028
Peak Intensity (in/hr)	3.7579
Undeveloped Runoff Coefficient (Cu)	0.8883
Developed Runoff Coefficient (Cd)	0.8971
Time of Concentration (min)	9.0
Clear Peak Flow Rate (cfs)	47.8698
Burned Peak Flow Rate (cfs)	47.8698
24-Hr Clear Runoff Volume (ac-ft)	7.1692
24-Hr Clear Runoff Volume (cu-ft)	312288.8469



Peak Flow Hydrologic Analysis

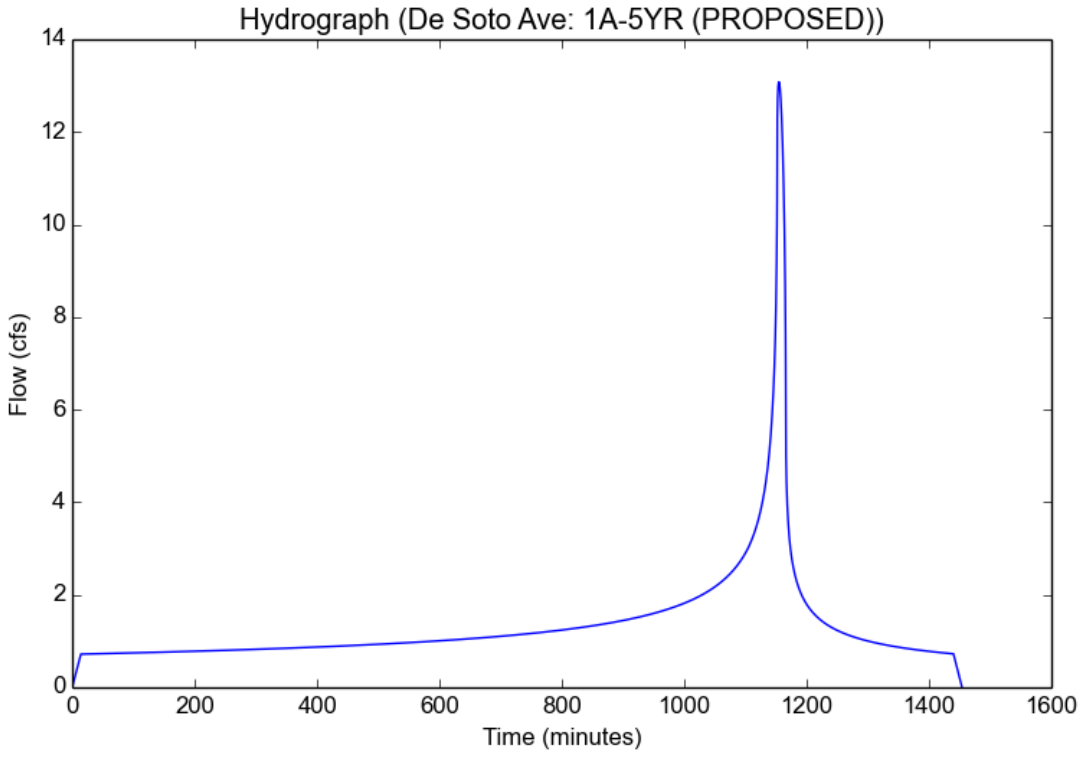
File location: W:/1LLJ010100/ENGR/DOCS/Hydrology/HydroCalcs/Proposed/De Soto Ave - 1A-5YR (PROPOSED).pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	De Soto Ave
Subarea ID	1A-5YR (PROPOSED)
Area (ac)	9.43
Flow Path Length (ft)	1008.0
Flow Path Slope (vft/hft)	0.008
50-yr Rainfall Depth (in)	7.4
Percent Impervious	0.87
Soil Type	16
Design Storm Frequency	5-yr
Fire Factor	0
LID	False

Output Results

Modeled (5-yr) Rainfall Depth (in)	4.3216
Peak Intensity (in/hr)	1.5892
Undeveloped Runoff Coefficient (Cu)	0.692
Developed Runoff Coefficient (Cd)	0.873
Time of Concentration (min)	14.0
Clear Peak Flow Rate (cfs)	13.0824
Burned Peak Flow Rate (cfs)	13.0824
24-Hr Clear Runoff Volume (ac-ft)	2.7098
24-Hr Clear Runoff Volume (cu-ft)	118040.9528



Peak Flow Hydrologic Analysis

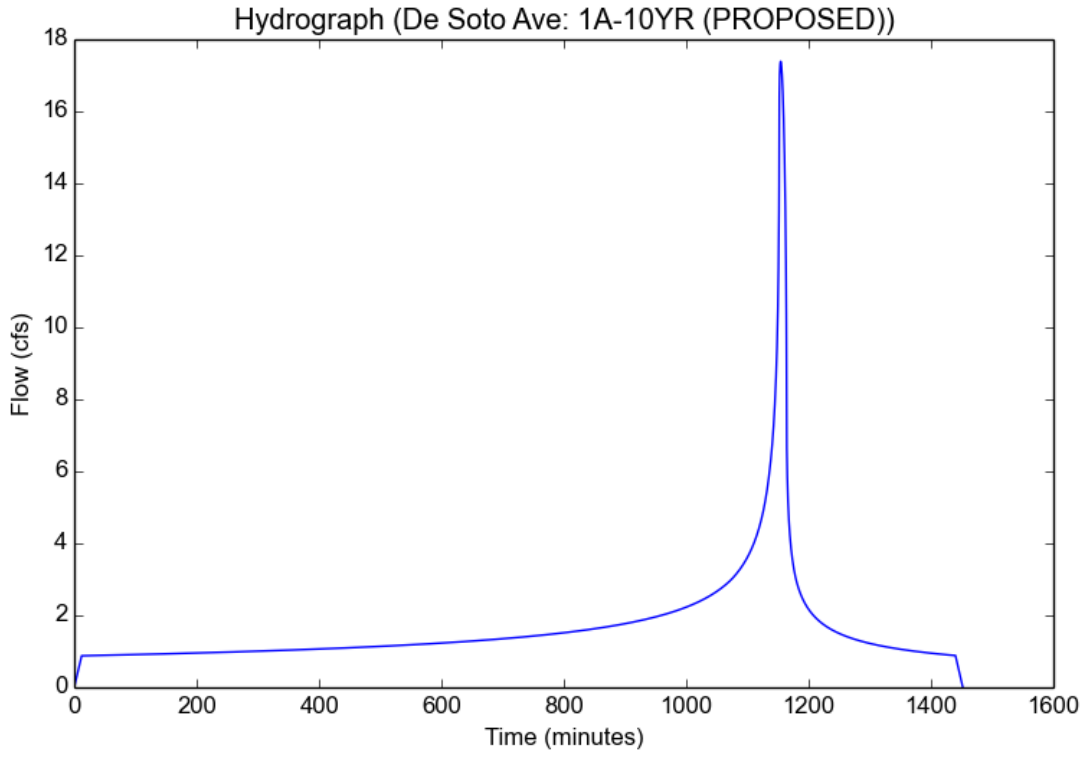
File location: W:/1LLJ010100/ENGR/DOCS/Hydrology/HydroCalcs/Proposed/De Soto Ave - 1A-10YR (PROPOSED).pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	De Soto Ave
Subarea ID	1A-10YR (PROPOSED)
Area (ac)	9.43
Flow Path Length (ft)	1008.0
Flow Path Slope (vft/hft)	0.008
50-yr Rainfall Depth (in)	7.4
Percent Impervious	0.87
Soil Type	16
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	5.2836
Peak Intensity (in/hr)	2.089
Undeveloped Runoff Coefficient (Cu)	0.7668
Developed Runoff Coefficient (Cd)	0.8827
Time of Concentration (min)	12.0
Clear Peak Flow Rate (cfs)	17.3882
Burned Peak Flow Rate (cfs)	17.3882
24-Hr Clear Runoff Volume (ac-ft)	3.3229
24-Hr Clear Runoff Volume (cu-ft)	144747.2504



Peak Flow Hydrologic Analysis

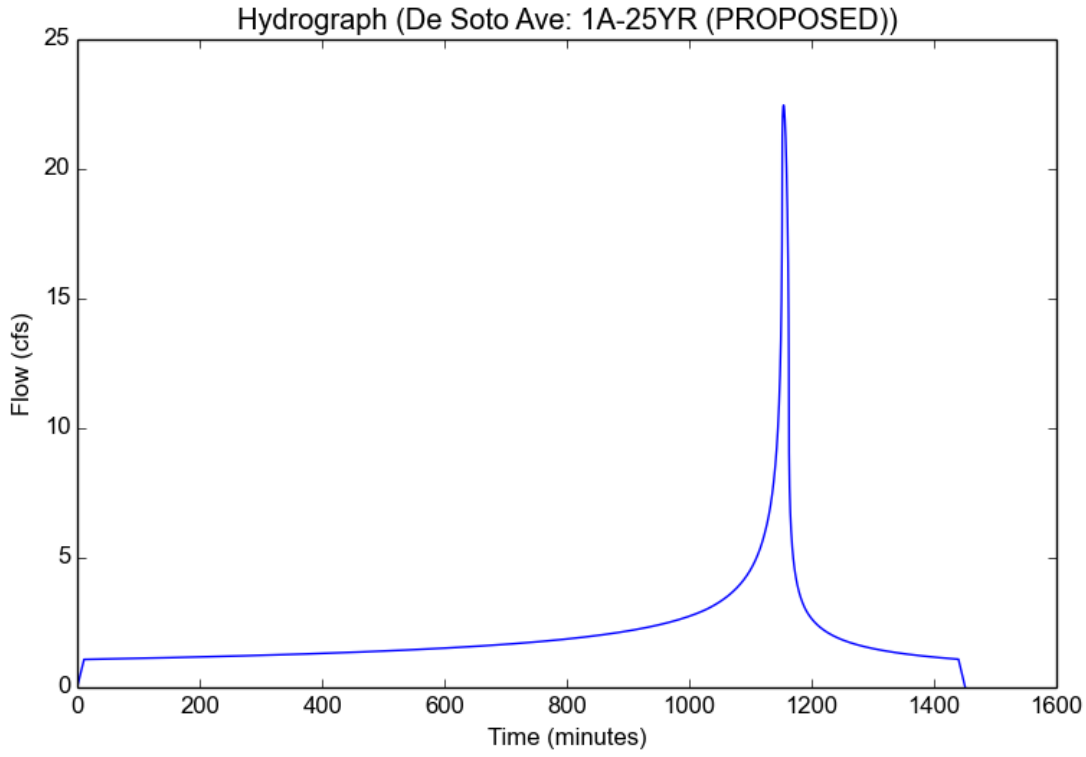
File location: W:/1LLJ010100/ENGR/DOCS/Hydrology/HydroCalcs/Proposed/De Soto Ave - 1A-25YR (PROPOSED).pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	De Soto Ave
Subarea ID	1A-25YR (PROPOSED)
Area (ac)	9.43
Flow Path Length (ft)	1008.0
Flow Path Slope (vft/hft)	0.008
50-yr Rainfall Depth (in)	7.4
Percent Impervious	0.87
Soil Type	16
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	6.4972
Peak Intensity (in/hr)	2.676
Undeveloped Runoff Coefficient (Cu)	0.8244
Developed Runoff Coefficient (Cd)	0.8902
Time of Concentration (min)	11.0
Clear Peak Flow Rate (cfs)	22.4633
Burned Peak Flow Rate (cfs)	22.4633
24-Hr Clear Runoff Volume (ac-ft)	4.1015
24-Hr Clear Runoff Volume (cu-ft)	178661.8065



Peak Flow Hydrologic Analysis

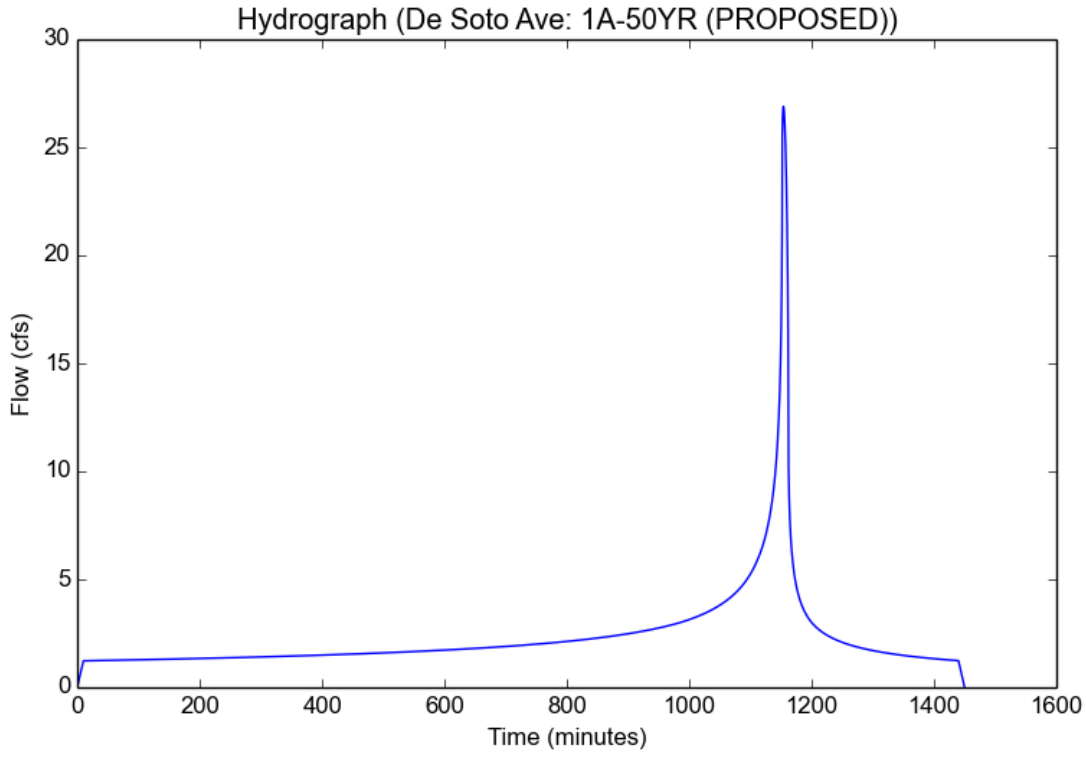
File location: W:/1LLJ010100/ENGR/DOCS/Hydrology/HydroCalcs/Proposed/De Soto Ave - 1A-50YR (PROPOSED).pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	De Soto Ave
Subarea ID	1A-50YR (PROPOSED)
Area (ac)	9.43
Flow Path Length (ft)	1008.0
Flow Path Slope (vft/hft)	0.008
50-yr Rainfall Depth (in)	7.4
Percent Impervious	0.87
Soil Type	16
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.4
Peak Intensity (in/hr)	3.1875
Undeveloped Runoff Coefficient (Cu)	0.859
Developed Runoff Coefficient (Cd)	0.8947
Time of Concentration (min)	10.0
Clear Peak Flow Rate (cfs)	26.8922
Burned Peak Flow Rate (cfs)	26.8922
24-Hr Clear Runoff Volume (ac-ft)	4.6846
24-Hr Clear Runoff Volume (cu-ft)	204061.3968



Peak Flow Hydrologic Analysis

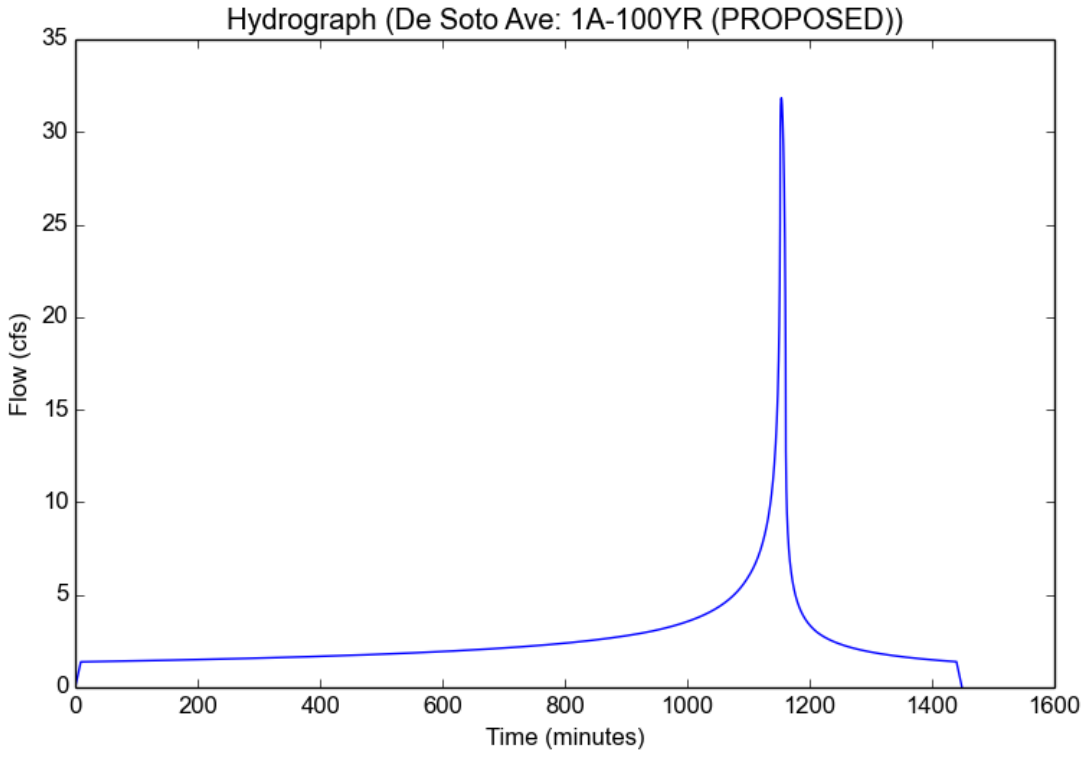
File location: W:/1LLJ010100/ENGR/DOCS/Hydrology/HydroCalcs/Proposed/De Soto Ave - 1A-100YR (PROPOSED).pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	De Soto Ave
Subarea ID	1A-100YR (PROPOSED)
Area (ac)	9.43
Flow Path Length (ft)	1008.0
Flow Path Slope (vft/hft)	0.008
50-yr Rainfall Depth (in)	7.4
Percent Impervious	0.87
Soil Type	16
Design Storm Frequency	100-yr
Fire Factor	0
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	8.3028
Peak Intensity (in/hr)	3.7579
Undeveloped Runoff Coefficient (Cu)	0.8883
Developed Runoff Coefficient (Cd)	0.8985
Time of Concentration (min)	9.0
Clear Peak Flow Rate (cfs)	31.8395
Burned Peak Flow Rate (cfs)	31.8395
24-Hr Clear Runoff Volume (ac-ft)	5.271
24-Hr Clear Runoff Volume (cu-ft)	229605.9526



Peak Flow Hydrologic Analysis

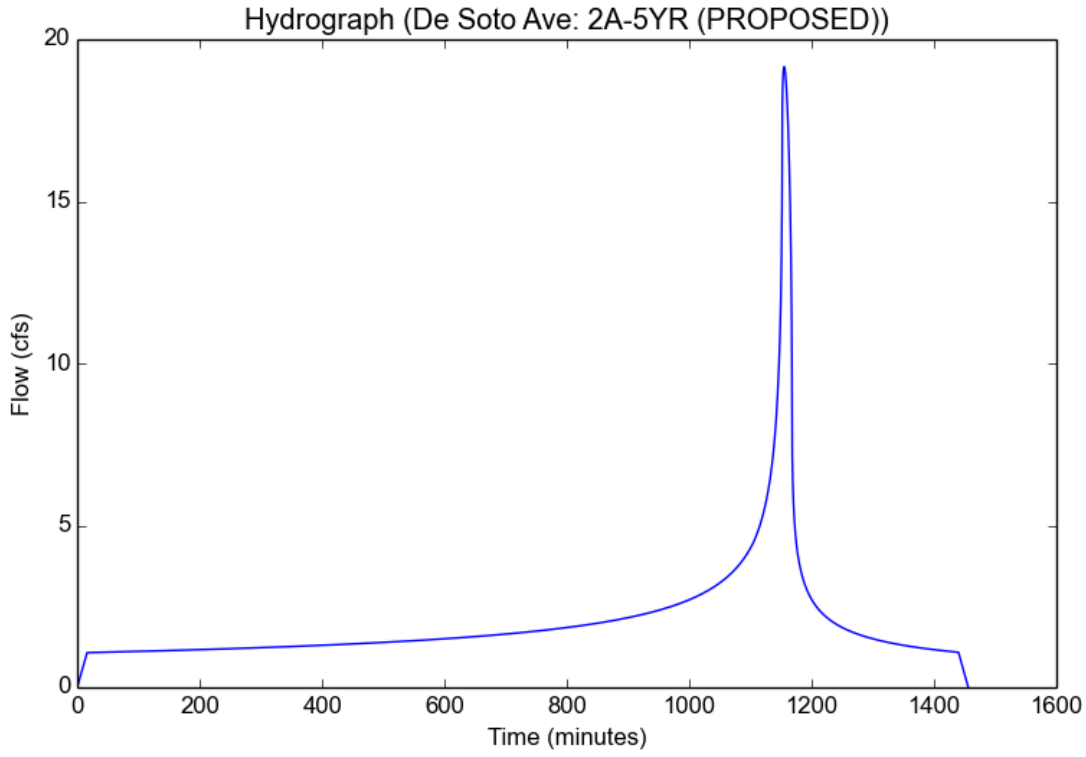
File location: W:/1LLJ010100/ENGR/DOCS/Hydrology/HydroCalcs/Proposed/De Soto Ave - 2A-5YR (PROPOSED).pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	De Soto Ave
Subarea ID	2A-5YR (PROPOSED)
Area (ac)	14.97
Flow Path Length (ft)	1208.0
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	7.4
Percent Impervious	0.81
Soil Type	16
Design Storm Frequency	5-yr
Fire Factor	0
LID	False

Output Results

Modeled (5-yr) Rainfall Depth (in)	4.3216
Peak Intensity (in/hr)	1.4925
Undeveloped Runoff Coefficient (Cu)	0.6757
Developed Runoff Coefficient (Cd)	0.8574
Time of Concentration (min)	16.0
Clear Peak Flow Rate (cfs)	19.1569
Burned Peak Flow Rate (cfs)	19.1569
24-Hr Clear Runoff Volume (ac-ft)	4.0659
24-Hr Clear Runoff Volume (cu-ft)	177111.4018



Peak Flow Hydrologic Analysis

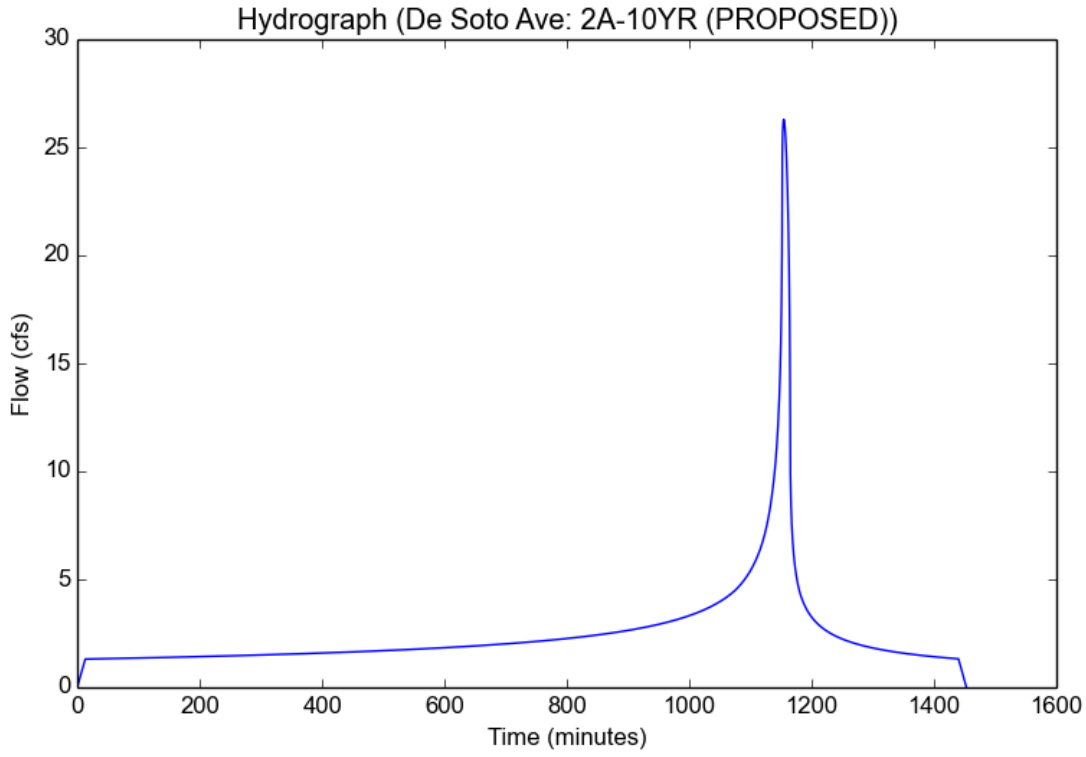
File location: W:/1LLJ010100/ENGR/DOCS/Hydrology/HydroCalcs/Proposed/De Soto Ave - 2A-10YR (PROPOSED).pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	De Soto Ave
Subarea ID	2A-10YR (PROPOSED)
Area (ac)	14.97
Flow Path Length (ft)	1208.0
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	7.4
Percent Impervious	0.81
Soil Type	16
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	5.2836
Peak Intensity (in/hr)	2.0119
Undeveloped Runoff Coefficient (Cu)	0.7586
Developed Runoff Coefficient (Cd)	0.8731
Time of Concentration (min)	13.0
Clear Peak Flow Rate (cfs)	26.2965
Burned Peak Flow Rate (cfs)	26.2965
24-Hr Clear Runoff Volume (ac-ft)	4.9943
24-Hr Clear Runoff Volume (cu-ft)	217550.9291



Peak Flow Hydrologic Analysis

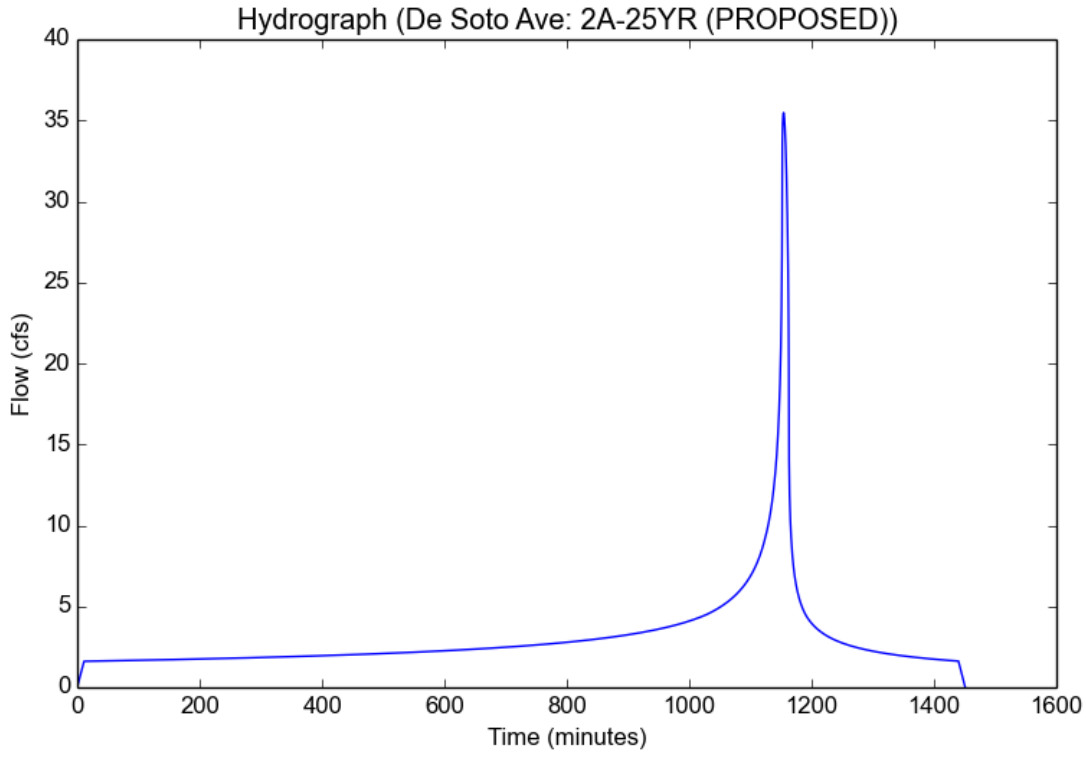
File location: W:/1LLJ010100/ENGR/DOCS/Hydrology/HydroCalcs/Proposed/De Soto Ave - 2A-25YR (PROPOSED).pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	De Soto Ave
Subarea ID	2A-25YR (PROPOSED)
Area (ac)	14.97
Flow Path Length (ft)	1208.0
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	7.4
Percent Impervious	0.81
Soil Type	16
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	6.4972
Peak Intensity (in/hr)	2.676
Undeveloped Runoff Coefficient (Cu)	0.8244
Developed Runoff Coefficient (Cd)	0.8856
Time of Concentration (min)	11.0
Clear Peak Flow Rate (cfs)	35.4784
Burned Peak Flow Rate (cfs)	35.4784
24-Hr Clear Runoff Volume (ac-ft)	6.1772
24-Hr Clear Runoff Volume (cu-ft)	269080.3467



Peak Flow Hydrologic Analysis

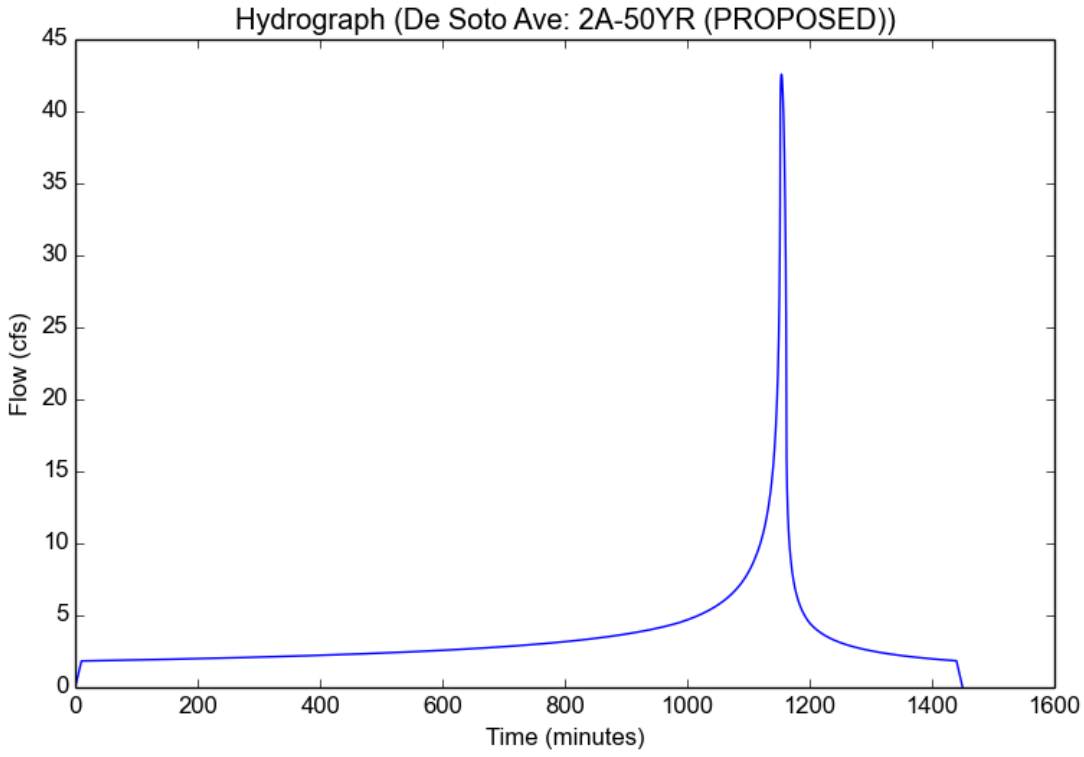
File location: W:/1LLJ010100/ENGR/DOCS/Hydrology/HydroCalcs/Proposed/De Soto Ave - 2A-50YR (PROPOSED).pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	De Soto Ave
Subarea ID	2A-50YR (PROPOSED)
Area (ac)	14.97
Flow Path Length (ft)	1208.0
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	7.4
Percent Impervious	0.81
Soil Type	16
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.4
Peak Intensity (in/hr)	3.1875
Undeveloped Runoff Coefficient (Cu)	0.859
Developed Runoff Coefficient (Cd)	0.8922
Time of Concentration (min)	10.0
Clear Peak Flow Rate (cfs)	42.5736
Burned Peak Flow Rate (cfs)	42.5736
24-Hr Clear Runoff Volume (ac-ft)	7.0662
24-Hr Clear Runoff Volume (cu-ft)	307801.8044



Peak Flow Hydrologic Analysis

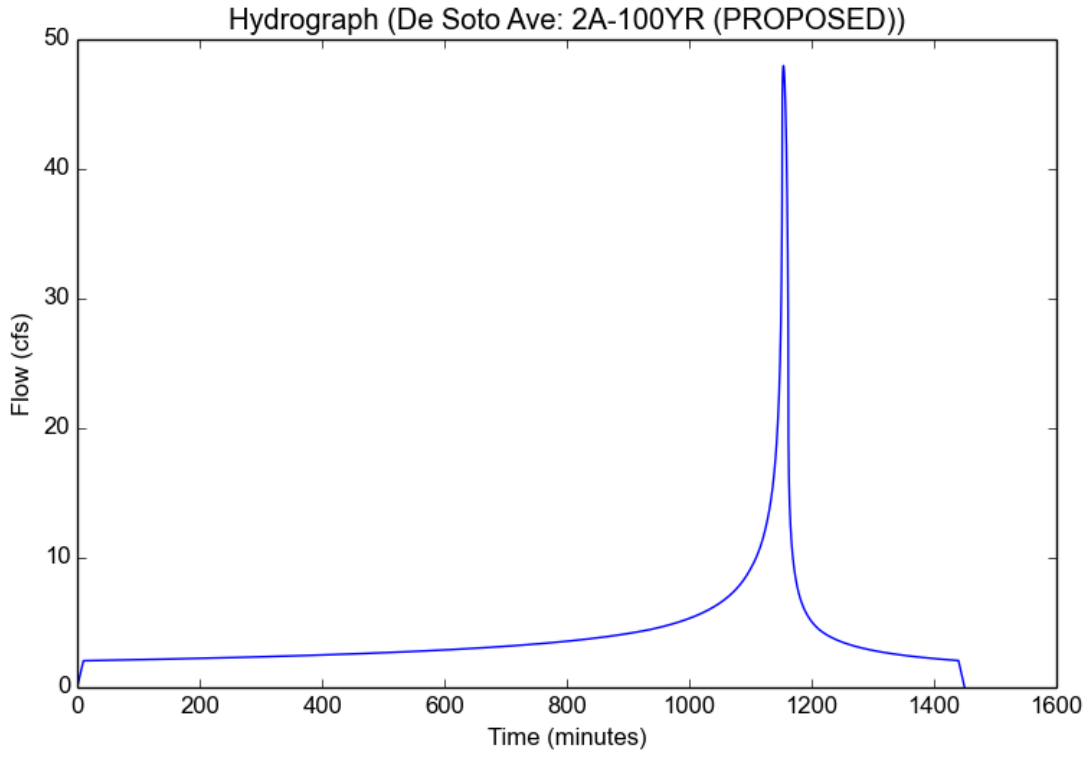
File location: W:/1LLJ010100/ENGR/DOCS/Hydrology/HydroCalcs/Proposed/De Soto Ave - 2A-100YR (PROPOSED).pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	De Soto Ave
Subarea ID	2A-100YR (PROPOSED)
Area (ac)	14.97
Flow Path Length (ft)	1208.0
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	7.4
Percent Impervious	0.81
Soil Type	16
Design Storm Frequency	100-yr
Fire Factor	0
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	8.3028
Peak Intensity (in/hr)	3.5764
Undeveloped Runoff Coefficient (Cu)	0.8789
Developed Runoff Coefficient (Cd)	0.896
Time of Concentration (min)	10.0
Clear Peak Flow Rate (cfs)	47.9704
Burned Peak Flow Rate (cfs)	47.9704
24-Hr Clear Runoff Volume (ac-ft)	7.9626
24-Hr Clear Runoff Volume (cu-ft)	346849.685



Peak Flow Hydrologic Analysis

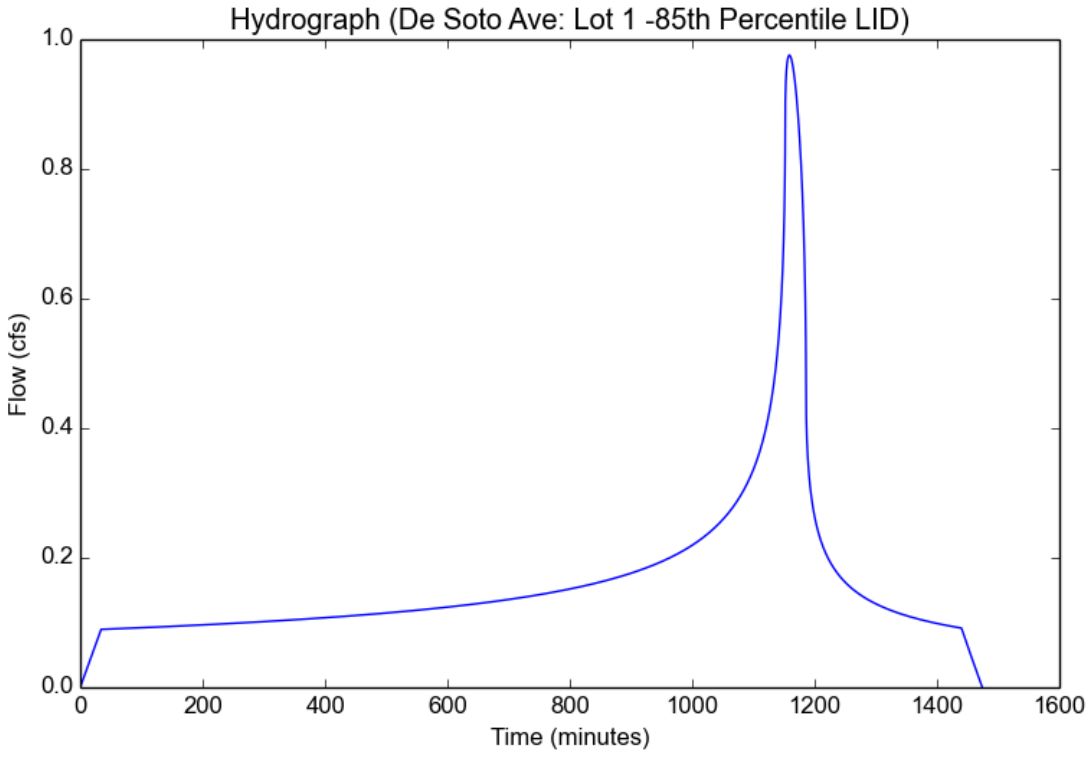
File location: W:/1LLJ010100/ENGR/DOCS/LID/HydroCalcs/De Soto Ave - Lot 1 -85th Percentile lID.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	De Soto Ave
Subarea ID	Lot 1 -85th Percentile LID
Area (ac)	4.93
Flow Path Length (ft)	768.0
Flow Path Slope (vft/hft)	0.008
85th Percentile Rainfall Depth (in)	1.03
Percent Impervious	0.866
Soil Type	16
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.03
Peak Intensity (in/hr)	0.2496
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.7928
Time of Concentration (min)	34.0
Clear Peak Flow Rate (cfs)	0.9756
Burned Peak Flow Rate (cfs)	0.9756
24-Hr Clear Runoff Volume (ac-ft)	0.3327
24-Hr Clear Runoff Volume (cu-ft)	14492.9471



Peak Flow Hydrologic Analysis

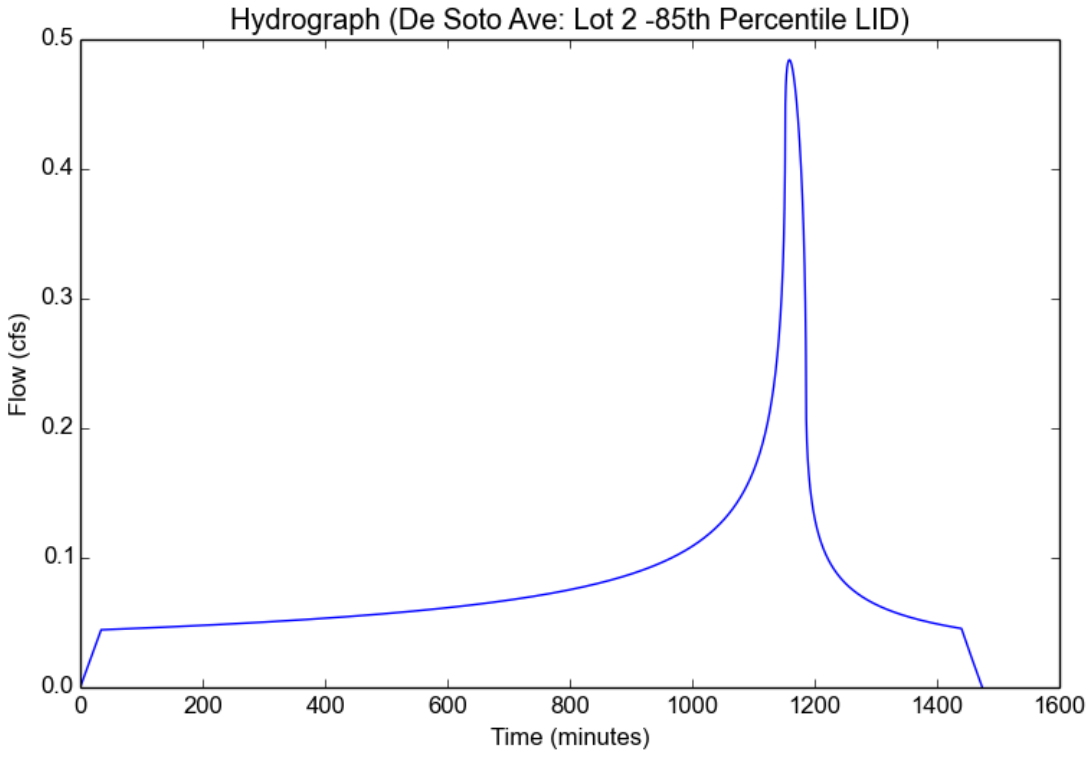
File location: W:/1LLJ010100/ENGR/DOCS/LID/HydroCalcs/De Soto Ave - Lot 2 -85th Percentile LID.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	De Soto Ave
Subarea ID	Lot 2 -85th Percentile LID
Area (ac)	2.51
Flow Path Length (ft)	756.0
Flow Path Slope (vft/hft)	0.008
85th Percentile Rainfall Depth (in)	1.03
Percent Impervious	0.841
Soil Type	16
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.03
Peak Intensity (in/hr)	0.2496
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.7728
Time of Concentration (min)	34.0
Clear Peak Flow Rate (cfs)	0.4842
Burned Peak Flow Rate (cfs)	0.4842
24-Hr Clear Runoff Volume (ac-ft)	0.1651
24-Hr Clear Runoff Volume (cu-ft)	7192.6178



Peak Flow Hydrologic Analysis

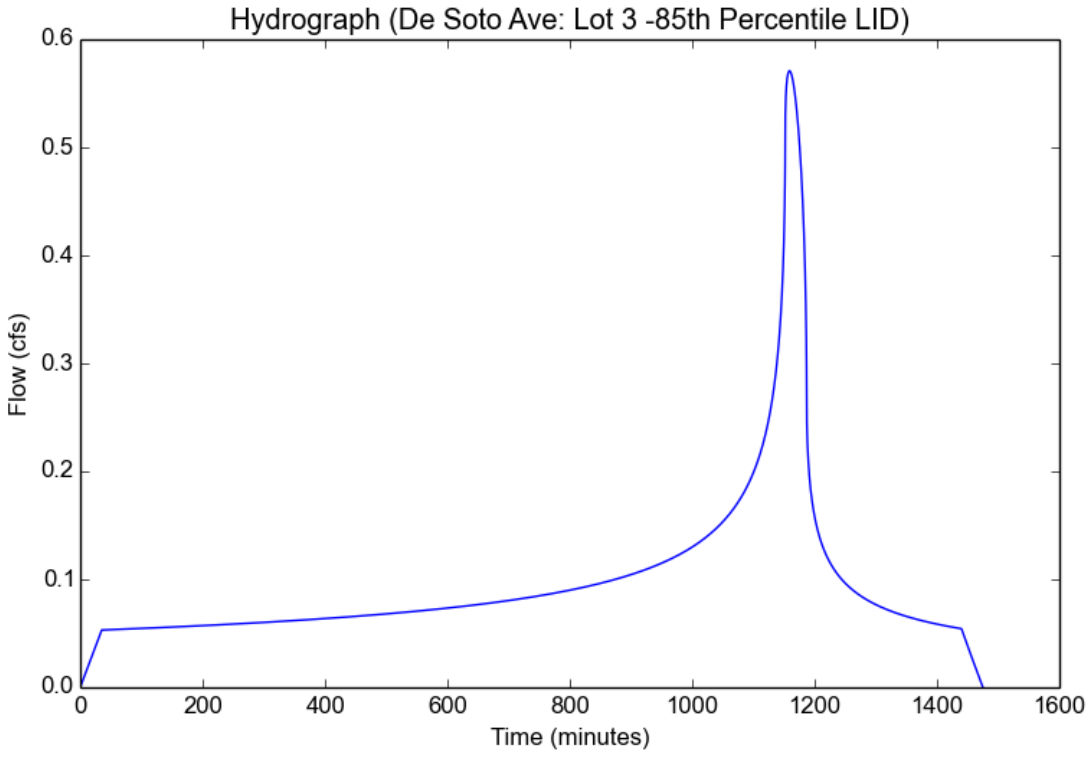
File location: W:/1LLJ010100/ENGR/DOCS/LID/HydroCalcs/De Soto Ave - Lot 3 -85th Percentile LID.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	De Soto Ave
Subarea ID	Lot 3 -85th Percentile LID
Area (ac)	2.93
Flow Path Length (ft)	685.0
Flow Path Slope (vft/hft)	0.005
85th Percentile Rainfall Depth (in)	1.03
Percent Impervious	0.864
Soil Type	16
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.03
Peak Intensity (in/hr)	0.2462
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.7912
Time of Concentration (min)	35.0
Clear Peak Flow Rate (cfs)	0.5708
Burned Peak Flow Rate (cfs)	0.5708
24-Hr Clear Runoff Volume (ac-ft)	0.1973
24-Hr Clear Runoff Volume (cu-ft)	8596.0797



Peak Flow Hydrologic Analysis

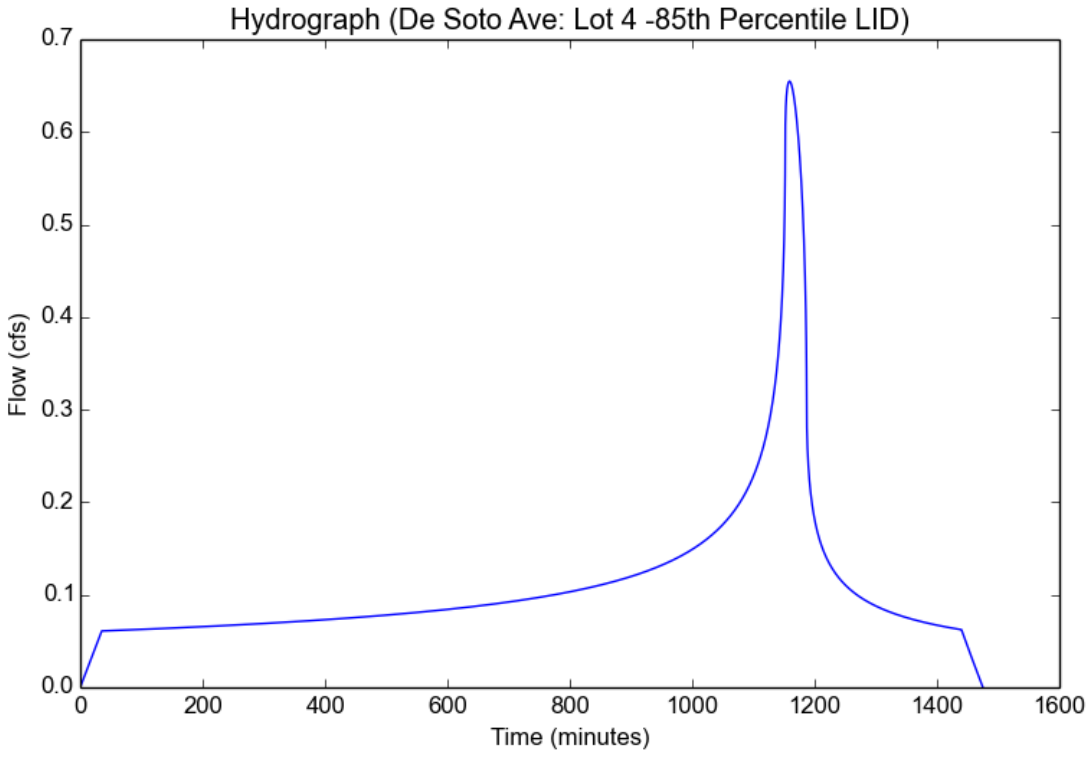
File location: W:/1LLJ010100/ENGR/DOCS/LID/HydroCalcs/De Soto Ave - Lot 4 -85th Percentile LID.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	De Soto Ave
Subarea ID	Lot 4 -85th Percentile LID
Area (ac)	3.51
Flow Path Length (ft)	821.0
Flow Path Slope (vft/hft)	0.011
85th Percentile Rainfall Depth (in)	1.03
Percent Impervious	0.822
Soil Type	16
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.03
Peak Intensity (in/hr)	0.2462
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.7576
Time of Concentration (min)	35.0
Clear Peak Flow Rate (cfs)	0.6548
Burned Peak Flow Rate (cfs)	0.6548
24-Hr Clear Runoff Volume (ac-ft)	0.2264
24-Hr Clear Runoff Volume (cu-ft)	9860.3792



Peak Flow Hydrologic Analysis

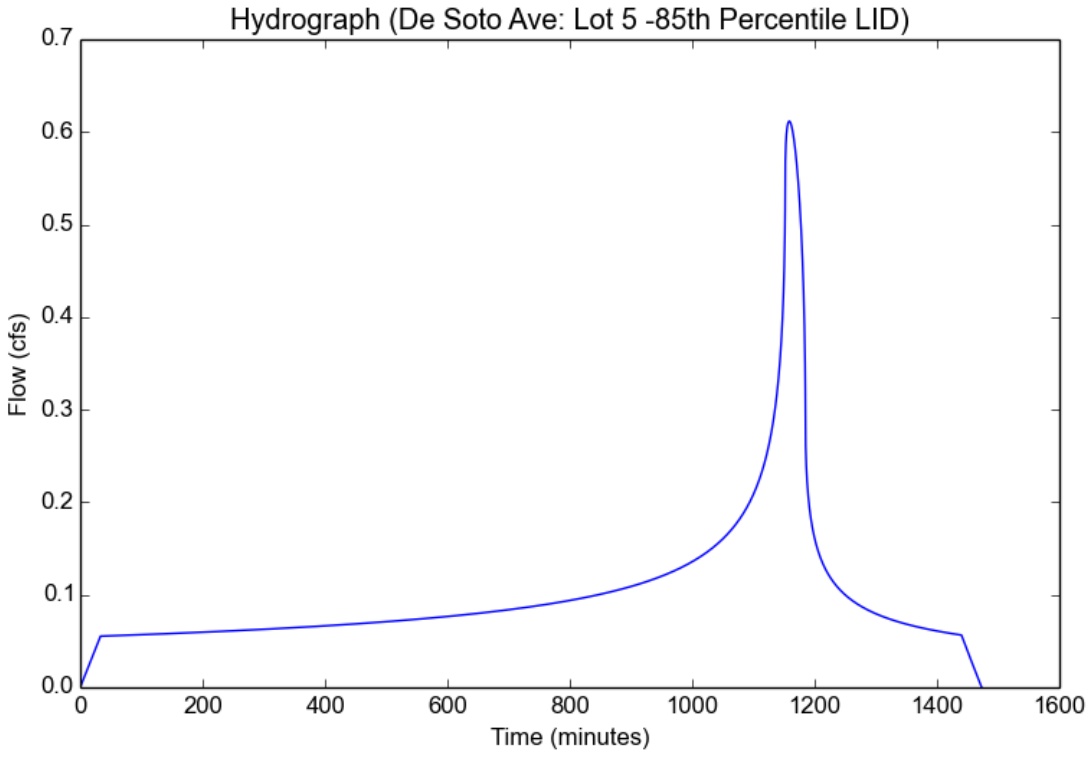
File location: W:/1LLJ010100/ENGR/DOCS/LID/HydroCalcs/De Soto Ave - Lot 5 -85th Percentile LID.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	De Soto Ave
Subarea ID	Lot 5 -85th Percentile LID
Area (ac)	3.23
Flow Path Length (ft)	729.0
Flow Path Slope (vft/hft)	0.01
85th Percentile Rainfall Depth (in)	1.03
Percent Impervious	0.81
Soil Type	16
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.03
Peak Intensity (in/hr)	0.2531
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.748
Time of Concentration (min)	33.0
Clear Peak Flow Rate (cfs)	0.6116
Burned Peak Flow Rate (cfs)	0.6116
24-Hr Clear Runoff Volume (ac-ft)	0.2057
24-Hr Clear Runoff Volume (cu-ft)	8958.801



Peak Flow Hydrologic Analysis

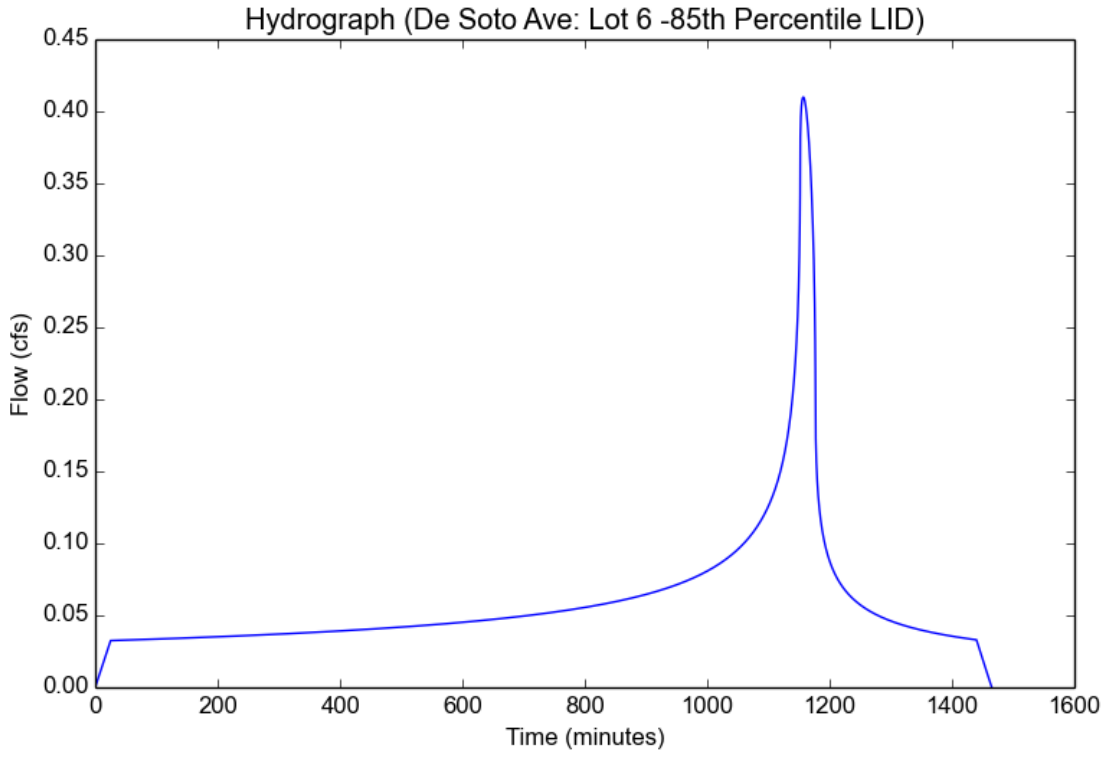
File location: W:/1LLJ010100/ENGR/DOCS/LID/HydroCalcs/De Soto Ave - Lot 6 -85th Percentile LID.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	De Soto Ave
Subarea ID	Lot 6 -85th Percentile LID
Area (ac)	1.88
Flow Path Length (ft)	539.0
Flow Path Slope (vft/hft)	0.014
85th Percentile Rainfall Depth (in)	1.03
Percent Impervious	0.82
Soil Type	16
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.03
Peak Intensity (in/hr)	0.2884
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.756
Time of Concentration (min)	25.0
Clear Peak Flow Rate (cfs)	0.4099
Burned Peak Flow Rate (cfs)	0.4099
24-Hr Clear Runoff Volume (ac-ft)	0.121
24-Hr Clear Runoff Volume (cu-ft)	5270.1481



Peak Flow Hydrologic Analysis

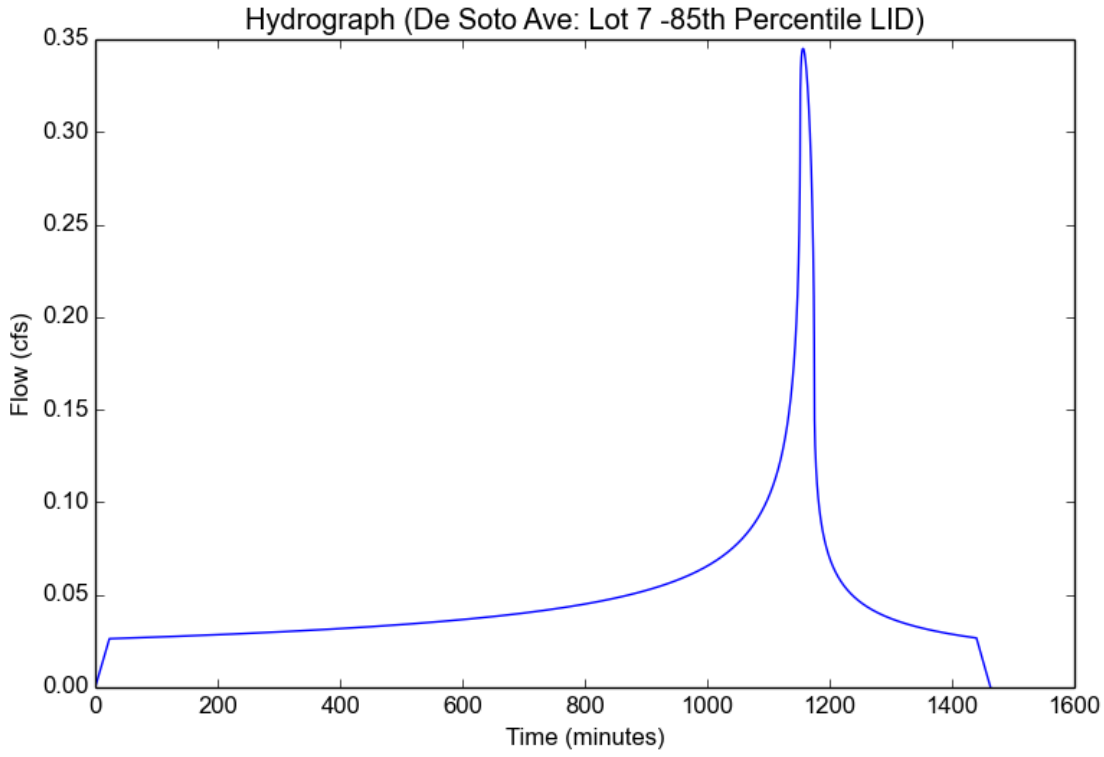
File location: W:/1LLJ010100/ENGR/DOCS/LID/HydroCalcs/De Soto Ave - Lot 7 -85th Percentile LID.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	De Soto Ave
Subarea ID	Lot 7 -85th Percentile LID
Area (ac)	1.46
Flow Path Length (ft)	434.0
Flow Path Slope (vft/hft)	0.01
85th Percentile Rainfall Depth (in)	1.03
Percent Impervious	0.86
Soil Type	16
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.03
Peak Intensity (in/hr)	0.2999
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.788
Time of Concentration (min)	23.0
Clear Peak Flow Rate (cfs)	0.3451
Burned Peak Flow Rate (cfs)	0.3451
24-Hr Clear Runoff Volume (ac-ft)	0.0979
24-Hr Clear Runoff Volume (cu-ft)	4266.0085



Peak Flow Hydrologic Analysis

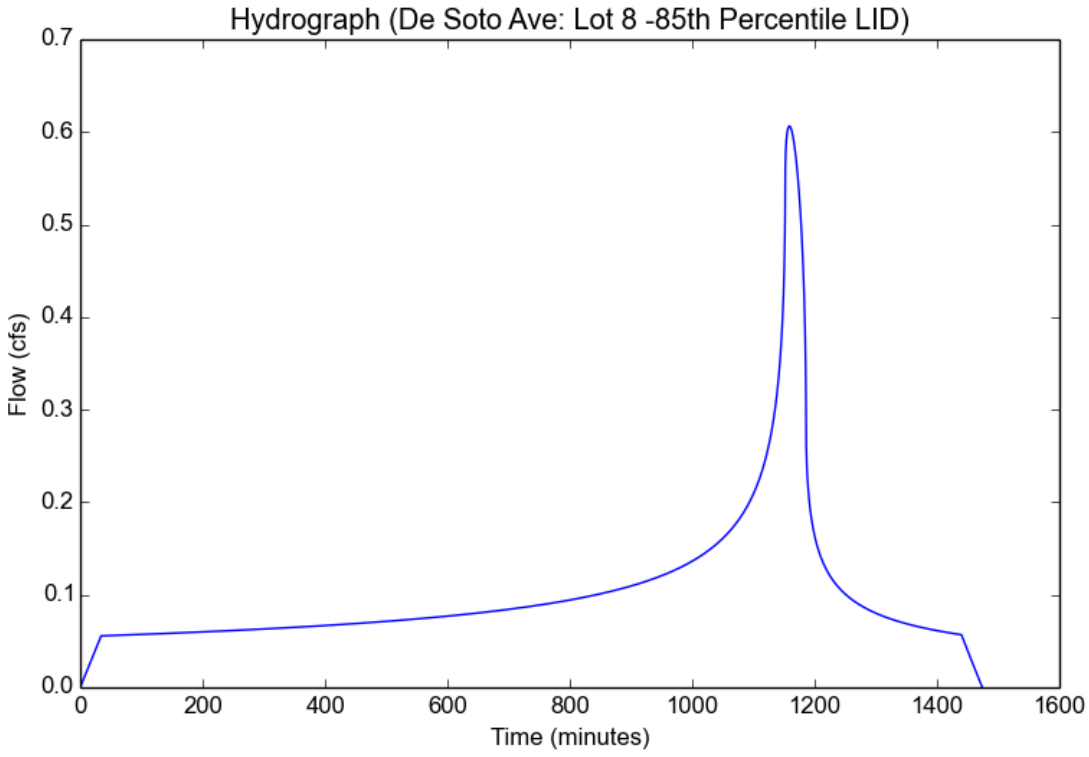
File location: W:/1LLJ010100/ENGR/DOCS/LID/HydroCalcs/De Soto Ave - Lot 8 -85th Percentile LID.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	De Soto Ave
Subarea ID	Lot 8 -85th Percentile LID
Area (ac)	3.47
Flow Path Length (ft)	556.0
Flow Path Slope (vft/hft)	0.004
85th Percentile Rainfall Depth (in)	1.03
Percent Impervious	0.75
Soil Type	16
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.03
Peak Intensity (in/hr)	0.2496
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.7
Time of Concentration (min)	34.0
Clear Peak Flow Rate (cfs)	0.6063
Burned Peak Flow Rate (cfs)	0.6063
24-Hr Clear Runoff Volume (ac-ft)	0.2068
24-Hr Clear Runoff Volume (cu-ft)	9006.8652



LOT 1

Design for: Capture & Use

Givens:

- V_{Design} = 14,493 ft³ *(from previous step)*
- 28,919 ft² of pervious area
- Medium Planting Type → Planting Factor = 0.4

i. Determine the design volume in gallons:

$$V_{Design}(gal) = 14{,}493\ ft^3 \bullet 7.48\ gal/ft^3 = 108{,}408\ gal$$

ii. Determine planting area (ft²) within project limits:

$$Planting\ Area\ (ft^2) = 28{,}919\ ft^2$$

iii. Determine Planter Factor, PF, (ft²):
(Planting factor may vary based on landscape design and plant types. Coordinate with Landscape Architect.)

$$Planter\ Factor\ (ft^2) = 0.4 \bullet 28{,}919\ ft^2 = 11{,}568\ ft^2$$

iv. Determine the 7- month (Oct 1 – April 30) Estimated Total Water Use (ETWU):

$$ETWU_{(7-month)} = ET_7 \bullet 0.62 \bullet PF$$

$$ETWU_{(7-month)} = 21.7 \bullet 0.62 \bullet 11{,}568\ ft^2 = 155{,}636\ gal$$

v. Verify $ETWU_{(7\text{-month})}$ is greater than or equal to the $V_{Designed}$:

$$ETWU_{(7-month))} = 155{,}636\ gal > V_{Design}(gal) = 108{,}408\ gal$$

ETWU IS GREATER THAN V DESIGN, THEREFORE CAPTURE AND RE-USE IS FEASIBLE

LOT 2

Design for: Capture & Use

Givens:

- V_{Design} = 7,193 ft³ *(from previous step)*
- 17,478 ft² of pervious area
- Medium Planting Type → Planting Factor = 0.4

i. Determine the design volume in gallons:

$$V_{Design}(gal) = 7193\ ft^3 \bullet 7.48\ gal/ft^3 = 53{,}804\ gal$$

ii. Determine planting area (ft²) within project limits:

$$Planting\ Area\ (ft^2) = 11{,}572\ ft^2$$

iii. Determine Planter Factor, PF, (ft²):
(Planting factor may vary based on landscape design and plant types. Coordinate with Landscape Architect.)

$$Planter\ Factor\ (ft^2) = 0.4 \bullet 11{,}572\ ft^2 = 4{,}629\ ft^2$$

iv. Determine the 7- month (Oct 1 – April 30) Estimated Total Water Use (ETWU):

$$ETWU_{(7-month)} = ET_7 \bullet 0.62 \bullet PF$$

$$ETWU_{(7-month)} = 21.7 \bullet 0.62 \bullet 4{,}629\ ft^2 = 62{,}276\ gal$$

v. Verify $ETWU_{(7\text{-month})}$ is greater than or equal to the $V_{Designed}$:

$$ETWU_{(7-month))} = 62{,}276\ gal > V_{Design}(gal) = 53{,}804\ gal$$

ETWU IS GREATER THAN V DESIGN, THEREFORE CAPTURE AND RE-USE IS FEASIBLE

LOT 3

Design for: Capture & Use

Givens:

- V_{Design} = 8,597 ft³ *(from previous step)*
- 17,407 ft² of pervious area
- Medium Planting Type → Planting Factor = 0.4

i. Determine the design volume in gallons:

$$V_{Design}(gal) = 8{,}597\ ft^3 \bullet 7.48\ gal/ft^3 = 64{,}306\ gal$$

ii. Determine planting area (ft²) within project limits:

$$Planting\ Area\ (ft^2) = 17{,}407\ ft^2$$

iii. Determine Planter Factor, PF, (ft²):
(Planting factor may vary based on landscape design and plant types. Coordinate with Landscape Architect.)

$$Planter\ Factor\ (ft^2) = 0.4 \bullet 17{,}407\ ft^2 = 6{,}963\ ft^2$$

iv. Determine the 7- month (Oct 1 – April 30) Estimated Total Water Use (ETWU):

$$ETWU_{(7-month)} = ET_7 \bullet 0.62 \bullet PF$$

$$ETWU_{(7-month)} = 21.7 \bullet 0.62 \bullet 6{,}963\ ft^2 = 93{,}676\ gal$$

v. Verify $ETWU_{(7\text{-month})}$ is greater than or equal to the $V_{Designed}$:

$$ETWU_{(7-month))} = 93{,}676\ gal > V_{Design}(gal) = 64{,}306\ gal$$

ETWU IS GREATER THAN V DESIGN, THEREFORE CAPTURE AND RE-USE IS FEASIBLE

LOT 4

Design for: Capture & Use

Givens:

- V_{Design} = 9,861 ft³ *(from previous step)*
- 27,334 ft² of pervious area
- Medium Planting Type → Planting Factor = 0.4

i. Determine the design volume in gallons:

$$V_{Design}(gal) = 9{,}861\ ft^3 \bullet 7.48\ gal/ft^3 = 73{,}760\ gal$$

ii. Determine planting area (ft²) within project limits:

$$Planting\ Area\ (ft^2) = 27{,}334\ ft^2$$

iii. Determine Planter Factor, PF, (ft²):
(Planting factor may vary based on landscape design and plant types. Coordinate with Landscape Architect.)

$$Planter\ Factor\ (ft^2) = 0.4 \bullet 27{,}334\ ft^2 = 10{,}934\ ft^2$$

iv. Determine the 7- month (Oct 1 – April 30) Estimated Total Water Use (ETWU):

$$ETWU_{(7-month)} = ET_7 \bullet 0.62 \bullet PF$$

$$ETWU_{(7-month)} = 21.7 \bullet 0.62 \bullet 6{,}963\ ft^2 = 147{,}101\ gal$$

v. Verify $ETWU_{(7\text{-month})}$ is greater than or equal to the $V_{Designed}$:

$$ETWU_{(7-month))} = 147{,}101\ gal > V_{Design}(gal) = 73{,}760\ gal$$

ETWU IS GREATER THAN V DESIGN, THEREFORE CAPTURE AND RE-USE IS FEASIBLE

LOT 5

Design for: Capture & Use

Givens:

- V_{Design} = 8,959 ft³ *(from previous step)*
- 26,861 ft² of pervious area
- Medium Planting Type → Planting Factor = 0.4

i. Determine the design volume in gallons:

$$V_{Design}(gal) = 8{,}959\ ft^3 \bullet 7.48\ gal/ft^3 = 67{,}013\ gal$$

ii. Determine planting area (ft²) within project limits:

$$Planting\ Area\ (ft^2) = 26{,}095\ ft^2$$

iii. Determine Planter Factor, PF, (ft²):
(Planting factor may vary based on landscape design and plant types. Coordinate with Landscape Architect.)

$$Planter\ Factor\ (ft^2) = 0.4 \bullet 26{,}095\ ft^2 = 10{,}438\ ft^2$$

iv. Determine the 7- month (Oct 1 – April 30) Estimated Total Water Use (ETWU):

$$ETWU_{(7-month)} = ET_7 \bullet 0.62 \bullet PF$$

$$ETWU_{(7-month)} = 21.7 \bullet 0.62 \bullet 10{,}744\ ft^2 = 140{,}433\ gal$$

v. Verify $ETWU_{(7\text{-month})}$ is greater than or equal to the $V_{Designed}$:

$$ETWU_{(7-month))} = 140{,}433\ gal > V_{Design}(gal) = 67{,}013\ gal$$

ETWU IS GREATER THAN V DESIGN, THEREFORE CAPTURE AND RE-USE IS FEASIBLE

LOT 6

Design for: Capture & Use

Givens:

- V_{Design} = 5,271 ft³ *(from previous step)*
- 14,778 ft² of pervious area
- Medium Planting Type → Planting Factor = 0.4

i. Determine the design volume in gallons:

$$V_{Design}(gal) = 5{,}271\ ft^3 \bullet 7.48\ gal/ft^3 = 39{,}427\ gal$$

ii. Determine planting area (ft²) within project limits:

$$Planting\ Area\ (ft^2) = 14{,}778\ ft^2$$

iii. Determine Planter Factor, PF, (ft²):
(Planting factor may vary based on landscape design and plant types. Coordinate with Landscape Architect.)

$$Planter\ Factor\ (ft^2) = 0.4 \bullet 14{,}778\ ft^2 = 5{,}911\ ft^2$$

iv. Determine the 7- month (Oct 1 – April 30) Estimated Total Water Use (ETWU):

$$ETWU_{(7-month)} = ET_7 \bullet 0.62 \bullet PF$$

$$ETWU_{(7-month)} = 21.7 \bullet 0.62 \bullet 5{,}911\ ft^2 = 79{,}529\ gal$$

v. Verify $ETWU_{(7\text{-month})}$ is greater than or equal to the $V_{Designed}$:

$$ETWU_{(7-month))} = 79{,}529\ gal > V_{Design}(gal) = 39{,}427\ gal$$

ETWU IS GREATER THAN V DESIGN, THEREFORE CAPTURE AND RE-USE IS FEASIBLE

LOT 7

Design for: Capture & Use

Givens:

- V_{Design} = 4,266 ft³ *(from previous step)*
- 14,778 ft² of pervious area
- Medium Planting Type → Planting Factor = 0.4

i. Determine the design volume in gallons:

$$V_{Design}(gal) = 4{,}266\ ft^3 \bullet 7.48\ gal/ft^3 = 31{,}910\ gal$$

ii. Determine planting area (ft²) within project limits:

$$Planting\ Area\ (ft^2) = 9{,}300\ ft^2$$

iii. Determine Planter Factor, PF, (ft²):
(Planting factor may vary based on landscape design and plant types. Coordinate with Landscape Architect.)

$$Planter\ Factor\ (ft^2) = 0.4 \bullet 9{,}300\ ft^2 = 3{,}720\ ft^2$$

iv. Determine the 7- month (Oct 1 – April 30) Estimated Total Water Use (ETWU):

$$ETWU_{(7-month)} = ET_7 \bullet 0.62 \bullet PF$$

$$ETWU_{(7-month)} = 21.7 \bullet 0.62 \bullet 3{,}720\ ft^2 = 50{,}049\ gal$$

v. Verify $ETWU_{(7\text{-month})}$ is greater than or equal to the $V_{Designed}$:

$$ETWU_{(7-month))} = 50{,}049\ gal > V_{Design}(gal) = 31{,}910\ gal$$

ETWU IS GREATER THAN V DESIGN, THEREFORE CAPTURE AND RE-USE IS FEASIBLE

LOT 8

Design for: Capture & Use

Givens:

- V_{Design} = 9,007 ft³ *(from previous step)*
- 38,464 ft² of pervious area
- Medium Planting Type → Planting Factor = 0.4

i. Determine the design volume in gallons:

$$V_{Design}(gal) = 9{,}007\ ft^3 \bullet 7.48\ gal/ft^3 = 67{,}372\ gal$$

ii. Determine planting area (ft²) within project limits:

$$Planting\ Area\ (ft^2) = 38{,}464\ ft^2$$

iii. Determine Planter Factor, PF, (ft²):
(Planting factor may vary based on landscape design and plant types. Coordinate with Landscape Architect.)

$$Planter\ Factor\ (ft^2) = 0.4 \bullet 38{,}464\ ft^2 = 15{,}386\ ft^2$$

iv. Determine the 7- month (Oct 1 – April 30) Estimated Total Water Use (ETWU):

$$ETWU_{(7-month)} = ET_7 \bullet 0.62 \bullet PF$$

$$ETWU_{(7-month)} = 21.7 \bullet 0.62 \bullet 15{,}386\ ft^2 = 206{,}998\ gal$$

v. Verify $ETWU_{(7\text{-month})}$ is greater than or equal to the $V_{Designed}$:

$$ETWU_{(7-month))} = 206{,}998\ gal > V_{Design}(gal) = 67{,}372\ gal$$

ETWU IS GREATER THAN V DESIGN, THEREFORE CAPTURE AND RE-USE IS FEASIBLE

LEGEND:

TC FLOW PATH

HYDROLOGY DRAINAGE SUB-AREA BOUNDARY

A
0.57 ac

SUB-AREA DESIGNATION AND ACREAGE

1A
10.2 AC

2A
14.2 AC

844.1 FT

860.5 FT

L=674 FT
S=1%

L=1042 FT
S=1.1%

DE SOTO AVENUE

SERRANIA AVENUE

WARNER CENTER LANE

BURBANK BOULEVARD

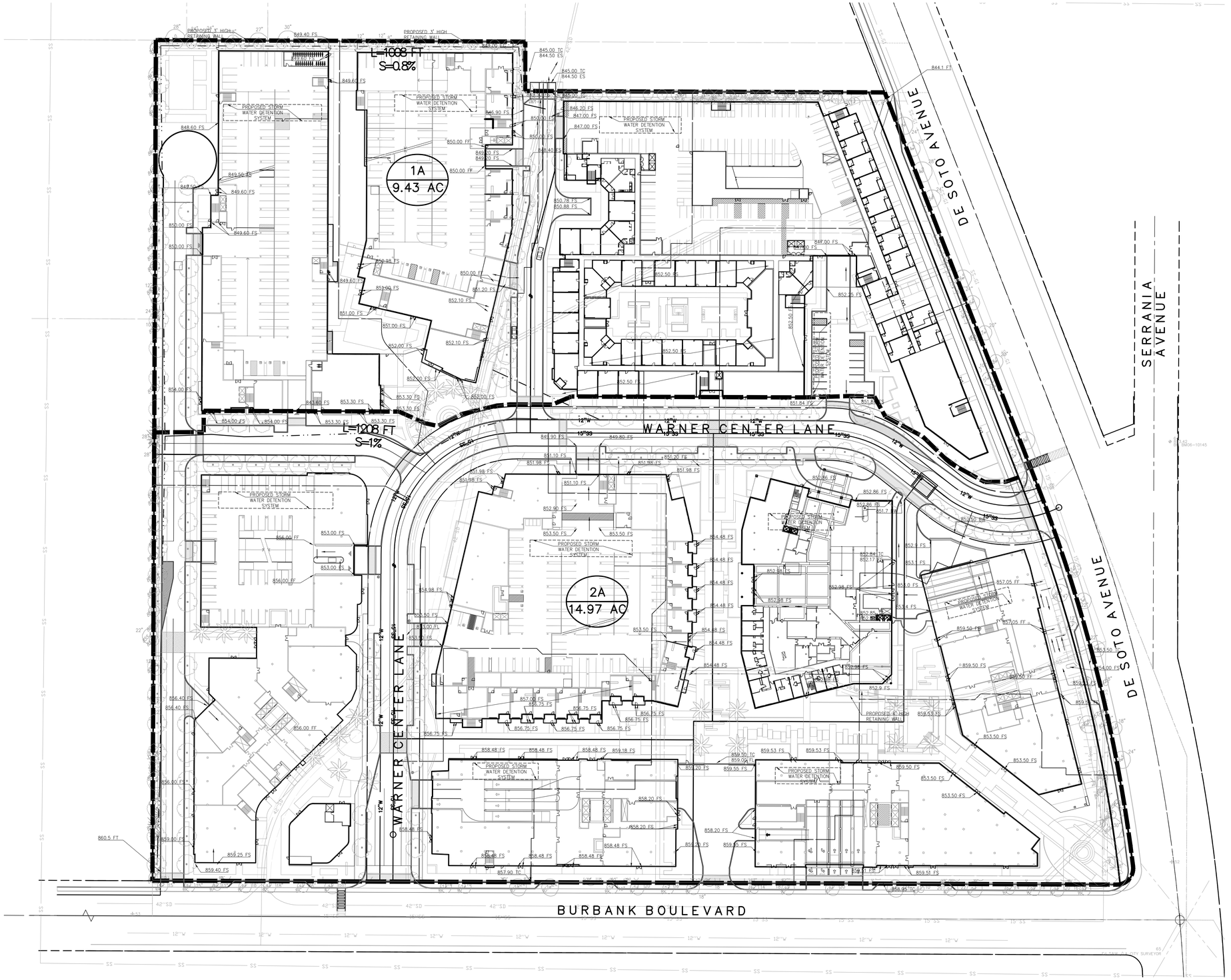
GRAPHIC SCALE
SCALE: 1" = 50'
Note: For reduced sized prints, original scale is in inches

DE SOTO AVENUE
EXISTING HYDROLOGY EXHIBIT

PSOMAS

DATE: 12-15-16 REVISED ON: 07-27-17
JOB No:1LLJ010100

SHEET 1 OF 1



LEGEND:

TC FLOW PATH

HYDROLOGY DRAINAGE SUB-AREA BOUNDARY

A
0.57 ac

SUB-AREA DESIGNATION AND ACREAGE

LID BMP TREATMENT SUMMARY

TOTAL AREA (ACRES)	TOTAL LIMIT OF WORK AREA (ACRES)	% LIMIT OF WORK	BMP DESIGN VOLUME Vw (FT^3)	
			REQUIRED	DESIGNED
24	24	100%	63,436 CF (FOR CAPTURE AND REUSE)	63,436 CF

50' 25' 0' 50' 100'

GRAPHIC SCALE
SCALE: 1" = 50'
Note: For reduced sized prints, original scale is in inches

DE SOTO AVENUE
PROPOSED HYDROLOGY EXHIBIT

PSOMAS

DATE: 12-15-16 REVISED ON: 05-21-19
JOB No:1LLJ010100

SHEET 1 OF 1