APPENDIX H1

Lemon Creek Hydrology and Hydraulics

Lemon Creek Hydrology & Hydraulics

Brookside Development Project

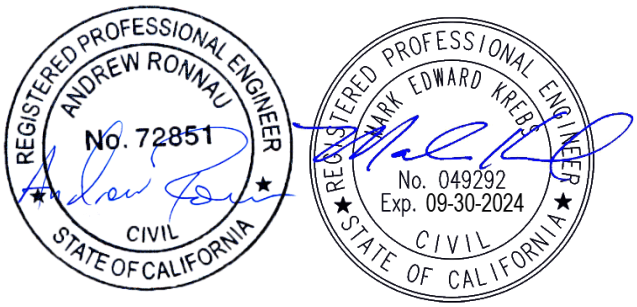
April 2024

Prepared For:

Spring Meadows Homes LLC /
Meadow Pass Estates LLC
18517 Gale Avenue, Suite A
City of Industry, CA 91748

Prepared By:

Pacific Advanced Civil Engineering, Inc.
17520 Newhope Street, Suite 200
Fountain Valley, CA 92708
714-481-7300



Contact Person:

Mark Krebs, P.E.
Andrew Ronnau, PhD, P.E.
Cherise Thompson, E.I.T.

PACE B852

Table of Contents

Executive Summary **1**
1 Project Location and Description **1-1**
1.1 Location 1-1
1.2 Land Use Designations / Proposed Use 1-1
1.3 Access 1-1
1.4 Open Space 1-1
1.5 Stormwater / Lemon Creek 1-1
1.6 "Before Project" Conditions 1-2
1.7 "After Project As-Proposed" Conditions 1-9
2 Hydrology **2-1**
2.1 Regional Hydrology – Lemon Creek 2-1
2.1.1 Previous Studies 2-1
2.1.2 PACE Regional Hydrology Methodology 2-1
2.1.3 Tributary Watersheds / Topographic Data 2-2
2.1.4 Precipitation and Storm Pattern 2-2
2.1.5 Loss Rates 2-4
2.1.6 Lag Time 2-6
2.1.7 Unit Hydrographs 2-8
2.1.8 Routing 2-9
2.1.9 Time Step 2-9
2.1.11 Results 2-10
2.2 Local Hydrology – Brookside Development Project 2-12
2.2.1 Local Hydrology Methodology 2-12
2.2.2 Results 2-17
2.2.3 Hydromodification Avoidance Measures 2-19
3 Hydraulics **3-20**
3.1 Modeling Data and Assumptions 3-20
3.1.1 Extents of Model 3-20
3.1.2 Cross-Section Spacing and Alignment 3-20
3.1.3 Discharge / Flow Rate 3-21
3.1.4 Manning's Roughness – "n" Values 3-21
3.1.5 Hydraulic Flow Regime 3-21
3.1.6 Boundary Condition 3-21
3.1.7 Topographic Data Source 3-22
3.1.8 Hydraulic Structure Data – Culverts 3-22
3.2 Modeling Results 3-23
3.2.1 "Before Project" Condition Hydraulic Results 3-23
3.2.3 "After Project As-Proposed" Condition Hydraulic Results 3-24
3.2.4 Comparison of "Before Project" & "After Project As-Proposed" Hydraulic Results 3-25
3.2.5 La Puente Culvert / Roadway 3-27
3.3 Stream Stability, Sediment Transport, and Erosion Potential in Lemon Creek 3-28
3.3.1 Long-Term Erosion Potential Analysis 3-28
3.3.2 Short-Term Erosion Potential Analysis 3-35
3.3.3 Natural Sedimentation Processes Maintained by Vegetation 3-42
4 Water Quality **4-1**
4.1 Water Quality Analysis 4-2
4.1.1 Annual Average Runoff Volume 4-2
4.1.3 Runoff Pollutant Concentrations 4-6
4.1.4 "Before Project" and "After Project As-Proposed" Pollutant Loadings to Lemon Creek 4-9
5 Conclusions **5-1**
References **1**

Tables

Table 1-1: Lemon Creek Existing Culverts 1-3
Table 1-2: Proposed Land Use Summary 1-9
Table 2-1: NOAA Atlas 2 Precipitation Values 2-2
Table 2-2: SCS Soil Loss Input Data 2-4
Table 2-3: LAG Time per Sub-Watershed 2-6
Table 2-4: HEC-HMS Model Results for Lemon Creek Regional Hydrology at La Puente Rd. 2-12
Table 2-5: HydroCalc On-Site Hydrology Inputs – "Before Project" Conditions 2-14
Table 2-6: HydroCalc On-Site Hydrology Inputs – "After Project As-Proposed" Conditions 2-14
Table 2-7: HydroCalc Results for On-Site Hydrology ("Before Project" Conditions) 2-17
Table 2-8: HydroCalc Results for On-Site Hydrology ("After Project" Conditions - w/o Basins) 2-18
Table 2-9: Project Changes to Runoff Peak Flow Rate & Volume Compared to Total Watershed Storm Hydrograph 2-19
Table 3-1: HEC-RAS Flow Rate Data 3-21
Table 3-2: Manning's Roughness "n" Values in Lemon Creek 3-21
Table 3-3: Culvert Data 3-22
Table 3-4: "Before Project" Conditions Hydraulic Results 3-23
Table 3-5: "After Project As-Proposed" Conditions Hydraulic Results 3-24
Table 3-6: Comparison of "Before Project" and "After Project As-Proposed" Conditions Water Surface Elevations 3-25
Table 3-7: Comparison of "Before Project" and "After Project As-Proposed" Conditions Velocities 3-27
Table 3-8: Reach Delineations 3-32
Table 3-9: Average Reach Work Performed – "Before Project" Conditions 3-32
Table 3-10: Average Reach Work Performed – "After Project As-Proposed" Conditions 3-33
Table 3-11: Erosion Potential of the "After Project As-Proposed" Condition 3-33
Table 3-12: Long-Term Erosion Potential of Lemon Creek 3-35
Table 3-13: Maximum Vertical Bed Shift Reach 5 (Short Term 25-, 50-yr Analysis) 3-37
Table 3-14: Top of Bank vs Grading Screening Results 3-44
Table 4-1: Water Quality Analysis - Precipitation Depths Analyzed 4-3
Table 4-2: Santa Fe Dam Gage Record - Yearly Runoff Volumes for Brookside 4-4
Table 4-3: Pollutant Runoff Concentrations 4-6
Table 4-4: "Before Project" Project Condition Pollutant Loadings to Lemon Creek 4-9
Table 4-5: "After Project As-Proposed" BMP Pollutant Removal Efficiencies – Low Density Residential Areas 4-10
Table 4-6: "After Project As-Proposed" BMP Pollutant Removal Efficiencies – Open Space (Equestrian) Areas 4-10
Table 4-7: "Before Project" vs. "After Project As-Proposed" Pollutant Discharges to Lemon Creek 4-11

Figures

Figure 1-1: Vicinity Map 1-4
Figure 1-2: "Before Project" Project Site Map 1-5
Figure 1-3: Downstream Face of 'Culvert A' 1-6
Figure 1-4: Downstream Face of 'Culvert B' 1-6
Figure 1-5: Upstream Face of 'Culvert C' 1-7
Figure 1-6: Downstream Face of 'Culvert D' (To Be Removed) 1-7
Figure 1-7: La Puente Culvert at Downstream End of Property 1-8
Figure 1-8: Dense Vegetation Within Lemon Creek 1-8
Figure 1-9: Site Development Plan 1-10
Figure 2-1: Regional Watershed Boundary 2-3
Figure 2-2: Valley Developed S-Graph 2-8
Figure 2-3: Valley Undeveloped S-Graph 2-9
Figure 2-4: 2-yr Runoff Hydrograph 2-10
Figure 2-5: 5-yr Runoff Hydrograph 2-10
Figure 2-6: 25-yr Runoff Hydrograph 2-11
Figure 2-7: 50-yr Runoff Hydrograph 2-11
Figure 2-8: 100-yr Runoff Hydrograph 2-12

Figure 2-9: On-Site Hydrologic Workmap – “Before Project” Conditions 2-15
Figure 2-10: On-Site Hydrologic Workmap – “After Project As-Proposed” Conditions.....2-16
Figure 3-1: “Before Project” vs. “After Project As-Proposed” Floodplain.....3-26
Figure 3-2: Shield’s Diagram.....3-30
Figure 3-3: Erosion Potential Probability Curve.....3-34
Figure 3-4: Lateral Erosion Envelope Template 3-36
Figure 3-5: Maximum Bed Degradation Reach 5 (Short Term 25-, 50-yr Analysis).....3-37
Figure 3-6: HEC-RAS Section 1399.42 Maximum Degradation Envelope.....3-38
Figure 3-7: HEC-RAS Section 1367.42 Maximum Degradation Envelope.....3-39
Figure 3-8: HEC-RAS Section 1257.87 Maximum Degradation Envelope.....3-40
Figure 3-9: HEC-RAS Section 1151.21 Maximum Degradation Envelope.....3-41
Figure 3-10: HEC-RAS Section 1131.21 Maximum Degradation Envelope.....3-42
Figure 3-11: Natural Bank Station Determination Workmap (XS 3105.06 to 2565.90) 3-45
Figure 3-12: Natural Bank Station Determination Workmap (XS 2502.39 to 1593.83) 3-46
Figure 3-13: Natural Bank Station Determination Workmap (XS 1465.87 to 1000.00) 3-47
Figure 4-1: Existing Land Uses for Water Quality Analysis 4-7
Figure 4-2: Proposed Land Uses for Water Quality Analysis 4-8

Appendix A – HydroCalc Results
Appendix B - As-Built Plans
Appendix C – Stream Stability Memo
Appendix D – Trash Rack Memo
Appendix E – LACFCD Hydrology Info Request Summary
Appendix F – Water Quality Analysis

Executive Summary

The following report provides hydrologic and hydraulic analyses and results for the proposed Brookside Project, located at 800 Meadow Pass Rd. in the City of Walnut. The purpose of this report is to compare the "Before Project" and "After Project as Proposed" conditions to evaluate the potential hydrologic and hydraulic impacts due to proposed improvements on the 25.8-acre property. Among other things, this analysis will (i) identify components of the project design ("project design features") which avoid, lessen, or eliminate what otherwise might be significant adverse impacts of the proposed project and (ii) recommended mitigation measures, where necessary, which, if required as conditions of approving the project, could reasonably be expected to reduce adverse impacts of the project as designed.

The "project as-proposed" would develop approximately 13.6 acres of the property over 27 lots, leaving 12.2 acres as permanent open space, some of which would be privately owned or residentially zoned property. Lemon Creek, a natural drainage feature that flows through the site, would remain largely untouched with exception to (1) the removal of one of four existing culverts (Culvert D), (2) the construction of the 'Street B' bridge crossing, (3) the relocation of an existing storm drain outlet in Lemon Creek, which only conveys off-site flows, and (4) the creation of new storm drain outlets where Water Quality Basin No. 1 and 2 discharge to Lemon Creek.

Culvert D is only capable of conveying runoff from very small storm events and otherwise overtops. The hydraulic turbulence caused by the overtopping of the culvert results in an increased risk of erosion, instability, and damage in the existing creek section; therefore, the removal of Culvert D would constitute an improvement to the stability of Lemon Creek and restore a more natural condition.

A regional hydrologic analysis was performed in order to identify peak flow rates for the 2-, 5-, 25-, 50-, and 100-yr storm events in Lemon Creek. At the confluence point at the upstream end of the La Puente Culvert, Lemon Creek receives runoff from a 1,541-acre tributary watershed that is largely developed. The analysis showed that the 100-yr event produces a peak runoff flow rate of 2,954 cfs; the 50-yr event produces 2,540 cfs, the 25-yr event produces 2,176 cfs, the 5-yr event produces 1,347 cfs, and the 2-yr event produces 975 cfs (**Table 2-4**).

The peak flow rates derived from the regional watershed analysis were used in hydraulic modeling of Lemon Creek for "before project" and "after project as-proposed" conditions evaluations. The "after project as-proposed" condition shows no increased peak runoff flow rates due to peak flood attenuation provided by two water quality basins proposed on the site (described in further detail below). The resulting water surface elevations and velocities were compared for the "before project" and "after project as-proposed" condition, showing minor changes in the vicinity of Culvert D (**Table 3-6**). A long-term stream stability / erosion potential analysis was performed to evaluate sediment transport trends in Lemon Creek, which show that the "project as-proposed" will not significantly change the potential for erosion in the creek. The "project as-proposed" is not anticipated to significantly change the potential of erosion or instability in Lemon Creek. Additionally, the existing vegetation in the creek and other culverts (A, B, C, and La Puente) will continue to contribute to the stabilization of the creek in the "after project as-proposed" condition.

Floodplain mapping was also performed, showing that the "after project as-proposed" floodplain would inundate less area than in the "before project" condition. No off-site areas would be added to the 100-yr floodplain limits. All proposed lots would be constructed with a pad elevation higher than the calculated 100-yr water surface elevations, plus freeboard.

A local hydrologic analysis was also performed in order to determine potential changes to peak runoff discharge rate and volume due to "project as-proposed". On-site runoff was evaluated in the "before project" and "after project as-proposed" condition for the 85th percentile, 2-yr, 5-yr, 25-yr, 50-yr, and 100-yr storm events. Comparison of the "Before Project" and "After Project as Proposed" conditions showed that the proposed water quality basin in the north of the site (Water Quality Basin No.1) eliminates increases in runoff peak flow rate and volume in Lemon Creek for all storm events analyzed up to a 100-yr storm event (**Table 2-8**). Without Water Quality Basin No. 1, increases in both runoff peak flow rate and volume would have occurred for the 85th percentile and 2-yr events, and increases in runoff volume would have occurred

for all storm events analyzed, due to the increased impervious area associated with the development. The increases in runoff flow rate and volume are avoided, up to the 100-yr storm event through detention of 100% of the runoff volume increases associated with the 100-yr storm event (2.7 ac-ft). Due to poor infiltration rates on the site (<0.3 in/hr), the captured water could not be reliably retained and infiltrated on-site; therefore, it would be slowly released into Lemon Creek without changing the peak of the storm runoff hydrograph of the watershed at-large. As a result of Water Quality Basin No.1, no further mitigation measures are needed or recommended to avoid, lessen, or eliminate any impacts of the proposed project with respect to runoff peak flow rate and volumes.

Comparison of the "Before Project" and "After Project as Proposed" conditions showed that the two proposed water quality basins reduce the loadings / concentrations of pollutants reaching Lemon Creek. Without the proposed water quality basins, increased impervious area associated with the proposed development of 13.6 acres of the site would have resulted in an increase in pollutants reaching Lemon Creek compared to the undeveloped condition. In accordance with LA County *LID Standards Manual* regulations, the water quality basins would be designed to detain / treat 1.5 x the 85th percentile runoff volume from their respective drainage areas before discharging to Lemon Creek due to the fact that poor infiltration rates would prevent any of the captured volume from being reliably retained on-site. A water quality analysis was performed, as described in **Section 4**, demonstrating the project will not have adverse impacts to water quality in Lemon Creek. No further mitigation measures are needed or recommended to avoid, lessen, or eliminate any impacts of the proposed project with respect to the quality of runoff from the site.

1 Project Location and Description

1.1 Location

The project site consists of 25.8 acres located at 800 Meadow Pass Road. It is comprised of Assessor's Parcel Nos. 8709-093-001, -002, and -003 and is bordered by La Puente Road to the south, North Lemon Avenue to the west, Meadow Pass Road to the north, and homes to the east. It is in the southeast portion of the City of Walnut (City), approximately 2.3 miles northwest of the confluence of State Route 60 and State Route 57 (See **Figure 1-1**). It is depicted on Township 02S, Range 09W, Section 6 of the United States Geological Survey, San Dimas California 7.5-minute quadrangle (Figure 2). The approximate center of the project site is located at latitude 34.024363 °N and longitude -117.866254°W.

1.2 Land Use Designations / Proposed Use

The project site has a General Plan designation of Very Low Density and is zoned Residential Planned Development Zone (RPD) with a designation of RPD–28,500–1.3. Pursuant to Section 6.24.030 A2 of the Walnut Municipal Code, the project proposes the development of 27 detached single-family homes under R-1 standards with a minimum lot size of 28,500 square feet. The project requires approval of a Tentative Tract Map and Site Plan/Architectural Review.

1.3 Access

All project streets will be public. The northerly 25 homes will take access from Meadow Pass Road and the two most southerly homes will take access from San Vicente Drive, with each street ending in a cul-de-sac to preclude cut-through traffic. A bridge will provide access over Lemon Creek to those homes south of Lemon Creek that will be accessed from Meadow Pass Road.

1.4 Open Space

The entirety of Lemon Creek will be preserved and included within 12.2 acres of privately owned and residentially zoned property - over 47% of the site – that will serve as permanent open space. Currently, the site contains approximately 1,876 trees. Through preservation and new plantings, the project will increase the number of trees onsite to approximately 1,936, also increasing the ratio of native to non-native/invasive trees. The developer will improve to City trail standards a public trail that will run through the open space area, passing across the project's primary road. An easement will then be granted to the City for the long-term operation and maintenance of the public trail.

As is common with existing development throughout the City's Residential Planned Development Zone, 9.5 acres of the open space area will be within privately owned residential lots. Those portions of open space, Lemon Creek, and the public trail within private lots will be subject to recorded deed restrictions prohibiting use of the restricted open space by the owners of the private lots, including planting vegetation, installing fencing, or otherwise developing or using the restricted natural open space areas. The restrictions will be enforceable by the City. The remaining 2.7 acres of the open space area will consist of internal slope areas and water quality basins that will be owned by a public agency or the Homeowners Association (HOA) and subject to similar deed restrictions.

The open space will be maintained by a combination of a Lighting and Open Space Maintenance District (LOSMD) through a new zone funded entirely by the project's homeowners (as to the natural open space only), the City (as to the trail only), the flood control district or another public or quasi-public agency (as to the water quality basins only), and the project's HOA.

1.5 Stormwater / Lemon Creek

Three public storm drain inlets along Meadow Pass Road at the northerly boundary of the project site currently direct offsite stormwater into and through existing public storm drain lines within the project site. That offsite stormwater then enters Lemon Creek through two existing outlets. These public storm drains,

which do not capture onsite stormwater now and will not do so when the project is complete, will be realigned under the project streets. One of the existing outlets into Lemon Creek will remain in its current location, while the second will be relocated to a point downstream of the proposed project bridge. **Figure 1-2** shows the "before project" site conditions.

While onsite stormwater historically flows directly into the creek, two water quality basins have been designed to detain any increase in on-site stormwater runoff resulting from the proposed development, up to a 100-year storm event. These basins will treat on-site runoff up to the 85th percentile storm event, consistent with Los Angeles County regulations. One water quality basin will be in the northern portion of the site and will hold and gradually release project stormwater into an existing public storm drain connection which enters the property from Lemon Avenue. The second water quality basin will be in the southern portion of the site and will hold and gradually release project stormwater into a proposed outlet to Lemon Creek. These water quality basins are designed to assure that project stormwater will enter Lemon Creek onsite at a volume and flow rate no greater than presently occurs. Runoff entering Lemon Creek will then pass offsite into existing public drainage facilities located on public property adjacent to the project site at La Puente Road.

1.6 "Before Project" Conditions

The "before project" site is primarily undeveloped, but contains various equestrian-related structures, including two horse barns with stables, fenced riding rings, maintenance storage facilities, feed sheds, and a covered riding arena. Although the site is privately owned, it is clear from past site visits that many nearby residents frequently use the trails adjacent to Lemon Creek.

Lemon Creek runs through the site, traveling approximately 2,340 feet within the project site from northeast to southwest. The existing project reach has a watershed approximately 1,541 acres in size, originating north of Meadow Pass Road. Nearly all of the project reach of Lemon Creek is vegetated, with some of the older trees and vegetation aged more than 15 years. The creek has a natural, trapezoidal shape with a low flow path created by a steady flow of water, consisting of dry weather flow and base flow, which is present even in the summer months. Small portions of the creek are engineered, primarily at each of the four culvert locations. These culverts also provide a place for the trail network to cross over the creek. The existing culvert locations and sizes are summarized in **Table 1-1**. There is some existing storm drain infrastructure on-site, including three storm drain inlets which convey flow from the catch basins on Meadow Pass Road and Colt Lane to two outlet locations within Lemon Creek. At the downstream end of the property, Lemon Creek enters a double 10 ft.(w) x 5 ft.(h) box culvert beneath La Puente Road, which is maintained by the City of Walnut (P.M. 14987, included in **Appendix B**). The La Puente culvert was designed for a 25-year flow rate of 1,750 cfs, according to the LACDPW as-built drawing dated October 4th, 1982 (See **Appendix B**).

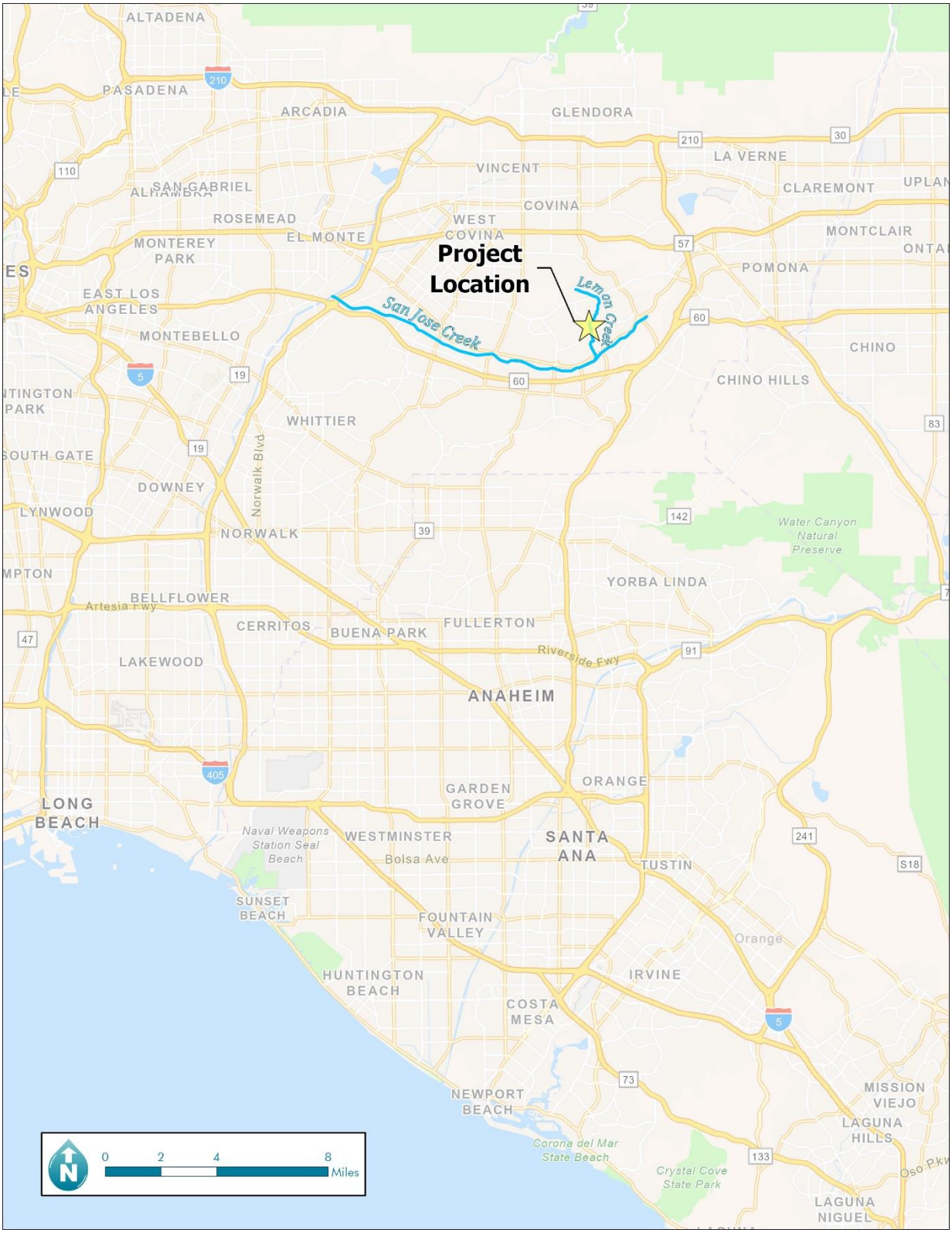
Table 1-1: Lemon Creek Existing Culverts

Creek Station	Culvert ID	Shape	Dimensions
29+34.17	SD Outlet 1	Circular	24-in. Dia.*
26+25.92	A	Circular	6.75 ft. Dia.* / 60 ft. Length
22+71	Lemon Ave. SD Outlet (SD Outlet 2)	Circular	81-in. Dia.*
22+30.01	B	Circular	6.0 ft. Dia.* / 22 ft. Length
14+12.68	C	Arch	13.5 ft.(w) x 10.25 ft.(h) / 16.5 ft. Length
11+16.46	D	Circular	6.0 ft. Dia.* / 19.5 ft. Length
10+00	La Puente Culvert	Double RCB	10'w x 5'h / 915 ft. Length

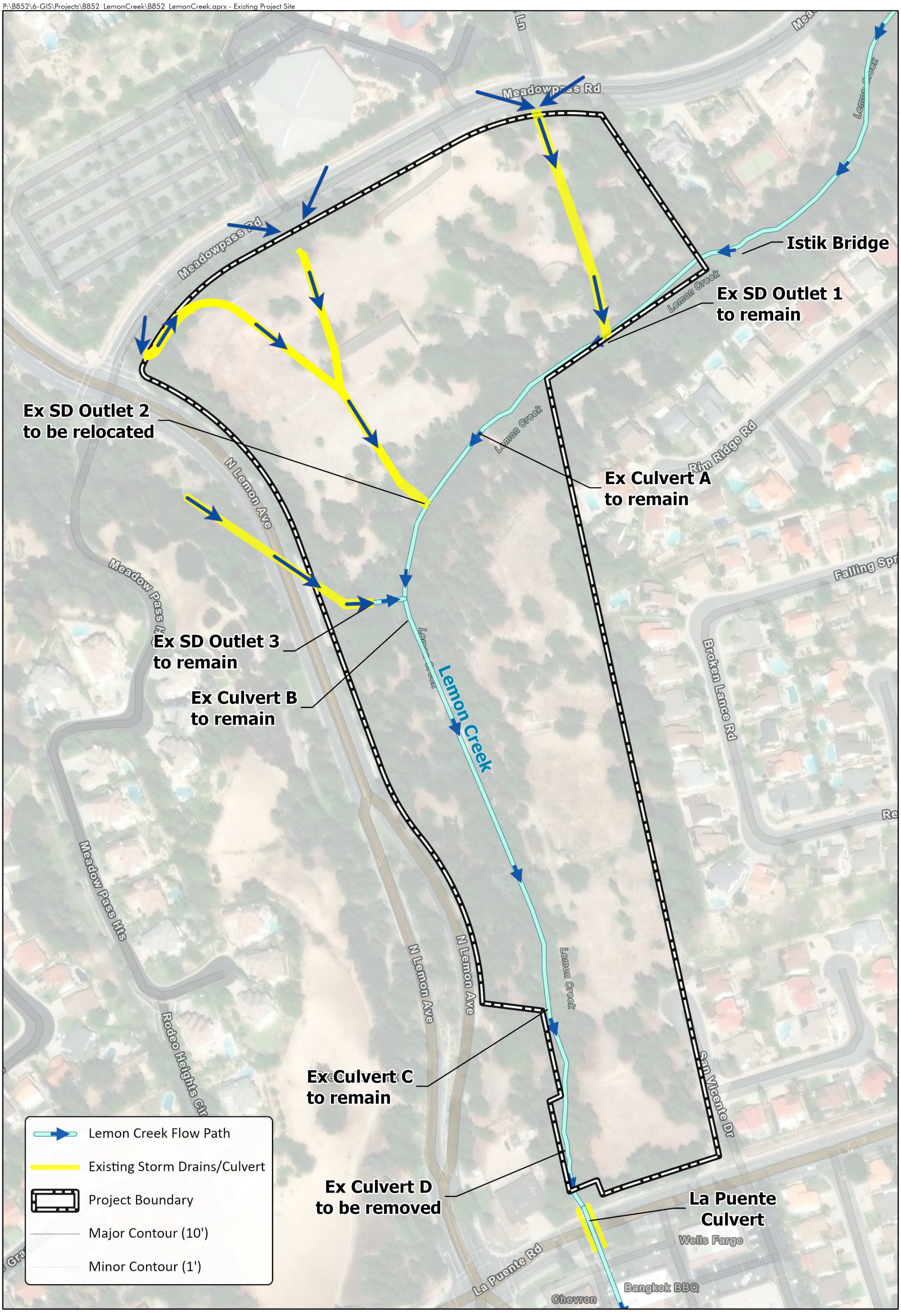
**Dia = diameter*

A site visit was performed by PACE on August 30th, 2021, during which a photo survey was performed to document the current conditions of the creek. Representative photos which characterize the creek are presented in **Figures 1-3** through **1-8**.

Figure 1-1: Vicinity Map



P:\B852\6-GIS\Projects\B852_LemonCreek\B852_LemonCreek.aprx - Existing Project Site



BROOKSIDE DEVELOPMENT

EXISTING PROJECT SITE

PACE Advanced Water Engineering

0 87.5 175 350 Feet

Date: 3/30/2023

Job Number: B852

Figure 1-2

Figure 1-3: Downstream Face of 'Culvert A'



Figure 1-4: Downstream Face of 'Culvert B'



Figure 1-5: Upstream Face of 'Culvert C'



Figure 1-6: Downstream Face of 'Culvert D' (To Be Removed)



Figure 1-7: La Puente Culvert at Downstream End of Property



Figure 1-8: Dense Vegetation Within Lemon Creek



1.7 "After Project As-Proposed" Conditions

The proposed Brookside Development Project proposes the removal of the existing equestrian-related structures and the construction of 27 residential housing lots, each with a minimum lot area of 28,500 square feet (See **Figure 1-9**). A summary of the proposed land use is provided in **Table 1-2**.

Table 1-2: Proposed Land Use Summary

Use	Acres	Unit	Residential Density
Single-Family Residential	19.95	27 Lots / 27 Dwelling Units	0.75 DU/AC*
Open Space	2.67	6 Lots	-
Public Streets (San Vicente Drive, A Street, B Street)	3.22	-	-
Total	**25.84**	**33 Lots / 27 Dwelling Units 6 Open Space Lots**	**0.75 DU/AC***

**DU = dwelling unit; AC = acres*

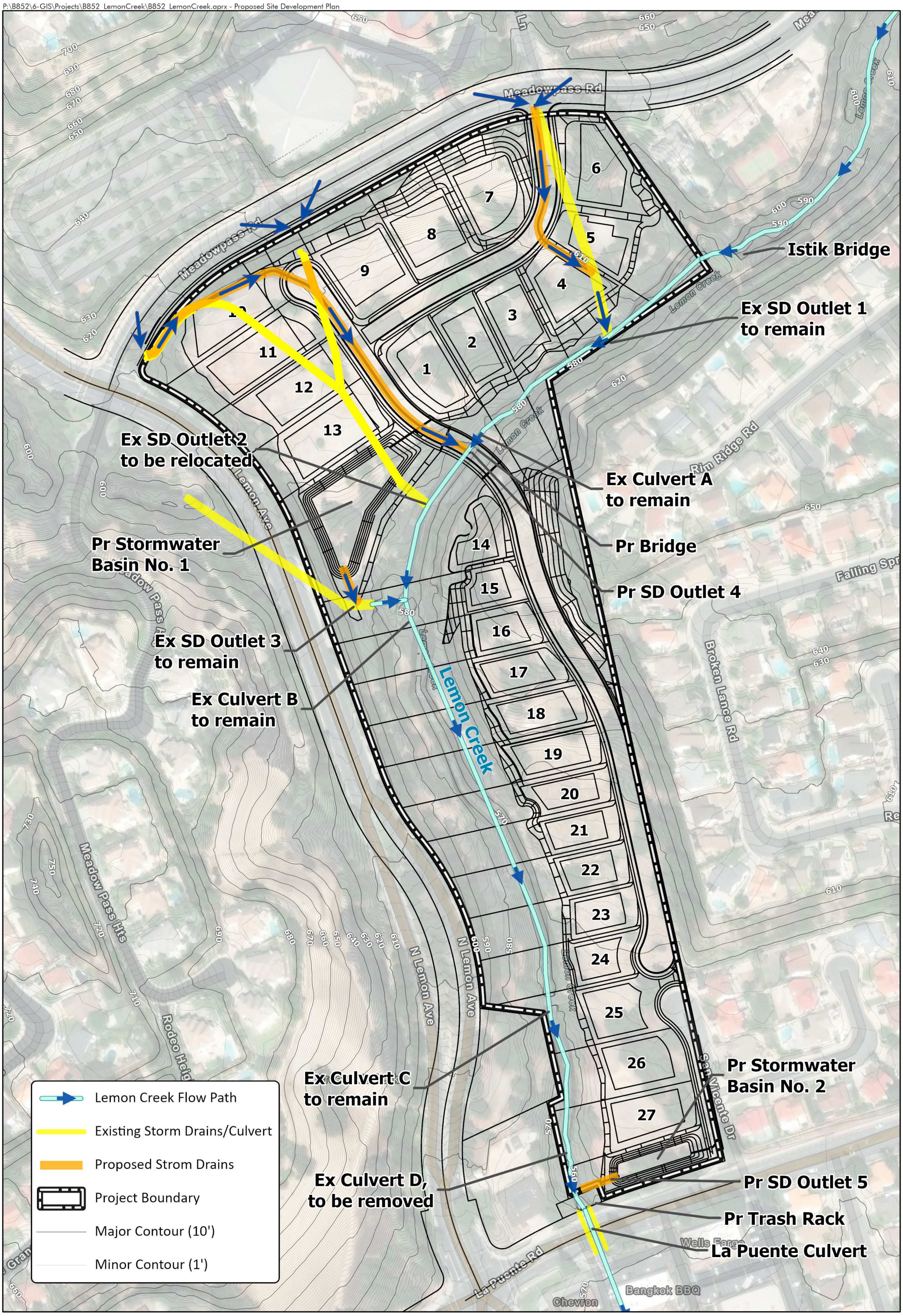
The 27 proposed dwelling units will be built adjacent to the Creek and will generally be elevated above existing ground in those areas. In addition to the 27 proposed dwelling units, new roads will be created to provide access to the homes from Meadow Pass Road. The change in land use from an equestrian center to a residential community will require that two water quality basins be built to treat runoff leaving the proposed development before it enters Lemon Creek and to avoid increases in peak storm runoff flow rates and volumes from the development. It should be noted that no stormwater is proposed to flow directly from developed areas into Lemon Creek. All run-off from the proposed development areas will undergo treatment in the water quality basins first, in accordance with LA County *Low Impact Development (LID) Standards Manual* requirements.

The existing Culvert D in Lemon Creek is grossly undersized and overtops in even the 2-yr event. The overtopping causes undue stress and hydraulic disturbance to the natural stream through increased turbulence and velocities on the downstream side of the culvert; therefore, the culvert is proposed to be removed. The project proposes the removal of Culvert D, which will provide vegetation and habitat restoration in the area. A man-made flow restriction will replace the culvert, preserving the control that the culvert previously lent to sediment transport in the creek while removing the turbulent and potentially destructive effects of overtopping.

Culverts A, B, and C, however, have more capacity than Culvert D and they are not proposed to be removed due to the stabilizing effect they have on the creek, and due to the fact that the trail network will utilize these points for pedestrians to cross over the creek. A stream stabilization analysis was performed by PACE, as discussed in the technical memorandum titled *Lemon Creek Stream Stability Analysis at Proposed Brookside Development* (June 2023). It should be noted that the removal of Culvert D will not have adverse changes to sediment transport in the creek, as demonstrated in **Section 3.3**.

Modifications within the creek will be minimized as much as possible, in order to avoid impacts to the vegetation. The project biologist will submit a request for permit to the U.S. Army Corps of Engineers (ACOE), 'Waters of the U.S.' and California Department of Fish and Wildlife (CDFW), 'Waters of the State' for any proposed work within the Creek jurisdictional areas.

P:\B852\6-GIS\Projects\B852_LemonCreek\B852_LemonCreek.aprx - Proposed Site Development Plan



BROOKSIDE DEVELOPMENT

PROPOSED SITE DEVELOPMENT PLAN

PACE Advanced Water Engineering

0 87.5 175 350 Feet

Date: 3/30/2023

Job Number: B852

Figure 1-9

2 Hydrology

2.1 Regional Hydrology – Lemon Creek

Lemon Creek is tributary to San Jose Creek, which ultimately drains to the San Gabriel River. Lemon Creek enters the project boundary at the northeastern project limit and exits to the south, just before entering the existing culvert at La Puente Road. The culvert at La Puente Road is a double reinforced concrete box (RCB) 10'(W) x 5'(H) maintained by the City of Walnut. According to LA County Public Works as-built plans (P.M. 14987, August 30, 1982), the culvert was designed with a 25-yr storm capacity, consisting of 1,750 cfs (see **Appendix B**).

Three existing storm drain inlets divert stormwater through the project site from Meadow Pass Road (northern boundary) to two outlet points in Lemon Creek (two of the storm drains combine into one pipe before outletting). The Lemon Avenue Storm Drain, identified on **Figure 1-2**, is also tributary to Lemon Creek, which confluences with the main stem about halfway through the project site. The entirety of the watershed draining to the downstream-most portion of the site has been analyzed in order to determine the design flow rate of Lemon Creek.

2.1.1 Previous Studies

2.1.1.1 FEMA Modeling / Floodplains

The project area is identified on FEMA FIRM Panel No. 06037C1725F, effective September 26, 2008, as Zone D, which is an area in which flood hazards are undetermined, but possible. Because this area of Lemon Creek has not been previously mapped, neither a floodplain nor base flood elevations have been established.

Additionally, Lemon Creek is not identified in the FEMA Flood Insurance Study (FIS; Study Number 06037CV001F, revised June 2, 2021) as a flooding source; therefore, no hydrology or storm event flow rates have been identified by FEMA for the project reach. Due to this lack of information regarding the hydrology of Lemon Creek, a hydrologic analysis was performed for the project reach in order to establish a 100-yr design flow rate and floodplain for Lemon Creek.

2.1.1.2 San Jose Creek Hydrology Study

50-yr storm frequency clear water flow rates were obtained from an information request summary submitted to the LA County Water Resources Division, Hydrology Section (included in **Appendix E**). The flow rates originated from the *San Jose Creek Hydrology Study* dated 1972. At the upstream end of the site, 2,021 cfs is conveyed through Lemon Creek, combining with 1,153 cfs at the tributary confluence at the Lemon Avenue storm drain for a total flow of 3,182 cfs. Another 73 cfs is added to the Creek between the confluence and the La Puente Road culvert, resulting in a combined 3,255 cfs at the downstream end of the project.

However, the 50-yr storm flow rates obtained from the County were calculated based on Zone Methodology, which does not reflect the current approved methods in the 2006 LA County Hydrology Manual. Additionally, current land use, drainage conditions, and rainfall depths differ from those used/assumed in the 1972 study. Therefore, the results of this study are outdated and should be updated with the results of the analysis presented herein to inform the design of the proposed Brookside Project.

2.1.2 PACE Regional Hydrology Methodology

According to Section 4.6 of the Los Angeles County *Hydrology Manua*l (January 2006), the design discharge a system is required to provide may be dictated by the receiving system's limited capacity at the proposed drain's outlet. The proposed drain's capacity is restricted to match the capacity available in the downstream drain when no future relief is planned. The double box culvert under La Puente Road, at the project reach's outlet, has a design capacity of 1,750 cfs, and has no plans for future relief at this time. As such, the proposed project is not required to analyze / design for hydraulics using a flow rate larger than

1,750 cfs. However, in order to provide the maximum amount of protection to the proposed structures adjacent to the Creek, it was determined that an updated 100-year 24-hour clearwater flowrate would be used for the project design / analysis.

The hydrology for the current study was developed following procedures outlined in the LA County *Hydrology Manual*, utilizing the Hydrologic Modeling System program (HEC-HMS, version 4.2), created by the U.S. Army Corps of Engineers. The LA County *Hydrology Manual* describes the rational method / modified rational method as the preferred way to calculate runoff peak flow rates and volumes. HEC-HMS does not support the Modified Rational Method; however, it has been adopted by LA County, as described in the *Hydrology Manual*.

The following sections detail the calculations, procedures, and data used in the current hydrology study, in order to obtain the 100-year, 50-year, and 2-year (24-hour) peak flow rates.

2.1.3 Tributary Watersheds / Topographic Data

The 25.8-acre Brookside Development project is located in a largely developed watershed that is 1,541 acres in size, just south of the San Jose Hills mountain range. Lemon Creek is one of several small creeks which run through the City of Walnut, flowing in a southerly direction, eventually confluencing with the San Gabriel River. The flow path of Lemon Creek is well-defined, mainly due to the steep slopes associated with the surrounding hillsides. The watershed draining to the project site is characterized by well-defined blocks of open space and residential housing tracts. The watershed and associated sub-watersheds draining to the project site were delineated using the 2015/2016 Los Angeles Region Imagery Acquisition Consortium (LARIAC) topographic dataset from the National Oceanic and Atmospheric Administration (NOAA). **Figure 2-1** shows the overall watershed delineation, as well as the sub-watershed areas contained therein.

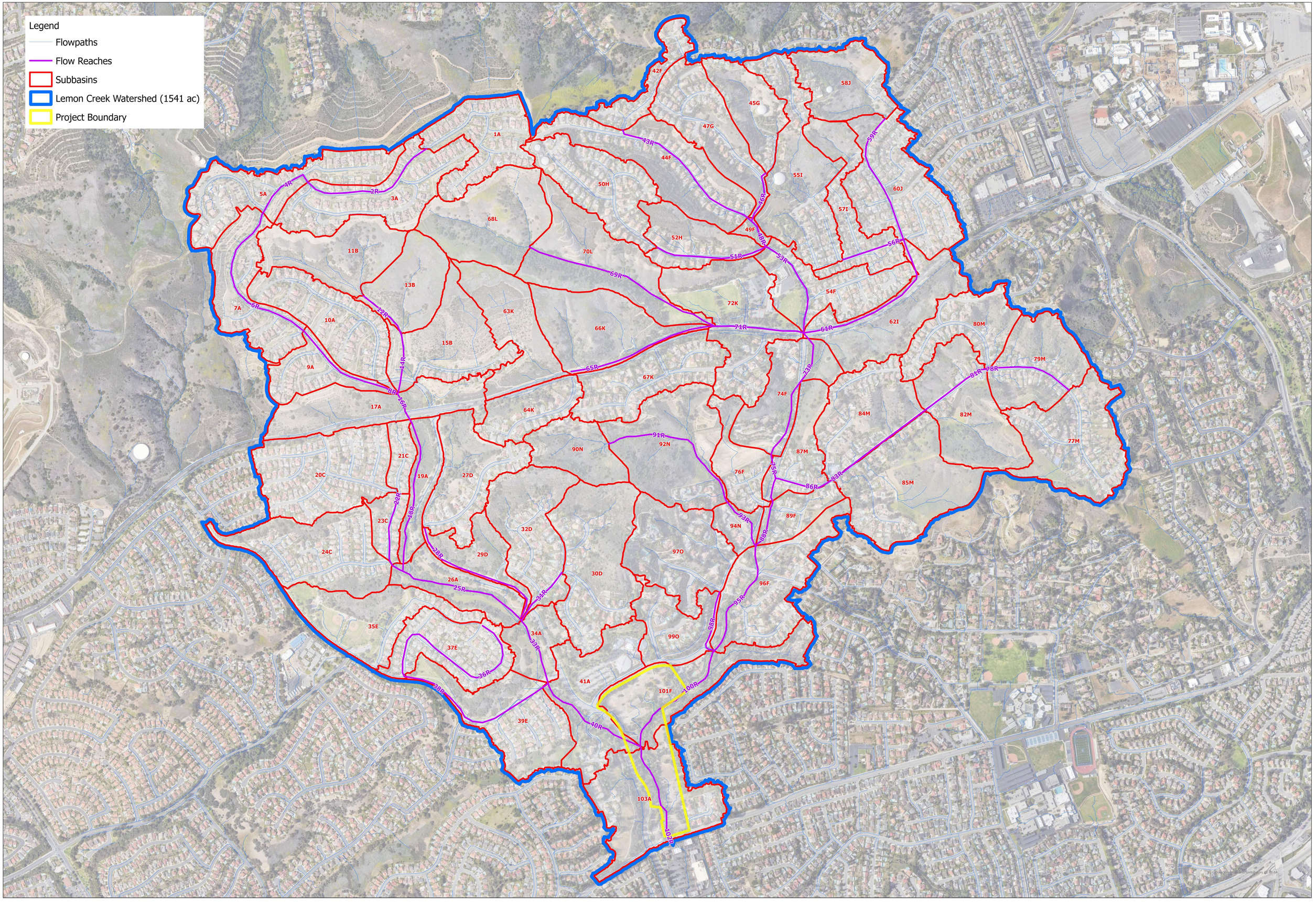
2.1.4 Precipitation and Storm Pattern

NOAA Atlas 2 data for the 100-year, 50-year, 25-year, 5-year, and 2-year (24-hour) precipitation values were obtained at the downstream terminus of the project reach. The precipitation values identified for each of the specified storm events are shown in **Table 2-1**.

Table 2-1: NOAA Atlas 2 Precipitation Values

Storm Event	Precipitation Depth (in)
100-year 24-hour	7.33
50-year 24-hour	6.49
25-year 24-hour	5.68
5-year, 24-hour	3.91
2-year 24-hour	3.01

The LA County *Hydrology Manual* (January 2006) specifies a 24-hour cumulative unit hyetograph to describe the temporal distribution of precipitation. The unit hyetograph provides the temporal distribution of one inch of rainfall occurring over a 24-hour period. The unit hyetograph is then scaled to match design rainfall depths. The unit hyetograph from Appendix A of the *Hydrology Manual* was applied to the respective storm event precipitation depths for the current study.



P:\B852\6-GIS\Projects\B852_Working\B852_Working.aprx - Watershed Workmap

BROOKSIDE DEVELOPMENT-WALNUT

PACE Advanced Water Engineering

0 350 700 1,400 Feet

Date: 9/27/2022

Job Number: B852

WATERSHED WORKMAP

Figure 2-1

2.1.5 *Loss Rates*

In order to determine runoff, the volume of water lost to infiltration, interception, depression storage, and evaporation must be determined. For the current study, losses due to interception, depression storage, and evaporation were considered negligible. Infiltration losses, which have the greatest effect on surface runoff, were determined using the Soil Conservation Service (SCS) Method. This method assigns a curve number (CN) to different areas of the watershed, depending on the soil and cover conditions (i.e. hydrologic soil group), cover type, treatment, and hydrologic condition. The curve number is then weighted according to how much area it describes and then averaged for the entire sub-area. The SCS method also incorporates the overall percentage of impervious area contained in the sub-watershed. Impervious percentages were obtained from the USDA TR-55, *Urban Hydrology for Small Watersheds* publication, which correlates land use to percent impervious.

A breakdown of the weighted curve number and percent impervious for each sub-watershed is listed in **Table 2-2**.

Table 2-2: SCS Soil Loss Input Data

Sub-Watershed ID	Area (mi^2)	Weighted CN	% Impervious
1A	0.04	91.54	51%
3A	0.05	91.63	52%
5A	0.05	86.86	36%
7A	0.04	88.4	42%
9A	0.02	90.87	50%
10A	0.04	91.5	51%
11B	0.04	82.94	21%
13B	0.03	80.32	14%
15B	0.04	83.85	26%
17A	0.05	85.58	34%
19A	0.02	83.74	24%
20C	0.06	91.58	52%
21C	0.01	91.09	49%
23C	0.01	90.79	48%
24C	0.05	89.97	45%
26A	0.03	82.95	21%
27D	0.04	92.95	45%
29D	0.02	92.73	52%
30D	0.06	91.76	47%
32D	0.05	91.69	47%
34A	0.02	85.38	32%
35E	0.04	83.25	20%
37E	0.04	91.57	52%
39E	0.05	91.17	49%
41A	0.05	91.3	61%
42F	0.02	91.25	51%
44F	0.05	90.83	47%
45G	0.03	91.97	66%
47G	0.04	91.48	51%
49F	0.003	90.71	51%
50H	0.04	91.13	49%
52H	0.03	90.15	45%
54F	0.04	92	58%
55I	0.06	87.51	43%
57I	0.03	88.38	41%

Sub-Watershed ID	Area (mi^2)	Weighted CN	% Impervious
58J	0.03	86.65	24%
60J	0.06	91.11	51%
62I	0.05	91.6	52%
63K	0.04	81.09	17%
64K	0.02	91.96	54%
66K	0.05	80.45	16%
67K	0.04	91.93	54%
68L	0.05	80.6	15%
70L	0.06	80	14%
72K	0.06	85.87	35%
74F	0.03	91.99	45%
76F	0.02	91.34	46%
77M	0.05	92.52	41%
79M	0.04	90.99	45%
80M	0.03	91.28	50%
82M	0.05	87.94	27%
84M	0.04	91.3	44%
85M	0.06	88.42	30%
87M	0.02	93.2	45%
89F	0.02	91.58	50%
90N	0.03	91.72	42%
92N	0.06	93.1	35%
94N	0.01	96.12	29%
96F	0.05	92.57	48%
97O	0.05	91.56	48%
99O	0.03	92.16	56%
101F	0.04	85.89	50%
103A	0.06	87.88	51%
Total Area =	**2.41** **1,541**	**sq. mi.** **ac**	

2.1.6 Lag Time

The lag time of a watershed describes the hydrologic characteristics of a watershed with respect to time. It can be described as the amount of time between the beginning of effective rainfall and the moment that the summation runoff hydrograph at the confluence point reaches 50% of the ultimate discharge.

The lag time for each watershed was computed using the Army Corps lag equation (**Equation 1**). For the purposes of lag time calculations, the manning's coefficient assigned to all sub-watersheds was a uniform value 0.03. The lag time calculated for each sub-watershed is identified in **Table 2-3**.

Equation 1: Army Corps Lag Equation

$$LAG = 24n\left(\frac{L * Lca}{Slope^{0.5}}\right)^{0.38}$$

Where:

- **LAG** = hours
- **n** = visually estimated mean of the n (Manning's formula) values of all collection streams and channels within the watershed
- **L** = length of longest watercourse (miles)
- **L_{CA}** = Length along the longest watercourse, measured upstream to a point opposite the centroid of the area (miles)
- **Slope** = overall slope of longest watercourse between headwaters and concentration point (ft/mile)

Table 2-3: LAG Time per Sub-Watershed

Sub-Watershed ID	L (mi)	L_{CA} (mi)	LAG (hr)
1A	0.44	0.23	0.12
3A	0.47	0.18	0.11
5A	0.39	0.07	0.07
7A	0.44	0.17	0.08
9A	0.38	0.15	0.08
10A	0.55	0.30	0.11
11B	0.31	0.31	0.08
13B	0.26	0.12	0.05
15B	0.43	0.20	0.08
17A	0.37	0.07	0.35
19A	0.36	0.19	0.09
20C	0.42	0.17	0.10
21C	0.18	0.09	0.05
23C	0.19	0.10	0.05
24C	0.51	0.16	0.11
26A	0.33	0.16	0.07
27D	0.34	0.18	0.08
29D	0.33	0.23	0.08
30D	0.28	0.11	0.05
32D	0.45	0.28	0.10
34A	0.20	0.13	0.06
35E	0.37	0.26	0.13
37E	0.48	0.21	0.13
39E	0.43	0.12	0.09
41A	0.44	0.19	0.09
42F	0.33	0.14	0.08
44F	0.60	0.25	0.11
45G	0.37	0.19	0.08
47G	0.51	0.29	0.10
49F	0.12	0.05	0.03

Sub-Watershed ID	L (mi)	L_{CA} (mi)	LAG (hr)
50H	0.42	0.20	0.51
52H	0.37	0.18	0.07
54F	0.34	0.13	0.09
55I	0.63	0.23	0.10
57I	0.48	0.20	0.09
58J	0.31	0.15	0.06
60J	0.37	0.15	0.08
62I	0.48	0.27	0.11
63K	0.42	0.19	0.07
64K	0.31	0.16	0.07
66K	0.58	0.42	0.13
67K	0.45	0.22	0.11
68L	0.29	0.12	0.05
70L	0.59	0.32	0.11
72K	0.39	0.17	0.07
74F	0.32	0.16	0.08
76F	0.32	0.15	0.07
77M	0.33	0.15	0.08
79M	0.27	0.12	0.06
80M	0.40	0.14	0.08
82M	0.29	0.10	0.06
84M	0.43	0.17	0.08
85M	0.42	0.19	0.09
87M	0.33	0.15	0.07
89F	0.28	0.16	0.08
90N	0.21	0.09	0.04
92N	0.40	0.21	0.09
94N	0.14	0.08	0.05
96F	0.52	0.21	0.10
97O	0.37	0.20	0.08
99O	0.36	0.21	0.08
101F	0.55	0.19	0.11
103A	0.37	0.17	0.08

2.1.7 Unit Hydrographs

The S-Graph method was utilized within HEC-HMS to transform the rainfall excess, using an appropriate summation unit hydrograph (abbreviated as s-graph) to represent the response of a sub-basin to a unit of precipitation. The S-Graph ordinate values were manually entered into HEC-HMS.

Because every watershed has different hydrologic characteristics, the runoff patterns to a downstream concentration point will also be different and the distribution graph documenting these runoff patterns will, likewise, vary considerably from other watersheds. However, most distribution graphs become comparable when the relationship of lag time is introduced. An empirical relationship can be observed when the lag times determined from the summation hydrographs for various gaged watersheds are correlated to the hydrologic characteristics of said watersheds. This allows S-graphs from gaged watersheds with certain hydrologic characteristics to be applied to un-gaged watershed with similar characteristics. Time in percent of lag has been used to determine S-Graphs for four main types of watersheds: Valley: Developed; Valley: Undeveloped; Foothill; and Mountain. The Valley: Developed S-Graph, which was used for the present study, is used for watersheds where uniform and developed channels exist or are to be developed for peak flow conveyance. The Valley: Undeveloped S-Graph was also used for the present study, which is applicable to natural watersheds whose channels are not sharply incised. The Valley: Developed/Undeveloped S-Graph was applied to different sub-areas on a case-by-case basis, depending on the hydrologic conditions visible in aerial imagery. The S-Graph ordinates are defined by the relationship between percentage of lag time and percentage of cumulative runoff volume. The lag time, obtained from the Army Corps Lag Equation (**Equation 1**), is used to scale the S-Graph before points are taken along the curve to compute the unit hydrograph. The Valley Developed S-Graph utilized in the present study is shown in **Figure 2-2** and the Valley Undeveloped S-Graph is shown in **Figure 2-3**.

Figure 2-2: Valley Developed S-Graph

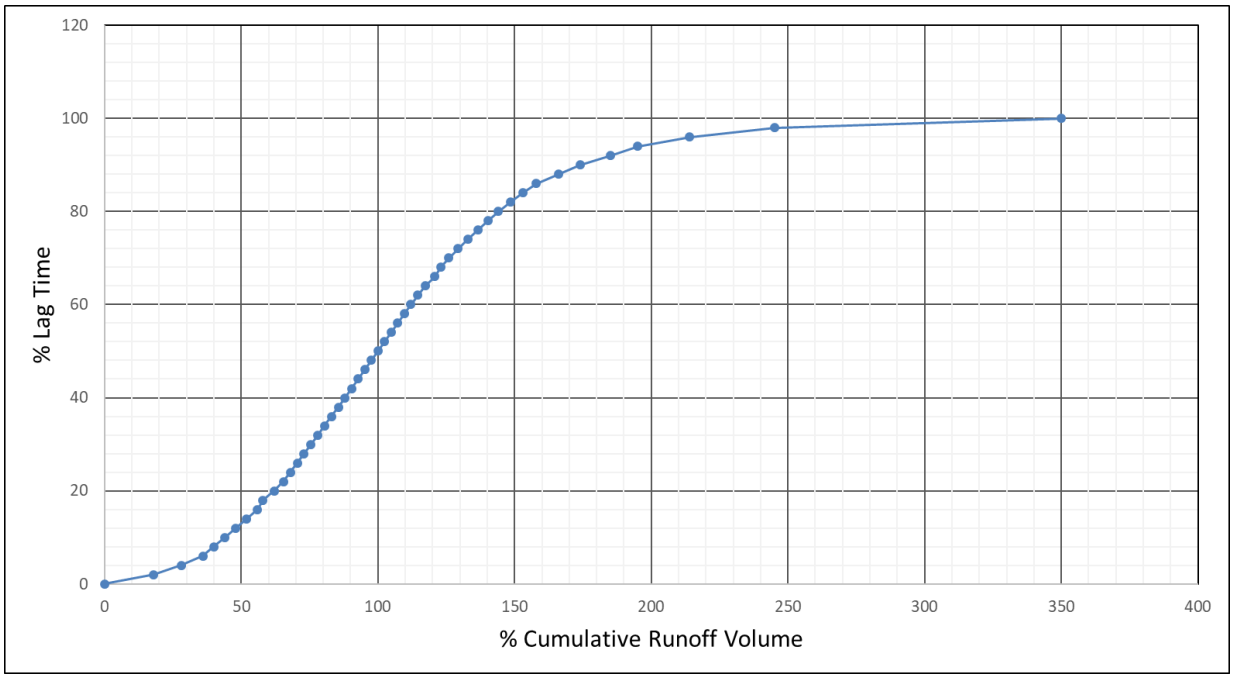
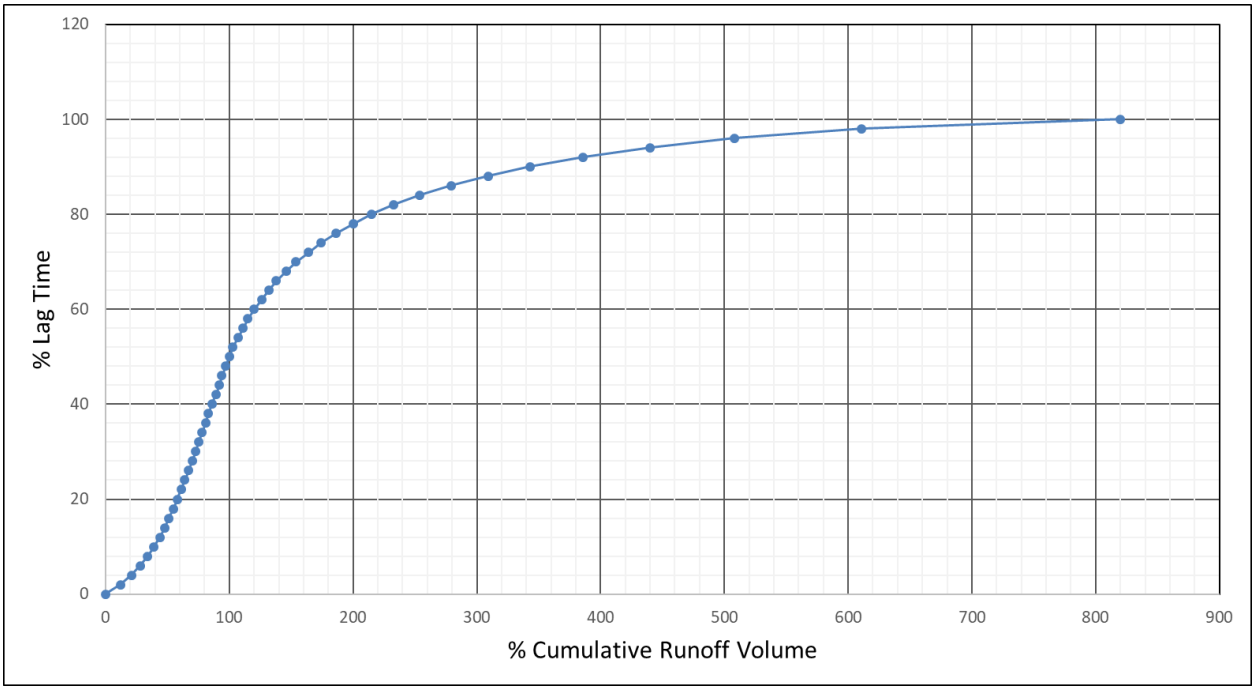


Figure 2-3: Valley Undeveloped S-Graph



2.1.8 Routing

The flow through each sub-watershed was routed through various sub-reaches, which were defined in the watershed delineation analysis (See **Figure 2-1**). In the absence of specific information relating to the sizing and configuration of existing conveyance features in the watershed, each sub-reach was defined assuming a uniform trapezoidal geometry, where:

- Base width = 20 ft.
- Manning's Value:
  - n = 0.3 (For Valleys)
  - n = 0.5 (For Mountains)
  - n = 0.015 (For Streets)
  - n = 0.014 (For Circular Pipes)
- Side Slope = 1.5(H) : 1(V)

Information relating to the average slope and length of each sub-reach was individually obtained for each element, using 2015/2016 LARIAC topographic data. The parameters for each sub-reach were used to route hydrographs in the HEC-HMS model, using the Kinematic Wave method. The Kinematic Wave Theory is used by the Los Angeles County Public Works to calculate time of concentration, T_C. Conservation of mass and the momentum equation are used to determine the time associated with overland flow.

2.1.9 Time Step

The time-step for the HEC-HMS model of the Lemon Creek Watershed was selected as 5-minutes. This was then verified by comparing it to the lag time of the entire watershed. The standard approach for selecting the appropriate time step is to make it as large as possible while keeping the time step less than 25% of the overall watershed lag time. This eliminates very short peaks from the results while also ensuring that the extracted flow rates are still conservative.

The overall Lemon Creek watershed lag time was found to be 0.371 hours (22.3 minutes). The selected time step of 5 minutes is 22.5% of the overall lag time, which meets the selected criteria.

2.1.11 Results

Using the HEC-HMS program to compute the runoff hydrograph for each sub-area and routing it through each sub-reach, a total runoff hydrograph was obtained for the watershed draining to the point in Lemon Creek immediately upstream of the La Puente Rd. culvert. The regional runoff hydrographs for the 2-, 5-, 25-, 50-, and 100-yr storms are shown in **Figures 2-3**, **2-4**, **2-5**, **2-6**, and **2-7** respectively. **Table 2-4** summarizes the results for each of the three events analyzed.

Figure 2-4: 2-yr Runoff Hydrograph

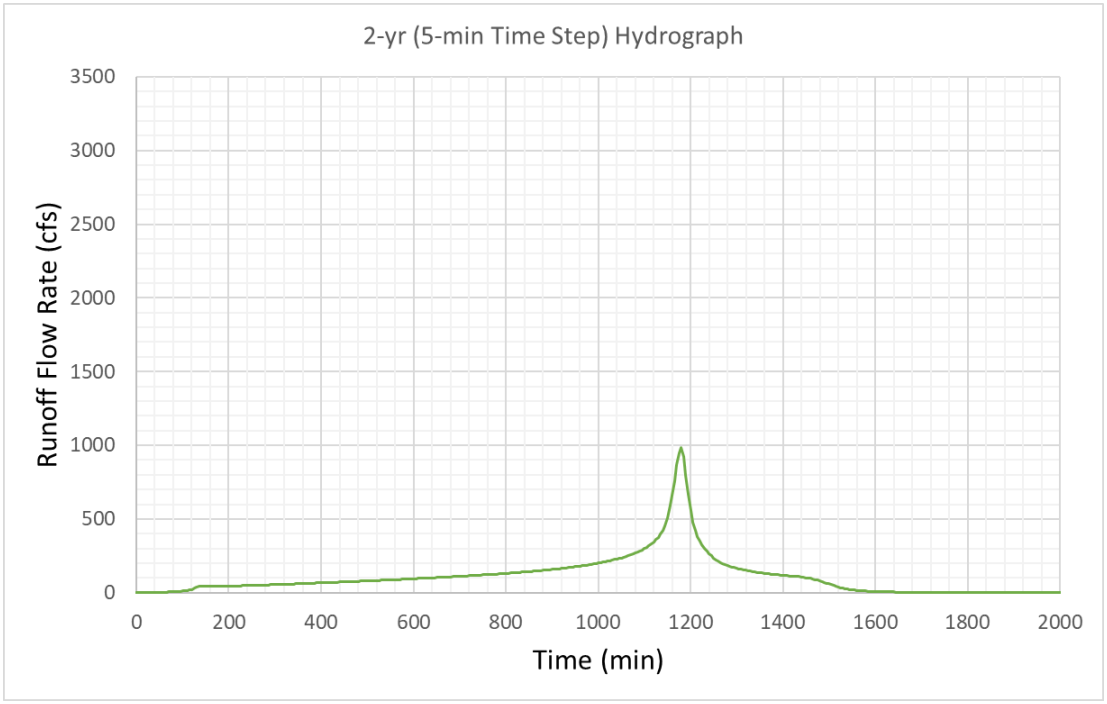


Figure 2-5: 5-yr Runoff Hydrograph

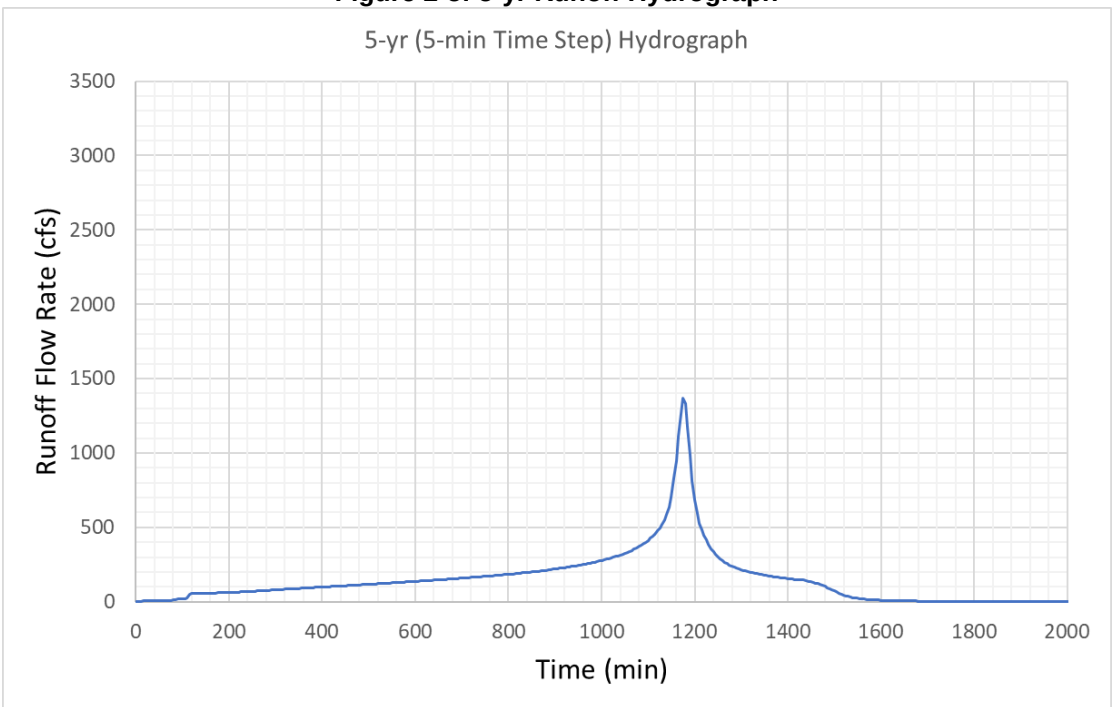


Figure 2-6: 25-yr Runoff Hydrograph

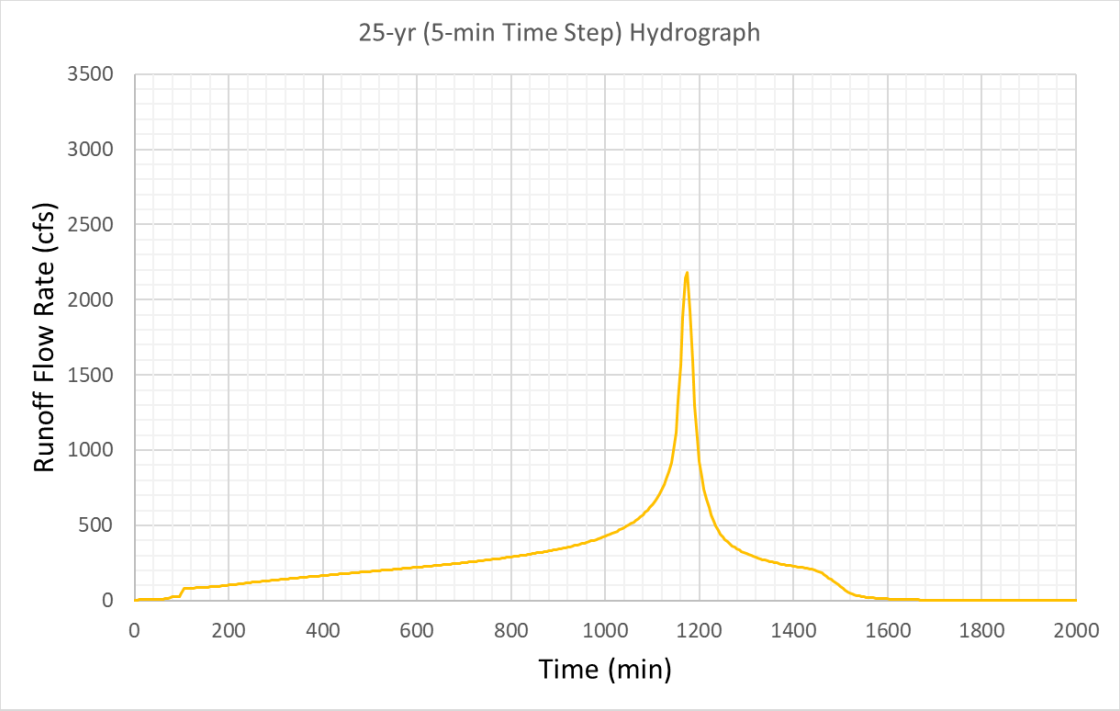


Figure 2-7: 50-yr Runoff Hydrograph

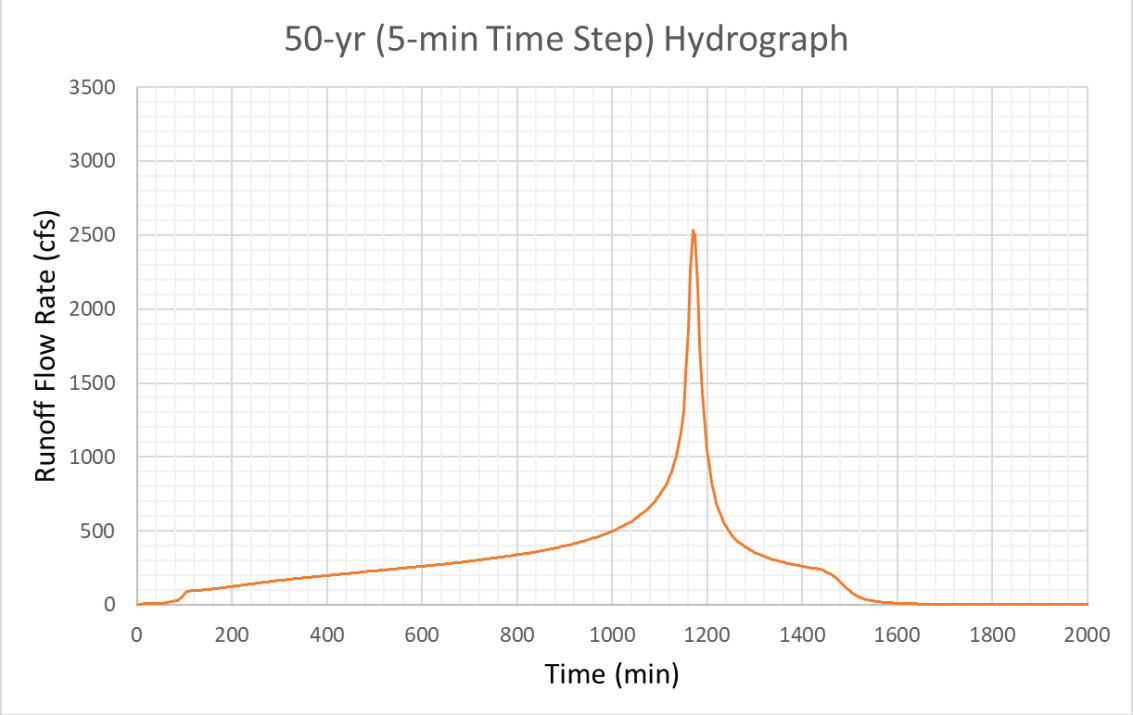


Figure 2-8: 100-yr Runoff Hydrograph

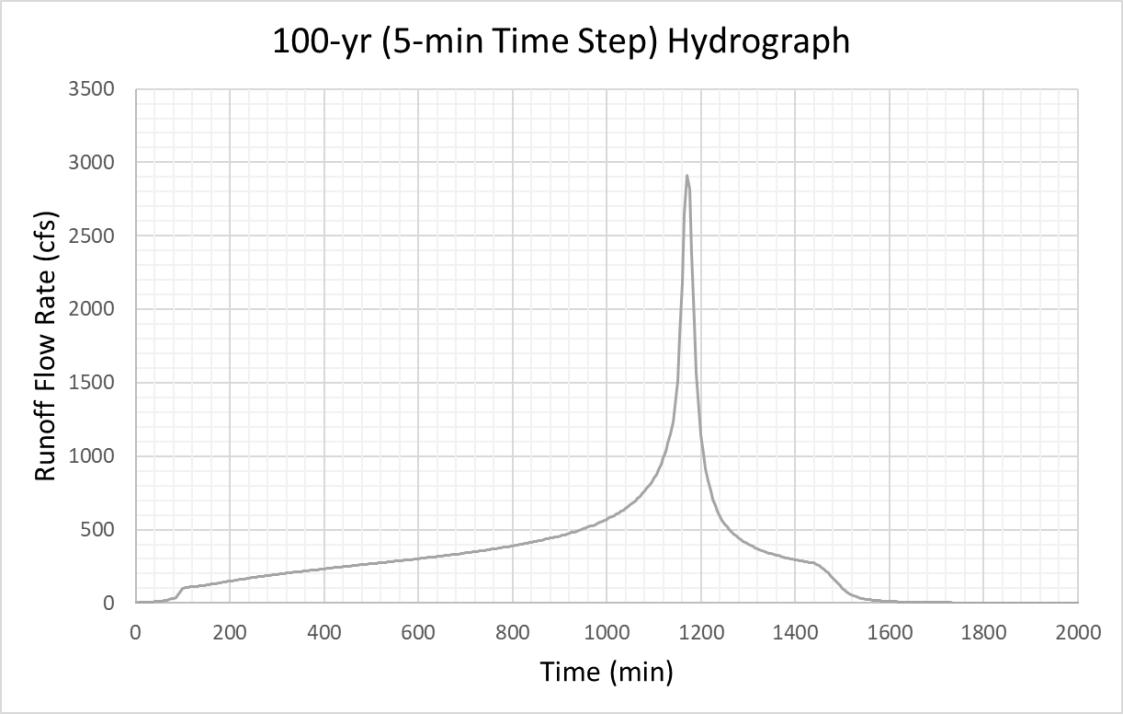


Table 2-4: HEC-HMS Model Results for Lemon Creek Regional Hydrology at La Puente Rd.

Return Period	Precipitation (in)	Peak Discharge (cfs)	Discharge Volume (ac-ft)
100-yr	7.33	2,954	852
50-yr	6.49	2,540	744
25-yr	5.68	2,176	640
5-yr	3.91	1,347	416
2-yr	3.01	975	305

This analysis shows that the 100-yr clearwater peak flow rate reaching the downstream terminus of the project is equal to 2,954 cfs. This is comparatively smaller than the 50-yr flow rate of 3,255 cfs found in the 1972 San Jose Creek Hydrology Study. However, as mentioned previously, the 1972 study used outdated methods to obtain the peak flow rate; therefore, the results from the present study are more appropriate to use for the hydraulic modeling of Lemon Creek. Additionally, the 100-yr clearwater peak flow rate from the present study is greater than the design capacity of the La Puente culvert (Q_{25} = 1,750 cfs, per 1972 LA County as-builts), ensuring that the proposed development will be protected from any backwater effects caused by the undersized culvert in a 100-yr storm event.

2.2 Local Hydrology – Brookside Development Project

In order to evaluate the changes that the “after project as-proposed” condition will have to peak runoff flow rate, volume, and water quality leaving the project site, a local on-site hydrology analysis was performed. “Before project” and “after project as-proposed” conditions were analyzed in order to quantify these changes.

2.2.1 Local Hydrology Methodology

HydroCalc 0.2.0, developed by the Los Angeles County Department of Public Works, was used for the Modified Rational Method hydrologic modeling of the project site, in accordance with the requirements of

the LA County *Hydrology Manual* (2006). The local hydrology analysis focuses on the 85th percentile, 2-yr, 5-yr, 25-yr, 50-yr, and 100-yr storm events.

For “before project” conditions, the project site was split into seven sub-watersheds, which were delineated using 1-ft. contour topography data (“before project” conditions sub-watershed map shown on **Figure 2-7)**. Under “after project as-proposed” conditions, the project site was split into ten sub-watersheds, which were delineated using the same 1-ft. contour topography data in conjunction with the site plan (proposed sub-watershed map shown on **Figure 2-8**).

The percentage of impervious area on each sub-watershed was determined using hydrologic soil types and land uses, which are published on the LACDPW Water Resources Publications website. In the “after project as-proposed” conditions analysis, the sub-watersheds that will undergo development were assigned the same percentage impervious area as “before project” conditions, with exception to where building footprints, driveways, sidewalk, and roads would be placed. Each of the impervious areas mentioned were assigned a 95% impervious value.

Soil types for each sub-watershed were also obtained from the LACDPW Water Resources Publications website, consisting of soils 2, 17, and 89.

The *LID Standards Manual* requires the project to analyze for the 85th percentile storm event for stormwater runoff water quality purposes. To obtain 85th percentile storm results from HydroCalc, an input of the 85th percentile precipitation depth is required. For all other storm events, only the 50-yr, 24-hr precipitation depth is required. Both the 85th percentile and 50-yr precipitation depths were obtained from the LA County interactive hydrology map found on the County website. The 50-yr, 24-hr precipitation depth for the project site is 6.5 inches, while the 85th percentile, 24-hr precipitation depth is 1.0 inches. **Table 2-5** contains the inputs used for each sub-watershed in “before project” conditions. **Table 2-6** contains the inputs used for “after project as-proposed” conditions. It should be noted that although identical watershed ID’s appear in “before project” and “after project as-proposed” conditions, they do not represent the same areas. Due to the proposed changes in grade, the watershed boundaries are different. For example, watershed ID 11A in “before project” conditions is 3.14 acres, while 11A in proposed conditions is 1.53 acres. This is also why more sub-watersheds were delineated in the “after project as-proposed” analysis than in “before project”. However, the total area of all the sub-watersheds matches between “before project” and “after project as-proposed” conditions, as shown in the following tables.

Table 2-5: HydroCalc On-Site Hydrology Inputs – "Before Project" Conditions

WS Name	Acres	L	Slope	Land Use	Percent Impervious	Soil Group	Soil Type
1A	1.86	623.8	0.11061	Mixed / Majority Road	65.6%	C	2
2A	6.26	739.9	0.06623	Mixed / Majority Open Space & Recreation	2.1%	C	17
4A	7.44	949.3	0.05794	Mixed / Majority Open Space & Recreation	0.0%	C	17
8A	5.39	1116.4	0.08151	Mixed / Majority Open Space & Recreation	1.6%	C	2
9A	2.53	912.2	0.05591	Mixed / Majority Open Space & Recreation	0.7%	C	2
11A	3.14	890.9	0.02469	Mixed / Majority Open Space & Recreation	2.8%	C	2
12A	0.33	406.0	0.01970	Mixed / Majority Open Space & Recreation	31.4%	C	2
Total Area =	**26.9**	**ac**					

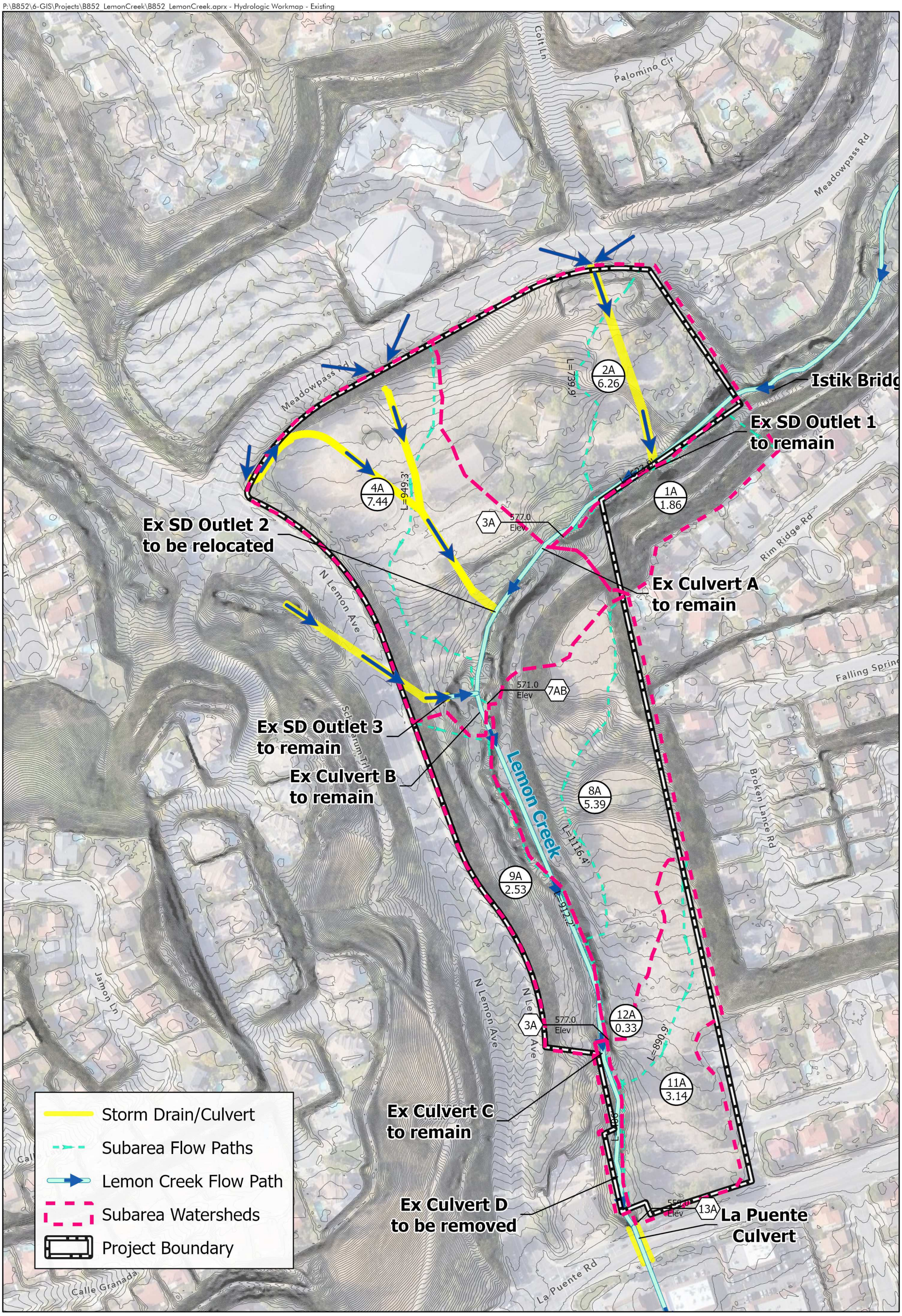
Table 2-6: HydroCalc On-Site Hydrology Inputs – "After Project As-Proposed" Conditions

WS Name	Acres	L	Slope	Land Use	Percent Impervious	Soil Group	Soil Type
1A	3.28	866.7	0.04038	Mixed / Majority Open Space & Recreation	37.0%	C	2
2A[1]	2.75	652.4	0.04599	Residential	74.5%	C	17
2B[1]	3.32	861.6	0.03714	Residential	42.9%	C	2
4A[1]	4.31	796.6	0.01130	Residential	19.6%	C	17
4B	1.05	377.9	0.02646	Mixed / Majority Open Space & Recreation	0.1%	C	2
5A[2]	4.24	954.1	0.03354	Residential	45.3%	C	2
5B[1]	1.47	542.7	0.01290	Residential	46.0%	C	2
9A	4.02	958.0	0.05323	Mixed / Majority Open Space & Recreation	0.3%	C	2
11A[2]	1.53	494.1	0.00607	Residential	26.3%	C	17
12A	0.97	512.5	0.07414	Mixed / Majority Open Space & Recreation	13.3%	C	2
Total Area =	**26.9**	**ac**					

Notes:

- *Gray cells indicate sub-watershed is developed in proposed conditions*
- *Superscript 1 indicates sub-watershed drains to Water Quality Basin No.1*
- *Superscript 2 indicates sub-watershed drains to Water Quality Basin No.2*

P:\B852\6-GIS\Projects\B852_LemonCreek\B852_LemonCreek.aprx - Hydrologic Workmap - Existing



BROOKSIDE DEVELOPMENT

ON-SITE WATERSHEDS WORKMAP EXISTING

PACE Advanced Water Engineering

0 100 200 400 Feet

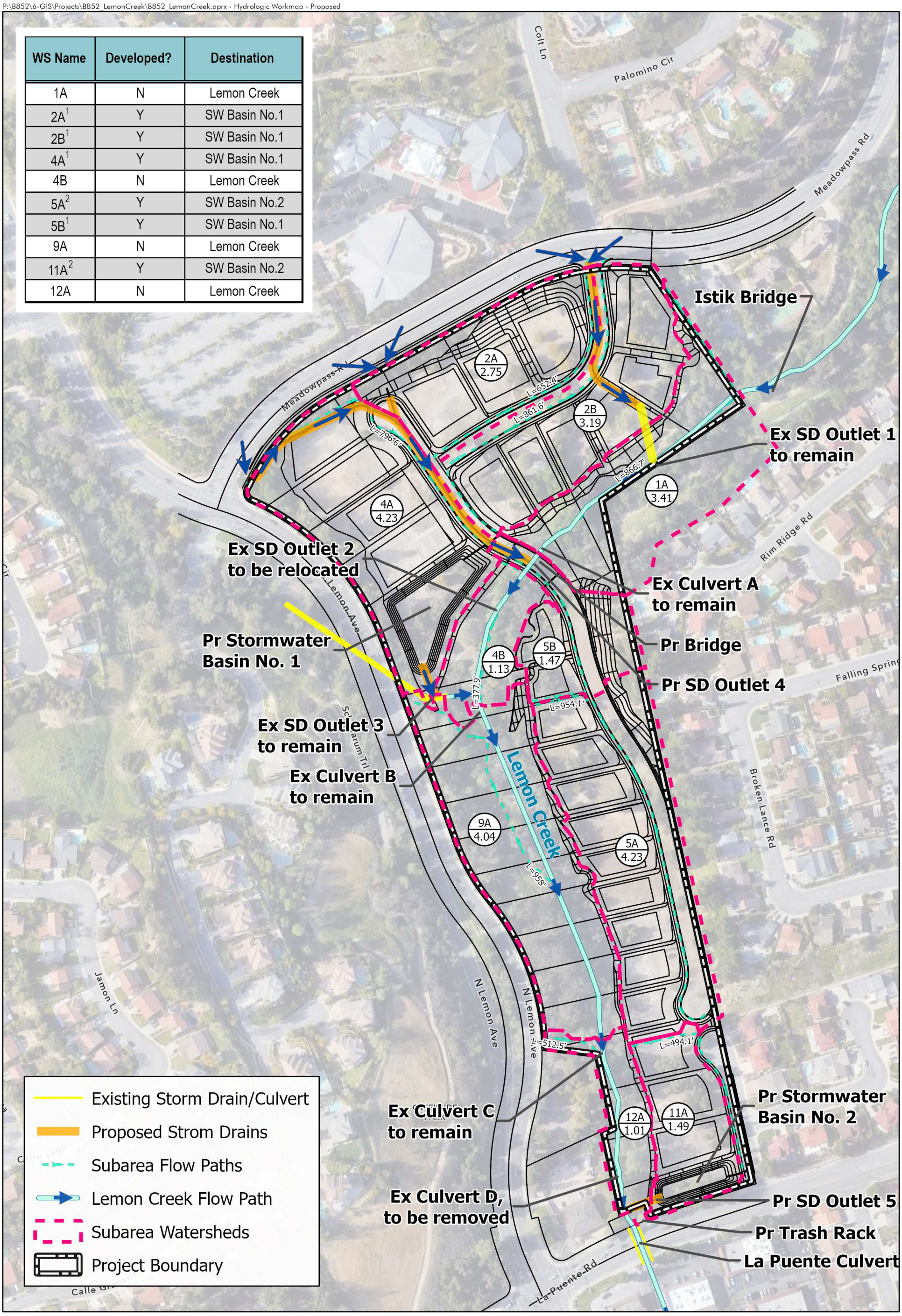
Date: 3/30/2023

Job Number: B852

Figure 2-9

P:\B852\6-GIS\Projects\B852_LemonCreek\B852_LemonCreek.aprx - Hydrologic Workmap - Proposed

WS Name	Developed?	Destination
1A	N	Lemon Creek
2A[1]	Y	SW Basin No.1
2B[1]	Y	SW Basin No.1
4A[1]	Y	SW Basin No.1
4B	N	Lemon Creek
5A[2]	Y	SW Basin No.2
5B[1]	Y	SW Basin No.1
9A	N	Lemon Creek
11A[2]	Y	SW Basin No.2
12A	N	Lemon Creek



BROOKSIDE DEVELOPMENT

ON-SITE WATERSHEDS WORKMAP PROPOSED

PACE Advanced Water Engineering

0 100 200 400 Feet

Date: 3/30/2023

Job Number: B852

Figure 2-10

2.2.2 *Results*

The peak flow rates derived from each sub-watershed in the HydroCalc analysis were added together to determine the total flow rate of runoff entering Lemon Creek from the project site in "before project" and "after project as-proposed" conditions. These values are summarized in **Tables 2-7** and **2-8** respectively, for the 85th percentile, 2-yr, 5-yr, 25-yr, 50-yr, and 100-yr storm events. It should be noted that the results in **Table 2-8** were used to determine the size of the proposed water quality basins and, therefore, do not include the positive effects of the basins. As such, the results from **Table 2-8** do not reflect the true "after project as-proposed" conditions. The results are, however, useful in ensuring the water quality basins are adequately designed to avoid increases in peak runoff flow rate and volume leaving project the site.

Complete results of the HydroCalc modeling are provided in **Appendix A** for each sub-watershed. It should be noted that the acreage totals listed in **Tables 2-7** and **2-8** equal 26.95 ac, while the total project site is 25.8 acres. This is due to the fact that small areas off-site drain through the site to Lemon Creek, as shown in **Figures 2-7** and **2-8** and have been incorporated into the local hydrology analysis.

Table 2-7: HydroCalc Results for On-Site Hydrology ("Before Project" Conditions)

WS Name	Acres	85th Percentile Q (cfs)	2-yr Q (cfs)	5-yr Q (cfs)	25-yr Q (cfs)	50-yr Q (cfs)	100-yr Q (cfs)
1A	1.86	0.5	1.7	3.2	5.7	6.5	7.3
2A	6.26	0.1	3.9	8.8	16.2	20.1	24.5
4A	7.44	0.1	4.1	9.3	17.9	22.2	24.9
8A	5.39	0.4	3.2	6.4	12.8	15.9	18.0
9A	2.53	0.2	1.5	3.2	6.0	7.5	9.1
11A	3.14	0.2	1.8	3.6	7.0	8.7	10.5
12A	0.33	0.1	0.3	0.5	0.9	1.2	1.3
Total =	**26.95**	**1.5**	**16.5**	**34.9**	**66.6**	**81.9**	**95.6**
WS Name	**Acres**	**85th Percentile Runoff Volume (ac-ft)**	**2-yr Runoff Volume (ac-ft)**	**5-yr Runoff Volume (ac-ft)**	**25-yr Runoff Volume (ac-ft)**	**50-yr Runoff Volume (ac-ft)**	**100-yr Runoff Volume (ac-ft)**
1A	1.86	0.1	0.3	0.4	0.6	0.7	0.8
2A	6.26	0.1	0.2	0.4	0.8	1.0	1.2
4A	7.44	0.1	0.3	0.5	0.9	1.1	1.4
8A	5.39	0.1	0.3	0.5	1.0	1.3	1.5
9A	2.53	0.0	0.1	0.2	0.5	0.6	0.7
11A	3.14	0.0	0.2	0.3	0.6	0.8	0.9
12A	0.33	0.0	0.0	0.0	0.1	0.1	0.1
Total =	**26.95**	**0.4**	**1.3**	**2.4**	**4.5**	**5.5**	**6.7**

Table 2-8: HydroCalc Results for On-Site Hydrology ("After Project" Conditions - w/o Basins)

WS Name	Acres	85th Percentile Q (cfs)	2-yr Q (cfs)	5-yr Q (cfs)	25-yr Q (cfs)	50-yr Q (cfs)	100-yr Q (cfs)
1A	3.28	0.4	2.3	4	8	10	11
2A[1]	2.75	0.5	2.3	4	8	9	11
2B[1]	3.32	0.5	2.3	4	8	10	11
4A[1]	4.31	0.2	2.3	5	10	11	14
4B	1.05	0.1	0.8	2	3	4	4
5A[2]	4.24	0.6	2.8	5	10	12	14
5B[1]	1.47	0.2	1.1	2	4	4	5
9A	4.02	0.2	2.4	5	10	12	13
11A[2]	1.53	0.1	1.0	2	4	5	5
12A	0.97	0.1	0.8	2	3	3	4
Total =	**26.95**	**3.0**	**18.1**	**35.5**	**66**	**79**	**93**
Delta (PR-EX) =		*1.5*	*1.6*	*0.6*	*0*	*-3*	*-3*

WS Name	Acres	85th Percentile Runoff Volume (ac-ft)	2-yr Runoff Volume (ac-ft)	5-yr Runoff Volume (ac-ft)	25-yr Runoff Volume (ac-ft)	50-yr Runoff Volume (ac-ft)	100-yr Runoff Volume (ac-ft)
1A	3.28	0.11	0.32	0.5	0.9	1.1	1.2
2A[1]	2.75	0.16	0.41	0.6	1.0	1.1	1.2
2B[1]	3.32	0.13	0.35	0.6	1.0	1.1	1.3
4A[1]	4.31	0.09	0.27	0.4	0.8	0.9	1.1
4B	1.05	0.01	0.05	0.1	0.2	0.2	0.3
5A[2]	4.24	0.17	0.46	0.7	1.2	1.5	1.7
5B[1]	1.47	0.06	0.16	0.3	0.4	0.5	0.6
9A	4.02	0.04	0.18	0.4	0.8	0.9	1.1
11A[2]	1.53	0.04	0.11	0.2	0.3	0.4	0.4
12A	0.97	0.02	0.06	0.1	0.2	0.3	0.3
Total =	**26.95**	**0.83**	**2.38**	**3.9**	**6.7**	**8.0**	**9.3**
Delta (PR-EX) =		*0.45*	*1.09*	*1.6*	*2.2*	*2.5*	*2.7*

Note: Gray cells indicate sub-watershed is developed in proposed conditions
PR = Proposed Conditions = "After Project" conditions, without considering the flow attenuation effects of the two water quality basins
EX = Existing Conditions = "Before Project" conditions

The results indicate that the peak runoff flow rate generated within the project site would increase in "after project as-proposed" conditions for the 85th percentile, 2-yr, and 5-yr storm events (without considering the proposed basins). However, the peak runoff flow rate would be unchanged/reduced for the 25-, 50-, and 100-yr storm events. The reduced peak runoff flow rates for the 25-, 50- and 100-yr storm events in "after project as-proposed" conditions are a result of longer flow paths introduced by the proposed streets and pipes.

The results also indicate that the runoff volume generated within the site would increase in "after project as-proposed" conditions for all storm events analyzed (without considering the proposed basins), which is consistent with more impervious area in a developed condition.

The proposed water quality basins were designed to avoid the aforementioned increases in peak runoff flow rate and volume from the site. Further discussion of the basins' design is included in the following sections.

2.2.3 Hydromodification Avoidance Measures

The *LID Standards Manual* calls for avoidance of hydromodification impacts, which are defined as impacts caused by changes in water quality, flow velocity, flow volume, and depth/width of flow. The project's avoidance of hydromodification impacts will be achieved through the use of two proposed water quality basins, which will temporarily store stormwater runoff during a storm event before discharging slowly into the natural drainage system downstream, after the peak of the storm has passed. This ensures that any increases in runoff volume, flow rate, etc. due to the proposed development are avoided, up to the 100-yr storm event.

Water Quality Basin No.1 has been designed to accommodate the entire increase in runoff volume for the 100-yr storm event, as shown in **Table 2-8**. Water Quality Basin No.1 has a design storage capacity of 2.67 ac-ft, with 1.0 ft. of freeboard provided between the ponded water surface and surrounding lot pad elevations. The depth of ponded water for the 100-yr condition in Basin No.1 is approximately 4.0 ft. The 85th percentile storm will not result in ponding in the basin, due to the storage provided by the media voids.

Water Quality Basin No.1 will avoid hydromodification impacts for the entire project, while both Basins 1 and 2 will avoid water quality impacts due to increased impervious area. Even with the proposed basins, it is helpful to compare the hydromodification values from **Table 2-8** to the total watershed runoff hydrograph values from **Table 2-4**. **Table 2-9** makes this comparison, demonstrating how relatively small the changes in runoff due to the proposed development (without considering basins) are. Increases to runoff peak flow rate and volume due to the project (without considering basins) are less than 0.4% for all conditions analyzed. Additionally, due to the detention provided by the water quality basins, the time at which the basins will discharge the collected runoff to Lemon Creek will occur after the peak of the regional storm runs through Lemon Creek. This ensures that the "project as-proposed" will not result in an increase in hydrograph peak flow rate or volume in Lemon Creek up to the 100-yr storm event. In conclusion, the "project as-proposed" will have negligible effects on Lemon Creek and will not result in impacts.

Table 2-9: Project Changes to Runoff Peak Flow Rate & Volume Compared to Total Watershed Storm Hydrograph

Storm Event	Delta Peak Runoff Flow Rate (cfs)	Total Watershed Runoff Peak Flow Rate[1] (cfs)	Percent Change to Total Watershed Runoff Peak Flow Rate
2-yr	1.6	975	0.2%
5-yr	0.6	1,347	0.0%
25-yr	0	2,176	0.0%
50-yr	-3	2,540	-0.1%
100-yr	-3	2,954	-0.1%
Storm Event	**Delta Peak Runoff Volume (ac-ft)**	**Total Watershed Runoff Volume[1] (ac-ft)**	**Percent Change to Total Watershed Runoff Volume**
2-yr	1.1	305	0.4%
5-yr	1.6	416	0.4%
25-yr	2.2	640	0.3%
50-yr	2.5	744	0.3%
100-yr	2.7	852	0.3%

Note 1: Total Watershed Runoff Volumes and Peak Flow Rates obtained from ***Table 2-4.***

3 Hydraulics

The following section presents the development and results of the hydraulic model created to evaluate changes in water surface elevation, floodplain extents, and velocity due to the "project as-proposed". **Section 3.1** outlines the modeling data inputs and assumptions used to create the hydraulic model. **Section 3.2** outlines the results from the hydraulic model, quantifies changes resulting from the "project as-proposed", and interprets the results. **Section 3.3** discusses the stability and sediment transport trends of Lemon Creek and how the "project as-proposed" will relate to those trends.

3.1 Modeling Data and Assumptions

Two hydraulic models were created for the present analysis: (1) "before project" conditions, and (2) "after project as-proposed" conditions. The "after project as-proposed" conditions model includes proposed pad grading / elevations in the overbank areas and the removal of Culvert D / replacement with a geometric flow restriction.

Some elements of the "project as-proposed" are not included in the HEC-RAS model, due to their being outside of the floodplain or having no impact to flow rates, water surface elevations, velocities, etc. in Lemon Creek.

Specifically, the proposed bridge crossing would be a single span and would therefore not contain any piers within the creek. However, there could be minor grading adjustments near the abutments of the bridge that could have minor changes to water surface elevations or velocities in Lemon Creek. The changes, if any, are not expected to impact the creek, with regards to stability, vegetation, habitat, changes to off-site areas, or flood risk. Further into the design stages of the bridge, when configuration and grading are known, those elements will be incorporated into the hydraulic modeling and analysis. The results and analysis will be used to ensure all proposed lots would be designed at an elevation higher than the calculated 100-yr water surface plus freeboard. Potential increases, if any, in velocity in the streambed adjacent to the bridge abutments would be avoided through the design of energy dissipation and/or erosion protection features as necessary. Potential changes to streambed, protected vegetation, and/or protected wildlife due to the bridge construction would comply with all relevant CEQA / CDFW requirements.

Additionally, the relocation of the existing storm drain outlet in the northern portion of the site and the creation of a new outlet for Water Quality Basin No.2 in the southern portion of the site would not result in any changes to peak flow rate or runoff volume entering Lemon Creek. Potential increases in velocity within the Creek near the outlets of the Water Quality Basins would be avoided through the installation of a standard energy dissipating structure. Potential changes to streambed, protected vegetation, and/or protected wildlife due to the storm drain outlet structures would also be avoided by the project per CEQA / CDFW requirements.

3.1.1 Extents of Model

A hydraulic model of Lemon Creek was developed using the Hydrologic Engineering Center's River Analysis System software (HEC-RAS, version 6.2). The reach of Lemon Creek was modeled using the flow rates obtained from the previously described regional hydrologic analysis. The water surface elevations for the clearwater 2-, 5-, 25-, 50- and 100-year events were determined from the hydraulic model. The upstream extents of the model begin approximately 75 ft. downstream of the northeastern property boundary. The model extents end at the entrance to the La Puente Culvert on the southern edge of the property boundary. The following sections give further details of the HEC-RAS model.

3.1.2 Cross-Section Spacing and Alignment

The cross-sections were spaced an average of 77 feet apart and represent the channel geometry normal to the direction of flow. The spacing between cross-section varies, in order to most accurately capture changes to the width, depth, and slope of Lemon Creek.

The "before project" conditions model includes the four existing culverts that convey water within the channel downstream towards La Puente Road. The "after project as-proposed" model includes these existing culverts with the exception of Culvert D, which is proposed to be removed. The "after project as-proposed" model also incorporates change in section geometry due to the proposed land development. The cross-section data was altered to match the proposed terrain adjacent to the channel, shown on **Figure 3-1**.

3.1.3 Discharge / Flow Rate

The flow rates used to model the "before project" and "after project as-proposed" conditions of Lemon Creek are shown below in **Table 3-1.** Lemon Creek experiences several locations of flow change in both "before project" and "after project as-proposed" conditions. These consist of (1) the flow rate entering Lemon Creek on the upstream end of the project (river station 3105.06), (2) after the confluence with flows from the existing 81-inch Lemon Ave. storm drain (river station 2271.00), and (3) at the downstream end of the project, immediately upstream of the La Puente Culvert entrance (river station 1000.00). The flow rates at each of these locations were extracted from the regional hydrology analysis discussed in **Section 2** of this report.

Table 3-1: HEC-RAS Flow Rate Data

River	River Station	2-Year (cfs)	5-Year (cfs)	25-yr (cfs)	50-Year (cfs)	100-Year (cfs)
Lemon Creek	3105.06	615	854	1,343	1,562	1,783
Lemon Creek	2271.00	962	1,331	2,147	2,515	2,923
Lemon Creek	1000.00	975	1,347	2,176	2,540	2,954

3.1.4 Manning's Roughness – "n" Values

The appropriate Manning's roughness coefficients were chosen based on the type of vegetative and surface cover within Lemon Creek. The Manning's values are used to represent energy losses along the channel for the purpose of determining the water surface elevations. The Manning's value varies along the channel and the overbank for the "before project" and "after project as-proposed" conditions. The types of cover and corresponding roughness values used are summarized in **Table 3-2**. "Before project" and "after project as-proposed" conditions models utilize Manning's roughness values within a range of 0.025 to 0.050

Table 3-2: Manning's Roughness "n" Values in Lemon Creek

Vegetation / Surface Cover	Manning's Roughness "n" Value
Main channel or overbank, dense vegetation (i.e. trees, tree stumps, tall brush, etc.)	0.050
Main channel or overbank, medium density vegetation (i.e. tall brush, grasses, scattered small trees)	0.040
Main channel, gravels, cobbles, few boulders	0.035
Main channel or overbank, light density vegetation (i.e. short brush, grasses, etc.)	0.025
Corrugated metal pipe	0.025

3.1.5 Hydraulic Flow Regime

The "before project" and "after project as-proposed" condition HEC-RAS models assume steady state conditions with a subcritical flow regime option. The subcritical flow regime produces the most conservative results, in terms of water surface elevations, which is important in determining freeboard and potential changes to the floodplain. The subcritical flow regime requires a boundary condition only on the downstream end of the reach.

3.1.6 Boundary Condition

The boundary conditions for both the "before project" and "after project as-proposed" condition models used a known water surface elevation for the downstream end of the model. At the downstream end of the project reach, flow enters the La Puente Culvert. Because this culvert was designed to flow under pressure for the 25-yr storm event (per 1972 LA County as-builts in **Appendix B**), water backs up at the culvert entrance to specific water surface elevations for most storm events. For the 25-, 50- and 100-yr storm events, it was determined that water in Lemon Creek spills over the La Puente Roadway, similar to a weir.

The water surface elevation at the culvert entrance corresponding to each storm event was determined through performing iterative calculations of peak culvert capacity (inlet control) and weir flow over La Puente Road (for the flow rates that result in overtopping at the road). The portion of flows entering the culvert versus overtopping the road were adjusted until the two equations resulted in an identical water surface elevation.

It should be noted that the only events modeled that do not overtop the road are the 2- and 5-yr events. The 25-, 50- and 100-yr events result in overtopping at the road, in both "before project" and "after project as-proposed" conditions. The capacity of the La Puente Culvert is responsible for this. The culvert was designed for the 25-yr event as calculated according to a separate hydrology analysis (1,750 cfs) and, even in this condition, was designed to have a submerged inlet. Any storms resulting in flow rates greater than 1,750 cfs increase the water level at the La Puente Culvert face, quickly overtopping the headwall and roadway. It should also be noted that the section at the downstream-most end of the project reach is identical in both "before project" and "after project as-proposed" conditions; therefore, the calculated water surface elevation used for the downstream boundary condition is the same for both "before project" and "after project as-proposed" models.

3.1.7 Topographic Data Source

The topographic data used to define the geometry of the cross-sections in both "before project" and "after project as-proposed" conditions was obtained from a site survey performed by Michael Baker, International in 2019. The "before project" conditions model cross-sections were cut using the 2019 topography. The "after project as-proposed" conditions model used the 2019 topography as a base, before modifying to incorporate the proposed grading changes reflected on the tentative tract map (shown on **Figure 3-1**). It should be noted that no proposed grading features will be located within Lemon Creek. All proposed grading will take place outside of Lemon Creek, in the overbank areas of the cross-sections.

3.1.8 Hydraulic Structure Data – Culverts

Table 3-3 below summarizes the configuration of each of the four existing culverts in Lemon Creek. Most are circular in shape, with the exception of Culvert C, which is an arch culvert. In "before project" conditions, the culverts are utilized as creek crossings for pedestrian and equestrian recreational purposes. In "after project as-proposed" conditions, the developer will improve the trail up to City standards and make it public. An easement will be granted to the City for the long-term operation and maintenance of the public trail. The proposed public trail will only cross over the Creek once – at Culvert A. Culvert D is proposed to be removed in "project as-proposed" conditions, which will provide vegetation and habitat restoration in this area.

Table 3-3: Culvert Data

Culvert	Shape	Diameter (ft)	Span (ft)	Length (ft)	Manning's "n"
A	Circular	6.75	-	60	0.024
B	Circular	6	-	22	0.024
C	Arch	10.25	13.5	16.5	0.024
D*	Circular	6	-	19.5	0.024

*Notes: *Culvert D is removed in "after project as-proposed" conditions.*

3.2 Modeling Results

The results of the "before project" and "after project as-proposed" conditions hydraulic modeling are presented in **Tables 3-4** and **3-5**. A direct comparison of those results is shown in **Tables 3-6** and **3-7** and is discussed in **Section 3.2.5**.

3.2.1 "Before Project" Condition Hydraulic Results

Table 3-4: "Before Project" Conditions Hydraulic Results

River Station	2-Year		5-Year		25-Year		50-Year		100-Year	
	WSE (ft)	Velocity (ft/s)	WSE (ft)	Velocity (ft/s)	WSE (ft)	Velocity (ft/s)	WSE (ft)	Velocity (ft/s)	WSE (ft)	Velocity (ft/s)
3105.06	593.5	9.6	594.3	10.4	595.6	11.4	596.1	11.8	596.6	12.2
3034.83	591.7	4.7	593.1	4.8	595.0	5.3	595.6	5.6	596.3	5.8
2901.87	591.8	2.2	593.1	2.6	595.0	3.4	595.6	3.7	596.2	3.9
2778.59	591.5	3.6	592.8	3.9	594.6	4.6	595.2	4.9	595.8	5.2
2685.9	591.4	3.2	592.7	3.4	594.5	4.1	595.1	4.3	595.7	4.6
2660.9	591.4	2.3	592.7	2.6	594.5	3.3	595.1	3.6	595.7	3.9
2625.92	Culvert A									
2590.9	581.9	13.6	583.1	16.0	585.7	6.8	586.2	7.2	586.6	7.6
2565.9	583.3	5.4	584.1	5.9	585.5	6.9	586.0	7.2	586.5	7.5
2502.39	582.5	6.4	583.4	6.6	584.8	7.2	585.4	7.5	585.9	7.7
2327.19	581.4	4.9	582.0	5.9	583.2	7.3	583.7	7.7	584.0	8.3
2271	581.6	2.2	582.3	2.6	583.6	3.4	584.1	3.7	584.5	4.0
2246	581.5	3.2	582.2	3.6	583.5	4.4	584.0	4.6	584.3	5.0
2230.01	Culvert B									
2216.36	580.4	8.3	580.9	9.2	581.9	10.6	582.3	11.1	583.9	6.6
2199	576.9	9.9	578.1	10.6	580.7	10.9	581.1	12.2	581.4	13.5
2084.1	575.5	8.8	577.3	8.2	580.5	7.9	580.9	8.8	581.2	9.9
1875.66	574.8	4.8	576.7	5.1	580.1	5.5	580.3	6.3	580.4	7.2
1770.29	574.3	5.7	576.4	5.1	579.9	4.6	580.1	5.3	580.2	6.1
1593.83	573.6	5.2	576.0	4.4	579.8	4.1	579.9	4.7	579.8	5.5
1465.87	573.4	4.0	576.0	3.5	579.7	3.3	579.9	3.9	579.8	4.5
1425.92	573.3	4.9	575.6	5.5	579.5	4.7	579.5	5.5	579.3	6.6
1412.68	Culvert C									
1399.42	571.0	6.3	571.6	8.1	572.3	12.1	572.3	14.1	572.1	16.8
1367.97	571.1	5.1	571.8	6.0	573.1	7.3	573.6	7.8	574.2	8.1
1257.87	570.8	4.5	571.5	5.1	572.9	5.9	573.4	6.1	574.1	6.2
1151.21	570.7	3.8	571.3	4.4	572.7	4.9	573.3	5.0	574.1	4.2
1131.21	570.4	5.0	571.1	5.4	572.5	5.5	573.1	5.6	573.8	5.6
1116.46	Culvert D									
1101.71	568.6	8.5	569.3	8.7	572.2	5.1	572.9	5.0	573.8	4.9
1081.52	565.6	8.3	569.2	5.2	572.3	4.0	573.0	4.1	573.8	4.1
1000	565.6	5.7	569.0	5.0	571.8	6.0	572.4	6.6	573.1	7.2

3.2.3 *"After Project As-Proposed" Condition Hydraulic Results*

Table 3-5: "After Project As-Proposed" Conditions Hydraulic Results

River Station	2-Year		5-Year		25-Year		50-Year		100-Year	
	WSE (ft)	Velocity (ft/s)	WSE (ft)	Velocity (ft/s)	WSE (ft)	Velocity (ft/s)	WSE (ft)	Velocity (ft/s)	WSE (ft)	Velocity (ft/s)
3105.06	593.5	9.6	594.3	10.4	595.6	11.4	596.1	11.8	596.6	12.2
3034.83	591.7	4.7	593.1	4.8	595.0	5.3	595.6	5.6	596.3	5.8
2901.87	591.8	2.2	593.1	2.6	595.0	3.4	595.6	3.7	596.2	3.9
2778.59	591.5	3.6	592.8	3.9	594.6	4.6	595.2	4.9	595.8	5.2
2685.9	591.4	3.2	592.7	3.4	594.5	4.1	595.1	4.3	595.7	4.6
2660.9	591.4	2.3	592.7	2.6	594.5	3.3	595.1	3.6	595.7	3.9
2625.92	Culvert A									
2590.9	581.9	13.6	583.1	16.0	585.7	6.8	586.2	7.2	586.6	7.6
2565.9	583.3	5.4	584.1	5.9	585.5	6.9	586.0	7.2	586.5	7.5
2502.39	582.5	6.4	583.4	6.6	584.8	7.2	585.4	7.5	585.9	7.7
2327.19	581.4	4.9	582.0	5.9	583.2	7.3	583.7	7.7	584.1	8.2
2271	581.6	2.2	582.3	2.6	583.6	3.4	584.1	3.7	584.6	4.0
2246	581.5	3.2	582.2	3.6	583.5	4.4	584.0	4.6	584.4	4.9
2230.01	Culvert B									
2216.36	580.4	8.3	580.9	9.2	581.9	10.6	582.3	11.1	583.9	6.6
2199	576.9	9.9	578.1	10.6	580.7	10.9	581.1	12.2	581.4	13.5
2084.1	575.5	8.8	577.3	8.2	580.5	7.9	580.9	8.8	581.2	9.8
1875.66	574.8	4.8	576.7	5.1	580.1	5.5	580.3	6.3	580.4	7.2
1770.29	574.3	5.7	576.4	5.2	579.9	4.6	580.1	5.3	580.2	6.1
1593.83	573.6	5.2	576.0	4.5	579.8	4.1	579.9	4.7	579.9	5.5
1465.87	573.4	4.0	575.9	3.5	579.7	3.3	579.8	3.9	579.8	4.5
1425.92	573.3	4.9	575.6	5.5	579.5	4.7	579.5	5.5	579.4	6.5
1412.68	Culvert C									
1399.42	571.0	6.3	571.5	8.2	572.1	12.3	572.2	14.3	572.1	16.8
1367.97	571.1	5.1	571.7	6.1	573.0	7.5	573.5	7.9	574.2	8.1
1257.87	570.9	4.4	571.5	5.2	572.7	6.1	573.3	6.2	574.1	6.2
1151.21	570.7	3.8	571.2	4.5	572.5	5.1	573.1	5.1	573.9	5.1
1131.21	570.4	5.0	570.9	5.7	572.3	6.0	573.0	5.8	573.8	5.6
1116.46	Culvert D*									
1101.71	569.6	7.6	570.1	8.0	572.1	5.9	572.9	5.6	573.7	5.4
1081.52	565.6	8.3	569.2	5.2	572.3	4.0	573.0	4.1	573.8	4.1
1000	565.6	5.7	569.0	5.0	571.8	6.0	572.4	6.6	573.1	7.2

3.2.4 *Comparison of "Before Project" & "After Project As-Proposed" Hydraulic Results*

Table 3-6: Comparison of "Before Project" and "After Project As-Proposed" Conditions Water Surface Elevations

River Station	2-Year			5-Year			25-Year			50-Year			100-Year		
	EX WSE (ft)	PR WSE (ft)	Delta (PR - EX)	EX WSE (ft)	PR WSE (ft)	Delta (PR - EX)	EX WSE (ft)	PR WSE (ft)	Delta (PR - EX)	EX WSE (ft)	PR WSE (ft)	Delta (PR - EX)	EX WSE (ft)	PR WSE (ft)	Delta (PR - EX)
3105.06	593.5	593.5	0.0	594.3	594.3	0.0	595.6	595.6	0.0	596.1	596.1	0.0	596.6	596.6	0.0
3034.83	591.7	591.7	0.0	593.1	593.1	0.0	595.0	595.0	0.0	595.6	595.7	0.0	596.3	596.3	0.0
2901.87	591.8	591.8	0.0	593.1	593.1	0.0	595.0	595.0	0.0	595.6	595.6	0.0	596.2	596.2	0.0
2778.59	591.5	591.5	0.0	592.8	592.8	0.0	594.6	594.6	0.0	595.2	595.2	0.0	595.8	595.8	0.0
2685.9	591.4	591.4	0.0	592.7	592.7	0.0	594.5	594.5	0.0	595.1	595.1	0.0	595.7	595.7	0.0
2660.9	591.4	591.4	0.0	592.7	592.7	0.0	594.5	594.5	0.0	595.1	595.1	0.0	595.7	595.7	0.0
2625.92	Culvert A														
2590.9	581.9	581.9	0.0	583.1	583.1	0.0	585.7	585.7	0.0	586.2	586.2	0.0	586.6	586.6	0.0
2565.9	583.3	583.3	0.0	584.1	584.1	0.0	585.5	585.5	0.0	586.0	586.0	0.0	586.5	586.5	0.0
2502.39	582.5	582.5	0.0	583.4	583.4	0.0	584.8	584.8	0.0	585.4	585.4	0.0	585.9	585.9	0.0
2327.19	581.4	581.4	0.0	582.0	582.0	0.0	583.2	583.2	0.0	583.7	583.8	0.0	584.1	584.0	-0.1
2271	581.6	581.6	0.0	582.3	582.3	0.0	583.6	583.6	0.0	584.1	584.2	0.0	584.6	584.5	-0.1
2246	581.5	581.5	0.0	582.2	582.2	0.0	583.5	583.4	0.0	584.0	584.0	0.0	584.4	584.3	-0.1
2230.01	Culvert B														
2216.36	580.4	580.4	0.0	580.9	580.9	0.0	581.9	581.9	0.0	582.3	582.3	0.0	583.9	583.9	0.0
2199	576.9	576.9	0.0	578.1	578.1	0.0	580.7	580.7	0.0	581.1	581.1	0.0	581.4	581.4	0.0
2084.1	575.5	575.5	0.0	577.3	577.3	0.0	580.5	580.5	0.0	580.9	580.9	0.0	581.2	581.2	0.0
1875.66	574.8	574.8	0.0	576.7	576.7	0.0	580.1	580.1	0.0	580.3	580.3	0.0	580.4	580.5	0.0
1770.29	574.3	574.3	0.0	576.4	576.4	0.0	579.9	579.9	0.0	580.1	580.1	0.0	580.2	580.2	0.0
1593.83	573.6	573.6	0.0	576.0	576.0	0.0	579.8	579.7	0.0	579.9	579.9	0.0	579.9	579.9	0.0
1465.87	573.4	573.4	0.0	576.0	575.9	0.0	579.7	579.7	0.0	579.8	579.8	0.0	579.8	579.8	0.0
1425.92	573.3	573.3	0.0	575.6	575.6	0.0	579.5	579.5	0.0	579.5	579.5	0.0	579.4	579.4	0.0
1412.68	Culvert C														
1399.42	571.0	571.0	0.0	571.6	571.5	0.0	572.1	572.1	0.0	572.2	572.2	0.0	572.1	572.1	0.0
1367.97	571.1	571.1	0.0	571.8	571.7	-0.1	573.0	573.0	0.0	573.5	573.5	0.0	574.2	573.8	-0.4
1257.87	570.8	570.9	0.0	571.5	571.5	-0.1	572.7	572.7	0.0	573.3	573.3	0.0	574.1	573.6	-0.5
1151.21	570.7	570.7	0.0	571.3	571.2	-0.1	572.5	572.3	-0.1	573.1	573.0	-0.2	573.9	573.1	-0.8
1131.21	570.4	570.4	0.0	571.1	570.9	-0.1	572.3	572.3	0.0	573.0	573.0	0.0	573.8	573.1	-0.7
1116.46	Culvert D														
1101.71	568.6	569.6	1.0	569.3	570.1	0.8	572.1	572.1	0.0	572.9	572.8	0.0	573.7	572.9	-0.8
1081.52	565.6	565.6	0.0	569.2	569.2	0.0	572.3	572.2	-0.1	573.0	572.9	-0.1	573.8	573.0	-0.8
1000	565.6	565.6	0.0	569.0	569.0	0.0	571.8	571.8	0.0	572.4	572.4	0.0	573.1	573.1	0.0

As can be seen from the comparison of results shown in **Table 3-6**, the "after project as-proposed" condition results in minor increases to water surface elevation for the 2- and 5-yr events only, localized to cross-section 1101.71. The changes occurring in this area are primarily due to the removal of Culvert D and the introduction of a flow restriction to the geometry. The flow restriction maintains the sediment transport stabilizing benefits of the culvert without the turbulence / potential damage caused by overtopping. No increases to water surface elevation are observed in the 100-yr "after project as-proposed" condition, indicating that on- and off-site areas will not be subject to increased flooding. Changes to the 100-yr floodplain associated with the proposed development will not create any changes off-site, as can be seen in **Figure 3-1**. Additionally, a minimum freeboard of 2.5 ft. will be maintained between the 100-yr water surface elevation and the proposed pad elevations. In conclusion, the "project as proposed" effects on water surface elevations in Lemon Creek are negligible and will not result in impacts.

Xrefs: 20_09720 Project Components.dwg; AnticipatedErosionBoundaries_20210922.dwg; B852 Rincon JD_20211013.dwg; B852 HEC-RAS Cross Sections.dwg; LARIAC_LIDAR_CONTOURS.dwg; B852 Ex Topo (Placeworks 07.12.21)-EXPLODED.dwg; HECRAS_Ex100yrFP_20220906.dwg; HECRAS_Pr100yrFP_20220906.dwg; 2023-01-11_TTM 27 LOTS.dwg; HECRAS_WSE100yr_20230203.dwg; EX_FP_100YR_20230623.dwg; PR_FP_100YR_2023062
Dimscale = 1; LTscale = 1; PSltscale = 1; ACAD Ver. = 23.0s (LMS Tech); Visretain = 1

TTM Base Dated 01-11-23

MEADOW PASS ROAD

EX. 24" DIA SD OUTLET 1 TO REMAIN

EX. CULVERT A TO REMAIN (6.75' DIA / 60' L)

EX. x DIA. SD OUTLET 2 TO BE RELOCATED

PR. BRIDGE (50' W) & PR. 33" DIA SD OUTLET 4

EX. 81" DIA. SD OUTLET 3 TO REMAIN

EX. CULVERT B TO REMAIN (6' DIA. / 13.5' L)

PROPERTY BOUNDARY

EX. CULVERT C TO REMAIN (ARCH 13.5'w x 10.25'h / 16.5' L)

EX. CULVERT D TO BE REMOVED (6' DIA / 19.5' L)

PR. x DIA. SD OUTLET 5

PR. TRASH RACK INSTALLATION

EX. LA PUENTE CULVERT (DOUBLE 10'w x 5'h RCB)

LEMON AVENUE

LA PUENTE ROAD

EX. LA CO. FIRE STATION

NORTH

80 40 0 80 160

LEGEND

- EXISTING 100-YR FLOODPLAIN
- PROPOSED 100-YR FLOODPLAIN
- HEC-RAS CROSS-SECTIONS

ATTACHMENT 3-1

JOB NO. B852

PACE
Advanced Water Engineering
17520 Newhope Street, Suite 200 | Fountain Valley, CA 92708
P: (714) 481-7300 | www.pacewater.com

JOB
BROOKSIDE PROJECT
WALNUT CA

TITLE
FLOODPLAIN COMPARISON EXHIBIT EXISTING VS. PROPOSED

PREPARED BY	CT
PROJECT ENGINEER R.C.E. NO.	-- # XXXX
EXP.	x/xx/xx
DRAWN	CT
SCALE	AS SHOWN
DESIGNED	MEK
CHECKED	MEK
DATE	03/16/23

NO	BY	DATE	REVISIONS	DATE	APP.

P:\B852\Engineering\GlobalExhibits\B852 Report Figures.dwg - Tab: 03-23 EX Vs PR FP - by cthompson on 11/22/23 at 10:50:07 AM

THESE DRAWINGS ARE THE PROPERTY OF P.A.C.E. AND SHALL NOT BE REPRODUCED IN ANY MANNER NOR BE USED FOR CONSTRUCTION UNLESS STAMPED "ISSUED FOR CONSTRUCTION"

Table 3-7: Comparison of "Before Project" and "After Project As-Proposed" Conditions Velocities

River Station	2-Year			5-Year			25-Year			50-Year			100-Year		
	EX Vel (ft)	PR Vel (ft)	Delta (PR - EX)	EX Vel (ft)	PR Vel (ft)	Delta (PR - EX)	EX Vel (ft)	PR Vel (ft)	Delta (PR - EX)	EX Vel (ft)	PR Vel (ft)	Delta (PR - EX)	EX Vel (ft)	PR Vel (ft)	Delta (PR - EX)
3105.06	9.6	9.6	0.0	10.4	10.4	0.0	11.4	11.4	0.0	11.8	11.8	0.0	12.2	12.2	0.0
3034.83	4.7	4.7	0.0	4.8	4.8	0.0	5.3	5.3	0.0	5.6	5.6	0.0	5.8	5.8	0.0
2901.87	2.2	2.2	0.0	2.6	2.6	0.0	3.4	3.4	0.0	3.7	3.7	0.0	3.9	3.9	0.0
2778.59	3.6	3.6	0.0	3.9	3.9	0.0	4.6	4.6	0.0	4.9	4.9	0.0	5.2	5.2	0.0
2685.9	3.2	3.2	0.0	3.4	3.4	0.0	4.1	4.1	0.0	4.3	4.3	0.0	4.6	4.6	0.0
2660.9	2.3	2.3	0.0	2.6	2.6	0.0	3.3	3.3	0.0	3.6	3.6	0.0	3.9	3.9	0.0
2625.92	Culvert A														
2590.9	13.6	13.6	0.0	16.0	16.0	0.0	6.8	6.8	0.0	7.2	7.2	0.0	7.6	7.6	0.0
2565.9	5.4	5.4	0.0	5.9	5.9	0.0	6.9	6.9	0.0	7.2	7.2	0.0	7.5	7.5	0.0
2502.39	6.4	6.4	0.0	6.6	6.6	0.0	7.2	7.2	0.0	7.5	7.5	0.0	7.7	7.7	0.0
2327.19	4.9	4.9	0.0	5.9	5.9	0.0	7.3	7.3	0.0	7.7	7.7	0.0	8.3	8.2	-0.1
2271	2.2	2.2	0.0	2.6	2.6	0.0	3.4	3.4	0.0	3.7	3.7	0.0	4.0	4.0	0.0
2246	3.2	3.2	0.0	3.6	3.6	0.0	4.4	4.4	0.0	4.6	4.6	0.0	5.0	4.9	0.0
2230.01	Culvert B														
2216.36	8.3	8.3	0.0	9.2	9.2	0.0	10.6	10.6	0.0	11.1	11.1	0.0	6.6	6.6	0.0
2199	9.9	9.9	0.0	10.6	10.6	0.0	10.9	10.9	0.0	12.2	12.2	0.0	13.5	13.5	0.0
2084.1	8.8	8.8	0.0	8.2	8.2	0.0	7.9	7.9	0.0	8.8	8.8	0.0	9.9	9.8	0.0
1875.66	4.8	4.8	0.0	5.1	5.1	0.0	5.5	5.5	0.0	6.3	6.3	0.0	7.2	7.2	0.0
1770.29	5.7	5.7	0.0	5.1	5.2	0.0	4.6	4.6	0.0	5.3	5.3	0.0	6.1	6.1	0.0
1593.83	5.2	5.2	0.0	4.4	4.5	0.0	4.1	4.1	0.0	4.7	4.7	0.0	5.5	5.5	0.0
1465.87	4.0	4.0	0.0	3.5	3.5	0.0	3.3	3.3	0.0	3.9	3.9	0.0	4.5	4.5	0.0
1425.92	4.9	4.9	0.0	5.5	5.5	0.0	4.7	4.7	0.0	5.5	5.5	0.0	6.6	6.5	0.0
1412.68	Culvert C														
1399.42	6.3	6.3	0.0	8.1	8.2	0.1	12.1	12.3	0.2	14.1	14.3	0.2	16.8	16.8	0.0
1367.97	5.1	5.1	0.0	6.0	6.1	0.1	7.3	7.5	0.2	7.8	7.9	0.1	8.1	8.1	0.0
1257.87	4.5	4.4	0.0	5.1	5.2	0.1	5.9	6.1	0.3	6.1	6.2	0.1	6.2	6.2	0.0
1151.21	3.8	3.8	0.0	4.4	4.5	0.1	4.9	5.1	0.3	5.0	5.1	0.1	4.2	5.1	0.9
1131.21	5.0	5.0	0.0	5.4	5.7	0.3	5.5	6.0	0.4	5.6	5.8	0.2	5.6	5.6	0.0
1116.46	Culvert D														
1101.71	8.5	7.6	-0.9	8.7	8.0	-0.7	5.1	5.9	0.8	5.0	5.6	0.6	4.9	5.4	0.5
1081.52	8.3	8.3	0.0	5.2	5.2	0.0	4.0	4.0	0.0	4.1	4.1	0.0	4.1	4.1	0.0
1000	5.7	5.7	0.0	5.0	5.0	0.0	6.0	6.0	0.0	6.6	6.6	0.0	7.2	7.2	0.0

As can be seen in **Table 3-7**, the "project as-proposed" results in some increases to velocity, primarily near Culvert D. Velocity during the 2-yr, 5-yr, 25-yr, 50-yr, and 100-yr events changes by an average of +0.0 ft/s, +0.0 ft/s, +0.1 ft/s, +0.0 ft/s, and +0.0 ft/s respectively. Although minor changes can be observed immediately upstream and downstream of Culvert D, the culvert removal constitutes a benefit to the creek and proposed development, stabilizing velocities in the area and ensuring that a large storm event doesn't create a catastrophic failure at this pinch point.

Where the increases in velocity do occur, the increases are contained within the creek banks and will not create any changes off-site, as can be seen in **Figure 3-1.** In conclusion, the "project as proposed" effects on velocities in Lemon Creek are negligible and will not result in impacts.

Further discussion of Lemon Creek's stability, sediment transport trends, and erosion potential are presented in **Section 3.3**.

3.2.5 La Puente Culvert / Roadway

As can be seen from the results comparison tables, the "project as-proposed" will not result in either an increase to water surface elevation or an increase in velocity at the City-maintained LACDPW culvert, thereby not having an adverse effect on the culvert's operation, maintenance, or design capacity. Additionally, as described in **Section 2.2**, the "project as proposed" will avoid any potential increases in

flow rate due to runoff from the "project as-proposed" through the use of the two water quality basins. As such, the "project as-proposed" will not adversely affect the LACDPW culvert.

The area near the La Puente culvert entrance has experienced flooding in the past apparently due to debris blocking flow at the entrance of the culvert. A trash rack was installed at the culvert entrance in 1995 in order to address this issue; however, in subsequent storm events, debris was observed to be caught on the grate itself, perpetuating the issue of flow restriction at the culvert. While the culvert is not situated on the Brookside property and the "project as-proposed" will not contribute to the debris/flooding problem, the City Engineer has requested a revised trash rack design to be submitted to the City in order to alleviate these issues.

The proposed trash rack would be sloped at 2:1, which is a more favorable design than either the existing trash rack, which is flush with the culvert face, or an in-line debris basin. The current trash rack is flush with the culvert face, which means that any debris that travels to this point gets pushed up against the grate and is trapped there, resulting in diminished flow capacity in the culvert. The sloped trash rack design causes debris that reaches the gate to slide up the inclined grate as the water level rises. As the culvert becomes full, the captured debris floats at the top of the grate, above the culvert opening, thereby allowing flow to travel unimpeded through the culvert.

The revised trash rack design will help reduce the flooding issues at La Puente Rd. and will require less operations and maintenance activities than the current grate. The maintenance activities that will need to take place, such as removing the accumulated trash/debris at the grate before/after storm events, will occur much as it does in "before project" conditions. The grate is within close proximity to La Puente Rd., allowing maintenance crews to easily inspect and access the grate for maintenance. However, a full engineering analysis of the culvert has not been completed, and it is unproven whether trash blockage of the culvert entrance is the only hydraulic problem with the culvert. Therefore, the installation of a new trash rack may not eliminate flooding problems at the culvert. In any case the culvert's design capacity of 1,750 cfs is significantly lower than Lemon Creek's 100-year discharge of 2,954 cfs, and some flooding/overtopping of the culvert will be expected regardless of improvements to the trash rack. A technical memo containing more details of the trash rack design was prepared by PACE in June 2023 and has been included in **Appendix D** for reference.

3.3 Stream Stability, Sediment Transport, and Erosion Potential in Lemon Creek

In June 2023, PACE prepared a technical memorandum titled *Lemon Creek Stream Stability Analysis at Proposed Brookside Development* (included in **Appendix C**). The analysis evaluated historical imagery, site photographs, and empirical equations for stable channel dimensions to determine Lemon Creek's potential to migrate vertically and horizontally over time. The analysis concluded that Lemon Creek is stable and that its stability can be credited to the protection provided by the dense existing vegetation and the existing culverts (with exception to Culvert D), which act as invert control points. In order to protect the proposed development, it was recommended that (1) minimal vegetation be removed from the creek during construction and (2) the proposed residential structure footprints be placed a minimum of 10 ft. outside the limits of the calculated average stable channel widths. The current plan complies with both of these recommendations and will not change the stability of Lemon Creek.

3.3.1 Long-Term Erosion Potential Analysis

In addition to the stream stability analysis, an erosion potential analysis was performed for each reach in "before project" and "after project as-proposed" conditions for the 2-, 5-, 25-, 50-, and 100-yr storm events, in order to analyze the proposed Brookside developments potential effects sediment transport in Lemon Creek. Using a wide range of storm events for the sediment transport analysis is helpful in determining the overall effects of the proposed development. Although 2-yr storm events generally mobilize much less sediment than 100-yr storm events, they occur much more frequently and have been demonstrated to be responsible for the majority of fluvial morphology observed in natural drainage systems (MacRae, C.R. 1992, *The Role of Moderate Flow Events and Bank Structure in the Determination of Channel Response to Urbanization*).

The method used for the Lemon Creek sediment transport analysis is described in the Los Angeles County MS4 Permit (Order No. R4-2012-0175), *Attachment J: Determination of Erosion Potential*. The erosion

potential method relates sediment transport to the work performed by the applied hydraulic forces on the channel boundary. If hydraulic forces do not exceed the threshold required to move sediment, sediment transport will not take place. Conversely, if hydraulic forces exceed the threshold required to move sediment, then sediment transport will take place. The larger the difference between the work performed by the hydraulic forces and the minimum threshold of work required to move sediment, the more sediment will be mobilized. Work performed by the applied hydraulic forces can be compared between "before project" and "after project as-proposed" conditions to determine the potential for erosion. The effective work index equation and erosion potential equation outlined in the MS4 Permit is approved for use to demonstrate appropriate hydromodification control for development in Los Angeles County. **Equation 3-1** describes the total effective work done on the channel boundary by the applied hydraulic forces.

Equation 3-1: Effective Work Index Equation

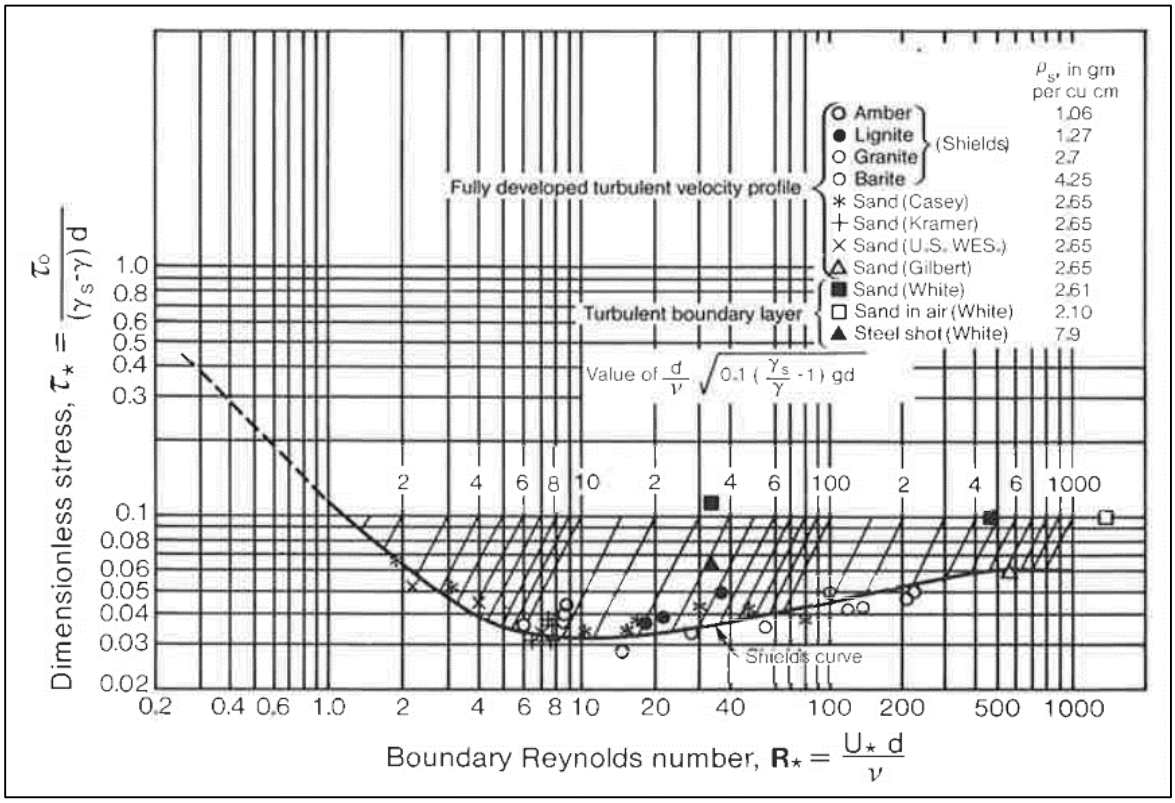
$$W = \sum_{i=1}^{n} (\tau_i - \tau_c)^{1.5} \cdot V \cdot \Delta t_i$$

Where,

W =	effective work
τ_C =	critical shear stress that initiates bed mobility or erodes the weakest bank layer
τ_i =	applied hydraulic shear stress
Δt =	duration of flows (in hours)
V =	mid-channel flow velocity
n =	length of flow record

The applied hydraulic shear stress (τ_i) was obtained from the HEC-RAS modeling results, along with mid-channel flow velocity (V). Duration of flows (Δt) was disregarded due to the fact that shear stress was being analyzed at the peak storm event flow rate, not for a continuous hydrograph. The critical shear stress (τ_C) was obtained using the Shield's diagram method, as described by Howard Chang in *Fluvial Processes in River Engineering.* Shield's diagram is shown in **Figure 3-2**. The dimensionless shear stress (τ^*) is obtained by first calculating the value of the 'third dimensionless parameter'. The calculation for the third dimensionless parameter is given in **Equation 3-2**.

Figure 3-2: Shield's Diagram



Equation 3-2: Third Dimensionless Parameter

$$\frac{d}{\nu}\left[0.1\left(\frac{\gamma_s}{\gamma} - 1\right)gd\right]^{1/2}$$

Where,

d = Median sediment diameter (ft) = D_{50}

γ_S = unit weight soil

γ = unit weight water

62.4 lf/ft^3

g = gravitational acceleration

32.2 ft/s^2

ν = kinematic viscosity of water

(assume 70^0 F)

= 1.0E-05 ft^2/s

The mean sediment diameter (D_{50}) was obtained from the grain size distribution analysis described in PACE's technical memorandum titled *Lemon Creek Stream Stability Analysis at Proposed Brookside Development* (included in **Appendix C**), where D_{50} = 0.192 mm (0.00063 ft).

The unit weight of soil was determined from Group Delta's geotechnical report performed for the Brookside project, titled *Preliminary Geotechnical Investigation Report for Entitlement Proposed Residential Development Tentative Tract No. 72798,* dated March 17, 2023. Multiple soil samples were

tested for dry unit weight, which came out to an average of 95 lb/ft^3. After entering the appropriate inputs into **Equation 3-2**, the value of the third dimensionless parameter equals 1.97. Following the diagonal lines on Shield's diagram corresponding to 1.97, the intersection point with Shield's curve correlates to a dimensionless shear stress (y-axis) value of 0.0725. **Equation 3-3** is used to convert dimensionless shear stress to critical shear stress.

Equation 3-3: Critical Shear Stress Equation

$$\tau_{\star} = \frac{\tau_o}{(\gamma_s - \gamma)\, d}$$

Where,

τ_C =	critical shear stress that initiates bed mobility or erodes the weakest bank layer
τ_i =	applied hydraulic shear stress
γ_S =	unit weight soil = 95 lb/ft^3
γ =	unit weight water = 62.4 lb/ft^3
d =	Median sediment diameter (ft) = D_{50} = 0.00063 ft.
V =	mid-channel flow velocity
n =	length of flow record

Using the inputs summarized, critical shear stress (τ_C) is equal to 0.0015 lbf/ft^2. This value was used as the critical shear input to the work equation described in **Equation 3-1**. The work equation was used to calculate the average work performed in each reach of Lemon Creek. Lemon Creek was split into five hydraulically similar reaches, which are generally delineated by the culverts and flow rate change locations. **Table 3-8** describes the reach delineations.

Table 3-8: Reach Delineations

Reach	River Sta
1	3105.07
1	3034.83
1	2901.87
1	2778.59
1	2685.9
1	2660.9
2	2625.92
2	2590.9
2	2565.9
2	2502.39
2	2327.19
3	2271
3	2246
4	2216.36
4	2199
4	2084.1
4	1875.66
4	1770.29
4	1593.83
4	1465.87
4	1425.92
5	1399.42
5	1367.97
5	1257.87
5	1151.21
5	1131.21
5	1101.71
5	1081.52
5	1000

The applied hydraulic shear stress and velocity outputs from HEC-RAS were averaged by reach and used to calculate "before project" and "after project as-proposed" condition work applied by the flows on the creek. A summary of the average reach hydraulics and calculated work for "before project" and "after project as-proposed" conditions is shown in **Tables 3-9** and **3-10** respectively.

Table 3-9: Average Reach Work Performed – "Before Project" Conditions

Reach	2-yr Shear Chan (lb/ft^2)	2-yr Vel Chnl (ft/s)	2-yr Work	5-yr Shear Chan (lb/ft^2)	5-yr Vel Chnl (ft/s)	5-yr Work	25-yr Shear Chan (lb/ft^2)	25-yr Vel Chnl (ft/s)	25-yr Work	50-yr Shear Chan (lb/ft^2)	50-yr Vel Chnl (ft/s)	50-yr Work	100-yr Shear Chan (lb/ft^2)	100-yr Vel Chnl (ft/s)	100-yr Work
1	1.2	4.3	18.8	1.3	4.6	23.1	1.6	5.3	31.1	1.7	5.6	34.5	1.8	5.9	38.8
2	3.0	7.6	77.4	3.8	8.6	133.5	2.2	7.0	22.7	2.3	7.4	26.4	2.5	7.8	31.8
3	0.2	2.7	0.2	0.2	3.1	0.4	0.3	3.9	0.8	0.4	4.1	1.0	0.4	4.5	1.4
4	1.6	6.5	31.1	1.5	6.5	28.9	1.4	6.5	28.5	1.7	7.2	43.4	1.8	7.5	55.9
5	1.1	5.9	10.0	1.0	6.0	8.7	1.1	6.3	12.7	1.3	6.8	20.7	1.5	7.1	37.1

Table 3-10: Average Reach Work Performed – "After Project As-Proposed" Conditions

Reach	2-yr Shear Chan (lb/ft²)	2-yr Vel Chnl (ft/s)	2-yr Work	5-yr Shear Chan (lb/ft²)	5-yr Vel Chnl (ft/s)	5-yr Work	25-yr Shear Chan (lb/ft²)	25-yr Vel Chnl (ft/s)	25-yr Work	50-yr Shear Chan (lb/ft²)	50-yr Vel Chnl (ft/s)	50-yr Work	100-yr Shear Chan (lb/ft²)	100-yr Vel Chnl (ft/s)	100-yr Work
1	1.2	4.3	18.8	1.3	4.6	23.1	1.6	5.3	31.1	1.7	5.6	34.5	1.8	5.9	38.8
Diff PR - EX =	*0.0*	*0.0*	*-0.1*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
2	3.0	7.6	77.4	3.8	8.6	133.5	2.2	7.0	22.7	2.3	7.4	26.4	2.5	7.7	31.2
Diff PR - EX =	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*-0.6*
3	0.2	2.7	0.2	0.2	3.1	0.4	0.3	3.9	0.8	0.4	4.1	1.0	0.4	4.5	1.3
Diff PR - EX =	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*-0.1*
4	1.6	6.5	19.0	1.5	6.5	18.2	1.4	6.5	17.9	1.7	7.2	25.4	1.8	7.5	29.8
Diff PR - EX =	*0.0*	*0.0*	*-12.1*	*0.0*	*0.0*	*-10.7*	*0.0*	*0.0*	*-10.6*	*0.0*	*0.0*	*-18.0*	*0.0*	*0.0*	*-26.2*
5	1.0	5.8	8.2	1.0	6.0	7.7	1.2	6.6	14.3	1.4	6.9	22.1	1.6	7.3	37.5
Diff PR - EX =	*-0.1*	*-0.1*	*-1.8*	*0.0*	*0.0*	*-0.9*	*0.1*	*0.3*	*1.6*	*0.1*	*0.2*	*1.4*	*0.1*	*0.2*	*0.4*

In order to determine the effects that the "project as-proposed" will have on Lemon Creek's ability to transport sediment, the erosion potential equation (**Equation 3-4**) was used, which compares "before project" and "after project as-proposed" work performed on the channel boundary.

Equation 3-4: Erosion Potential Equation

$$E_P = \frac{W_{post}}{W_{pre}}$$

Where,

E_p = Erosion Potential (<= 1 Erosion Not Likely; >1 Erosion Likely)
W_{post} = work index estimated for the "after project as-proposed" condition
W_{pre} = work index estimated for the "before project" condition

Table 3-11 summarizes the erosion potential of each reach for each storm event. Erosion potential values of 1 or less indicate that erosion in the "after project as-proposed" condition is not likely. Values greater than one indicate varying degrees of erosion are likely in the "after project as-proposed" condition.

Table 3-11: Erosion Potential of the "After Project As-Proposed" Condition

Reach	Erosion Potential 2-yr	Erosion Potential 5-yr	Erosion Potential 25-yr	Erosion Potential 50-yr	Erosion Potential 100-yr
1	1.0	1.0	1.0	1.0	1.0
2	1.0	1.0	1.0	1.0	1.0
3	1.0	1.0	1.0	1.0	0.9
4	0.6	0.6	0.6	0.6	0.5
5	0.8	0.9	1.1	1.1	1.0

Note: EP Values >1 indicate erosion in the "after project as-proposed" condition is likely. Values <=1 indicate erosion in the "after project as-proposed" condition is unlikely.

As shown in **Table 3-11**, erosion potential is not likely in Lemon Creek except for Reach 5 in the 25- and 50-year events; however, it is important to note that these storm events are relatively large and rare. As mentioned previously, small to moderate storm events have been shown to have greater impact on fluvial morphology than large storm events. In order to capture the effects of low erosion potential in the smaller storm events (which happen most frequently) as well as the slightly higher erosion potential in the larger storm events (which happen infrequently), the results from **Table 3-11** were used to calculate the long-term erosion potential of each reach. The expression which quantifies the long-term erosion potential is shown in **Equation 3-4**. It is, essentially, a frequency-weighted average value, incorporating many small events, some medium events, and a few large events. The result is an expected value.

Equation 3-5: Long-Term Erosion Potential Analysis

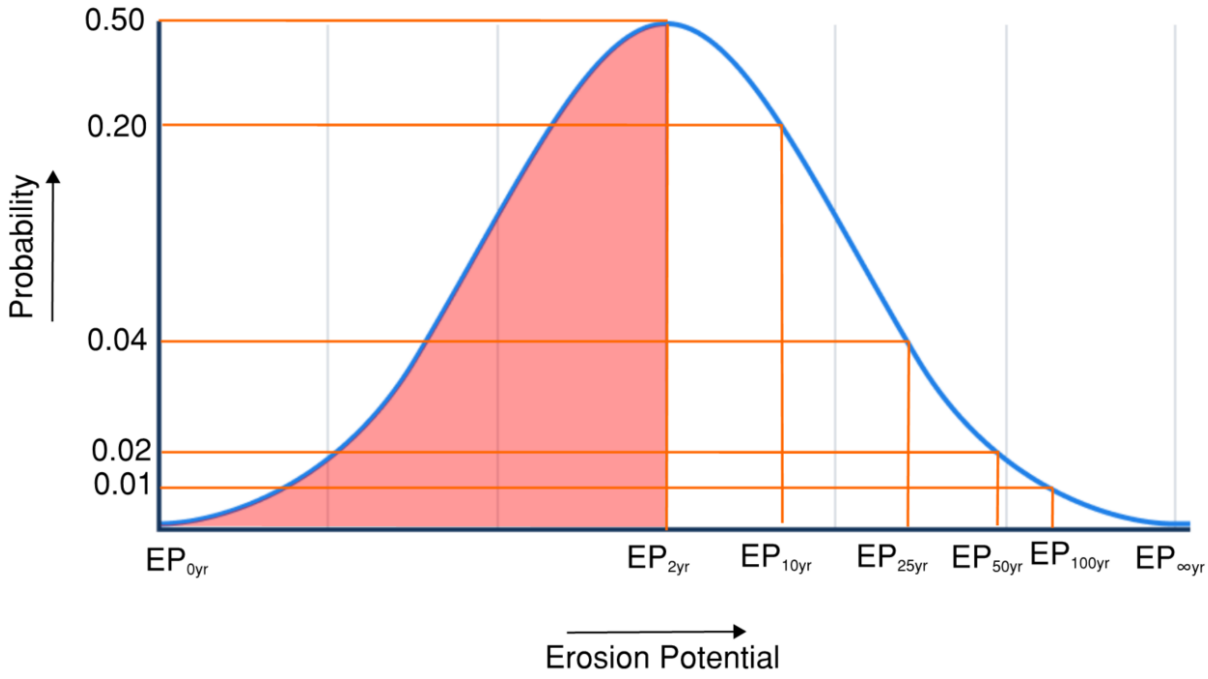
$$< W >= \frac{\sum_0^\infty [\mathrm{W(R)} \times \mathrm{P(R)}]\ \mathrm{dR}}{\sum_0^\infty [\mathrm{P(R)}]\ \mathrm{dR}}$$

Where,

W = Long-Term Erosion Potential
W(R) = Erosion Potential
P(R) = Probability of Storm Occurrence
R = Return Period

Over a long time period, including a mix of small and large storm events, the expected value of the erosion potential can be described by the curve shown below:

Figure 3-3: Erosion Potential Probability Curve



Note that the shape of the curve does not represent the exact probability distribution of the storm events, but is presented as a familiar bell curve shape to describe the concept in the calculations.

Equation 3-4 describes the long term erosion potential as the area under the curve shown in **Figure 3-3**. The curve shows the relationship between erosion potential and probability of the associated recurrence interval. The 2-yr erosion potential is centered on the curve due to the fact that the 2-yr storm has a 50%

chance of occurrence in any given year. For extremely small storm events with a minimum 0 cfs, no erosion is expected due to the lack of work provided by the flow. Conversely, for extremely large storm events, the erosion potential would be equal to 1, considering that changes in the geometry of Lemon Creek would constitute a very small portion of the floodplain created by inundation of a catastrophic flood event; therefore, the "after project as-proposed" condition would have no effect on the work performed by the flow on the channel boundary compared to the "before project" condition. Using these assumptions, the long-term erosion potential can be calculated according to **Equation 3-5.**

Equation 3-6: Long-Term Erosion Potential Analysis - Derived

$$< W > = \left(\frac{1}{2} \times (EP_2) \times (P_2) + \frac{1}{2} \times (EP_5 + EP_2) \times (P_2 - P_5) + \frac{1}{2} \times (EP_5 + EP_{25}) \times (P_5 - P_{25}) + \frac{1}{2} \times (EP_{25} + EP_{50}) \times (P_{25} - P_{50}) + \frac{1}{2} \times (EP_{50} + EP_{100}) \times (P_{50} - P_{100}) + \frac{1}{2} \times (1 + EP_{100}) * P_{100}\right) \div (P_2 + P_5 + P_{25} + P_{50} + P_{100})$$

Where,

W = Long-Term Erosion Potential
EP_X = Erosion Potential of Storm Event 'X'
P_X = Probability of Occurrence of Storm 'X'

Equation 3-5 was used to calculate the long-term erosion potential of all reaches, using the input data from **Table 3-11**. **Table 3-12** summarizes the long-term potential of each reach. The expectation values shown indicate the predicted ratio of work ("project as-proposed" versus "before project") exerted on the streambed over the course of time. The values, all less than 1.0, indicate that increased erosive effects are not expected. These results support the conclusions of the PACE technical memorandum titled *Lemon Creek Stream Stability Analysis at Proposed Brookside Development* (June 2023; Included in **Appendix C**), that the creek is stable and is not expected to erode in "before project" or "after project as-proposed" conditions.

Table 3-12: Long-Term Erosion Potential of Lemon Creek

Reach No.	Long-Term Erosion Potential Lemon Creek
1	1.00
2	1.00
3	1.00
4	0.62
5	0.89

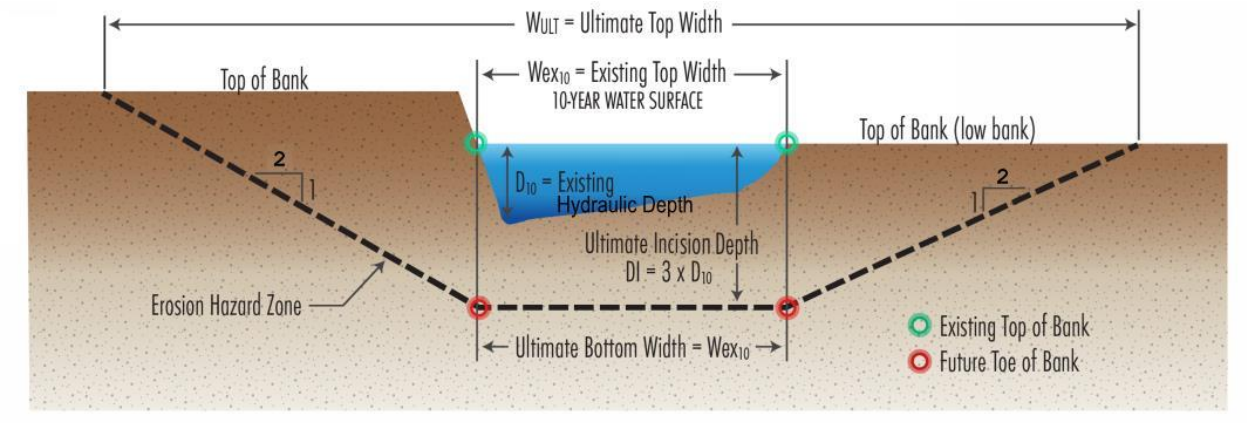
Note: EP Values >1 indicate erosion in the "after project as-proposed" condition is likely. Values <=1 indicate erosion in the "after project as-proposed" condition is unlikely.

3.3.2 Short-Term Erosion Potential Analysis

While values presented in **Table 3-12** are useful in evaluating the long-term trends of erosion in the creek, further analysis was performed for Reach 5 in the 25- and 50-yr events, which showed some potential for short-term erosion in the "after project as-proposed" condition in **Table 3-11**. Erosion values are slightly greater than 1.0 for those cases, which mean erosion is possible in the short term for a 25- or 50-yr storm event, even though the creek is not expected to erode in the long-term. The short term erosion analysis involves evaluating the geometry of the creek in Reach 5 for maximum possible erosion that could occur, given known constraints.

The potential short-term erosion analysis utilized for the Brookside project was adapted from a template procedure described in a report titled *Erosion Hazard Zone and Channel Stabilization Criteria for City of Austin Streams* (Ayres Associates, 2004). This study utilized data from previous geomorphic surveys and channel enlargement measures conducted for the City of Austin in development of the *Watershed Protection Masterplan* (City of Austin, 2001) using methods described in *Technical Procedures for Watershed Erosion Assessments* (City of Austin, 1997). The criteria for developing an Erosion Hazard Zone provides limits, outside of which, resources are not expected to be threatened as a result of future stream erosion. Lateral stability exists when the creek moves within these expected limits. The template defines the "maximum envelope" for this movement, incorporating geotechnical slope stability into the assessment. **Figure 3-4** shows the creek geometry template for a stable condition.

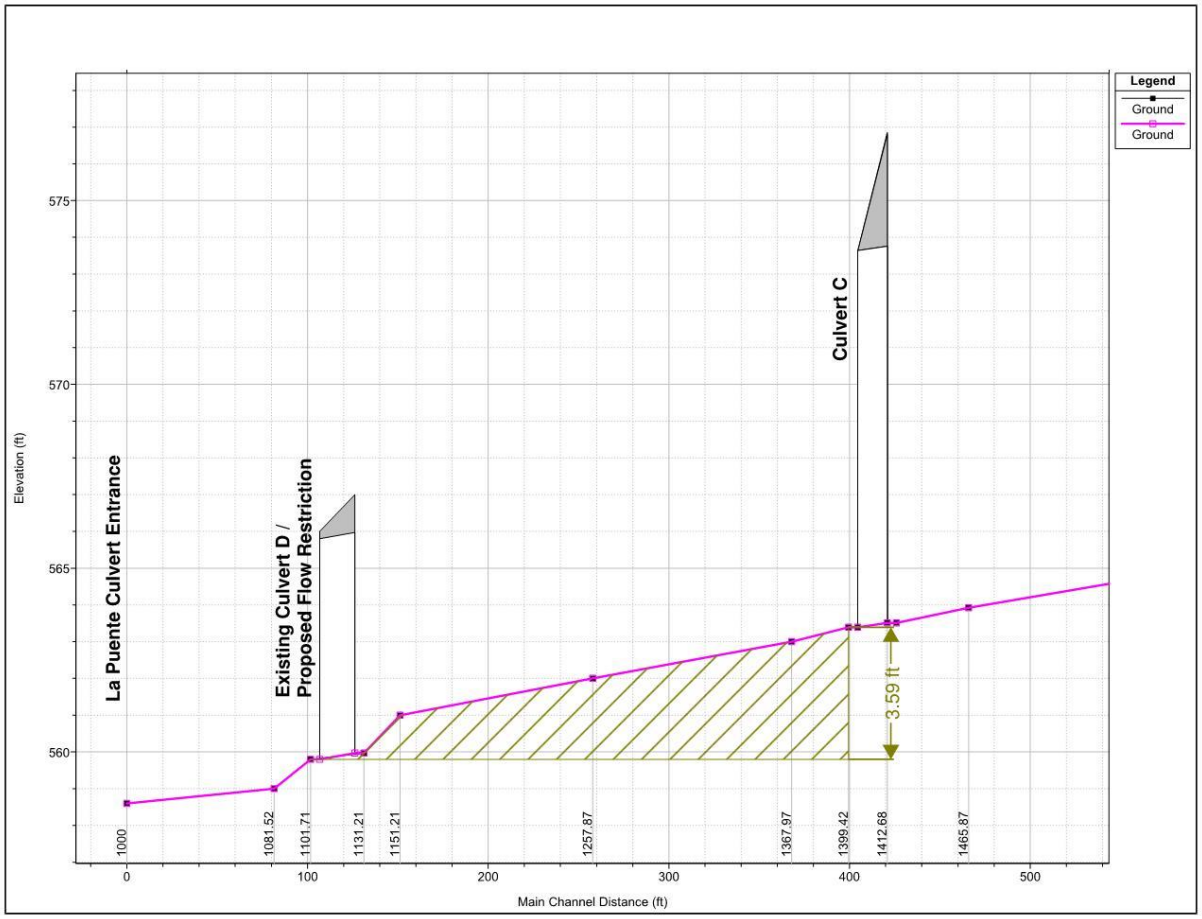
Figure 3-4: Lateral Erosion Envelope Template



The original template shown in the City of Austin's *Erosion Hazard Zone and Channel Stabilization Criteria for Austin Streams* recommends a stable channel side slope of 4(H) : 1(V). This side slope is based on general geotechnical stability of alluvial stream banks in the Austin area with an additional factor of safety for the Erosion Hazard Zone. After consulting the geotechnical report prepared by Group Delta for the Brookside project, it was recommended that a 2(H) : 1(V) slope be used instead, as this is more in line with the stable slope of the soils existing in Lemon Creek.

Instead of using hydraulic indicators of the stream's ability to move bed material ($3 \times D_{10}$), as shown in the City of Austin template, a maximum invert degradation was obtained by analyzing physical constraints in the creek. Maximum bed erosion in Reach 5 can be estimated using the invert profile of Lemon Creek and the culvert locations. The culvert locations represent rigid points in the creek invert which will not shift over time. Reach 5 extends from Culvert C to the La Puente culvert entrance, encompassing Culvert D. Although Culvert D is proposed to be removed, an artificial flow restriction will remain in place, preserving the rigid invert point at this location. Using the known rigid invert points, the maximum degradation that could occur to the creek invert in Reach 5 would be indicated by a 0.00% slope between Culverts C and D, as shown in **Figure 3-5**.

Figure 3-5: Maximum Bed Degradation Reach 5 (Short Term 25-, 50-yr Analysis)



The vertical shift in invert elevation at each of the HEC-RAS cross-sections of Reach 5 is shown in **Table 3-13**. The maximum bed degradation occurs immediately downstream of Culvert C (approximately 3.6 ft), with reduced degradation approaching the next downstream rigid invert point, at Culvert D.

Table 3-13: Maximum Vertical Bed Shift Reach 5 (Short Term 25-, 50-yr Analysis)

HEC-RAS River Station	Existing / Proposed Invert Elevation (ft)	Maximum Degradation Elevation (ft)	Difference (ft)
1399.42	563.39	559.80	3.59
1367.97	563.00	559.80	3.20
1257.87	562.00	559.80	2.20
1151.21	561.00	559.80	1.20
1131.21	559.97	559.80	0.17
1101.71	559.80	559.80	0.00

The maximum vertical shift in invert elevation for each of the channel sections would result in a corresponding lateral shift of the banks, with the creek maintaining a stable slope of 2(H) : 1(V), as shown in **Figure 3-4**. The maximum vertical and horizontal shifts due to degradation in Reach 5 were outlined on

the cross-sections from the HEC-RAS model, in order to determine maximum channel top width extents. **Figures 3-6** thru **3-10** show the potential maximum degradation at each cross-section in Reach 5.

Figure 3-6: HEC-RAS Section 1399.42 Maximum Degradation Envelope

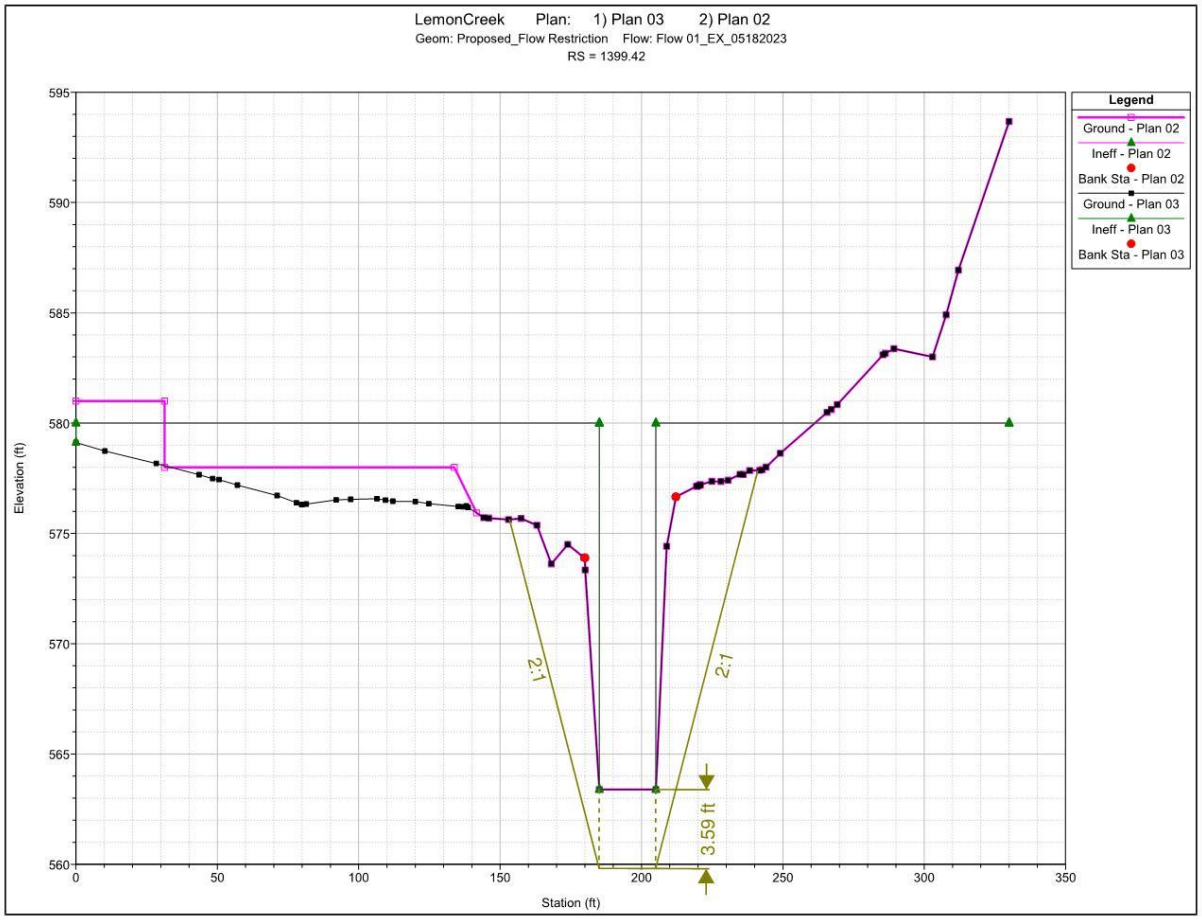


Figure 3-7: HEC-RAS Section 1367.42 Maximum Degradation Envelope

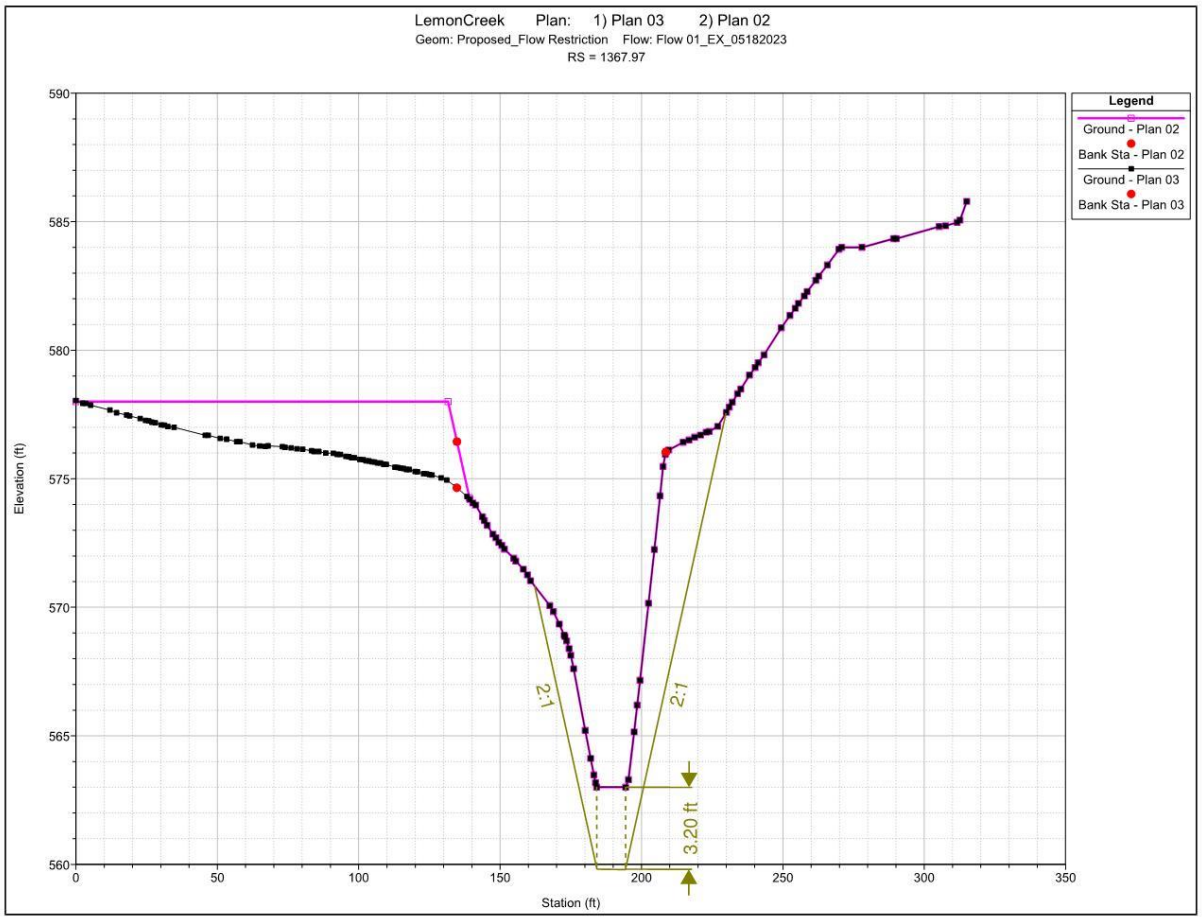


Figure 3-8: HEC-RAS Section 1257.87 Maximum Degradation Envelope

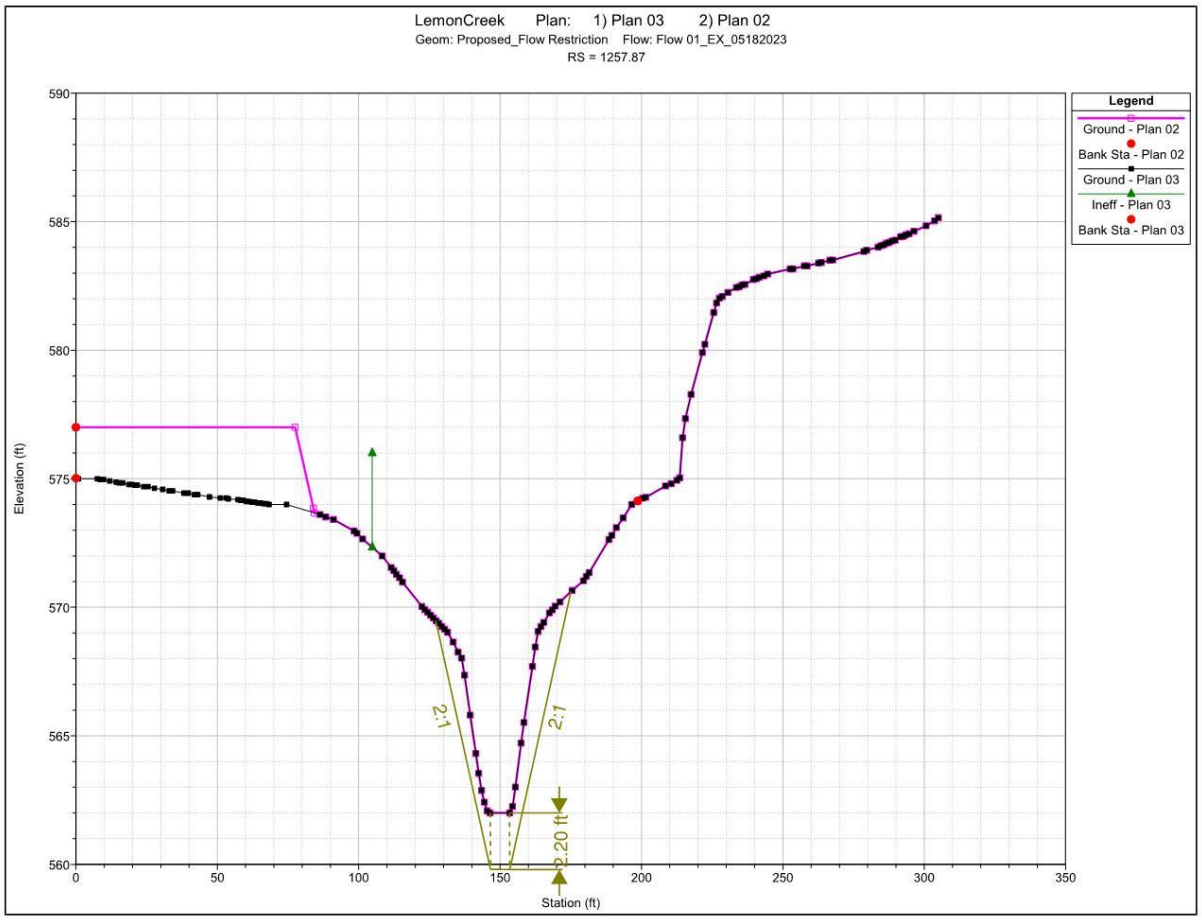


Figure 3-9: HEC-RAS Section 1151.21 Maximum Degradation Envelope

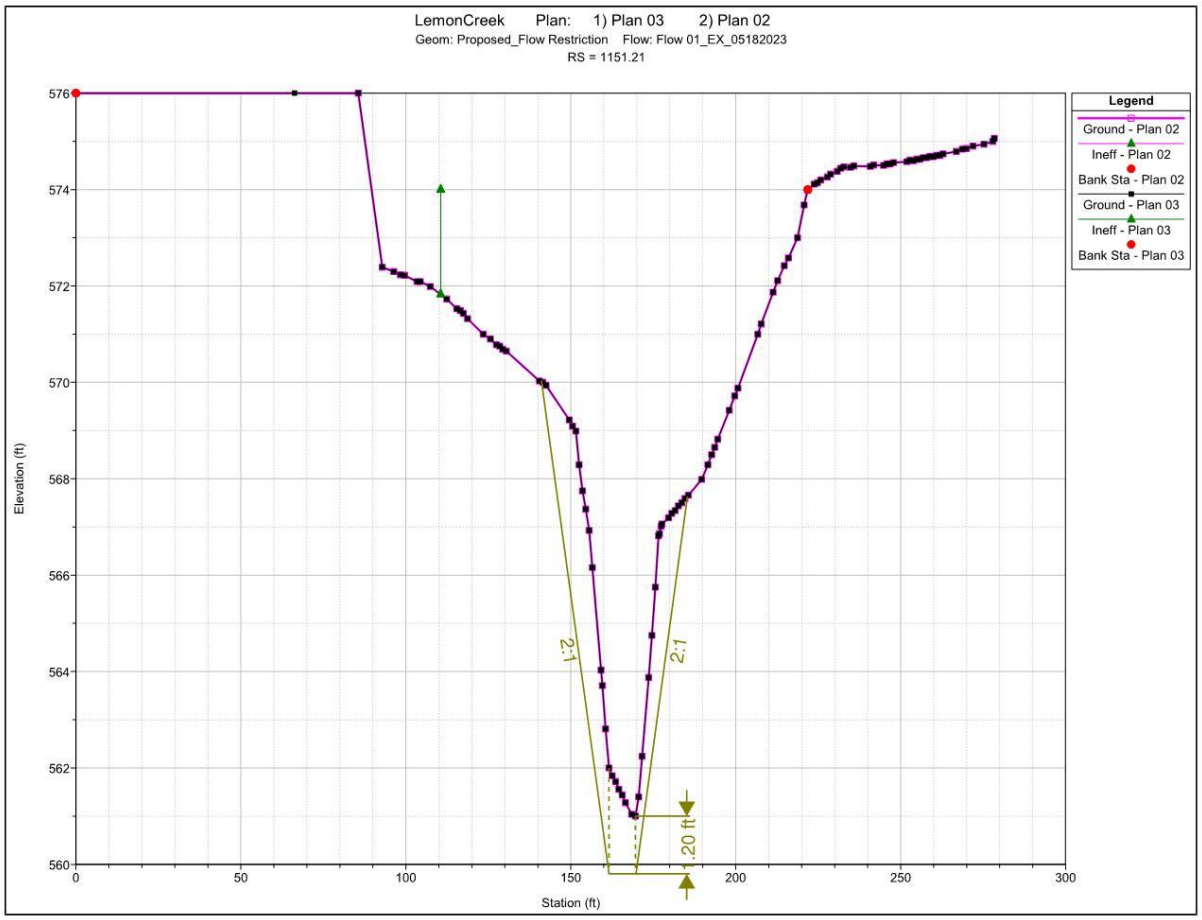
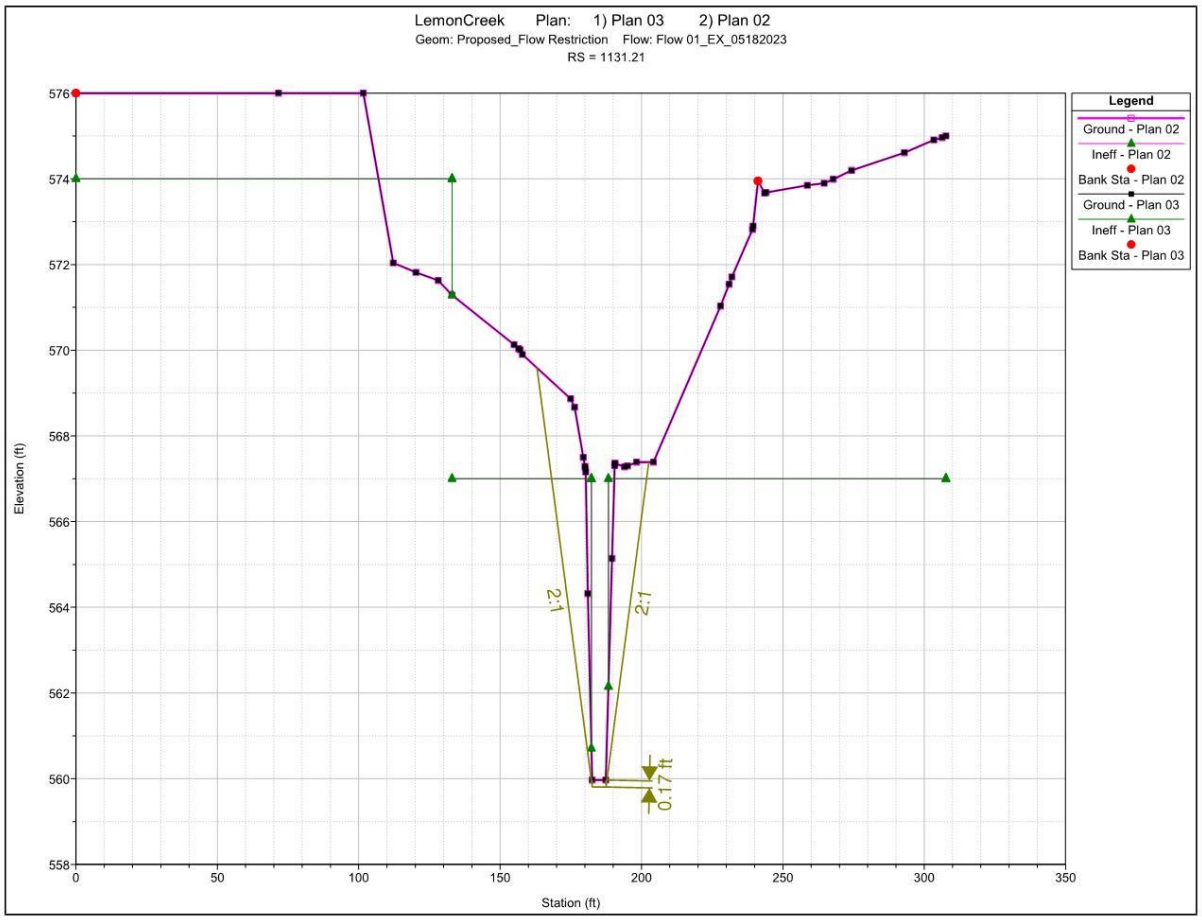


Figure 3-10: HEC-RAS Section 1131.21 Maximum Degradation Envelope



It should be noted that the potential degradation shown on each of the sections is a maximum envelope outlined by physical constraints in the creek. It is not known if the stream power of the 25- or 50-yr condition would be great enough to move such a volume of bed material. Therefore, the analysis is a conservative approach and should only be used to demonstrate that, in the event Lemon Creek were to erode in the short-term due to erosion in the 25- or 50-yr storm events, it would not significantly impact Lemon Creek or present a hazard to nearby properties or people in either “before project” or “after project as-proposed” conditions.

Each of the cross-sections presented above show “before project” and “after project as-proposed” grades. As can be seen, the maximum lateral shift of Lemon Creek due to degradation would not conflict with the proposed slopes or pads; therefore, potential short-term erosion in the 25- and 50-yr events would not have significant impacts on nearby properties or people.

3.3.3 Natural Sedimentation Processes Maintained by Vegetation

While the previous sections discuss how the project will not increase erosion of the creek channel in the short-term or long-term, it is also important to discuss the natural processes that provide sediment to Lemon Creek. Stable natural stream beds exist when there is a balance between sediment delivered to the creek from the watershed and sediment transported through the creek channel. Both increases and decreases in sediment delivery can negatively impact a stream’s stability and diminish its value as natural resource. Therefore, it is important that proposed changes near a creek do not interfere with its natural sediment production areas (degradation) or its deposition areas (aggradation).

For the sake of this discussion, natural sediment production / deposition areas are defined by the main banks of the creek, which regularly experience inundation during rain events. The channelized runoff comes into contact with the channel bed and banks, either removing soil or depositing soil. The channel bed and banks of Lemon Creek are well-defined, as seen in field visits, photos, and topographic data. Other natural features important for sediment delivery to a stream channel include landslide areas, steep, eroding hillsides, and steep tributary streams, none of which are present on the project site.

In order to determine the potential for the development to disrupt Lemon Creek's natural sedimentation processes, the limits of grading and construction activity were compared to the observed limits of the creek banks (at top of bank). A screening process was performed for each cross-section in the HEC-RAS hydraulic model to determine if proposed grading limits encroached anywhere within the creek bed or banks. If grading were to encroach into the creek bed or banks, the natural vegetation would be disturbed, which could threaten the natural sedimentation processes in the creek.

It should be noted that the bank stations included in the HEC-RAS hydraulic model, as described in **Sections 3.1** and **3.2**, are distinct from the top of bank stations referenced in this section. The top of bank stations used in **Sections 3.1** and **3.2** were set above the 100-yr water surface at all sections, as specified in the HEC-RAS user's manual. This placement allows the model to accurately calculate hydraulic results for the creek, and is not intended to describe the main channel as defined in a geomorphic or wildlife habitat sense. In the case of Lemon Creek, there are numerous sections where the 100-yr water surface elevation is above the main channel top of bank. This scenario typically occurs in areas where the 100-yr floodplain spills out of the main channel and onto the overbanks. For these areas, it is understood that the potential sediment production area is limited to the main channel corridor within the 100-yr floodplain, and does not extend to the outer limits of the 100-yr floodplain. Inundation from a 100-yr flood is extremely rare (1% chance annual occurrence) and the sediment in these areas would contribute neither aggradation nor degradation to the natural sedimentation processes of Lemon Creek.

The screening process was performed for all sections in the HEC-RAS model, using the "main channel" limits to establish top of bank. If sections with proposed grading encroached beyond the main channel limits, they would be flagged for further review; however, the analysis showed that grading did not encroach into the main channel at any cross-sections. **Table 3-14** shows the comparison of bank stations to the limits of grading. Sections with "N/A" did not contain proposed grading on the specified bank. The minimum clearance between edge of grading and channel bank on the left bank (east) is approximately 16 ft., while the average clearance is 49 ft. For the right bank (west), the minimum clearance is 15 ft., while the average clearance is 41 ft.

Figures 3-11, **3-12**, and **3-13** show the bank stations identified on the cross-sections from HEC-RAS, plotted at a 1H:1:V ratio to better convey the scale of the sections.

This screening analysis shows that the proposed grading will not encroach into the main channel bed or banks and will, therefore, not disturb the natural vegetation or the associated natural sedimentation processes of Lemon Creek.

The only areas not addressed by this analysis are the areas in the creek that would be temporarily disturbed by construction activities. These are limited to (1) the construction of the bridge across Lemon Creek and (2) the removal of Culvert D / replacement with an artificial flow restriction. Erosion in these areas will be prevented by construction-phase erosion control BMPs followed by permanent stabilization with appropriate materials and vegetation.

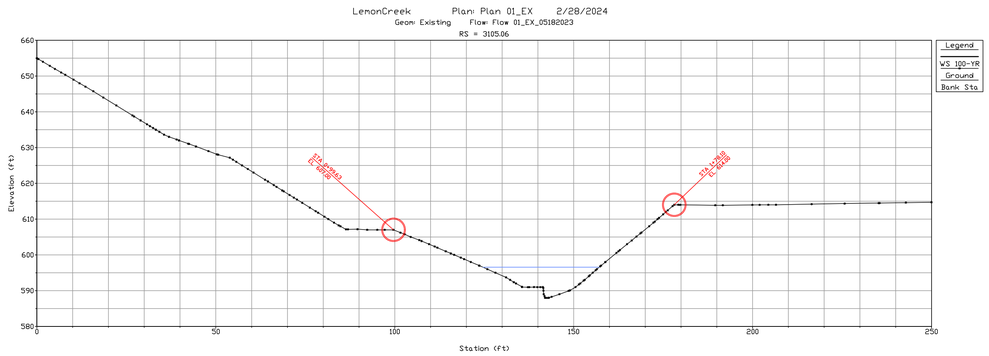
The proposed bridge will be a single span bridge with abutments outside of the main channel top of bank (See River Stations 2590.90 and 2565.90 on **Table 3-14** for clearances). Construction activities may result in the removal of vegetation in the immediate vicinity of the bridge; however, all removed vegetation will be replaced at a minimum 1:1 ratio, utilizing only native / non-invasive plant types. The proposed bridge will not result in a reduction of vegetative density in the area and will, therefore, not disturb the natural sedimentation processes of Lemon Creek.

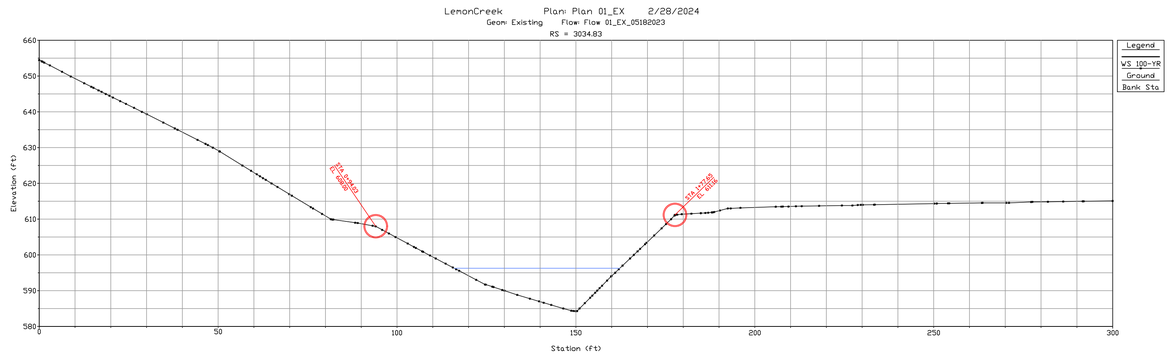
The proposed removal of Culvert D and the replacement with an artificial flow restriction device may also result in the removal of vegetation in the immediate vicinity. The flow restriction is intended to mimic pre-project stream hydraulics (i.e. flow velocities) while not compromising the integrity of the creek banks, which occurs in existing conditions whenever the culvert overtops. The flow restriction is also intended to maintain

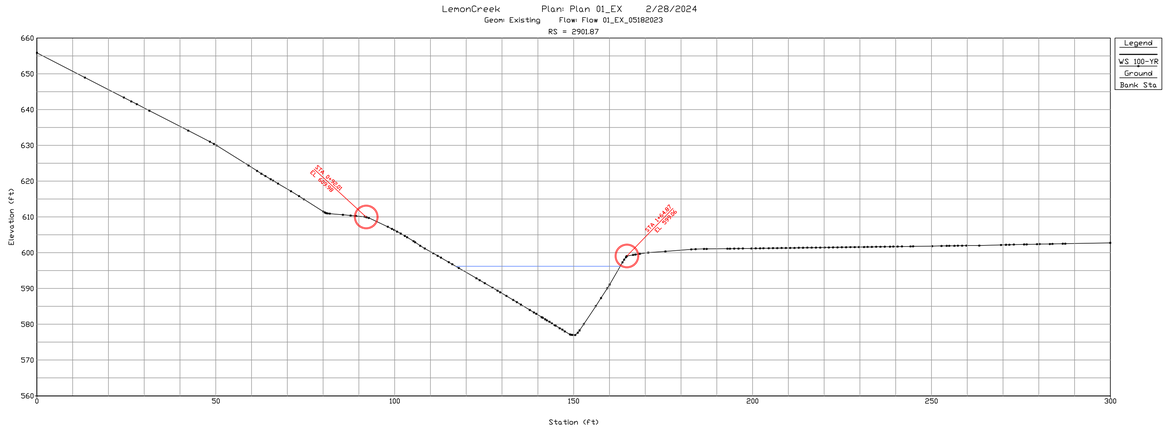
a rigid invert to stabilize the creek bed. The configuration / materials of the flow restriction will be determined during later phases of design, but will not result in an increased footprint, compared to the existing culvert. Additionally, natural materials will be used to the maximum extent practicable, in order to maintain a natural aesthetic to the creek (i.e. boulders). All removed vegetation due to the culvert removal / flow restriction installation will be replaced at a minimum 1:1 ratio, utilizing only native / non-invasive plant types. The proposed culvert removal / flow restriction installation will not result in a reduction of vegetative density in the area and will, therefore, not disturb the natural sedimentation processes of Lemon Creek.

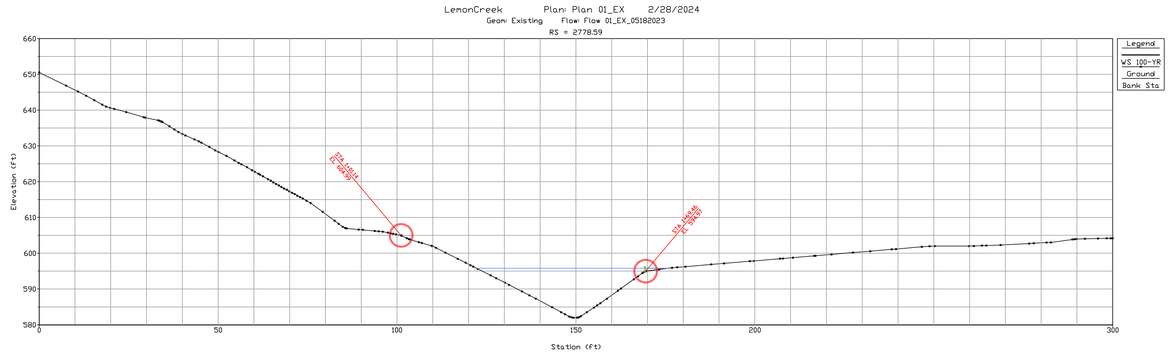
Table 3-14: Top of Bank vs Grading Screening Results

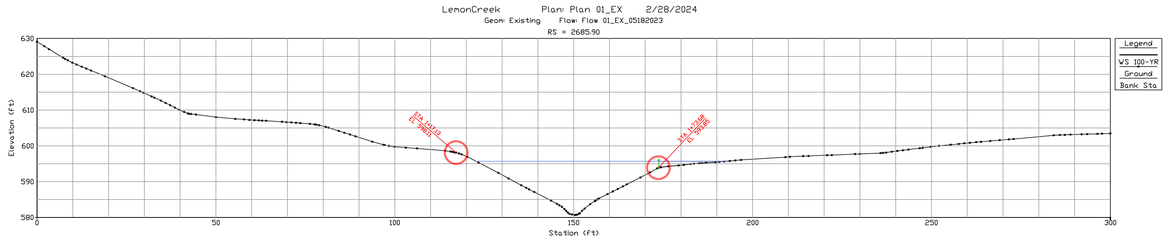
River Station	Left Bank Sta	Rightmost Limits of Left Bank PR Grading	Clearance Left Bank (ft)	Right Bank Sta	Leftmost Limits of Right Bank PR Grading	Clearance Right Bank (ft)
3105.06	99.63	N/A	N/A	178.10	242.83	64.73
3034.83	94.03	N/A	N/A	177.65	221.25	43.60
2901.87	92.01	N/A	N/A	164.87	191.36	26.49
2778.59	101.14	N/A	N/A	169.46	188.36	18.90
2685.90	117.13	N/A	N/A	173.68	209.53	35.85
2660.90	132.68	N/A	N/A	175.85	210.72	34.87
2590.90	135.78	101.64	34.14	177.07	214.51	37.44
2565.90	136.81	105.43	31.38	192.83	207.30	14.47
2502.39	141.95	97.93	44.02	174.48	205.87	31.39
2327.19	108.99	35.49	73.50	148.17	216.19	68.02
2271.00	140.02	76.05	63.97	173.87	251.63	77.76
2246.00	143.21	78.39	64.82	159.65	N/A	N/A
2216.36	140.48	97.80	42.68	162.25	N/A	N/A
2199.00	145.51	129.78	15.73	182.54	N/A	N/A
2084.10	121.33	36.63	84.70	163.51	N/A	N/A
1875.66	119.29	56.73	62.56	165.85	N/A	N/A
1770.29	95.32	55.44	39.88	138.36	N/A	N/A
1593.83	101.68	68.11	33.57	133.59	N/A	N/A
1465.87	184.62	151.04	33.58	205.80	N/A	N/A
1425.92	217.76	188.80	28.96	248.36	N/A	N/A
1399.42	179.99	141.67	38.32	213.30	N/A	N/A
1367.97	172.95	139.31	33.64	208.63	N/A	N/A
1257.87	136.40	84.32	52.08	163.45	N/A	N/A
1151.21	151.54	92.84	58.70	176.61	N/A	N/A
1131.21	180.31	112.19	68.12	190.56	N/A	N/A
1101.71	226.16	162.80	63.36	234.94	N/A	N/A
1081.52	226.91	173.75	53.16	253.99	N/A	N/A
1000.00	811.10	N/A	N/A	845.07	N/A	N/A

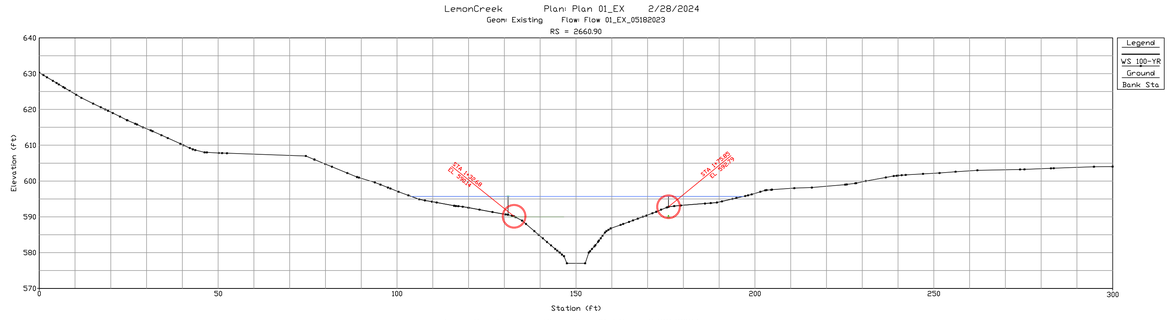


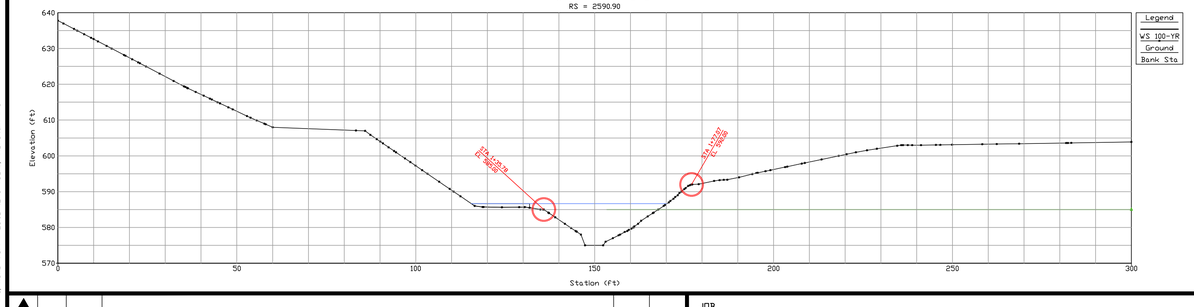


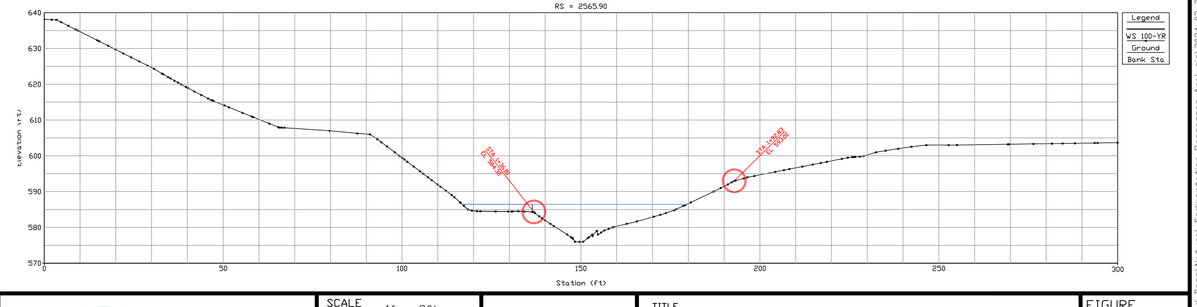












THESE DRAWINGS ARE THE PROPERTY OF PACE AND SHALL NOT BE REPRODUCED IN ANY MANNER NOR BE USED FOR CONSTRUCTION UNLESS STAMPED "ISSUED FOR CONSTRUCTION".

P:\B852\Engineering\Calcs and Docs\Natural Sedimentation Processes Analysis\2024-02-28_EX Plan Geometry Sections.wrg - Tab: FIGURE 3-11 (3105.06-2565.90) By: CThompson on Feb 29, 2024 at 11:49 am

Xrefs:
Dmscale = 1; Lscale = 1; PSltscale = 1; ACAD Ver. = 23.0s (LMS Tech); Viewtwin = 1

NO	BY	DATE		DATE	APP.

JOB

BROOKSIDE

TENTATIVE TRACT NO. 72798

WALNUT CA

PACE
Advanced Water Engineering
17520 Newhope Street, Suite 200 | Fountain Valley, CA 92708
P: (714) 481-7300 | www.pacewater.com

SCALE	1" = 20'
DESIGNED	M.K.
DRAWN	C.T.
CHECKED	M.K. / R.R.
DATE	02/29/2024
JOB NO.	B852

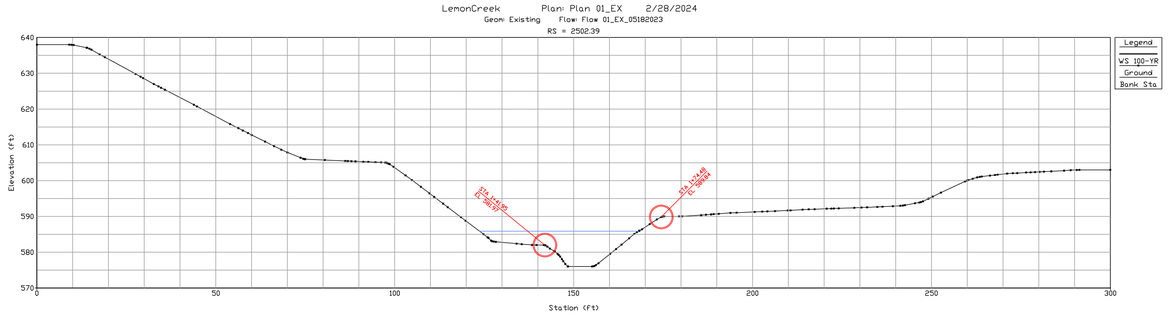
TITLE

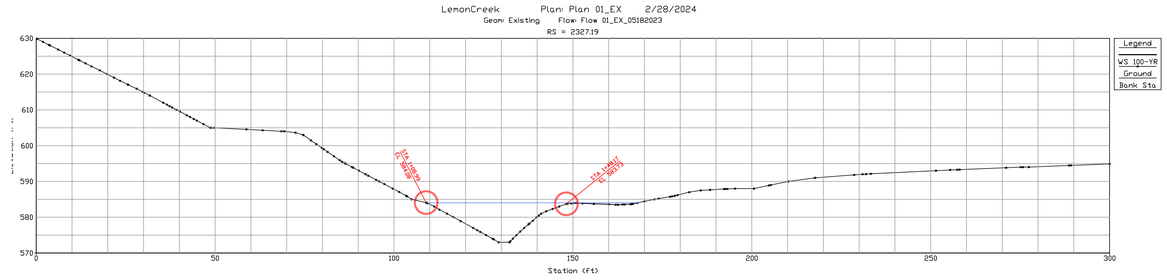
NATURAL BANK STATION DETERMINATION WORKMAP XS 3105.06 TO 2565.90

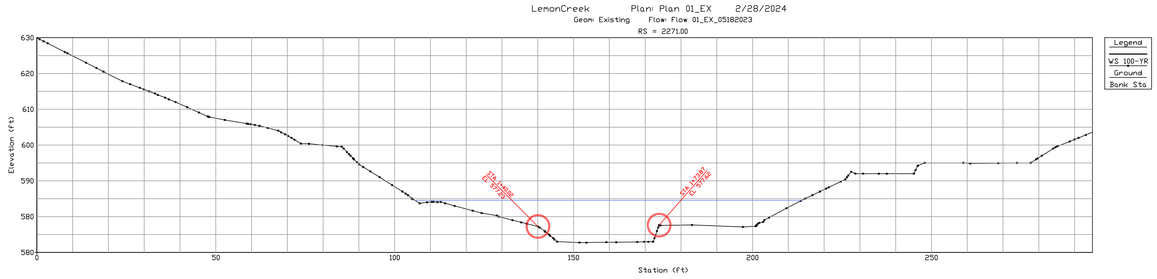
FIGURE

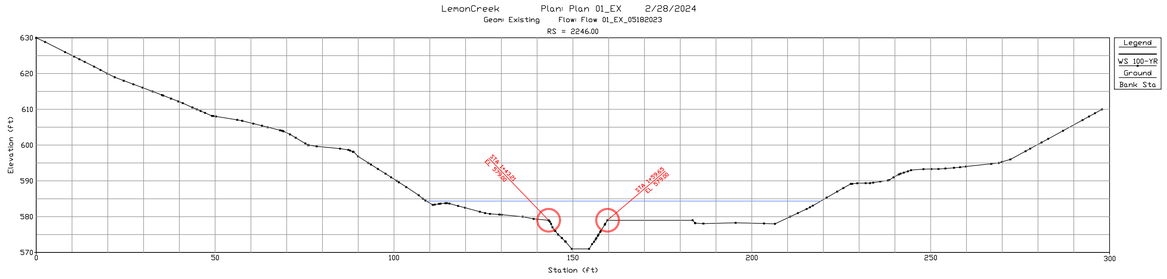
3-11

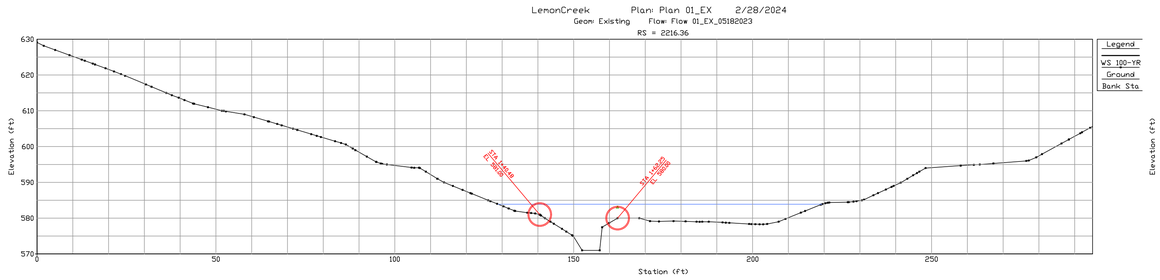
B852

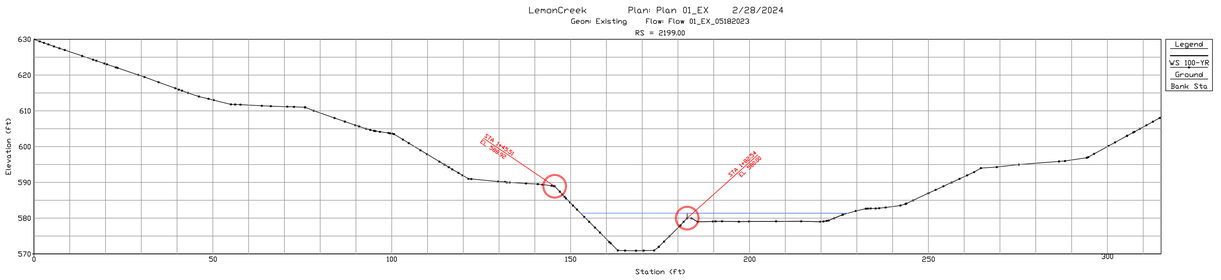


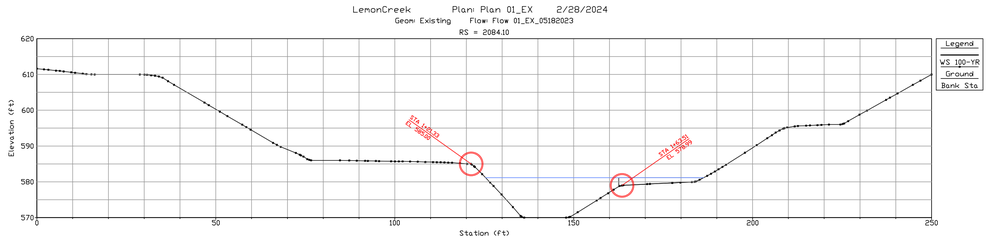


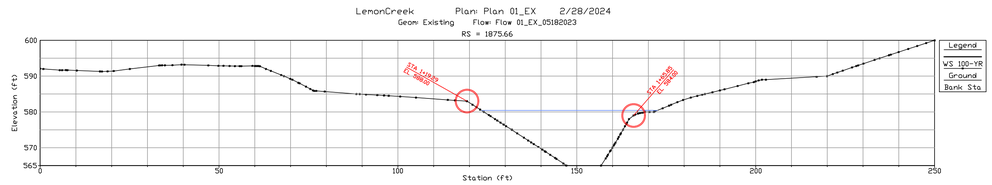


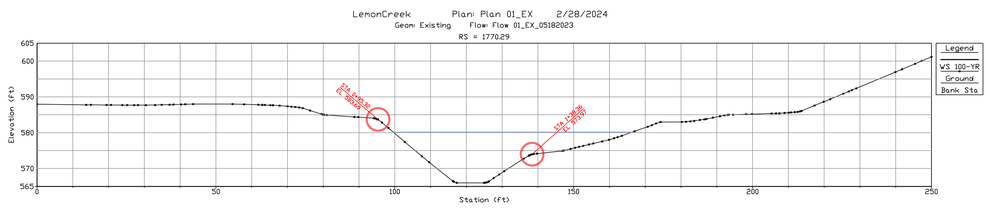


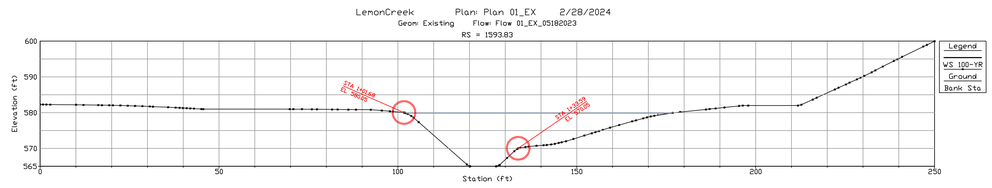












NO	BY	DATE		DATE	APP.
1					
2					
3					
4					
5					

JOB

BROOKSIDE

TENTATIVE TRACT NO. 72798

WALNUT CA

PACE
Advanced Water Engineering
17520 Newhope Street, Suite 200 | Fountain Valley, CA 92708
P: (714) 481-7300 | www.pacewater.com

SCALE	1" = 20'
DESIGNED	M.K.
DRAWN	C.T.
CHECKED	M.K. / R.R.
DATE	02/29/2024
JOB NO.	B852

TITLE

NATURAL BANK STATION DETERMINATION WORKMAP XS 2502.39 TO 1593.83

FIGURE

3-12

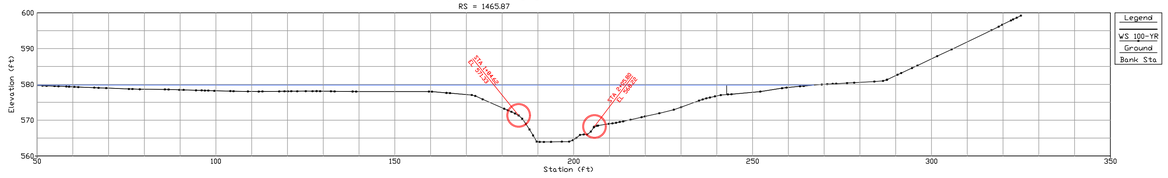
B852

THESE DRAWINGS ARE THE PROPERTY OF PACE AND SHALL NOT BE REPRODUCED IN ANY MANNER NOR BE USED FOR CONSTRUCTION UNLESS STAMPED "ISSUED FOR CONSTRUCTION".

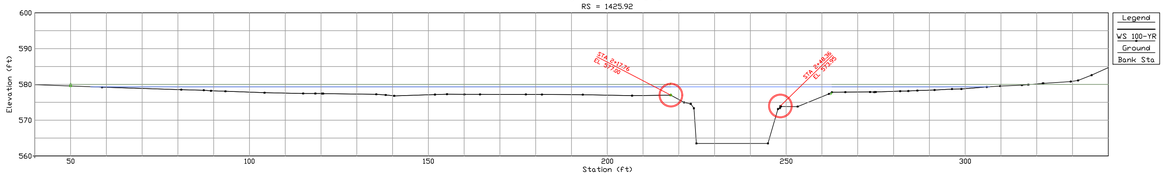
P:\B852\Engineering\Calcs and Docs\Natural Sedimentation Processes Analysis\2024-02-28_EX Plan Geometry Sections.dwg - Tab: FIGURE 3-12 (2502.39-1593.83) By: CThompson on Feb. 29, 2024 at 11:49 am

X-refs:
Dimscale = 1, LTscale = 1, PSltscale = 1, ACAD Ver. = 23.0s (LMS Tech), Varetain = 1

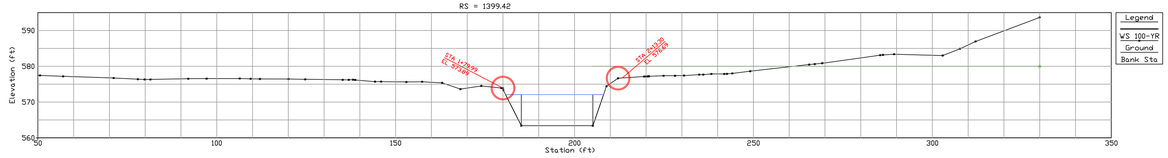
LemonCreek Plan: Plan 01_EX 2/28/2024
Geom: Existing Flow: Flow 01_EX_05182023
RS = 1465.87



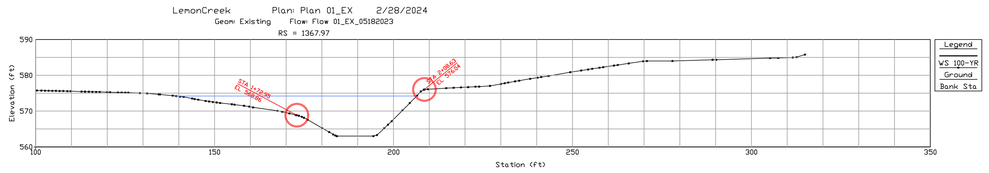
LemonCreek Plan: Plan 01_EX 2/28/2024
Geom: Existing Flow: Flow 01_EX_05182023
RS = 1425.92



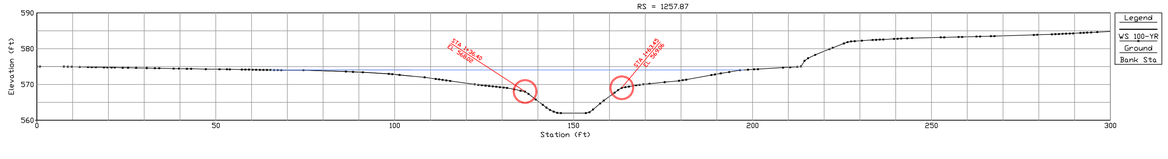
LemonCreek Plan: Plan 01_EX 2/28/2024
Geom: Existing Flow: Flow 01_EX_05182023
RS = 1399.42



LemonCreek Plan: Plan 01_EX 2/28/2024
Geom: Existing Flow: Flow 01_EX_05182023
RS = 1367.97



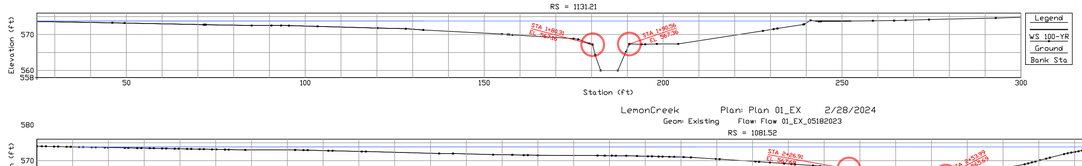
LemonCreek Plan: Plan 01_EX 2/28/2024
Geom: Existing Flow: Flow 01_EX_05182023
RS = 1257.87



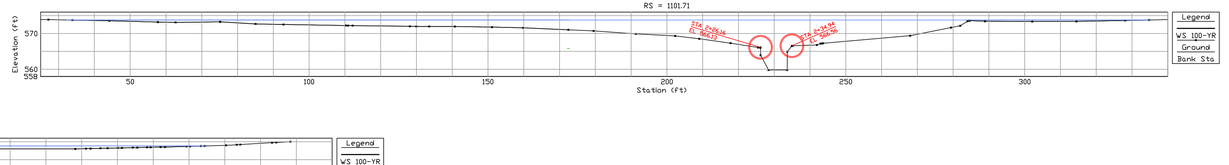
LemonCreek Plan: Plan 01_EX 2/28/2024
Geom: Existing Flow: Flow 01_EX_05182023
RS = 1151.21



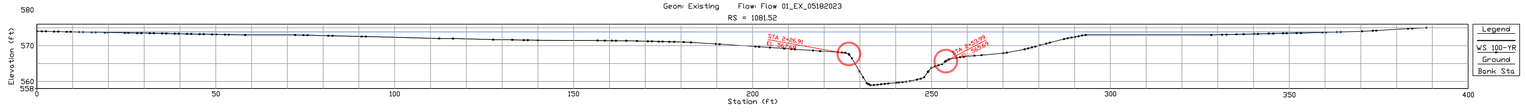
LemonCreek Plan: Plan 01_EX 2/28/2024
Geom: Existing Flow: Flow 01_EX_05182023
RS = 1131.21



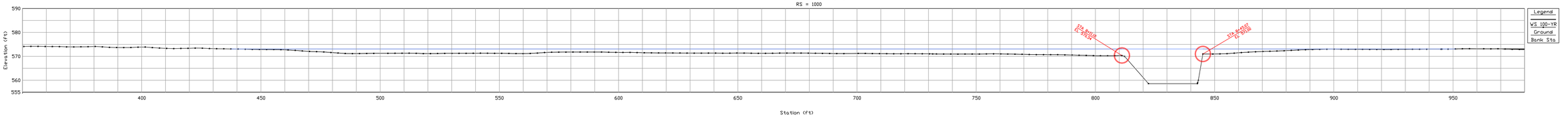
LemonCreek Plan: Plan 01_EX 2/28/2024
Geom: Existing Flow: Flow 01_EX_05182023
RS = 1101.71



LemonCreek Plan: Plan 01_EX 2/28/2024
Geom: Existing Flow: Flow 01_EX_05182023
RS = 1081.52



LemonCreek Plan: Plan 01_EX 2/28/2024
Geom: Existing Flow: Flow 01_EX_05182023
RS = 1000



THESE DRAWINGS ARE THE PROPERTY OF PACE AND SHALL NOT BE REPRODUCED IN ANY MANNER NOR BE USED FOR CONSTRUCTION UNLESS STAMPED "ISSUED FOR CONSTRUCTION".

P:\B852\Engineering\Calcs and Docs\Natural Sedimentation Processes Analysis\2024-02-28_EX Plan Geometry Sections.dwg - Tab FIGURE 3-13 (1465.87-1000) By: Chompson on Feb. 29, 2024 at 11:50 am

Xrefs:
Dmscale = 1; LTscale = 1; PSltscale = 1; ACAD Ver = 23.0s (LMS Tech); Visretain = 1

NO	BY	DATE		DATE	APP.

JOB
BROOKSIDE
TENTATIVE TRACT
NO. 72798
WALNUT CA

PACE
Advanced Water Engineering
17520 Newhope Street, Suite 200 | Fountain Valley, CA 92708
P: (714) 481-7300 | www.pacewater.com

SCALE	1" = 20'
DESIGNED	M.K.
DRAWN	C.T.
CHECKED	M.K. / R.R.
DATE	02/29/2024
JOB NO.	B852

TITLE
NATURAL BANK STATION
DETERMINATION WORKMAP
XS 1465.87 TO 1000.00

FIGURE
3-13
B852

4 Water Quality

In order to comply with the requirements of the National Pollution Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit for stormwater and non-stormwater discharges from the MS4 within the coastal watersheds of Los Angeles County (CAS0004001, Order No. R4-2012-0175), Los Angeles County has prepared the *2014 Low Impact Development Standards Manual* (*LID Standards Manual*), which provides guidance for the implementation of stormwater quality control measures in new development and redevelopment projects with the intention of improving water quality and avoiding potential water quality impacts from stormwater and non-stormwater discharges. The LA County MS4 permit applies to the City of Walnut, as does the 2014 *LID Standards Manual*.

The Brookside project will treat, through biofiltration, 150% of the 85th percentile storm runoff from developed areas, meeting the requirements of the *LID Standards Manual*. This ensures that runoff draining across the site does not contribute to an increase of pollutant loads in Lemon Creek. Due to low infiltration rates on the Brookside project site (<0.3 in/hr), the proposed basins cannot treat through infiltration, which is why the project will satisfy the stormwater quality requirements through the use of two biofiltration basins, which will hold, at a minimum, 1.5 x the stormwater quality design volume (SWQDv, 85th percentile) that could not be reliably contained on-site through retention.

Water Quality Basin No. 1 is located just south of Lot No. 13 (See **Figure 1-9**), and is capable of storing up to 2.67 ac-ft of water, with a surface area of 32,480 square feet (at top of slope). The maximum storage capacity includes some void volume within the porous material at the basin invert. This basin will intercept flows from proposed sub-watersheds 2A, 2B, 4A, and 5B before discharging to Lemon Creek. The water quality basin is designed to capture the 100-yr hydromodification volume of the entire site (discussed in more detail in **Section 2.2.4**), in addition to the water quality volume (0.65 ac-ft from sub-watersheds 2A, 2B, 4A, and 5B only). Basin No.1 is designed to store the water quality volume within the voids of the porous media at the facility invert and will not pond above the invert. The porous media will extend 5.6 ft. below the invert of the basin, with a 30% void ratio. The calculation of the water quality volume is shown below.

$$V_{Dsn,1} = 1.5 \times V_{85,1}$$

$$V_{Dsn,1} = 1.5 \times 0.44$$

$$V_{Dsn,1} = 0.65 \text{ ac-ft}$$

Water Quality Basin No.2 is located just south of Lot No. 27, and is capable of storing up to 0.67 ac-ft of water, with a surface area of 11,380 square feet (at top of slope). This basin will intercept flows from proposed sub-watersheds 5A and 11A before discharging to Lemon Creek. The water quality basin design volume is 0.31 ac-ft (see calculations for $V_{DSN,\ 2}$ below), occupying approximately 46% of its maximum capacity. Water Quality Basin No.2 is not designed to capture any hydromodification volume from the site, but is designed to capture the water quality volume from its contributing sub-watersheds (5A & 11A). A portion of the water quality volume will be stored within the voids of the porous media at the facility invert. The remaining portion will pond 18-inches above the basin invert, in accordance with the *LID Standards Manual*. Basin No.2 will have 2.5 ft. of freeboard between the ponded surface and adjacent lot pads. The total depth of the basin is dictated not only by the ponded water, but also by constrictions created by the site grade and required tie-in with the proposed storm drain infrastructure. Further details of the design of the basins and other relevant standards of the *LID Standards Manual* that are met by the project are provided in PACE's *Brookside Project Low Impact Development Plan* (February 2023).

$$V_{Dsn,2} = 1.5 \times V_{85,2}$$

$$V_{Dsn,2} = 1.5 \times 0.21$$

$$V_{Dsn,2} = 0.31 \text{ ac-ft}$$

In order to quantify the efficacy of the proposed water quality basins and to determine the project's overall impact to water quality in Lemon Creek, PACE performed an analysis which compares the "before project" and "after project as-proposed" condition quality of stormwater runoff.

4.1 Water Quality Analysis

In order to evaluate the impacts of the "project as-proposed" on the water quality of stormwater discharged from the site, a study of average annual runoff and expected loads of typical constituents of stormwater runoff was completed. The water quality analysis was performed in four steps: (1) calculation of annual average runoff volume from the site into Lemon Creek in both "before project" and "after project as-proposed" conditions, (2) estimation of pollutant concentration / loading in site runoff for both "before project" and "after project as-proposed" conditions, (3) estimation of the two water quality basins' efficiency in pollutant removal in "after project as-proposed", and (4) providing an estimate of the pollutant loading that may be discharged from the site in "after project as-proposed" conditions. The resulting pollutant loadings to Lemon Creek were then compared for "before project" and "after project as-proposed" conditions to determine potential impacts.

4.1.1 Annual Average Runoff Volume

The first step in calculating annual average runoff volume from the project site into Lemon Creek involved analyzing nearby rain gauge data from NOAA's online database. Three rain gauges were observed to be in close proximity to the project site, including the Santa Fe Dam gauge (station COOP:047926), the Spadra Lanterman Hospital gauge (station COOP:048436), and the Diamond Bar gauge (station COOP:042432). Out of these three, the Santa Fe Dam was deemed most appropriate to use for the analysis, as it had the longest record of hourly rainfall (about 64 years, from July 1, 1948 to May 2, 2012), with a low record of missing data.

In order to estimate average annual runoff volume, the historical rainfall depths were evaluated for the site. The Santa Fe Dam gauge records were first filtered of missing and zero-value data and then delineated into discrete storm events defined by 24-hour periods. Rainfall lasting longer than 24-hours was split into multiple storm events. Each individual storm event was analyzed for a cumulative precipitation value. In total, 2,331 discrete storm events were analyzed, with total storm precipitation values ranging from 0.01 in. to 8.15 in. The calculated average annual precipitation depth was found to be 16.4 inches. This is corroborated by the Los Angeles Almanac summary of record at the Santa Fe Dam.

In order to correlate precipitation depth with a runoff volume, various benchmark precipitation values were run through the HydroCalc models used in the local hydrology analysis described in **Section 2.2**. However, some changes were made to the hydrologic inputs in order to suit the present analysis. HydroCalc modeling results are included in **Appendix A**. A summary of the inputs used for the water quality analysis models is included below:

- Sub-watershed Size: Same sub-watershed delineation / size used in the local hydrology analysis (see **Tables 2-5** and **2-6**).
- Flow Path Lengths: Same flow path lengths used in the local hydrology analysis (see **Tables 2-5** and **2-6**).
- Flow Path Slopes: Same flow path slopes used in the local hydrology analysis (see **Tables 2-5** and **2-6**).
- Rainfall Depths: Various depths which were selected to most closely align with the range of storm depths derived from the gauge data. Includes 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.2, 1.5, 2.0, 2.5, 3.0, 4.0, 6.0, 8.0, and 10.0-inch rainfall depths.
- Percent Impervious: For "after project as-proposed" conditions, all developed areas were designated as "Single Family Residential" and assigned the corresponding percent impervious from the TR-55 publication ("Residential, ½ acre"). All non-developed areas were designated as "Open Space" and assigned a 0% impervious value.

  The percent impervious utilized for the local hydrology analysis differs from the water quality analysis in that the local hydrology analysis conservatively assumed a higher percentage of impervious area, resulting in a larger site runoff volume.

The calculated runoff volume was used to size the water quality basins, which protect against flooding, water quality, and hydromodification impacts to the creek. The water quality basins are designed to attenuate the increase in runoff volume up to the 100-yr storm event, which warrants the use of more conservative percent impervious values in their design.

The percent impervious values used to obtain runoff for the water quality analysis do not need to be as conservative, since they are not being used to design any site features; therefore, the TR-55 percent impervious value associated with the Single Family Residential land use was utilized (which is the official proposed land use of the Brookside development is Single Family Residential).

- Soil Type: Same soil types used in the local hydrology analysis (see **Tables 2-5** and **2-6**).

The benchmark precipitation values were run through the HydroCalc model to find correlating runoff volumes from the site. **Table 4-1** summarizes the precipitation values analyzed, percentage of storms falling into the range of bounding precipitation values, and corresponding runoff volume.

Table 4-1: Water Quality Analysis - Precipitation Depths Analyzed

Storm P Range (in)	Percent of Storms in Gage Record Encompassed	Before Project Runoff Volume (ac-ft)	After Project Runoff Volume to Lemon Creek (ac-ft)	After Project Runoff Volume to WQ Basin 1 (ac-ft)	After Project Runoff Volume to WQ Basin 2 (ac-ft)	AfterProject Runoff Volume Total (ac-ft)
0-0.1	47.8%	0.02	0.01	0.03	0.01	0.06
0.1-0.2	10.0%	0.05	0.01	0.07	0.03	0.11
0.2-0.3	6.8%	0.07	0.02	0.10	0.04	0.17
0.3-0.4	4.5%	0.10	0.03	0.14	0.06	0.23
0.4-0.5	4.7%	0.12	0.04	0.17	0.07	0.28
0.5-0.6	3.0%	0.14	0.04	0.20	0.09	0.34
0.6-0.7	3.3%	0.17	0.05	0.24	0.10	0.40
0.7-0.8	1.9%	0.19	0.04	0.27	0.12	0.44
0.8-0.9	2.4%	0.22	0.07	0.31	0.13	0.52
0.9-1.0	1.7%	0.24	0.09	0.35	0.15	0.60
1.0-1.2	2.9%	0.34	0.12	0.45	0.18	0.77
1.2-1.5	2.8%	0.46	0.17	0.54	0.24	0.97
1.5-2.0	3.4%	0.76	0.27	0.76	0.34	1.40
2.0-2.5	2.1%	1.07	0.38	0.99	0.45	1.86
2.5-3.0	1.2%	1.42	0.51	1.23	0.56	2.36
3.0-4.0	1.1%	2.26	0.83	1.75	0.82	3.49
4.0-5.0	0.6%	3.38	1.27	2.35	1.13	4.90
5.0-6.0	0.6%	4.51	1.71	2.95	1.43	6.30
6.0-7.0	0.0%	5.91	2.24	3.64	1.79	7.93
7.0-8.0	0.0%	7.32	2.76	4.33	2.14	9.56
8.0-9.0	0.0%	8.90	3.31	5.08	2.52	11.29

Using the correlation between precipitation and runoff values at key data points shown in **Table 4-1**, all the storm events previously discretized were organized by year and converted to runoff volume. The total runoff

volume was then added together for each year. **Table 4-2** shows the total rainfall recorded for each year. Note, the data for years 1948, 1980,1981, and 2012 were disregarded due to incomplete data or an unusually large percentage of missing data. The remaining years were then used to obtain a yearly average runoff volume, which is summarized at the bottom of **Table 4-2**.

Table 4-2: Santa Fe Dam Gage Record - Yearly Runoff Volumes for Brookside

Month	Year	Sum P (in)	Sum V EX - LC (ac-ft)	Sum V PR - LC (ac-ft)	Sum V PR - WQ1 (ac-ft)	Sum V PR - WQ2 (ac-ft)	Sum V PR - TOT (ac-ft)
Jul-Dec	1948	3.0	0.9	0.3	1.2	0.5	2.1
Jan-Dec	1949	13.1	4.2	1.4	5.1	2.2	8.8
Jan-Dec	1950	9.1	2.6	0.9	3.4	1.4	5.8
Jan-Dec	1951	13.3	4.7	1.6	5.1	2.2	9.1
Jan-Dec	1952	28.0	11.0	3.9	11.2	5.0	20.5
Jan-Dec	1953	4.8	1.2	0.4	1.7	0.7	2.8
Jan-Dec	1954	15.7	5.3	1.8	6.0	2.6	10.6
Jan-Dec	1955	11.3	3.0	0.9	4.0	1.7	6.8
Jan-Dec	1956	13.7	6.8	2.5	5.9	2.7	11.3
Jan-Dec	1957	17.3	5.0	1.7	6.5	2.8	11.2
Jan-Dec	1958	20.8	7.0	2.4	8.1	3.5	14.3
Jan-Dec	1959	9.6	3.2	1.1	3.7	1.6	6.5
Jan-Dec	1960	10.0	2.6	0.8	3.6	1.5	6.0
Jan-Dec	1961	7.4	2.4	0.8	2.8	1.2	4.8
Jan-Dec	1962	16.0	5.8	2.0	6.3	2.8	11.3
Jan-Dec	1963	14.9	4.7	1.6	5.4	2.3	9.5
Jan-Dec	1964	10.2	2.8	0.9	3.7	1.6	6.3
Jan-Dec	1965	26.3	9.5	3.3	10.3	4.5	18.5
Jan-Dec	1966	12.6	4.7	1.6	4.8	2.1	8.8
Jan-Dec	1967	22.1	7.9	2.7	8.7	3.8	15.5
Jan-Dec	1968	8.3	3.2	1.1	3.3	1.5	6.0
Jan-Dec	1969	31.4	12.1	4.2	12.5	5.5	22.8
Jan-Dec	1970	19.7	7.6	2.7	8.0	3.5	14.6
Jan-Dec	1971	10.6	3.4	1.2	4.0	1.7	7.0
Jan-Dec	1972	6.9	2.0	0.7	2.7	1.1	4.6
Jan-Dec	1973	17.6	6.2	2.1	6.9	3.0	12.3
Jan-Dec	1974	19.0	11.2	4.1	8.6	4.0	17.1
Jan-Dec	1975	8.9	2.4	0.8	3.2	1.4	5.5
Jan-Dec	1976	8.9	2.7	0.9	3.3	1.4	5.7
Jan-Dec	1977	17.2	5.5	1.9	6.5	2.8	11.4
Jan-Dec	1978	34.8	12.3	4.2	13.7	6.0	24.4
Jan-Dec	1979	13.2	4.3	1.5	5.0	2.2	8.9
Jan-Dec	1980	0.0	0.0	0.0	0.0	0.0	0.0
Jan-Dec	1981	0.0	0.0	0.0	0.0	0.0	0.0
Jan-Dec	1982	8.2	2.7	0.9	3.2	1.4	5.7
Jan-Dec	1983	31.7	11.2	3.9	12.0	5.3	21.6
Jan-Dec	1984	11.3	3.2	1.1	4.2	1.8	7.2
Jan-Dec	1985	8.4	2.2	0.7	3.0	1.3	5.1
Jan-Dec	1986	18.6	5.9	2.0	7.0	3.0	12.2
Jan-Dec	1987	13.2	4.1	1.4	5.1	2.2	8.8
Jan-Dec	1988	14.3	4.8	1.6	5.4	2.4	9.6
Jan-Dec	1989	5.1	1.3	0.4	1.8	0.8	3.1
Jan-Dec	1990	9.2	3.4	1.1	3.7	1.6	6.6
Jan-Dec	1991	19.4	7.1	2.5	7.5	3.3	13.7

Month	Year	Sum P (in)	Sum V EX - LC (ac-ft)	Sum V PR - LC (ac-ft)	Sum V PR - WQ1 (ac-ft)	Sum V PR - WQ2 (ac-ft)	Sum V PR - TOT (ac-ft)
Jan-Dec	1992	25.6	9.5	3.3	10.1	4.4	18.2
Jan-Dec	1993	29.5	12.2	4.4	11.9	5.3	22.1
Jan-Dec	1994	11.0	2.7	0.8	3.8	1.6	6.4
Jan-Dec	1995	30.6	11.7	4.2	12.1	5.3	22.1
Jan-Dec	1996	23.8	9.6	3.4	9.5	4.2	17.5
Jan-Dec	1997	6.1	1.8	0.6	2.2	0.9	3.8
Jan-Dec	1998	31.2	11.3	3.9	12.0	5.3	21.6
Jan-Dec	1999	7.4	2.0	0.6	2.8	1.2	4.6
Jan-Dec	2000	14.5	4.9	1.7	5.5	2.4	9.9
Jan-Dec	2001	20.8	7.8	2.7	8.0	3.5	14.5
Jan-Dec	2002	8.8	2.8	1.0	3.3	1.4	5.8
Jan-Dec	2003	16.8	7.1	2.5	6.6	3.0	12.5
Jan-Dec	2004	24.3	9.4	3.3	9.6	4.3	17.6
Jan-Dec	2005	36.3	16.0	5.8	15.1	6.8	28.3
Jan-Dec	2006	14.9	5.2	1.8	5.8	2.5	10.3
Jan-Dec	2007	8.8	2.4	0.8	3.2	1.4	5.5
Jan-Dec	2008	22.2	8.7	3.1	8.6	3.9	15.9
Jan-Dec	2009	12.3	4.0	1.3	4.6	2.0	8.1
Jan-Dec	2010	29.4	10.5	3.6	11.3	5.0	20.3
Jan-Dec	2011	12.7	4.0	1.3	4.8	2.1	8.3
Jan-May	2012	6.3	1.6	0.5	2.2	0.9	3.8
Average:		**16.4**	**5.8**	**2.0**	**6.4**	**2.8**	**11.4**

Notes:
Red highlighted cells indicate years not used in analysis due to large amounts of missing / excluded data

P = Precipitation
V = Volume
TOT = Total
EX = Existing
PR = Proposed
LC = Lemon Creek
WQ1 = Water Quality Basin No.1
WQ2 = Water Quality Basin No.2

4.1.3 Runoff Pollutant Concentrations

In order to analyze the effects that the proposed development might have on water quality entering Lemon Creek, the "before project" and "after project as-proposed" condition sites were split into discrete land uses which have been correlated to pollutant loading runoff data in past studies.

The existing site land uses were separated into Open Space (Equestrian) and Open Space (Vacant). Areas of the site that were known to have had higher concentrations of equine activity were assigned the "Equestrian" land use, while all others were assigned "Vacant". The last known use of the Brookside site was as an equestrian center, which is used as the baseline of comparison for pollutant loading to Lemon Creek for the present analysis. Although the equestrian center has closed since 2014, the pollutant loadings to Lemon Creek that are associated with equestrian use were previously acceptable to the City and nearby residents and can, therefore, be used as the basis of comparison for the "before project" vs. "after project as-proposed" condition analysis. **Figure 4-1** summarizes the assumptions made for land use in the "before project" (baseline) condition.

The proposed site land uses were separated into Low Density Residential, Open Space (Equestrian), and Open Space (Vacant). Some trails will be preserved in the "after project as-proposed" condition, which are anticipated to be utilized for equestrian recreational activities; therefore, a small percentage of the "after project as-proposed" condition site was analyzed for pollutant runoff associated with equestrian use. **Figure 4-2** summarizes the assumptions made for land use in the "after project as-proposed" condition.

Pollutant runoff concentrations associated with each of the aforementioned land uses were found from multiple scientific studies. **Table 4-3** summarizes the land uses, constituents analyzed, and the assumed pollutant runoff concentrations from each of the associated scientific studies.

Table 4-3: Pollutant Runoff Concentrations

Pollutant	Constituent	Concentrations Open Space & Recreation (Vacant)	Concentrations Open Space and Recreation (Horse)	Concentrations Low Density Residential
Bacteria	Indicator Bacteria			
	Total Coliform (MPN/100mL)[2]	9,187[3]	3,000,000[1]	92,300[1]
Minerals	Total Dissolved Solids (TDS) (mg/L)	237[3]	237[3]	58[4]
	Total Suspended Solids (TSS) (mg/L)	186.0[3]	530.7[1]	22.0[1]
Nutrients	Total Phosphorus (mg/L)	0.16[3]	4.76[5]	0.39[4]
	Total Nitrogen (mg/L)[6]	**1.89[3]**	27.39[5]	**3.86[4]**
	Nitrate	*1.05[3]*	-	*0.86[4]*
	Nitrite	*0.05[3]*	-	*0.10[4]*
	TKN	*0.79[3]*	-	*2.90[4]*
Metals	Total Copper (mg/L)	0.015[3]	0.038[1]	0.017[1]

Notes:

1 - Southern California Coastal Water Research Project (SCCWRP) Technical Report 510, "Sources, Patterns, and Mechanisms of Storm Water Pollutant Loading From Watersheds and Land Uses of the Greater Los Angeles Area, California, USA" (March 2007) - Appendix B. 'Recreational (Horse)' Land Use

2 - MPN/100mL is "Most Probable Number of Bacteria per 100 milliliters"

3 - "Los Angeles County 1994-2000 Integrated Receiving Water Impacts Report". 'Vacant' Land Use

4 - "Los Angeles County 1994-2000 Integrated Receiving Water Impacts Report". 'High Density Single Family Residential' Land Use

5 - "Contamination of Surface Run-off Water and Soil in Two Horse Paddocks" by S. Airaksinen, M.-L. Heiskanen, & H. Heinonen-Tanski, July 4, 2006

6 - Total Nitrogen taken to be the sum of Nitrate, Nitrite, and TKN (Total Kjeldahl Nitrogen).

P:\B852\6-GIS\Projects\B852_LemonCreek\B852_LemonCreek.aprx - Equestrian Use Areas – Existing Conditions



Land Use	Acres
Open Space and Recreation	18.1
Equestrian Areas	5.1
Equestrian Trails	2.6

BROOKSIDE DEVELOPMENT

BROOKSIDE EQUESTRIAN USE AREAS - EXISTING CONDITIONS

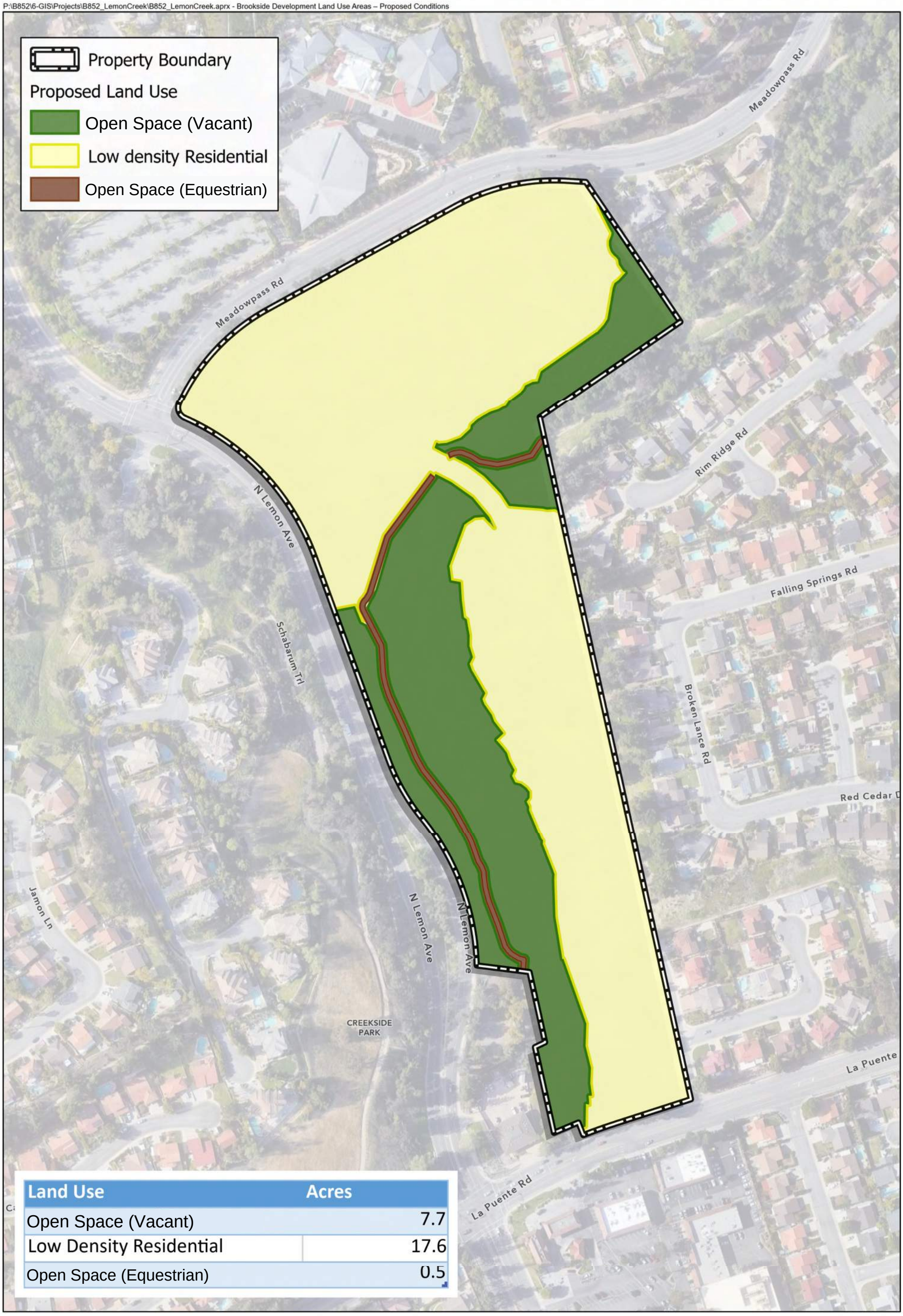
PACE Advanced Water Engineering

0 100 200 400 Feet

Date: 7/14/2023

Job Number: B852

P:\B852\6-GIS\Projects\B852_LemonCreek\B852_LemonCreek.aprx - Brookside Development Land Use Areas – Proposed Conditions



Land Use	Acres
Open Space (Vacant)	7.7
Low Density Residential	17.6
Open Space (Equestrian)	0.5

BROOKSIDE DEVELOPMENT

BROOKSIDE DEVELOPMENT LAND USE AREAS
PROPOSED CONDITIONS

PACE Advanced Water Engineering

0 100 200 400 Feet

Date: 7/14/2023

Job Number: B852

4.1.4 *"Before Project" and "After Project As-Proposed" Pollutant Loadings to Lemon Creek*

The average yearly runoff volume and pollutant concentrations described in the prior sections were used to calculate the concentration and loading of each pollutant entering Lemon Creek. The concentrations of the pollutants are given in units of mg/L with exception to Total Coliform, which is given in 'MPN/100mL', in consistency with the units provided in the referenced scientific studies. Similarly, the loadings of the pollutants are given in units of pounds (lb), with exception to Total Coliform, which is given in units of 'Billions of MPN' (most probable number). **Table 4-4** summarizes the pollutant loadings / concentrations from the pre-project conditions Brookside site to Lemon Creek.

Table 4-4: "Before Project" Project Condition Pollutant Loadings to Lemon Creek

Discharge Point	Existing Land Use	Runoff Volume[1] (AF)	Runoff Total Coliform[2] (MPN/ 100 ml)	Runoff TDS (mg/L)	Runoff TSS (mg/L)	Runoff Total P (mg/L)	Runoff Total N (mg/L)	Runoff Total Cu (mg/L)
Lemon Creek	Open Space (Vacant)	4.10	9,187	237	186.0	0.16	1.89	0.015
	Open Space (Equestrian)[3]	1.75	3,000,000	237	530.7	4.76	27.39	0.038
	Total Pollutant Runoff Load to Lemon Creek (lbs)		**65,047**	**3,771**	**4,013.9**	**16.62**	**108.06**	**0.309**

Notes:
1 - Runoff volume calculated using annual average rainfall
2 - Total Coliform load reported in billions of MPN
3 - Equestrian Use areas identified from satellite imagery as fenced areas for horses, stables, feeding areas, corrals, trails, etc. Trails identified from site visits and topography. Although the entire site would have been used for horse recreation / care, this provides a conservative estimate using only areas that had higher traffic / residence time of horses.

For "after project as-proposed" conditions, the two water quality basins were taken into account in the pollutant discharge calculations. All developed areas of the Brookside site will drain to the water quality basins. All undeveloped areas will drain directly to Lemon Creek as occurs in "before project" conditions. The proposed trails will have a designated BMP to treat runoff before it enters the Creek. Although the exact configuration of the trail BMPs have yet to be determined, a vegetated swale configuration was assumed for the present analysis.

The water quality basins are designed to treat 1.5 x the 85th percentile volume; however, all storm events will be directed to the basins before discharging to Lemon Creek. The 1.5 x 85th percentile volume will receive the highest benefit of treatment, undergoing biofiltration. Runoff volumes larger than the 1.5 x 85th percentile will receive smaller but still positive effects of treatment, more similar to an extended detention basin. Utilizing the Santa Fe Dam gage data, 1.5 x the 85th percentile rainfall depth (1.5 x 1.0" = 1.5") was found to encompass approximately 90% of storms. Therefore, the biofiltration pollutant removal rates were utilized for 90% of the annual average runoff volume from the Low Density Residential areas of the site, while the detention basin pollutant removal rates were utilized for the remaining 10% of annual average runoff volume from the Low Density Residential areas of the site.

Open Space (Vacant) land uses were assumed to receive no pollutant removal treatment from BMPs.

Open Space (Equestrian) land uses (in the "after project as-proposed" condition) were assumed to receive treatment from vegetated swale type BMPs for 85% of the annual average runoff volume. The remaining 15% of annual average runoff volume was assumed to receive no treatment from BMPs. Although the trail BMPs have not yet been designed, it was assumed they will be designed to treat the 85th percentile runoff volume from the trails.

The databases included in the *Structural BMP Specifications for the Massachusetts Stormwater Handbook* and the *International Stormwater BMP Database: 2020 Summary Statistics* were used to obtain percent removal efficiencies for biofiltration type BMPs, detention basin type BMPs, and vegetated swale type BMPs. In the absence of percent removal efficiency of the BMPs for 'Total Coliform', the data for 'Fecal

Coliform' was used instead, since both 'Fecal Coliform' and 'Total Coliform' would be removed at the same rate by the BMPs. **Tables 4-5 and 4-6** summarize the pollutant percent removal efficiency assumed for each pollutant in "after project as-proposed" conditions.

Table 4-5: "After Project As-Proposed" BMP Pollutant Removal Efficiencies – Low Density Residential Areas

Pollutant	Bioretention Removal Rate (90% of Volume)	Detention Basin Removal Rate (10% of Volume)
Total Coliform	90	60
Total TDS	0	0
Total TSS	80	40
Total P	60	20
Total N	40	33
Total Cu	65	40

Notes:
Data from a combination of (1) Massachusetts Department of Environmental Protection – BMP Factsheets ('Bioretention Areas & Rain Gardens / 'Dry Detention Basin') and (2) International Stormwater BMP Database - 2020 Urban BMP Database Performance Summary Report ('Detention Basin' and 'Bioretention').

Table 4-6: "After Project As-Proposed" BMP Pollutant Removal Efficiencies – Open Space (Equestrian) Areas

Pollutant	Vegetated (Wet) Swale Removal Rate (85% of Volume)	Remaining (15% of Volume)
Total Coliform	71	0
Total TDS	66	0
Total TSS	59	0
Total P	55	0
Total N	50	0
Total Cu	43	0

Notes:
Data from (1) Massachusetts Department of Environmental Protection – BMP Factsheets ('Water Quality Swale') and (2) International Stormwater BMP Database - 2020 Urban BMP Database Performance Summary Report ('Grass Swale').

Applying the runoff pollutant concentrations from the proposed land uses to the runoff reaching each of the basins, in addition to the BMP removal data listed in **Tables 4-5 and 4-6**, the pollutant loadings / concentrations were calculated for runoff leaving the BMPs and entering Lemon Creek. **Table 4-7** summarizes the pollutant loadings from the "after project as-proposed" condition to Lemon Creek, and makes a direct comparison between "before project" and "after project as-proposed" conditions pollutant discharges. Pollutant loadings / rates are also provided for the "before project" condition as a vacant site (as opposed to equestrian) for comparison. However, as discussed in prior sections, the baseline comparison for the water quality impacts analysis is "before project" with equestrian use. Supplementary data is provided in **Appendix F**.

Table 4-7: "Before Project" vs. "After Project As-Proposed" Pollutant Discharges to Lemon Creek

Site Conditions	Volume of Water Discharged[1] (AF)	Total Coliform Discharged[2] (MPN)	TDS Discharged (lbs)	TSS Discharged (lbs)	Total P Discharged (lbs)	Total N Discharged (lbs)	Total Cu Discharged (lbs)
Before Project Conditions (Equestrian)	6	65,047	3,771	4,014	17	108	0.3
Before Project Conditions (Vacant)	6	663	3,771	2,960	3	30	0.2
After Project Conditions	11	3,250	2,920	883	8	58	0.2
Percent Change Pre (Equestrian) vs Post		-95%	-23%	-78%	-53%	-46%	-33%

Notes:
1 – Runoff volume calculated using annual average rainfall
2 - Total Coliform load reported in billions of MPN

As shown in **Table 4-7**, the "after project as-proposed" condition results in a decrease in loading to Lemon Creek for all pollutants analyzed. The results indicate the project will not have an impact to water quality in Lemon Creek.

5 Conclusions

The results of the regional hydrology analysis were used to create a hydraulic model of Lemon Creek reflecting “before project” and “after project as-proposed” conditions, in order to compare water surface elevations and velocities for the 2-, 5-, 25-, 50-, and 100-yr storm events. The comparative analysis showed minor decreases in water surface elevation in the “after project as-proposed” condition, compared to “before project”, with exception to one cross-section in the 2- and 5-year conditions only. The minor increases in the 2- and 5-year condition will not result in impacts on- or off-site. Additionally, a minimum freeboard of 2.5 ft. will be maintained between the 100-yr water surface elevation and the proposed pad elevations. The comparative analysis also showed that some minor increases in velocity occur in the “after project as-proposed” condition, immediately adjacent to Culvert D. Where the minor increases in velocity do occur, the increases are contained within the creek banks and will not create any on- or off-site impacts. The increases are also not anticipated to alter the stability of Lemon Creek, due to the preservation of the existing vegetation in the creek and the stabilizing effects of the existing culverts upstream (A, B, and C). Additionally, the changes in velocity are relatively minor (less than 1 ft/s change for all storm events). As a result, no further mitigation measures are needed or recommended to avoid, lessen, or eliminate any impacts of the “project as-proposed” with respect to flow depths or velocity.

An erosion potential analysis was performed for the “before project” and “after project as-proposed” conditions, indicating no increase in long-term erosion potential due to the “project as-proposed”. The potential for erosion occurs in all natural drainage systems, including in the “before project” condition of Brookside. Impacts can be evaluated by determining if an increase in the potential for erosion would occur due to the “project as-proposed”. A short term erosion potential analysis showed a slight increase in the potential for erosion in the “after project as-proposed” condition for Reach 5 in a 25- and 50-yr storm event, but not in the smaller, more frequent 2- and 5-yr storm events. Smaller events are more impactful to channel morphology over a long period of time, due to their higher frequency of occurrence. Analysis of the maximum erosion envelope in Reach 5 showed that potential short-term erosion in the 25- and 50-yr storm events would be localized and limited in scope, not presenting a significant impact to Lemon Creek. The results of the long-term erosion potential analysis indicated that the “project as-proposed” will not result in an increase of erosion potential. The results of this analysis support the conclusions of the technical memorandum prepared by PACE, titled *Lemon Creek Stream Stability Analysis at Proposed Brookside Development* (June 2023; Included in **Appendix C**). As such, no further mitigation measures are needed or recommended to avoid, lessen, or eliminate any impacts of the “project as-proposed” with respect to erosion and sediment transport.

An on-site hydrology analysis was also performed, in order to determine potential impacts to water quality or runoff volume / peak flow rates in Lemon Creek due to the “project as-proposed”. After analyzing the 85th percentile, 2-yr, 5-yr, 25-yr, 50-yr, and 100-yr storm events, it was determined that increases in runoff volume would be avoided for all storm events analyzed, up to the 100-yr, through the use of Water Quality Basin No.1, by temporarily storing the change in runoff volume up to the 100-yr storm event (2.67 ac-ft). Additionally, both Basins 1 and 2 will be utilized to temporarily store and treat the 85th percentile runoff from the development to avoid any increase in pollutant loading to Lemon Creek in the “project as-proposed” condition (0.65 ac-ft in Basin 1 and 0.31 ac-ft in Basin 2). As such, no further mitigation measures are needed or recommended to avoid, lessen, or eliminate any impacts of the “project as-proposed” with respect to hydromodification.

A water quality analysis was performed, based on the calculated average annual runoff from the site in “before project” and “after project-as proposed” conditions. The “after project as-proposed” conditions modeling took into account the pollutant reducing benefits of the two proposed water quality basins and a trail BMP. Comparison of the “before project” and “after project as-proposed” pollutant loading to Lemon Creek indicates a decrease in loading to Lemon Creek for all pollutants analyzed. Therefore, the project will not have adverse impacts to water quality in Lemon Creek. As such, no further mitigation measures are needed or recommended to avoid, lessen, or eliminate any impacts of the “project as-proposed” with respect to water quality.

In past storm events, flooding has been observed in Lemon Creek over the La Puente roadway, highlighting the fact that debris gets trapped against the trash rack at the culvert face, thereby diminishing its capacity.

Due to the two proposed water quality basins, the project will not contribute to an increase in runoff peak flow rate or volume at the culvert. Additionally, the hydraulic modeling performed for the project demonstrates that no changes to water surface elevation or velocity will occur at the culvert in "after project as-proposed". In addition, PACE has developed a revised trash rack design for the City at the La Puente Culvert entrance, which will help to prevent debris from accumulating at the entrance during storm events and restricting flow from entering the culvert. The revised trash rack will help to alleviate flooding problems over La Puente Road in future storm events (see **Appendix D**).

References

Federal Highway Administration (FHWA), Hydraulic Engineering Circular Number 18. May 2001.

Los Angeles County Department of Public Works, *Los Angeles County Hydrology Manual*, January 2006.

Los Angeles County Department of Public Works, *Low Impact Development Standards Manual,* February 2014.

Los Angeles County Department of Public Works, *Los Angeles County 1994-2000 Integrated Receiving Water Impacts Report,* <https://www.waterboards.ca.gov/centralcoast//board_info/agendas/2005/feb/item28/latham_watkins/item28_exhibit2.pdf>

Pacific Advanced Civil Engineering Inc. (PACE), *Lemon Creek Stream Stability Analysis at Proposed Brookside Development*, June 2023.

Statement of Facts and Findings for the Brookside Project Final Environmental Impact Report, SCH No. 2016051030, May 2021.

US Army Corps of Engineers (USACOE), HEC-HMS Hydrologic Modeling Software, version 4.2

US Army Corps of Engineers (USACOE), HEC-RAS River Analysis System, version 6.0.

APPENDIX A - HYDROCALC RESULTS:
LOCAL HYDROLOGY PROPOSED CONDITIONS ANALYSIS

Peak Flow Hydrologic Analysis

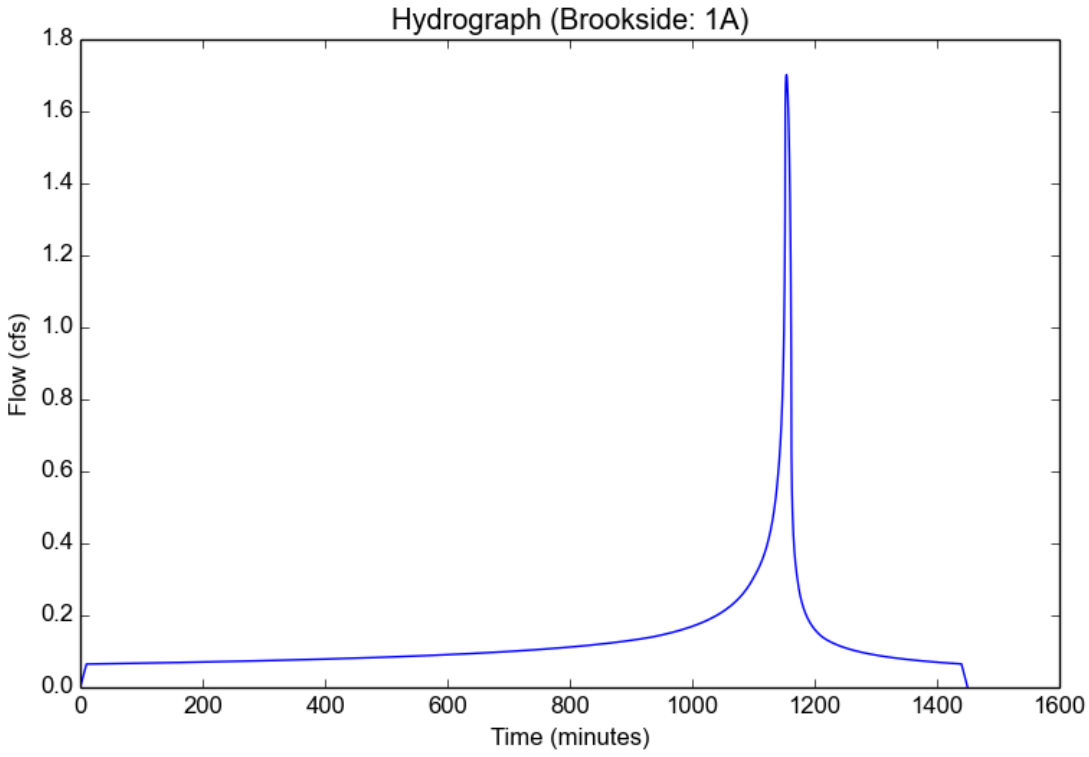
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/2-yr/Brookside Existing - 1A - 2yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1A
Area (ac)	1.86
Flow Path Length (ft)	623.8
Flow Path Slope (vft/hft)	0.11061
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.656
Soil Type	2
Design Storm Frequency	2-yr
Fire Factor	0
LID	False

Output Results

Modeled (2-yr) Rainfall Depth (in)	2.5155
Peak Intensity (in/hr)	1.0835
Undeveloped Runoff Coefficient (Cu)	0.7384
Developed Runoff Coefficient (Cd)	0.8444
Time of Concentration (min)	10.0
Clear Peak Flow Rate (cfs)	1.7018
Burned Peak Flow Rate (cfs)	1.7018
24-Hr Clear Runoff Volume (ac-ft)	0.2569
24-Hr Clear Runoff Volume (cu-ft)	11189.3893



Peak Flow Hydrologic Analysis

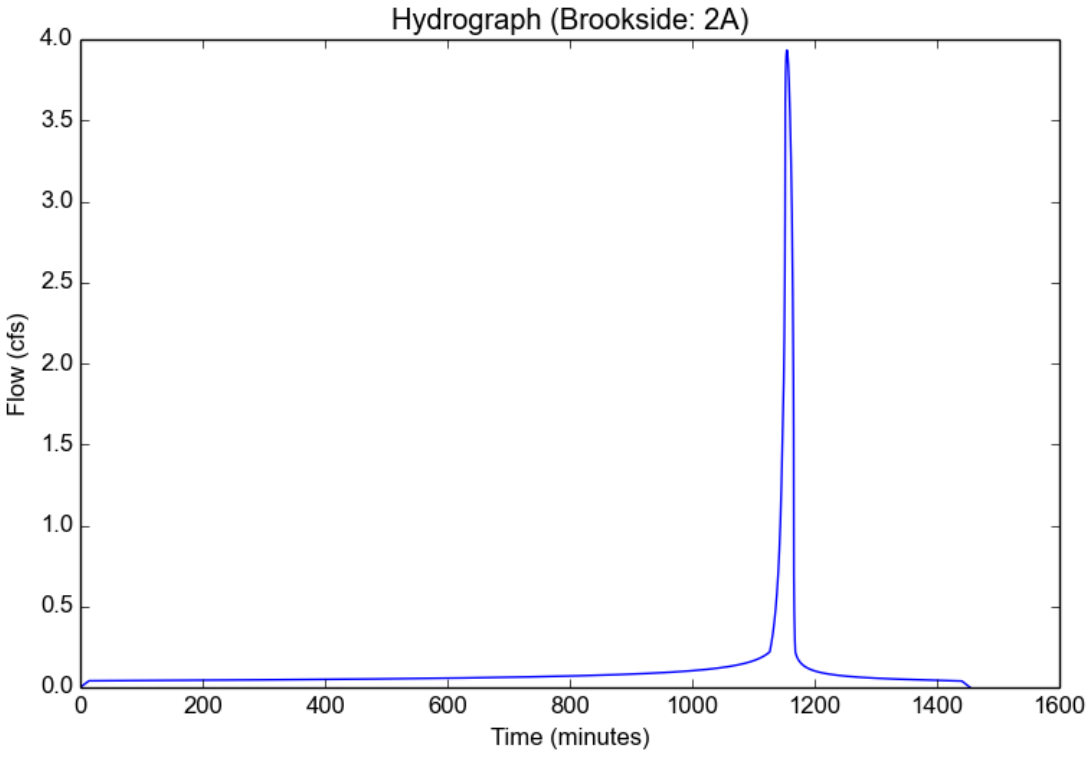
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/2-yr/Brookside Existing - 2A - 2yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	6.26
Flow Path Length (ft)	739.9
Flow Path Slope (vft/hft)	0.06623
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.021
Soil Type	17
Design Storm Frequency	2-yr
Fire Factor	0
LID	False

Output Results

Modeled (2-yr) Rainfall Depth (in)	2.5155
Peak Intensity (in/hr)	0.925
Undeveloped Runoff Coefficient (Cu)	0.6745
Developed Runoff Coefficient (Cd)	0.6793
Time of Concentration (min)	14.0
Clear Peak Flow Rate (cfs)	3.9335
Burned Peak Flow Rate (cfs)	3.9335
24-Hr Clear Runoff Volume (ac-ft)	0.2255
24-Hr Clear Runoff Volume (cu-ft)	9824.547



Peak Flow Hydrologic Analysis

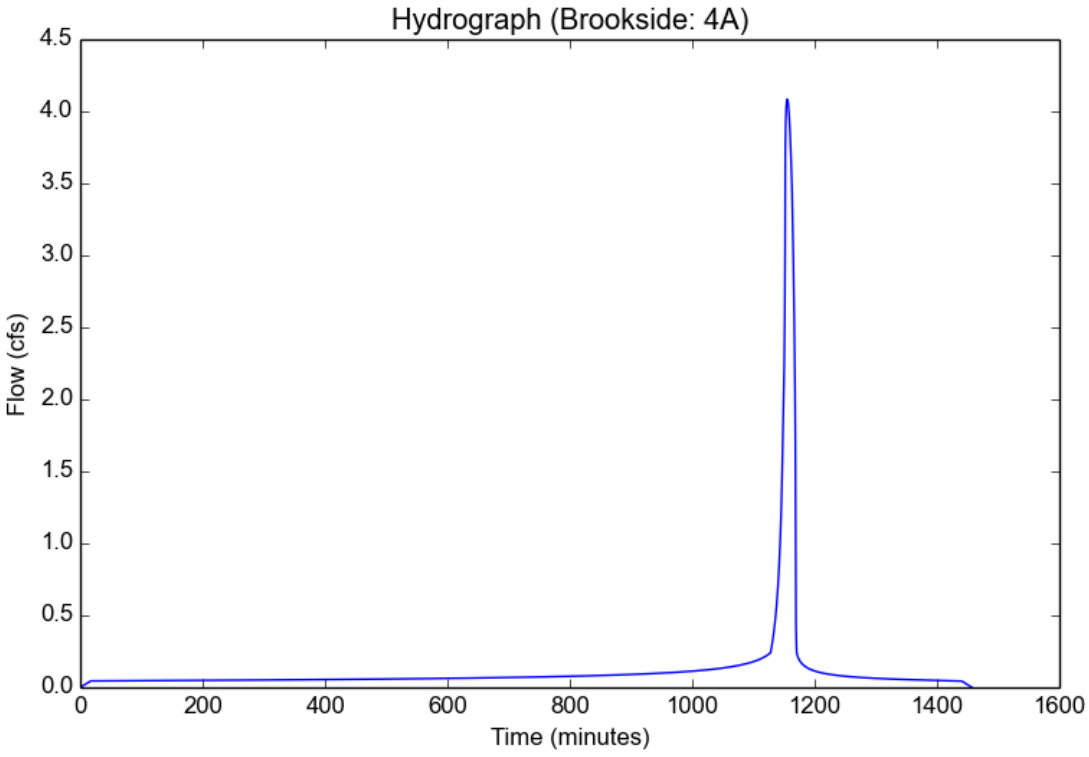
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/2-yr/Brookside Existing - 4A - 2yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	7.44
Flow Path Length (ft)	949.3
Flow Path Slope (vft/hft)	0.05794
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	2-yr
Fire Factor	0
LID	False

Output Results

Modeled (2-yr) Rainfall Depth (in)	2.5155
Peak Intensity (in/hr)	0.8444
Undeveloped Runoff Coefficient (Cu)	0.6477
Developed Runoff Coefficient (Cd)	0.6502
Time of Concentration (min)	17.0
Clear Peak Flow Rate (cfs)	4.0849
Burned Peak Flow Rate (cfs)	4.0849
24-Hr Clear Runoff Volume (ac-ft)	0.2549
24-Hr Clear Runoff Volume (cu-ft)	11102.566



Peak Flow Hydrologic Analysis

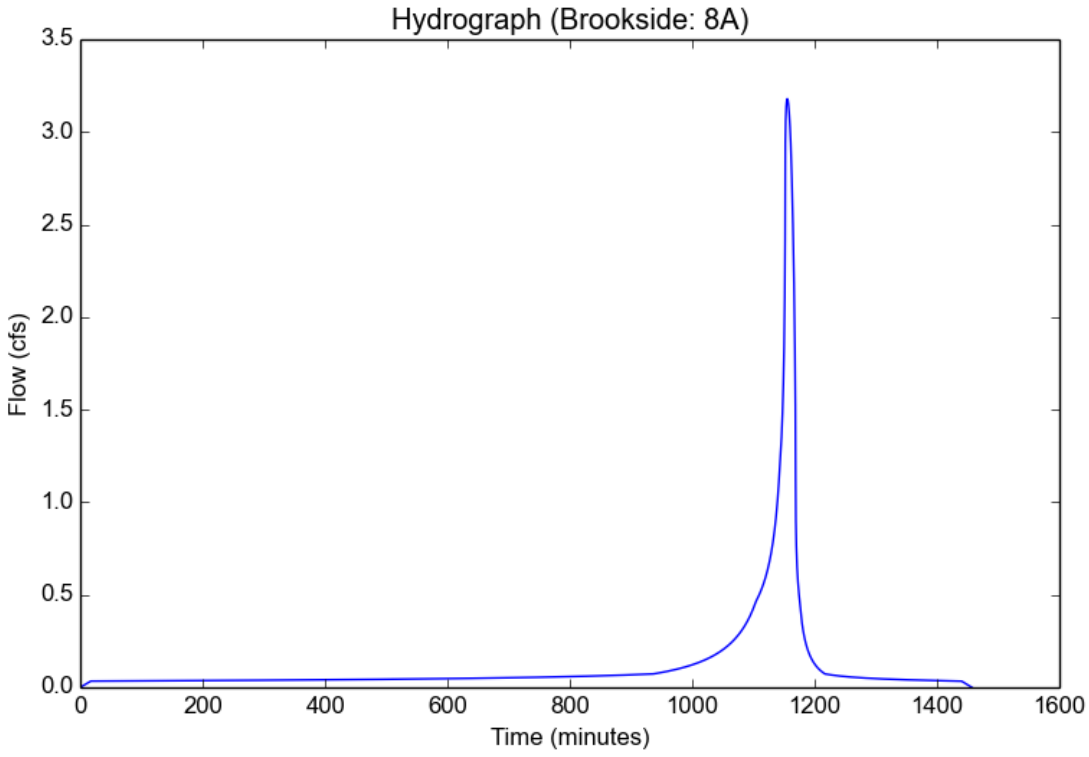
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/2-yr/Brookside Existing - 8A - 2yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	8A
Area (ac)	5.39
Flow Path Length (ft)	1116.4
Flow Path Slope (vft/hft)	0.08151
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.016
Soil Type	2
Design Storm Frequency	2-yr
Fire Factor	0
LID	False

Output Results

Modeled (2-yr) Rainfall Depth (in)	2.5155
Peak Intensity (in/hr)	0.8444
Undeveloped Runoff Coefficient (Cu)	0.6953
Developed Runoff Coefficient (Cd)	0.6985
Time of Concentration (min)	17.0
Clear Peak Flow Rate (cfs)	3.1791
Burned Peak Flow Rate (cfs)	3.1791
24-Hr Clear Runoff Volume (ac-ft)	0.252
24-Hr Clear Runoff Volume (cu-ft)	10978.1073



Peak Flow Hydrologic Analysis

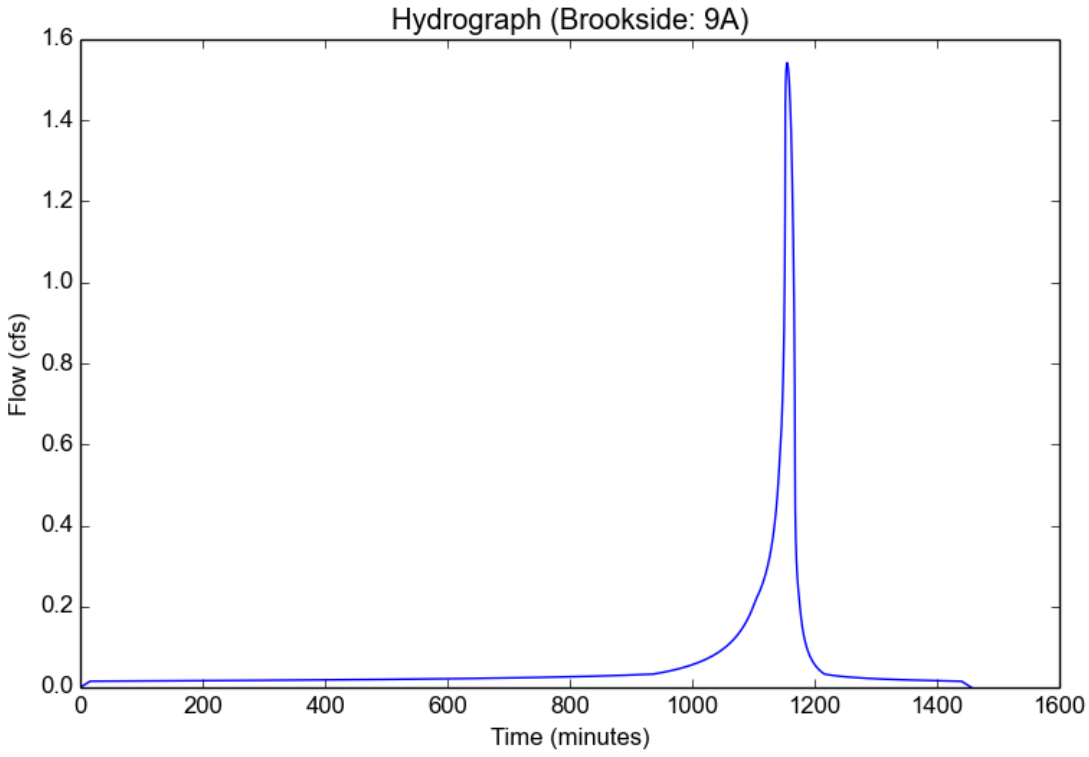
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/2-yr/Brookside Existing - 9A- 2yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	2.53
Flow Path Length (ft)	912.2
Flow Path Slope (vft/hft)	0.05591
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	2-yr
Fire Factor	0
LID	False

Output Results

Modeled (2-yr) Rainfall Depth (in)	2.5155
Peak Intensity (in/hr)	0.8688
Undeveloped Runoff Coefficient (Cu)	0.6997
Developed Runoff Coefficient (Cd)	0.7017
Time of Concentration (min)	16.0
Clear Peak Flow Rate (cfs)	1.5422
Burned Peak Flow Rate (cfs)	1.5422
24-Hr Clear Runoff Volume (ac-ft)	0.1162
24-Hr Clear Runoff Volume (cu-ft)	5061.5774



Peak Flow Hydrologic Analysis

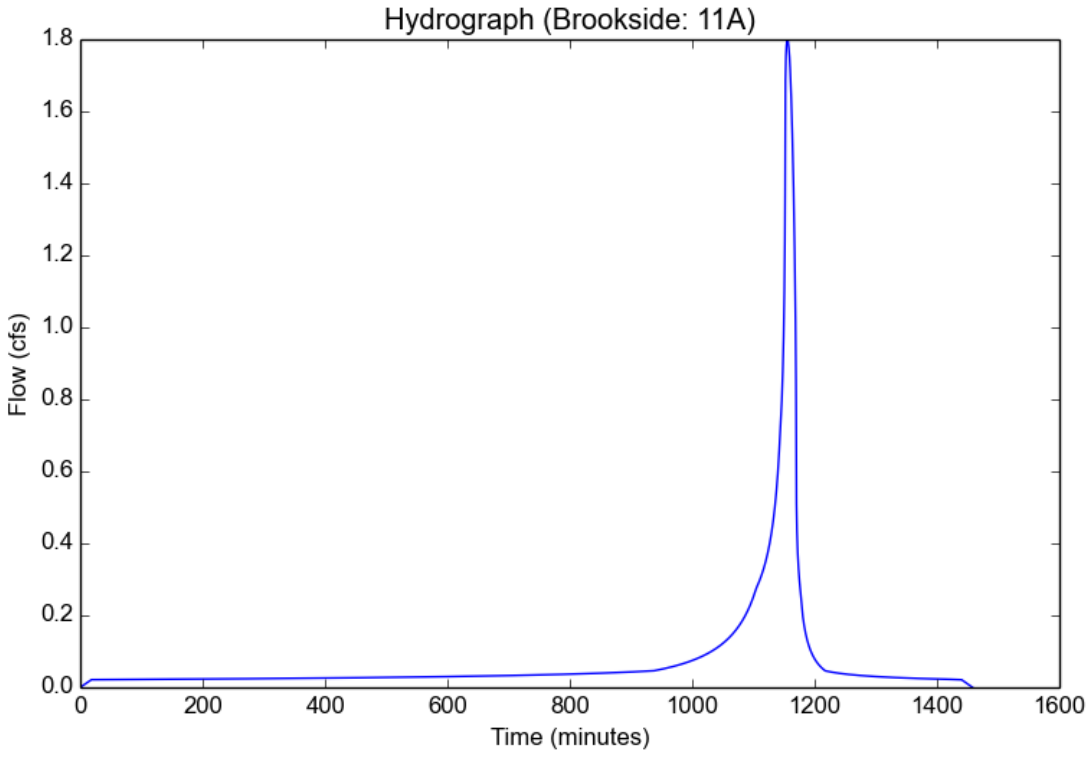
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/2-yr/Brookside Existing - 11A - 2yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	3.14
Flow Path Length (ft)	890.9
Flow Path Slope (vft/hft)	0.02469
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.028
Soil Type	2
Design Storm Frequency	2-yr
Fire Factor	0
LID	False

Output Results

Modeled (2-yr) Rainfall Depth (in)	2.5155
Peak Intensity (in/hr)	0.822
Undeveloped Runoff Coefficient (Cu)	0.6912
Developed Runoff Coefficient (Cd)	0.6971
Time of Concentration (min)	18.0
Clear Peak Flow Rate (cfs)	1.7992
Burned Peak Flow Rate (cfs)	1.7992
24-Hr Clear Runoff Volume (ac-ft)	0.1521
24-Hr Clear Runoff Volume (cu-ft)	6625.224



Peak Flow Hydrologic Analysis

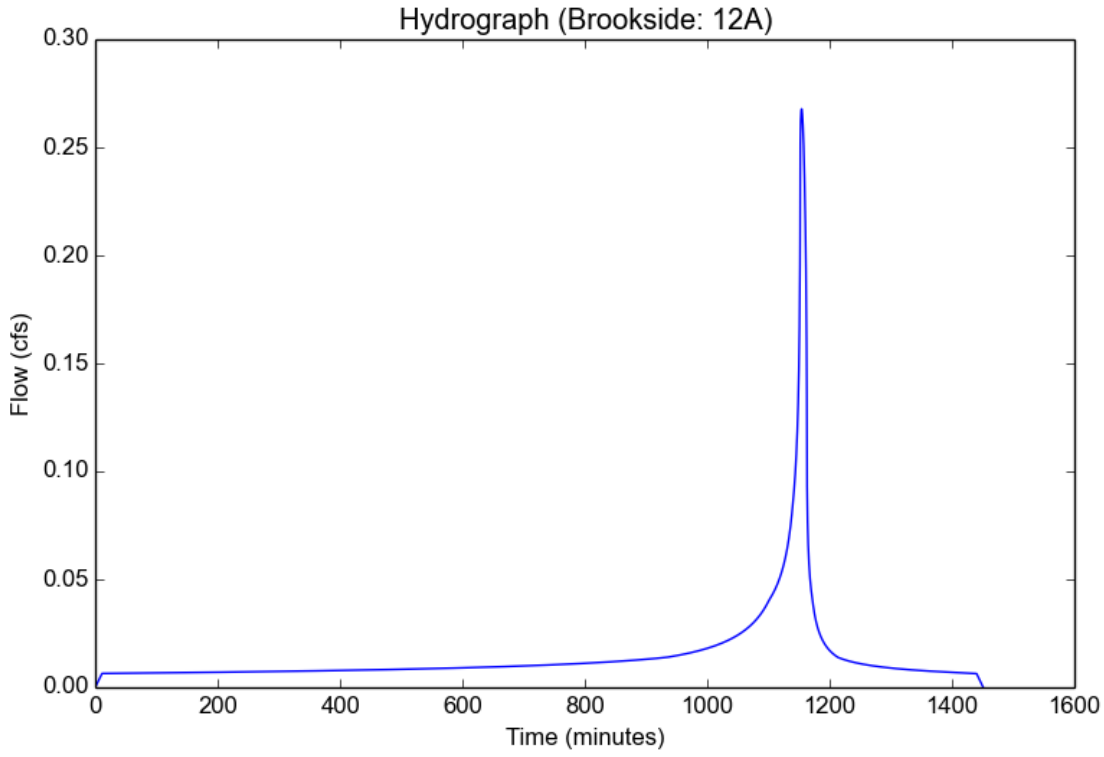
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/2-yr/Brookside Existing - 12A - 2yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.33
Flow Path Length (ft)	406.0
Flow Path Slope (vft/hft)	0.0197
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.314
Soil Type	2
Design Storm Frequency	2-yr
Fire Factor	0
LID	False

Output Results

Modeled (2-yr) Rainfall Depth (in)	2.5155
Peak Intensity (in/hr)	1.0361
Undeveloped Runoff Coefficient (Cu)	0.7298
Developed Runoff Coefficient (Cd)	0.7832
Time of Concentration (min)	11.0
Clear Peak Flow Rate (cfs)	0.2678
Burned Peak Flow Rate (cfs)	0.2678
24-Hr Clear Runoff Volume (ac-ft)	0.0295
24-Hr Clear Runoff Volume (cu-ft)	1284.6264



Peak Flow Hydrologic Analysis

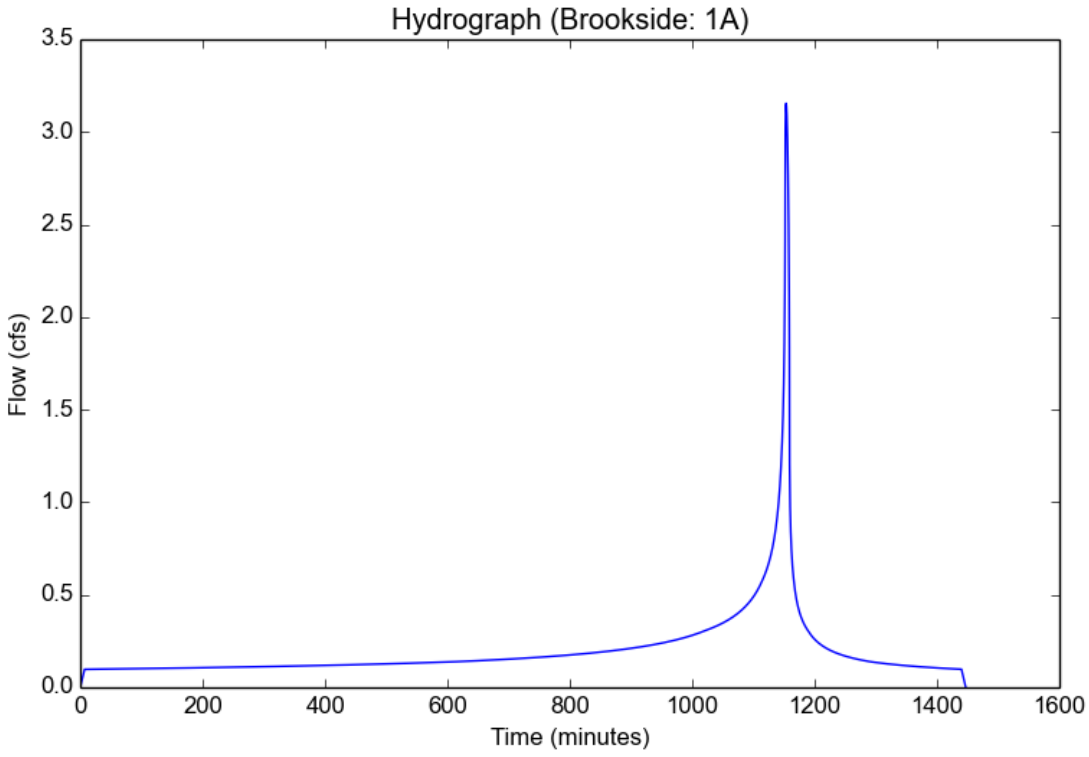
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/5-yr/Brookside Existing - 1A - 5yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1A
Area (ac)	1.86
Flow Path Length (ft)	623.8
Flow Path Slope (vft/hft)	0.11061
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.656
Soil Type	2
Design Storm Frequency	5-yr
Fire Factor	0
LID	False

Output Results

Modeled (5-yr) Rainfall Depth (in)	3.796
Peak Intensity (in/hr)	1.9335
Undeveloped Runoff Coefficient (Cu)	0.8336
Developed Runoff Coefficient (Cd)	0.8771
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	3.1545
Burned Peak Flow Rate (cfs)	3.1545
24-Hr Clear Runoff Volume (ac-ft)	0.4017
24-Hr Clear Runoff Volume (cu-ft)	17496.2625



Peak Flow Hydrologic Analysis

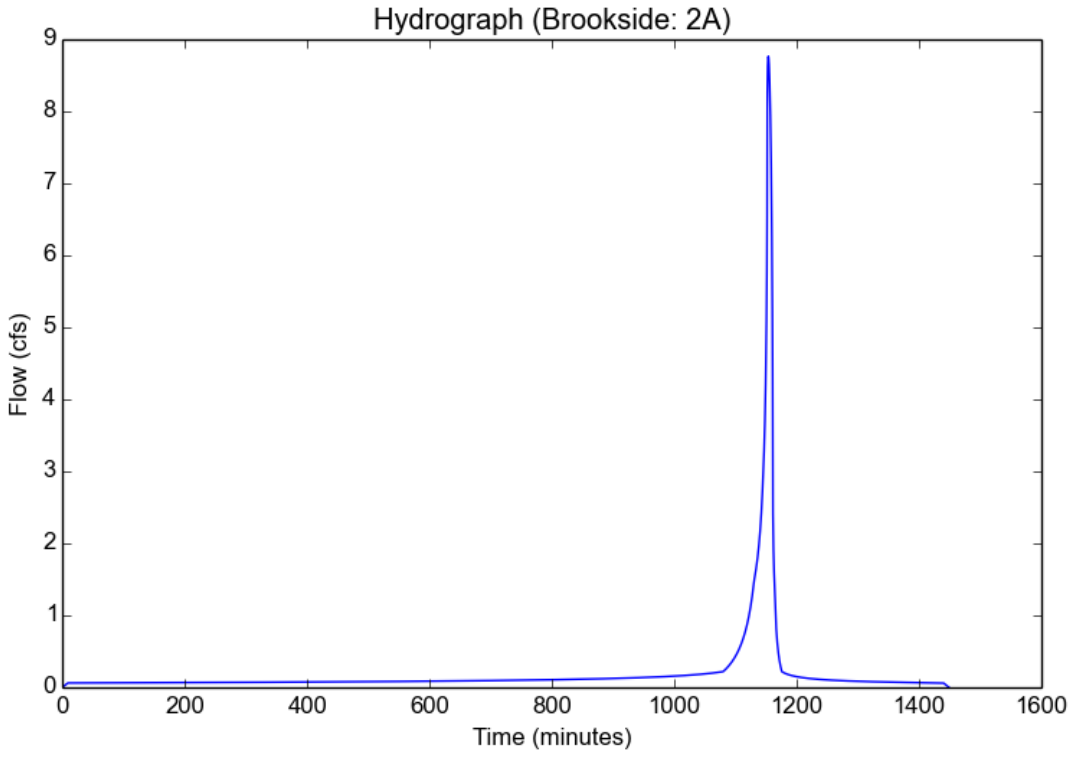
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/5-yr/Brookside Existing - 2A - 5yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	6.26
Flow Path Length (ft)	739.9
Flow Path Slope (vft/hft)	0.06623
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.021
Soil Type	17
Design Storm Frequency	5-yr
Fire Factor	0
LID	False

Output Results

Modeled (5-yr) Rainfall Depth (in)	3.796
Peak Intensity (in/hr)	1.7181
Undeveloped Runoff Coefficient (Cu)	0.8131
Developed Runoff Coefficient (Cd)	0.8149
Time of Concentration (min)	9.0
Clear Peak Flow Rate (cfs)	8.765
Burned Peak Flow Rate (cfs)	8.765
24-Hr Clear Runoff Volume (ac-ft)	0.4095
24-Hr Clear Runoff Volume (cu-ft)	17837.512



Peak Flow Hydrologic Analysis

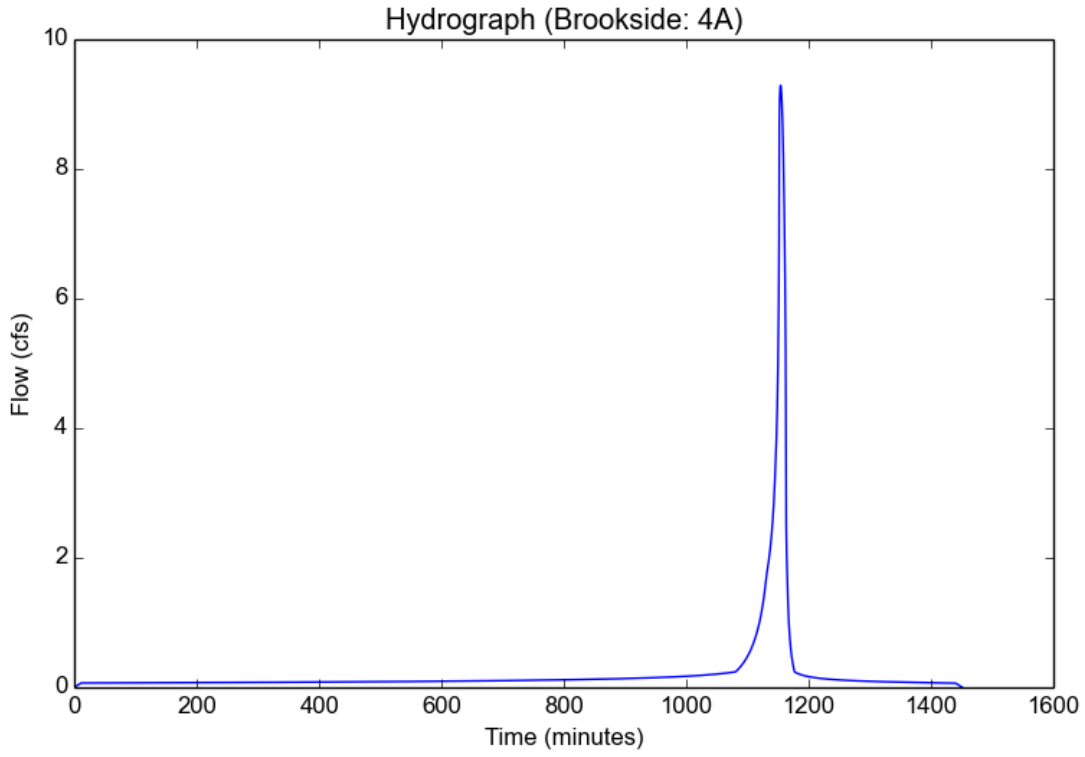
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/5-yr/Brookside Existing - 4A - 5yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	7.44
Flow Path Length (ft)	949.3
Flow Path Slope (vft/hft)	0.05794
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	5-yr
Fire Factor	0
LID	False

Output Results

Modeled (5-yr) Rainfall Depth (in)	3.796
Peak Intensity (in/hr)	1.5635
Undeveloped Runoff Coefficient (Cu)	0.7976
Developed Runoff Coefficient (Cd)	0.7986
Time of Concentration (min)	11.0
Clear Peak Flow Rate (cfs)	9.2894
Burned Peak Flow Rate (cfs)	9.2894
24-Hr Clear Runoff Volume (ac-ft)	0.4683
24-Hr Clear Runoff Volume (cu-ft)	20397.2741



Peak Flow Hydrologic Analysis

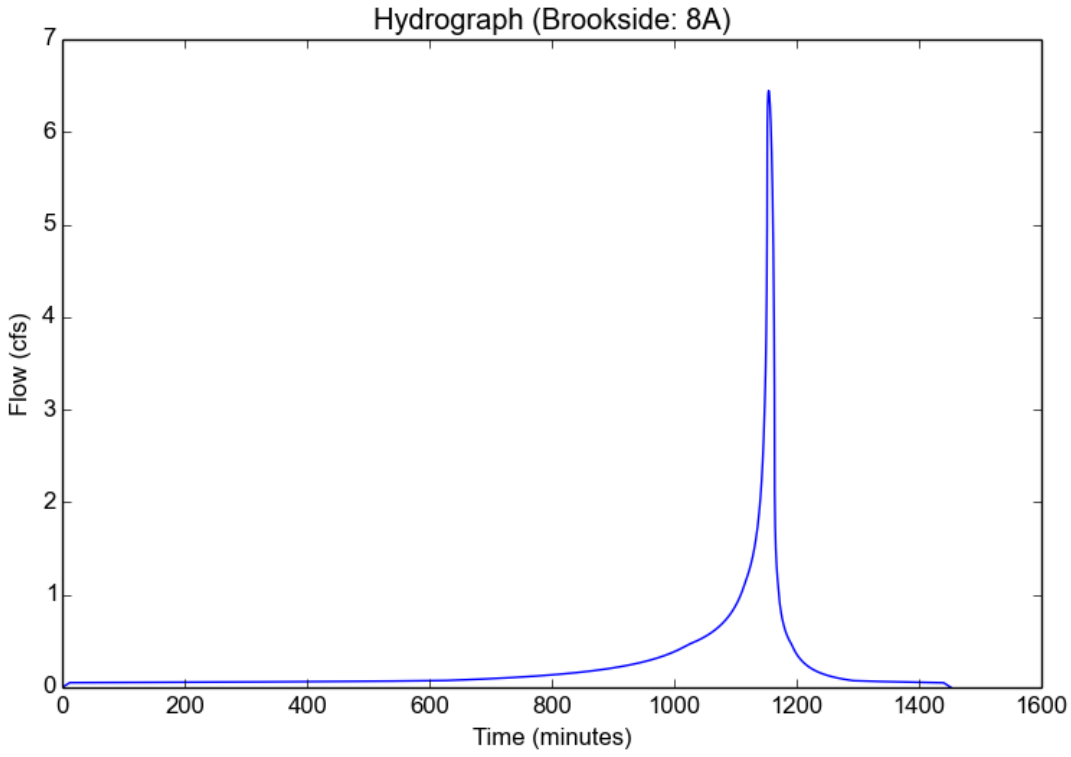
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/5-yr/Brookside Existing - 8A- 5 yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	8A
Area (ac)	5.39
Flow Path Length (ft)	1116.4
Flow Path Slope (vft/hft)	0.08151
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.016
Soil Type	2
Design Storm Frequency	5-yr
Fire Factor	0
LID	False

Output Results

Modeled (5-yr) Rainfall Depth (in)	3.796
Peak Intensity (in/hr)	1.5008
Undeveloped Runoff Coefficient (Cu)	0.7952
Developed Runoff Coefficient (Cd)	0.7969
Time of Concentration (min)	12.0
Clear Peak Flow Rate (cfs)	6.4461
Burned Peak Flow Rate (cfs)	6.4461
24-Hr Clear Runoff Volume (ac-ft)	0.4972
24-Hr Clear Runoff Volume (cu-ft)	21655.916



Peak Flow Hydrologic Analysis

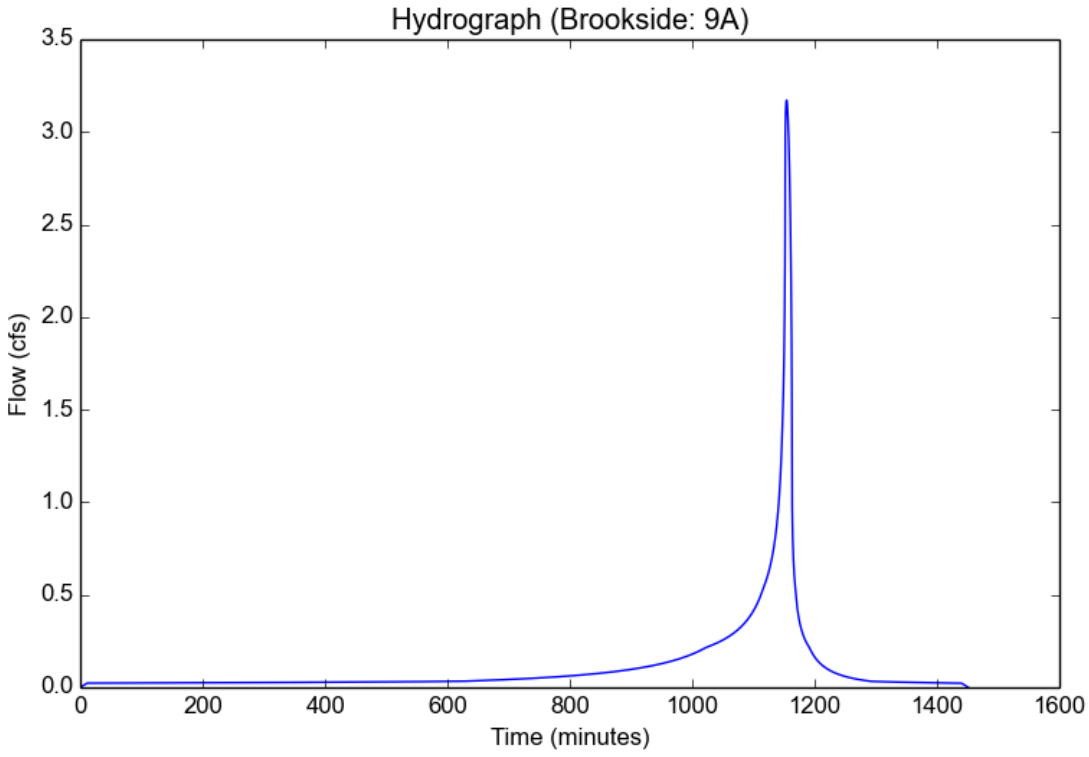
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/5-yr/Brookside Existing - 9A - 5yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	2.53
Flow Path Length (ft)	912.2
Flow Path Slope (vft/hft)	0.05591
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	5-yr
Fire Factor	0
LID	False

Output Results

Modeled (5-yr) Rainfall Depth (in)	3.796
Peak Intensity (in/hr)	1.5635
Undeveloped Runoff Coefficient (Cu)	0.8007
Developed Runoff Coefficient (Cd)	0.8017
Time of Concentration (min)	11.0
Clear Peak Flow Rate (cfs)	3.1713
Burned Peak Flow Rate (cfs)	3.1713
24-Hr Clear Runoff Volume (ac-ft)	0.2305
24-Hr Clear Runoff Volume (cu-ft)	10039.7022



Peak Flow Hydrologic Analysis

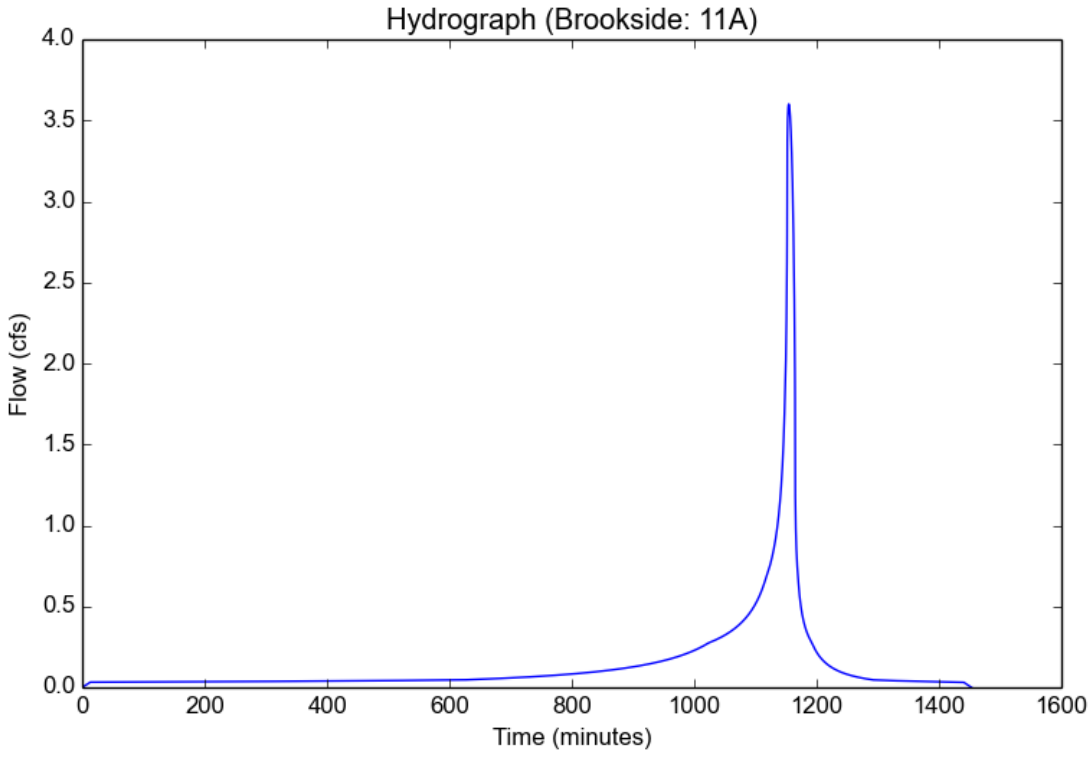
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/5-yr/Brookside Existing - 11A - 5yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	3.14
Flow Path Length (ft)	890.9
Flow Path Slope (vft/hft)	0.02469
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.028
Soil Type	2
Design Storm Frequency	5-yr
Fire Factor	0
LID	False

Output Results

Modeled (5-yr) Rainfall Depth (in)	3.796
Peak Intensity (in/hr)	1.4454
Undeveloped Runoff Coefficient (Cu)	0.7903
Developed Runoff Coefficient (Cd)	0.7933
Time of Concentration (min)	13.0
Clear Peak Flow Rate (cfs)	3.6006
Burned Peak Flow Rate (cfs)	3.6006
24-Hr Clear Runoff Volume (ac-ft)	0.2968
24-Hr Clear Runoff Volume (cu-ft)	12930.3703



Peak Flow Hydrologic Analysis

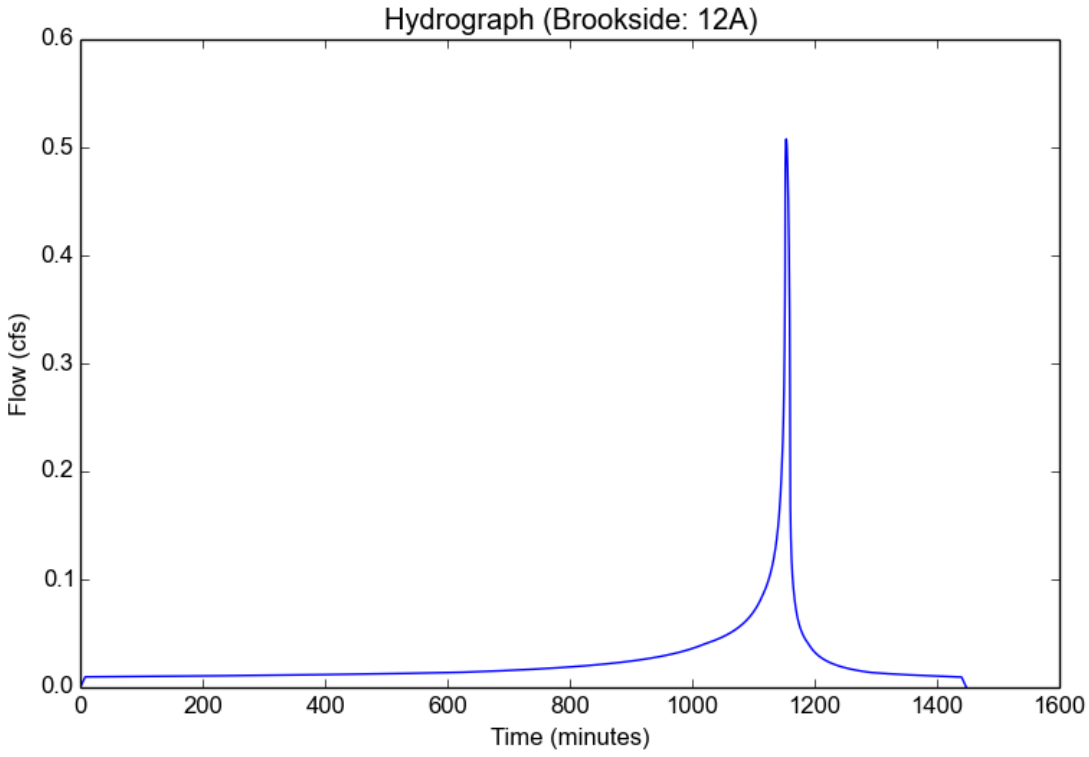
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/5-yr/Brookside Existing - 12A - 5yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.33
Flow Path Length (ft)	406.0
Flow Path Slope (vft/hft)	0.0197
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.314
Soil Type	2
Design Storm Frequency	5-yr
Fire Factor	0
LID	False

Output Results

Modeled (5-yr) Rainfall Depth (in)	3.796
Peak Intensity (in/hr)	1.8159
Undeveloped Runoff Coefficient (Cu)	0.8231
Developed Runoff Coefficient (Cd)	0.8473
Time of Concentration (min)	8.0
Clear Peak Flow Rate (cfs)	0.5077
Burned Peak Flow Rate (cfs)	0.5077
24-Hr Clear Runoff Volume (ac-ft)	0.0495
24-Hr Clear Runoff Volume (cu-ft)	2154.701



Peak Flow Hydrologic Analysis

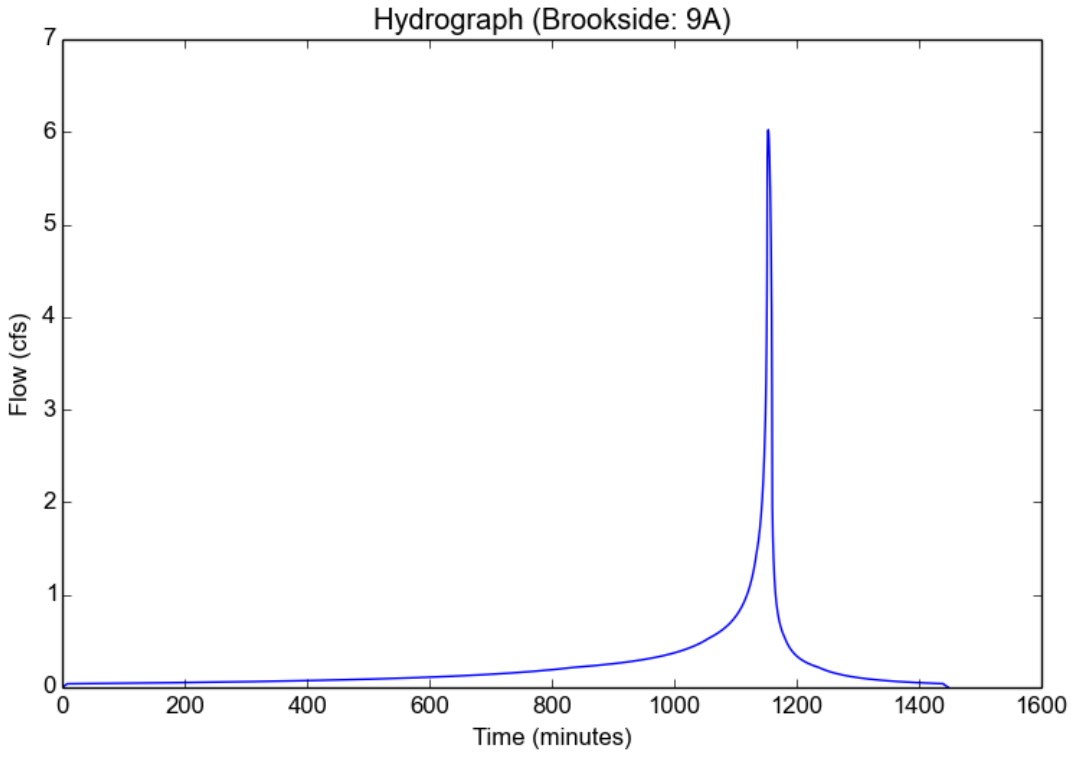
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/25-yr/Brookside Existing- 9A - 25yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	2.53
Flow Path Length (ft)	912.2
Flow Path Slope (vft/hft)	0.05591
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.707
Peak Intensity (in/hr)	2.7301
Undeveloped Runoff Coefficient (Cu)	0.8717
Developed Runoff Coefficient (Cd)	0.872
Time of Concentration (min)	8.0
Clear Peak Flow Rate (cfs)	6.0231
Burned Peak Flow Rate (cfs)	6.0231
24-Hr Clear Runoff Volume (ac-ft)	0.4747
24-Hr Clear Runoff Volume (cu-ft)	20676.3093



Peak Flow Hydrologic Analysis

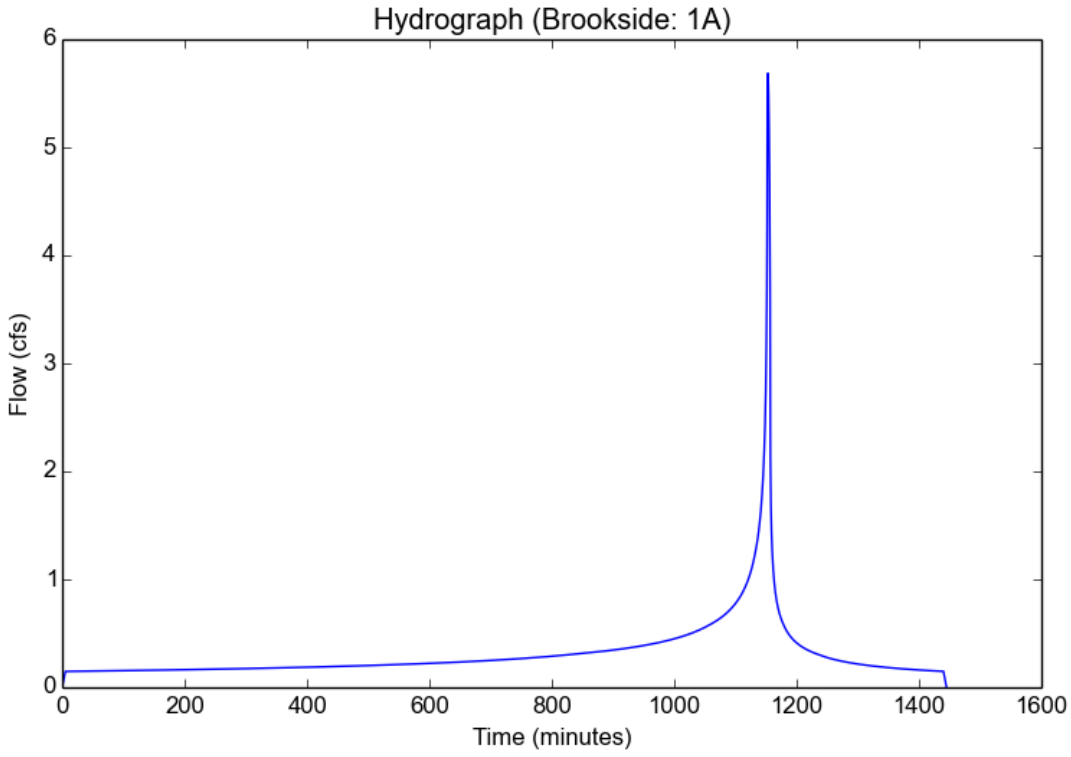
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/25-yr/Brookside Existing - 1A - 25yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1A
Area (ac)	1.86
Flow Path Length (ft)	623.8
Flow Path Slope (vft/hft)	0.11061
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.656
Soil Type	2
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.707
Peak Intensity (in/hr)	3.405
Undeveloped Runoff Coefficient (Cu)	0.8934
Developed Runoff Coefficient (Cd)	0.8977
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	5.6856
Burned Peak Flow Rate (cfs)	5.6856
24-Hr Clear Runoff Volume (ac-ft)	0.6365
24-Hr Clear Runoff Volume (cu-ft)	27727.6148



Peak Flow Hydrologic Analysis

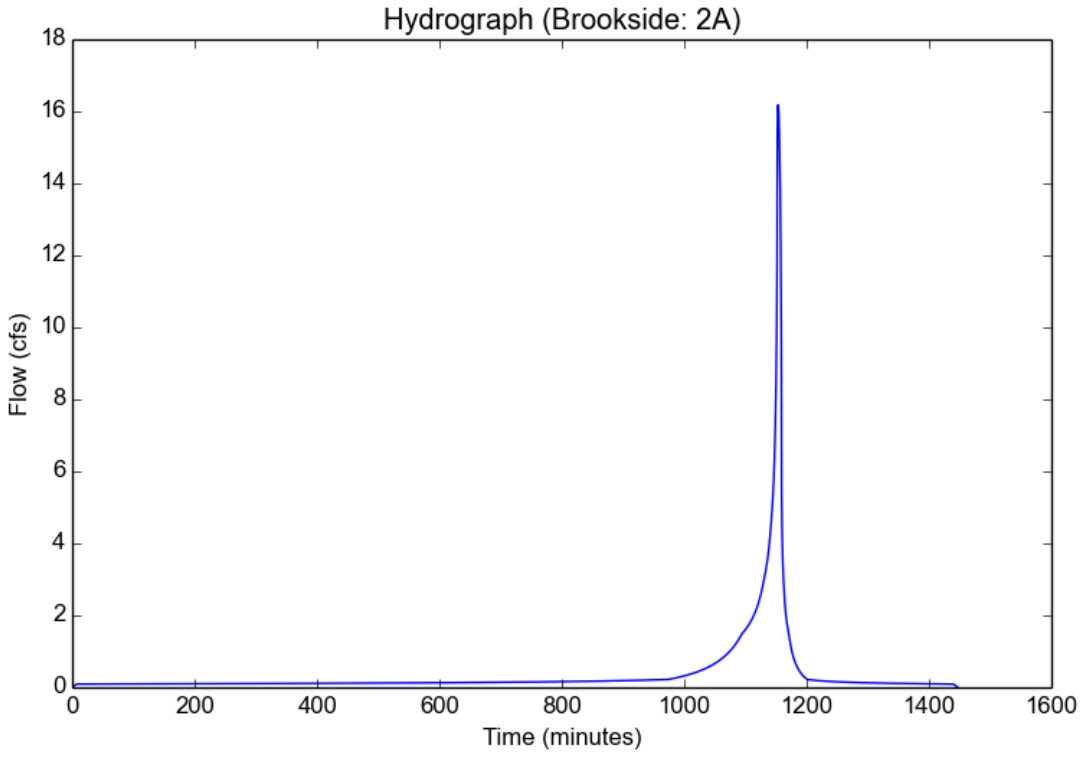
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/25-yr/Brookside Existing - 2A - 25yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	6.26
Flow Path Length (ft)	739.9
Flow Path Slope (vft/hft)	0.06623
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.021
Soil Type	17
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.707
Peak Intensity (in/hr)	2.9069
Undeveloped Runoff Coefficient (Cu)	0.889
Developed Runoff Coefficient (Cd)	0.8892
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	16.181
Burned Peak Flow Rate (cfs)	16.181
24-Hr Clear Runoff Volume (ac-ft)	0.7762
24-Hr Clear Runoff Volume (cu-ft)	33810.7964



Peak Flow Hydrologic Analysis

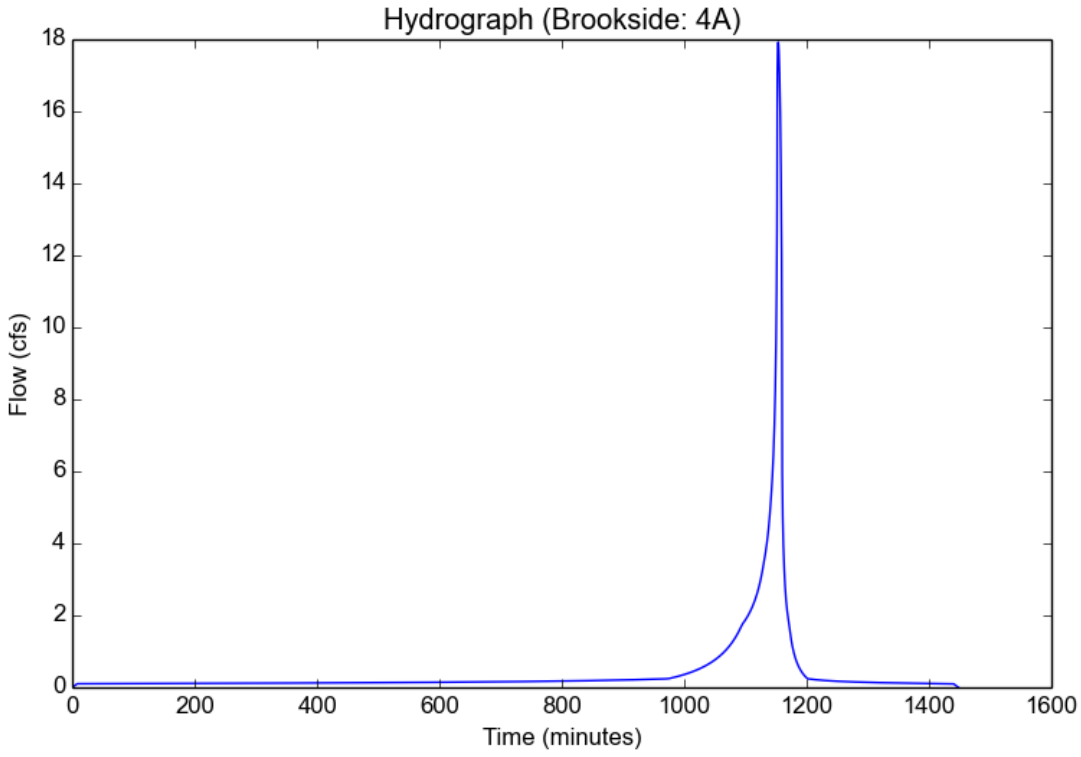
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/25-yr/Brookside Existing - 4A - 25yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	7.44
Flow Path Length (ft)	949.3
Flow Path Slope (vft/hft)	0.05794
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.707
Peak Intensity (in/hr)	2.7301
Undeveloped Runoff Coefficient (Cu)	0.8822
Developed Runoff Coefficient (Cd)	0.8824
Time of Concentration (min)	8.0
Clear Peak Flow Rate (cfs)	17.9225
Burned Peak Flow Rate (cfs)	17.9225
24-Hr Clear Runoff Volume (ac-ft)	0.8973
24-Hr Clear Runoff Volume (cu-ft)	39087.0452



Peak Flow Hydrologic Analysis

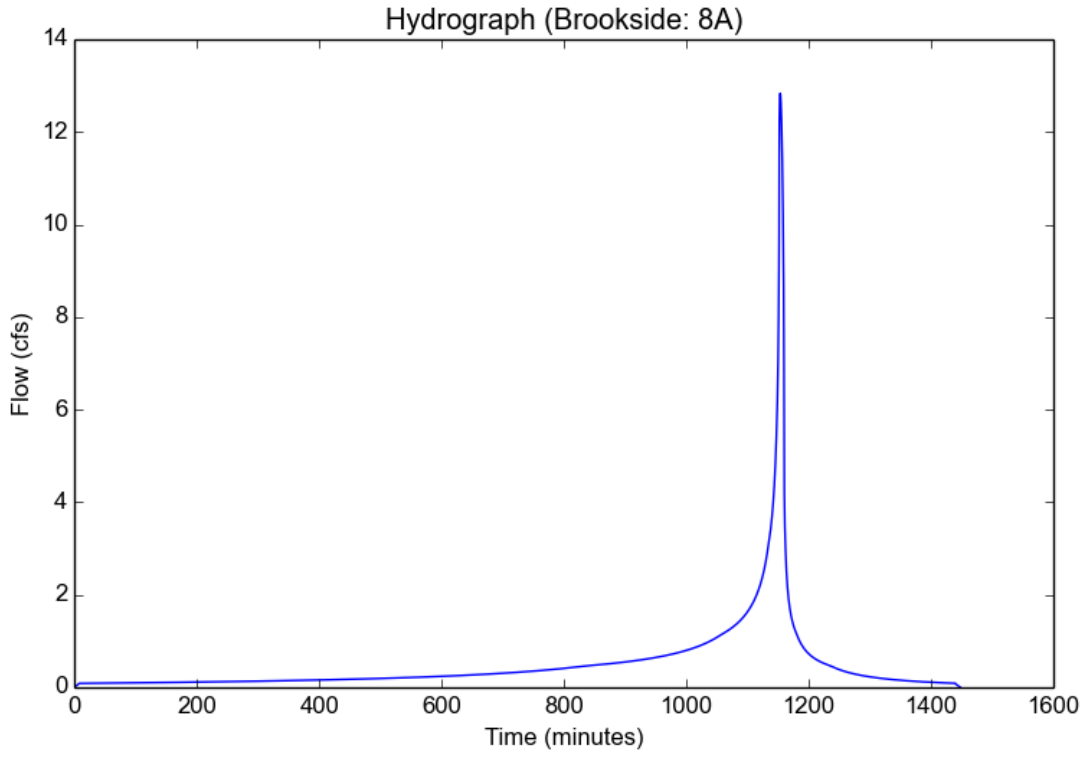
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/25-yr/Brookside Existing - 8A - 25yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	8A
Area (ac)	5.39
Flow Path Length (ft)	1116.4
Flow Path Slope (vft/hft)	0.08151
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.016
Soil Type	2
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.707
Peak Intensity (in/hr)	2.7301
Undeveloped Runoff Coefficient (Cu)	0.8717
Developed Runoff Coefficient (Cd)	0.8722
Time of Concentration (min)	8.0
Clear Peak Flow Rate (cfs)	12.8343
Burned Peak Flow Rate (cfs)	12.8343
24-Hr Clear Runoff Volume (ac-ft)	1.019
24-Hr Clear Runoff Volume (cu-ft)	44386.5911



Peak Flow Hydrologic Analysis

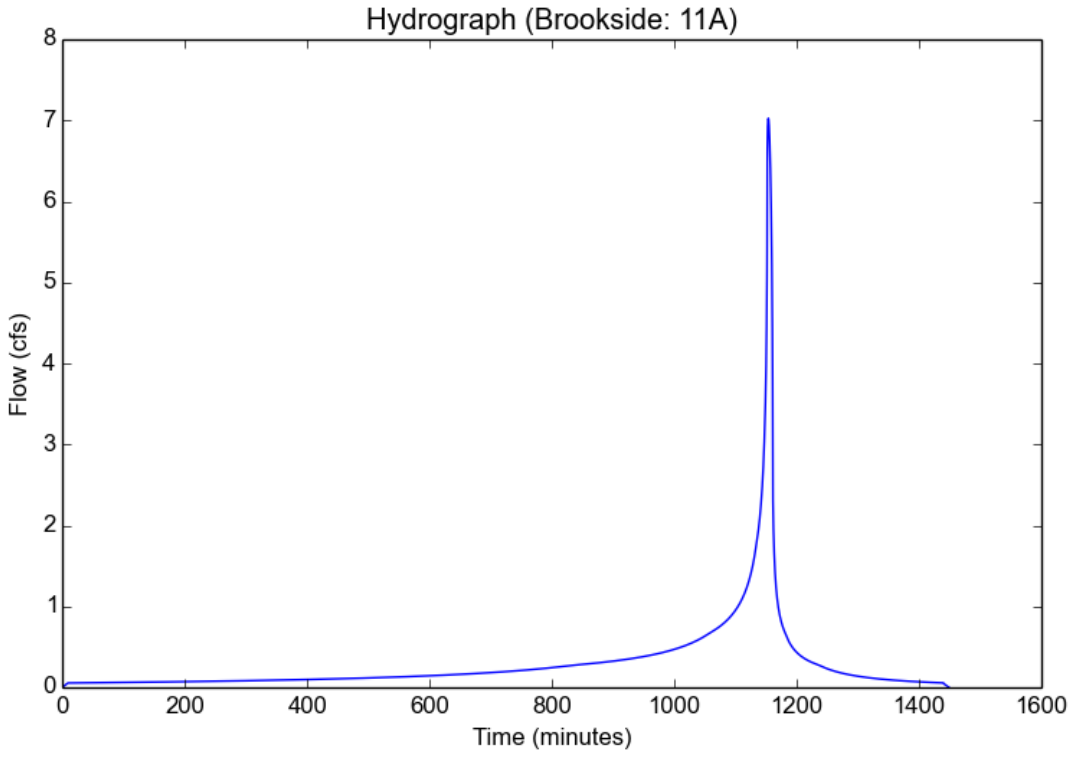
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/25-yr/Brookside Existing - 11A - 25yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	3.14
Flow Path Length (ft)	890.9
Flow Path Slope (vft/hft)	0.02469
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.028
Soil Type	2
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.707
Peak Intensity (in/hr)	2.5831
Undeveloped Runoff Coefficient (Cu)	0.8652
Developed Runoff Coefficient (Cd)	0.8662
Time of Concentration (min)	9.0
Clear Peak Flow Rate (cfs)	7.0256
Burned Peak Flow Rate (cfs)	7.0256
24-Hr Clear Runoff Volume (ac-ft)	0.6025
24-Hr Clear Runoff Volume (cu-ft)	26245.0559



Peak Flow Hydrologic Analysis

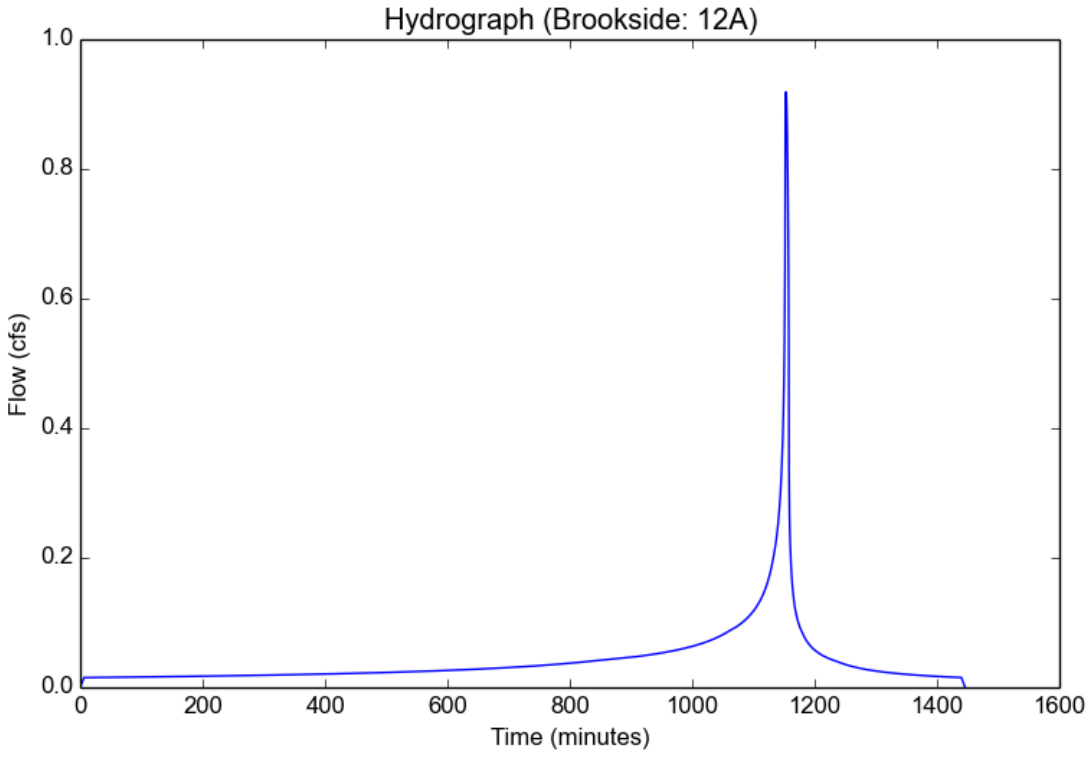
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/25-yr/Brookside Existing - 12A - 25yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.33
Flow Path Length (ft)	406.0
Flow Path Slope (vft/hft)	0.0197
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.314
Soil Type	2
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.707
Peak Intensity (in/hr)	3.1253
Undeveloped Runoff Coefficient (Cu)	0.8867
Developed Runoff Coefficient (Cd)	0.8909
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	0.9188
Burned Peak Flow Rate (cfs)	0.9188
24-Hr Clear Runoff Volume (ac-ft)	0.0859
24-Hr Clear Runoff Volume (cu-ft)	3743.5221



Peak Flow Hydrologic Analysis

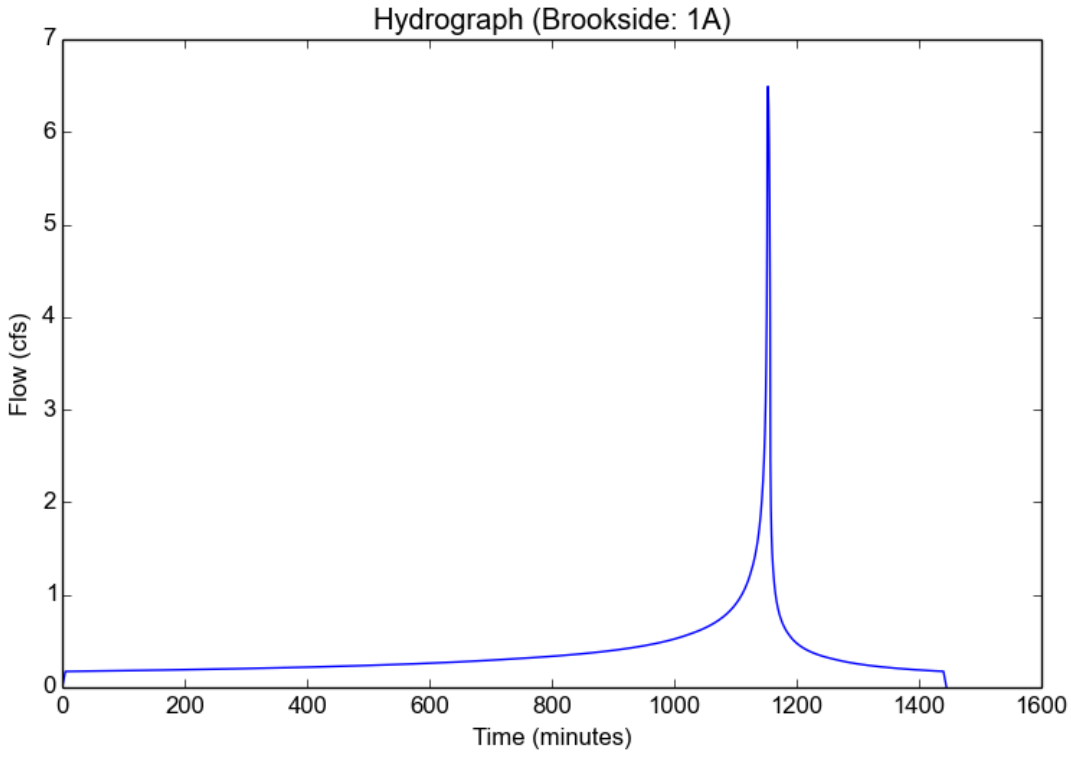
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/50-yr/Brookside Existing - 1A - 50yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1A
Area (ac)	1.86
Flow Path Length (ft)	623.8
Flow Path Slope (vft/hft)	0.11061
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.656
Soil Type	2
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.5
Peak Intensity (in/hr)	3.8781
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	6.4919
Burned Peak Flow Rate (cfs)	6.4919
24-Hr Clear Runoff Volume (ac-ft)	0.739
24-Hr Clear Runoff Volume (cu-ft)	32191.0964



Peak Flow Hydrologic Analysis

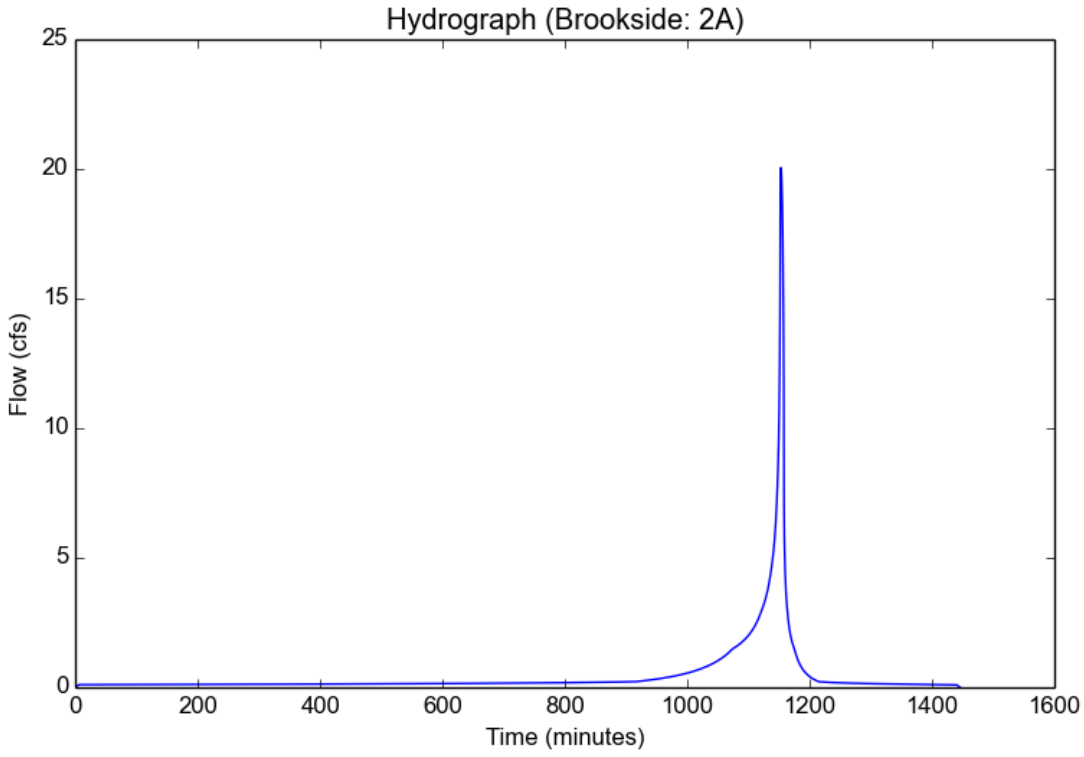
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/50-yr/Brookside Existing - 2A - 50yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	6.26
Flow Path Length (ft)	739.9
Flow Path Slope (vft/hft)	0.06623
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.021
Soil Type	17
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.5
Peak Intensity (in/hr)	3.5596
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	20.0548
Burned Peak Flow Rate (cfs)	20.0548
24-Hr Clear Runoff Volume (ac-ft)	0.9613
24-Hr Clear Runoff Volume (cu-ft)	41872.2766



Peak Flow Hydrologic Analysis

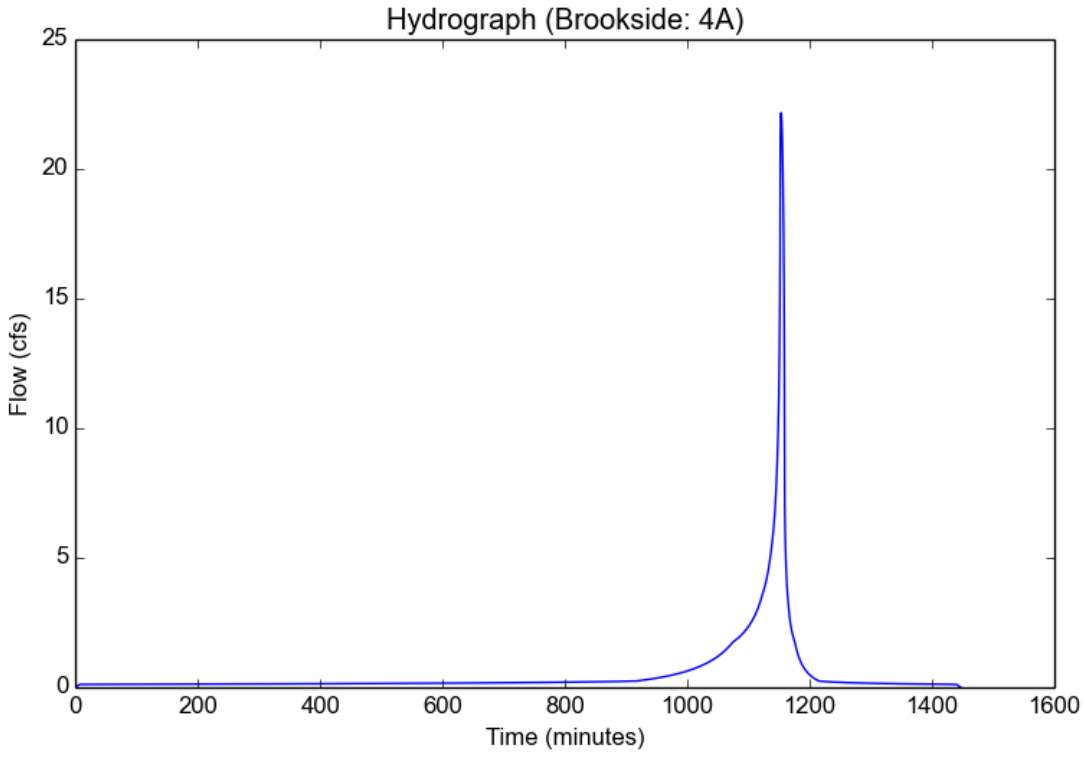
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/50-yr/Brookside Existing - 4A - 50yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	7.44
Flow Path Length (ft)	949.3
Flow Path Slope (vft/hft)	0.05794
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.5
Peak Intensity (in/hr)	3.3108
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	22.1693
Burned Peak Flow Rate (cfs)	22.1693
24-Hr Clear Runoff Volume (ac-ft)	1.1155
24-Hr Clear Runoff Volume (cu-ft)	48591.857



Peak Flow Hydrologic Analysis

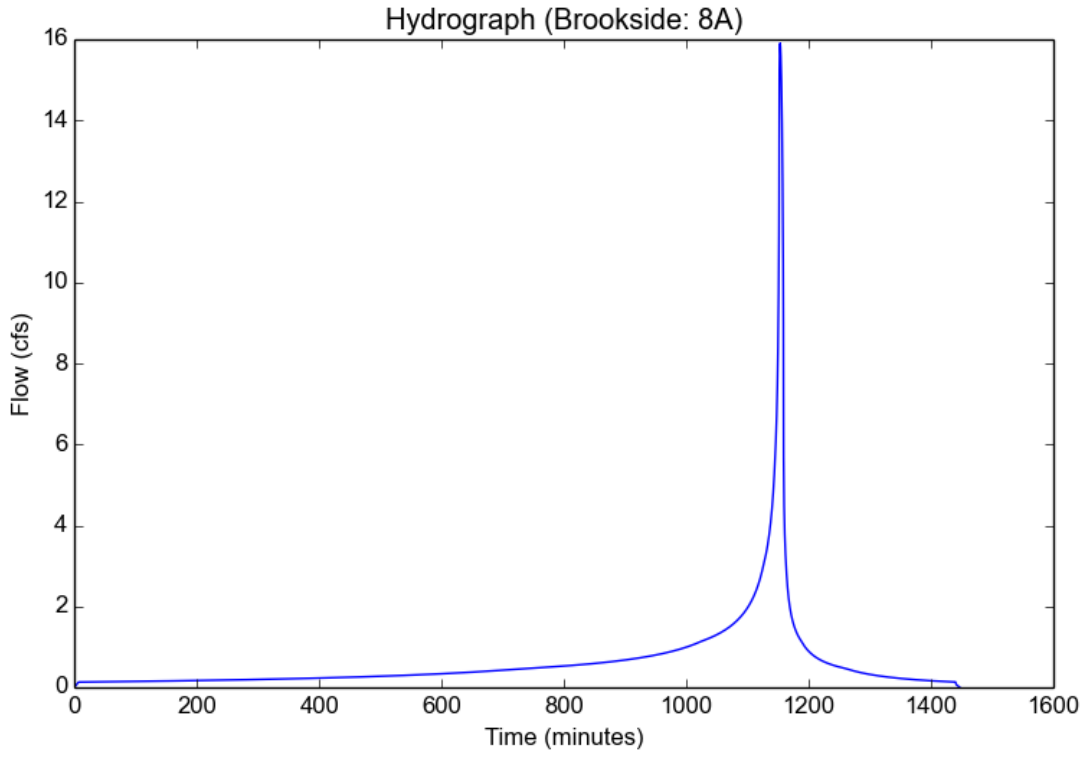
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/50-yr/Brookside Existing - 8A - 50yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	8A
Area (ac)	5.39
Flow Path Length (ft)	1116.4
Flow Path Slope (vft/hft)	0.08151
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.016
Soil Type	2
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.5
Peak Intensity (in/hr)	3.3108
Undeveloped Runoff Coefficient (Cu)	0.8912
Developed Runoff Coefficient (Cd)	0.8913
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	15.9059
Burned Peak Flow Rate (cfs)	15.9059
24-Hr Clear Runoff Volume (ac-ft)	1.2774
24-Hr Clear Runoff Volume (cu-ft)	55644.0839



Peak Flow Hydrologic Analysis

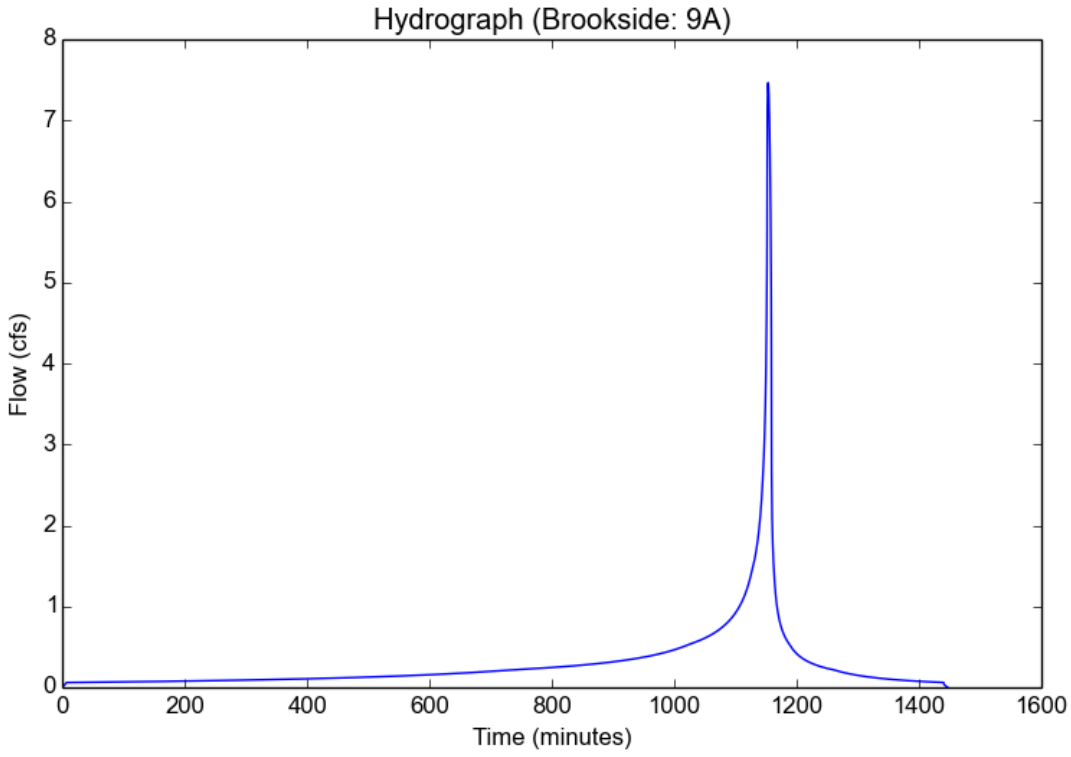
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/50-yr/Brookside Existing - 9A - 50yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	2.53
Flow Path Length (ft)	912.2
Flow Path Slope (vft/hft)	0.05591
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.5
Peak Intensity (in/hr)	3.3108
Undeveloped Runoff Coefficient (Cu)	0.8912
Developed Runoff Coefficient (Cd)	0.8913
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	7.4656
Burned Peak Flow Rate (cfs)	7.4656
24-Hr Clear Runoff Volume (ac-ft)	0.5958
24-Hr Clear Runoff Volume (cu-ft)	25953.0225



Peak Flow Hydrologic Analysis

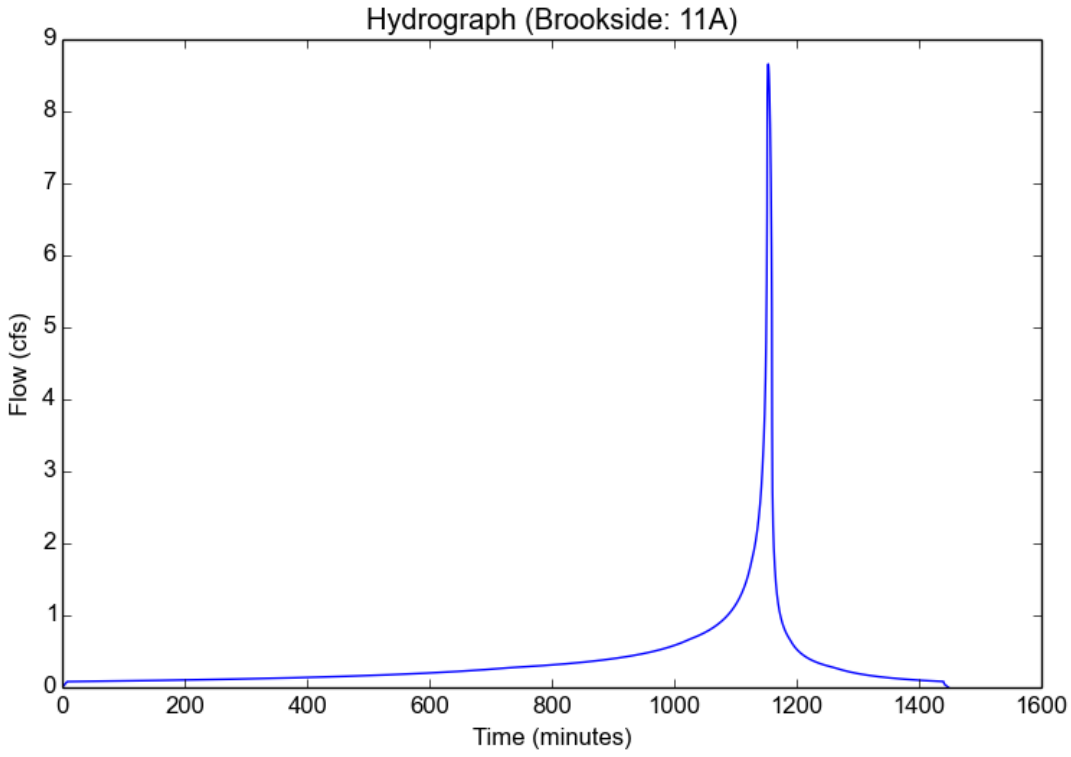
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/50-yr/Brookside Existing - 11A - 50yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	3.14
Flow Path Length (ft)	890.9
Flow Path Slope (vft/hft)	0.02469
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.028
Soil Type	2
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.5
Peak Intensity (in/hr)	3.1094
Undeveloped Runoff Coefficient (Cu)	0.8863
Developed Runoff Coefficient (Cd)	0.8867
Time of Concentration (min)	8.0
Clear Peak Flow Rate (cfs)	8.6573
Burned Peak Flow Rate (cfs)	8.6573
24-Hr Clear Runoff Volume (ac-ft)	0.7535
24-Hr Clear Runoff Volume (cu-ft)	32823.0867



Peak Flow Hydrologic Analysis

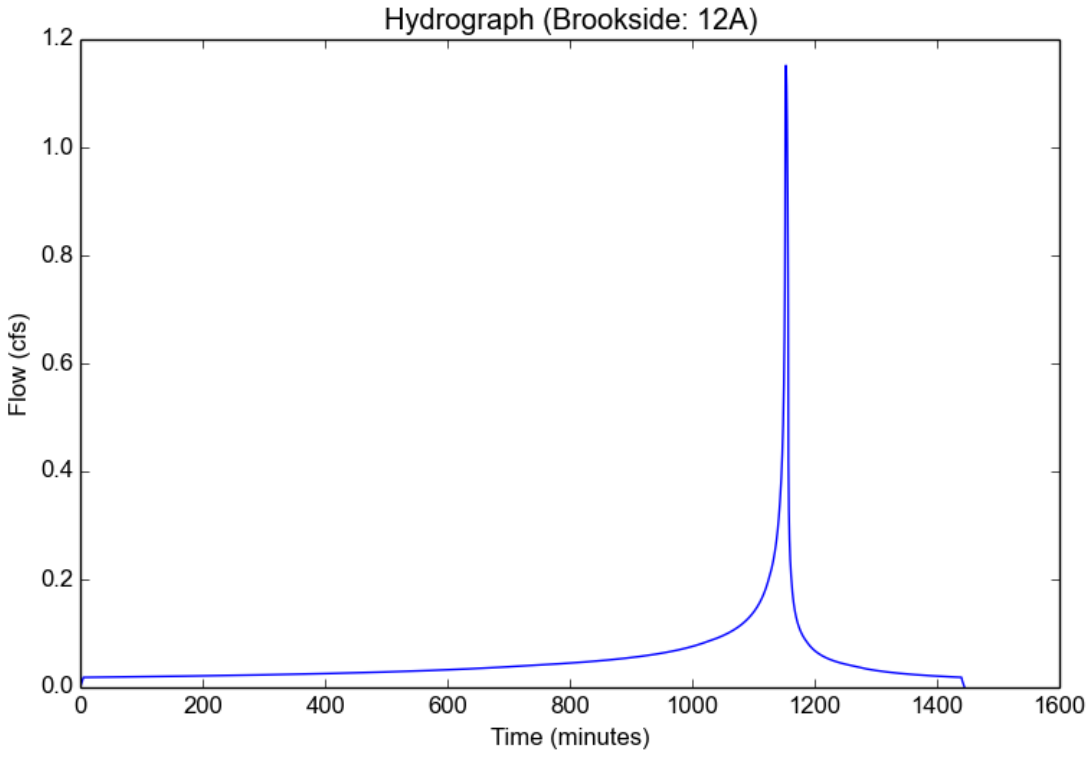
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/50-yr/Brookside Existing - 12A - 50yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.33
Flow Path Length (ft)	406.0
Flow Path Slope (vft/hft)	0.0197
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.314
Soil Type	2
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.5
Peak Intensity (in/hr)	3.8781
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.1518
Burned Peak Flow Rate (cfs)	1.1518
24-Hr Clear Runoff Volume (ac-ft)	0.1028
24-Hr Clear Runoff Volume (cu-ft)	4480.0454



Peak Flow Hydrologic Analysis

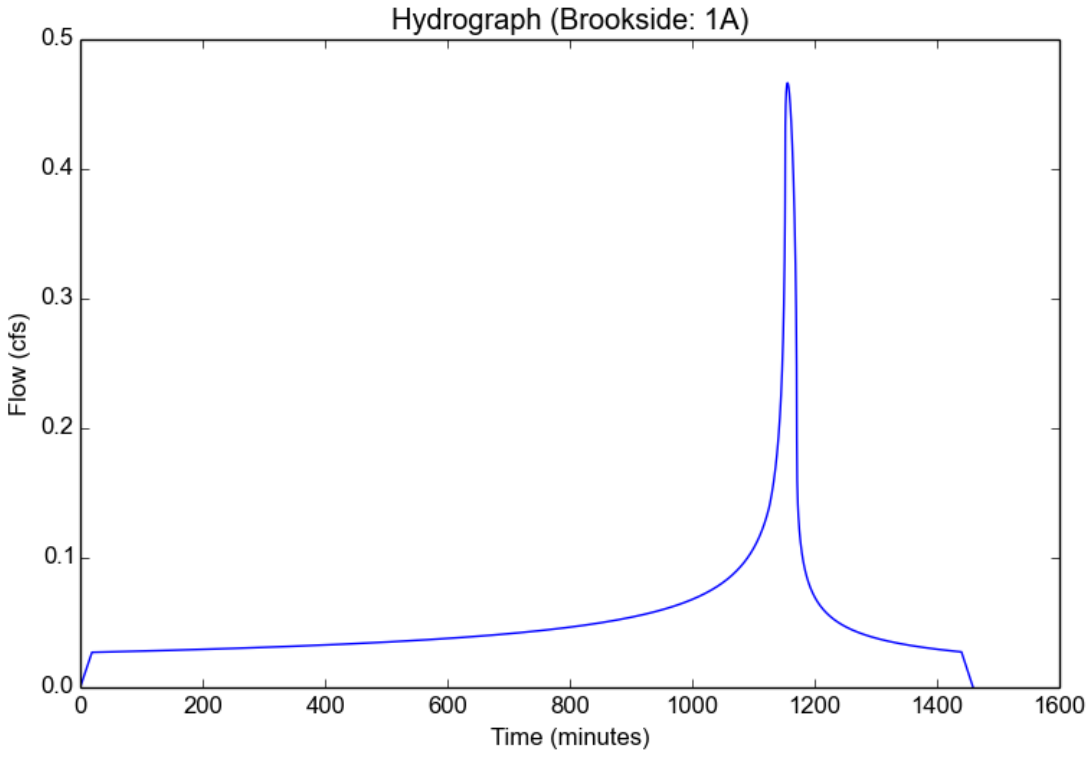
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/85th Percentile/Brookside Existing - 1A - 85th Percentile.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1A
Area (ac)	1.86
Flow Path Length (ft)	623.8
Flow Path Slope (vft/hft)	0.11061
85th Percentile Rainfall Depth (in)	1.05
Percent Impervious	0.656
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.05
Peak Intensity (in/hr)	0.3345
Undeveloped Runoff Coefficient (Cu)	0.463
Developed Runoff Coefficient (Cd)	0.7497
Time of Concentration (min)	19.0
Clear Peak Flow Rate (cfs)	0.4664
Burned Peak Flow Rate (cfs)	0.4664
24-Hr Clear Runoff Volume (ac-ft)	0.103
24-Hr Clear Runoff Volume (cu-ft)	4484.9849



Peak Flow Hydrologic Analysis

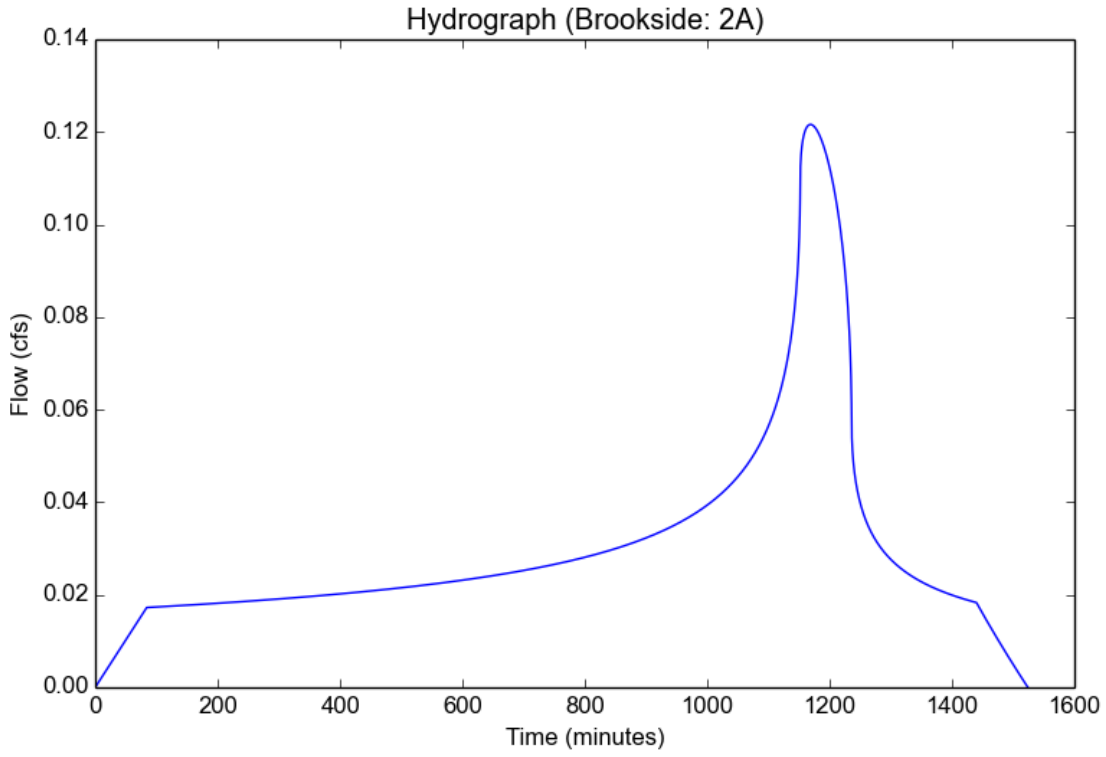
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/85th Percentile/Brookside Existing - 2A - 85th Percentile.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	6.26
Flow Path Length (ft)	739.9
Flow Path Slope (vft/hft)	0.06623
85th Percentile Rainfall Depth (in)	1.05
Percent Impervious	0.021
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.05
Peak Intensity (in/hr)	0.1663
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.1168
Time of Concentration (min)	84.0
Clear Peak Flow Rate (cfs)	0.1216
Burned Peak Flow Rate (cfs)	0.1216
24-Hr Clear Runoff Volume (ac-ft)	0.0635
24-Hr Clear Runoff Volume (cu-ft)	2764.0729



Peak Flow Hydrologic Analysis

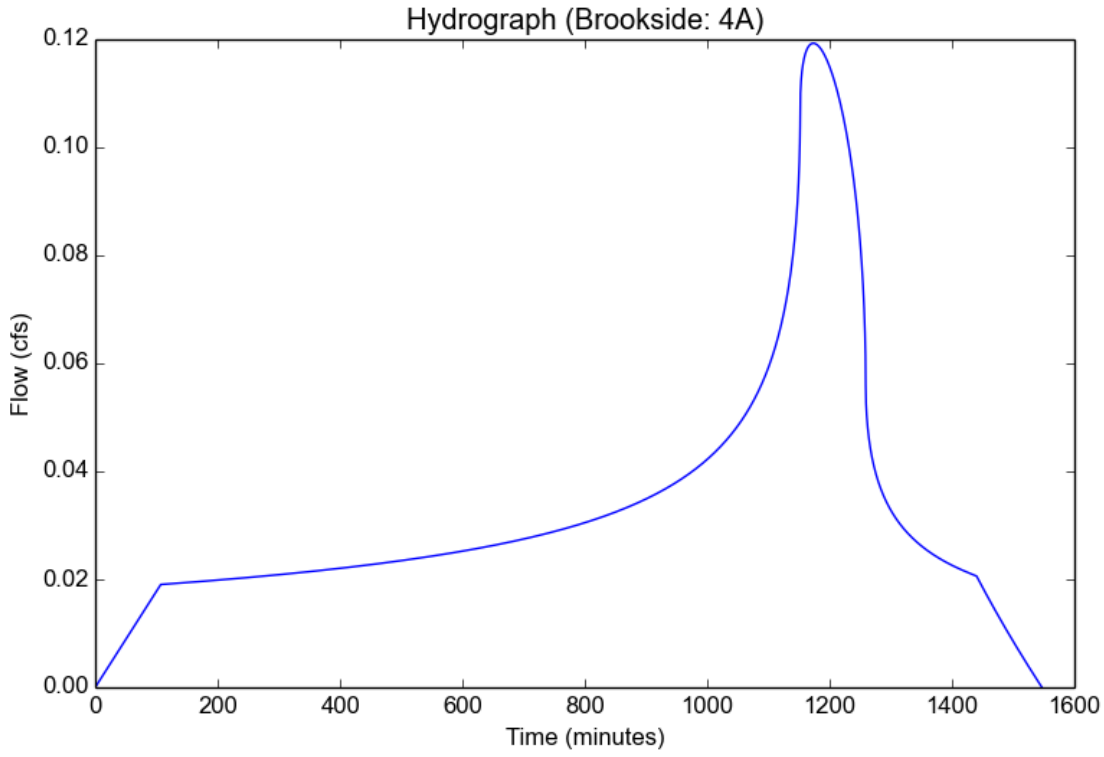
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/85th Percentile/Brookside Existing - 4A - 85th Percentile.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	7.44
Flow Path Length (ft)	949.3
Flow Path Slope (vft/hft)	0.05794
85th Percentile Rainfall Depth (in)	1.05
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.05
Peak Intensity (in/hr)	0.1485
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	107.0
Clear Peak Flow Rate (cfs)	0.1193
Burned Peak Flow Rate (cfs)	0.1193
24-Hr Clear Runoff Volume (ac-ft)	0.0697
24-Hr Clear Runoff Volume (cu-ft)	3037.7727



Peak Flow Hydrologic Analysis

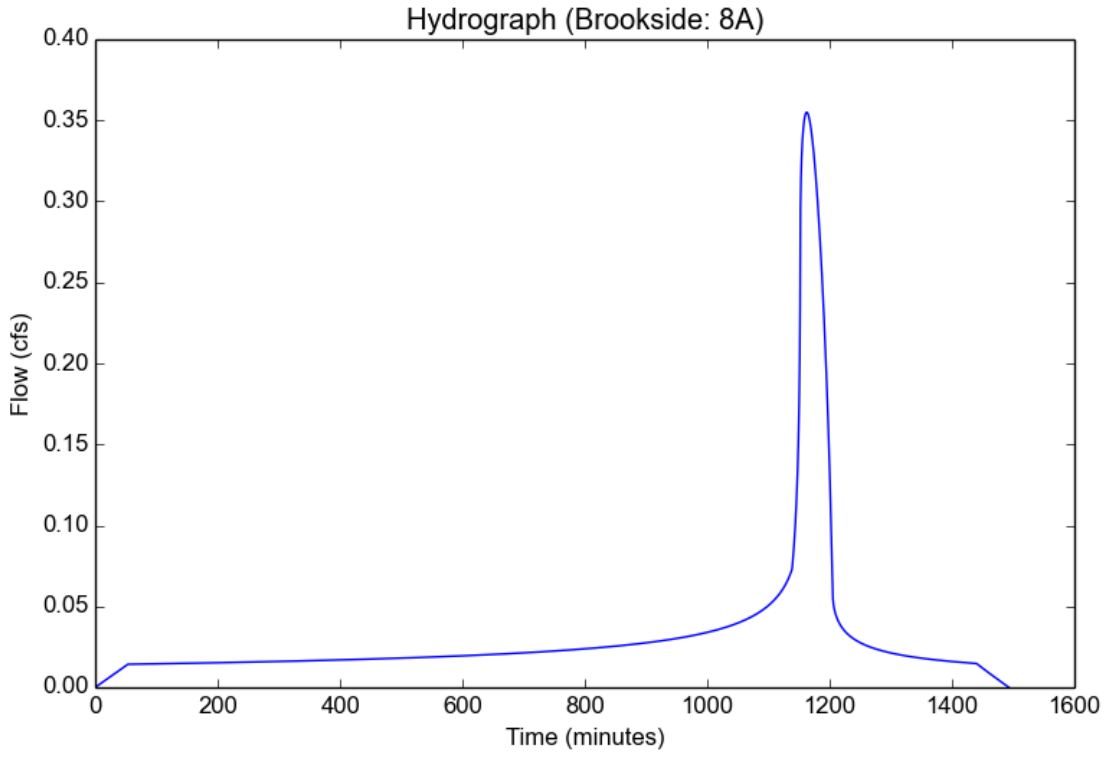
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/85th Percentile/Brookside Existing - 8A - 85th Percentile.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	8A
Area (ac)	5.39
Flow Path Length (ft)	1116.4
Flow Path Slope (vft/hft)	0.08151
85th Percentile Rainfall Depth (in)	1.05
Percent Impervious	0.016
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.05
Peak Intensity (in/hr)	0.2065
Undeveloped Runoff Coefficient (Cu)	0.3094
Developed Runoff Coefficient (Cd)	0.3189
Time of Concentration (min)	53.0
Clear Peak Flow Rate (cfs)	0.355
Burned Peak Flow Rate (cfs)	0.355
24-Hr Clear Runoff Volume (ac-ft)	0.0653
24-Hr Clear Runoff Volume (cu-ft)	2843.0823



Peak Flow Hydrologic Analysis

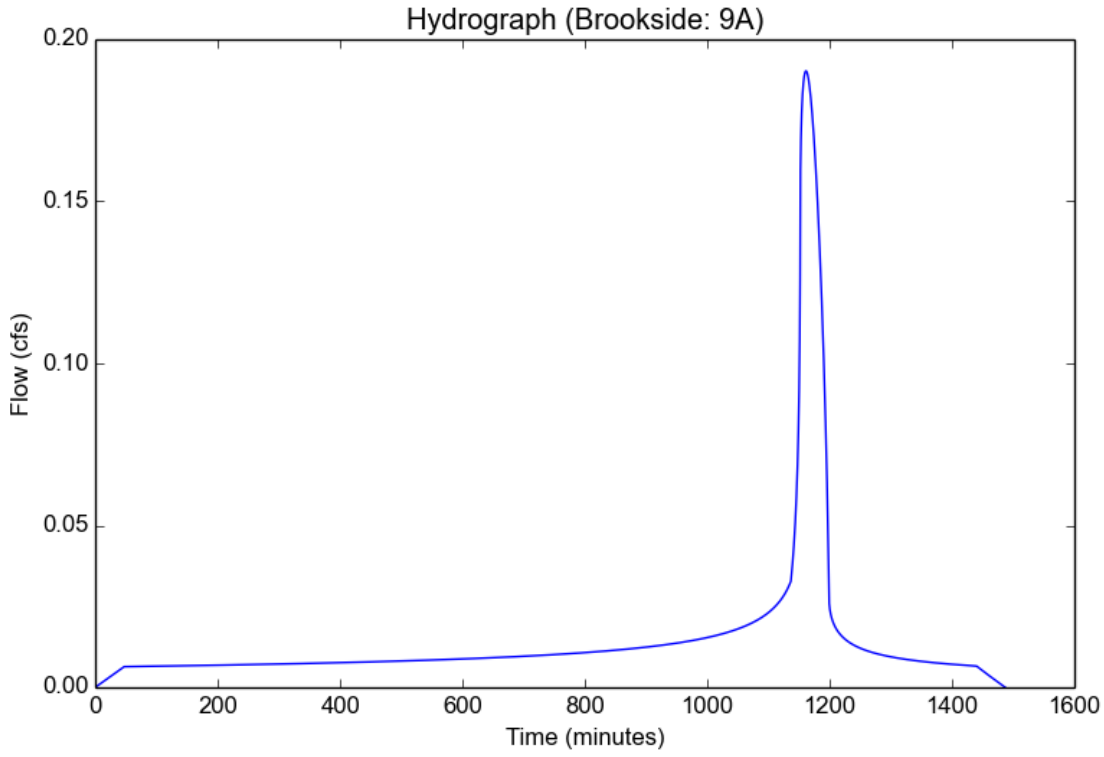
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/85th Percentile/Brookside Existing - 9A - 85th Percentile.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	2.53
Flow Path Length (ft)	912.2
Flow Path Slope (vft/hft)	0.05591
85th Percentile Rainfall Depth (in)	1.05
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.05
Peak Intensity (in/hr)	0.2185
Undeveloped Runoff Coefficient (Cu)	0.3385
Developed Runoff Coefficient (Cd)	0.3441
Time of Concentration (min)	47.0
Clear Peak Flow Rate (cfs)	0.1903
Burned Peak Flow Rate (cfs)	0.1903
24-Hr Clear Runoff Volume (ac-ft)	0.0302
24-Hr Clear Runoff Volume (cu-ft)	1316.3485



Peak Flow Hydrologic Analysis

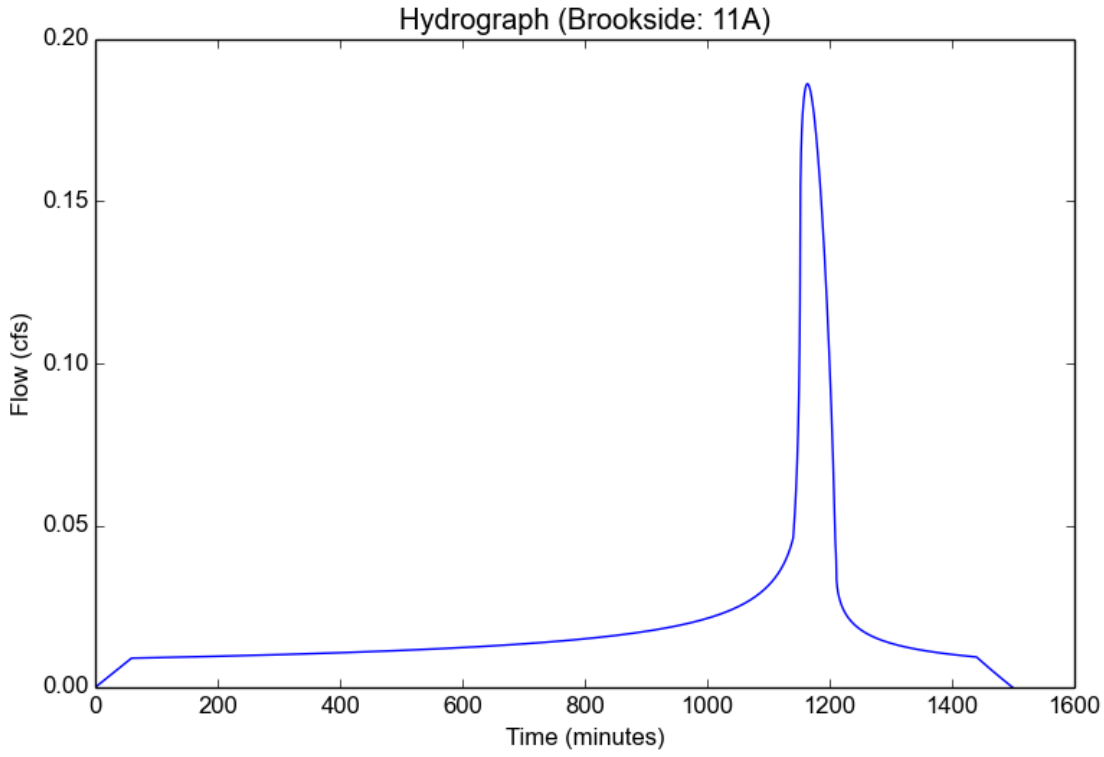
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/85th Percentile/Brookside Existing - 11A - 85th Percentile.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	3.14
Flow Path Length (ft)	890.9
Flow Path Slope (vft/hft)	0.02469
85th Percentile Rainfall Depth (in)	1.05
Percent Impervious	0.028
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.05
Peak Intensity (in/hr)	0.1964
Undeveloped Runoff Coefficient (Cu)	0.2849
Developed Runoff Coefficient (Cd)	0.3021
Time of Concentration (min)	59.0
Clear Peak Flow Rate (cfs)	0.1863
Burned Peak Flow Rate (cfs)	0.1863
24-Hr Clear Runoff Volume (ac-ft)	0.0399
24-Hr Clear Runoff Volume (cu-ft)	1737.0985



Peak Flow Hydrologic Analysis

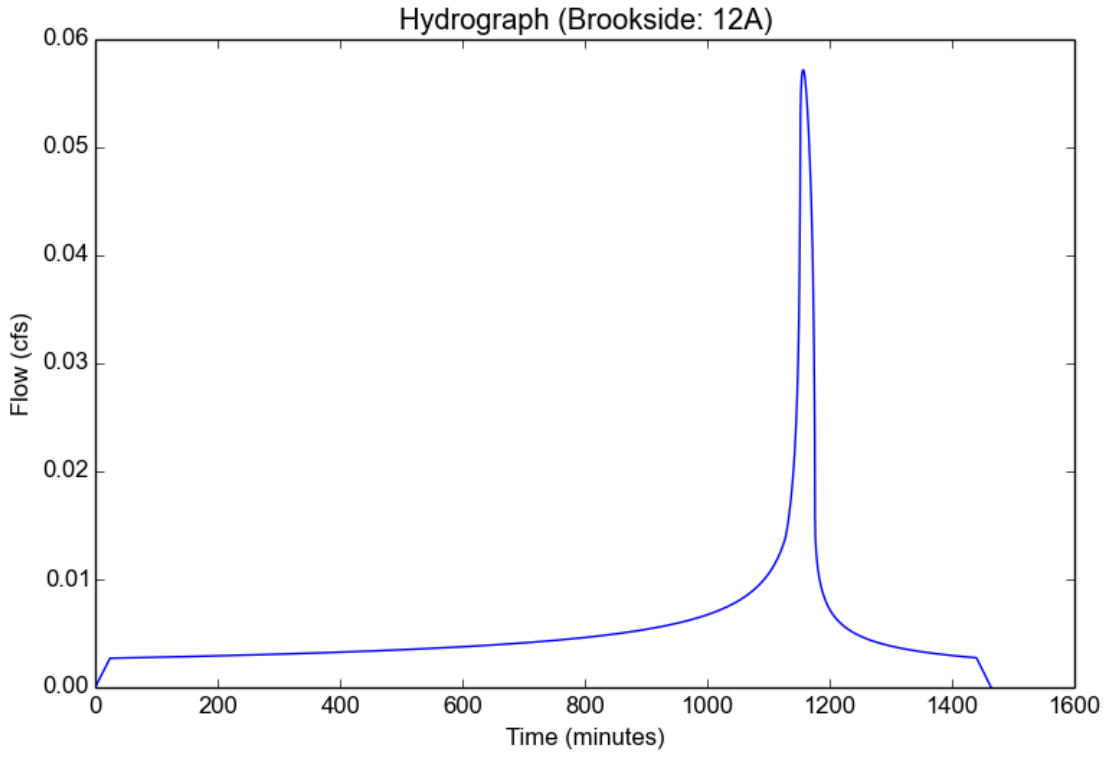
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/85th Percentile/Brookside Existing - 12A - 85th Percentile.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.33
Flow Path Length (ft)	406.0
Flow Path Slope (vft/hft)	0.0197
85th Percentile Rainfall Depth (in)	1.05
Percent Impervious	0.314
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.05
Peak Intensity (in/hr)	0.2997
Undeveloped Runoff Coefficient (Cu)	0.4308
Developed Runoff Coefficient (Cd)	0.5781
Time of Concentration (min)	24.0
Clear Peak Flow Rate (cfs)	0.0572
Burned Peak Flow Rate (cfs)	0.0572
24-Hr Clear Runoff Volume (ac-ft)	0.0108
24-Hr Clear Runoff Volume (cu-ft)	469.7187



Peak Flow Hydrologic Analysis

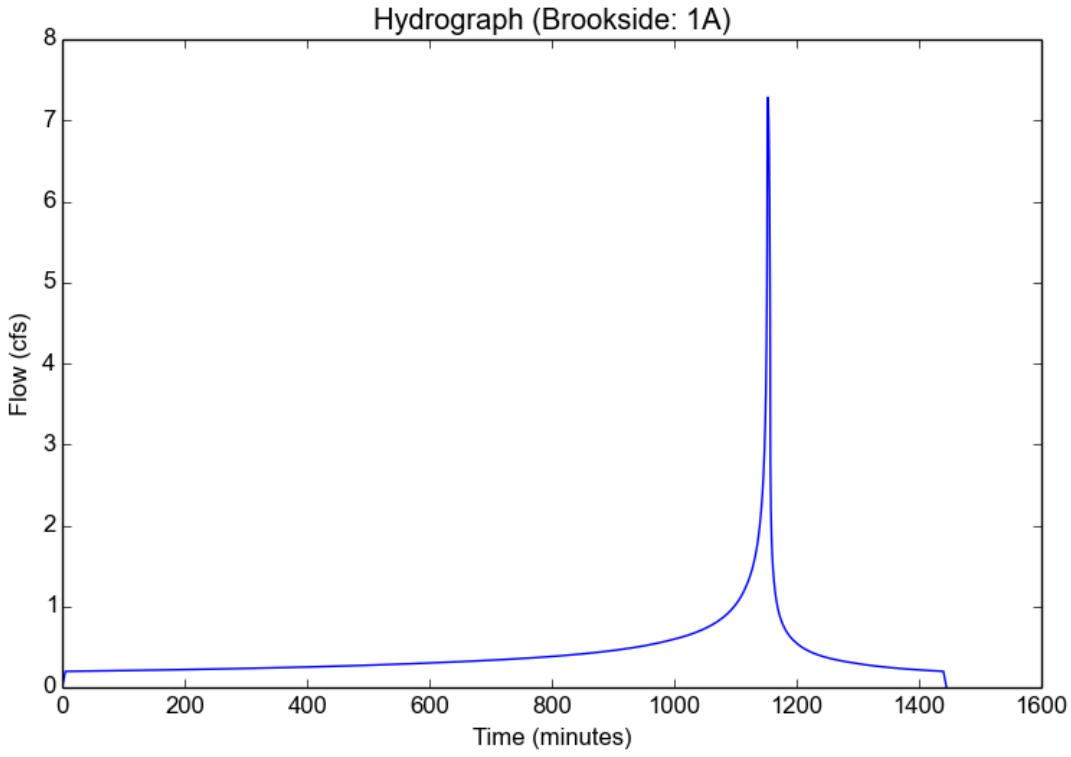
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/100yr/Brookside Existing - 1A - 100yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1A
Area (ac)	1.86
Flow Path Length (ft)	623.8
Flow Path Slope (vft/hft)	0.11061
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.656
Soil Type	2
Design Storm Frequency	100-yr
Fire Factor	0
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	7.293
Peak Intensity (in/hr)	4.3512
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	7.2839
Burned Peak Flow Rate (cfs)	7.2839
24-Hr Clear Runoff Volume (ac-ft)	0.8428
24-Hr Clear Runoff Volume (cu-ft)	36712.1306



Peak Flow Hydrologic Analysis

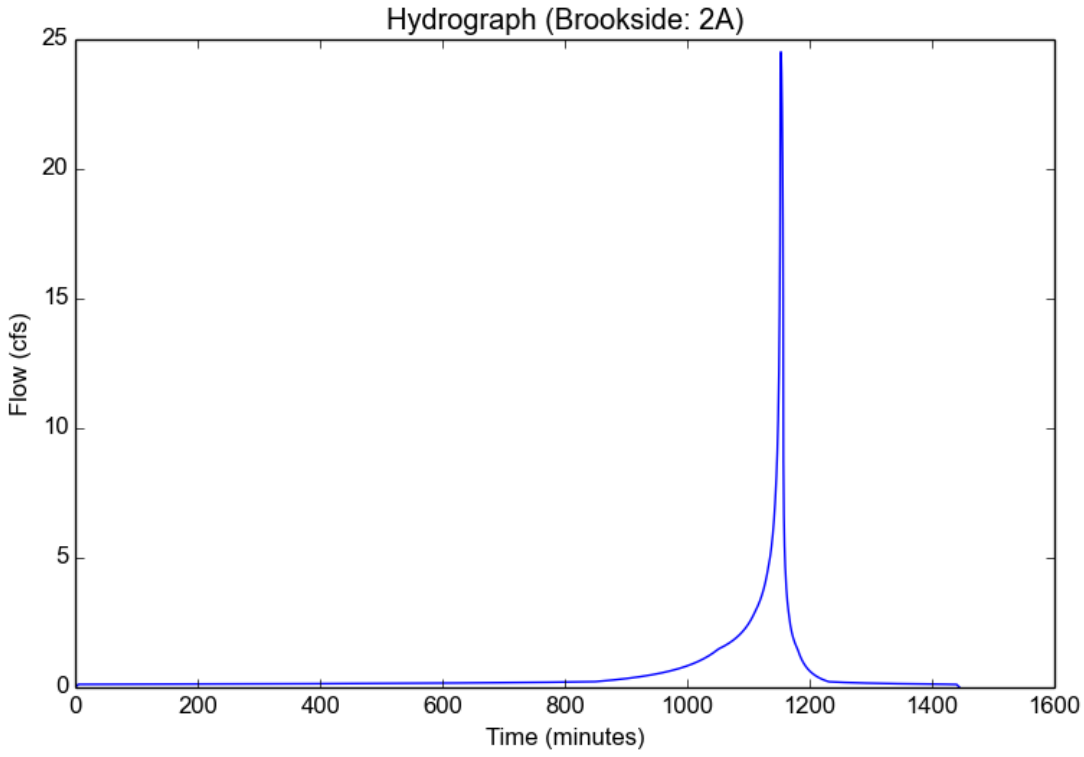
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/100yr/Brookside Existing - 2A - 100yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	6.26
Flow Path Length (ft)	739.9
Flow Path Slope (vft/hft)	0.06623
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.021
Soil Type	17
Design Storm Frequency	100-yr
Fire Factor	0
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	7.293
Peak Intensity (in/hr)	4.3512
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	24.5147
Burned Peak Flow Rate (cfs)	24.5147
24-Hr Clear Runoff Volume (ac-ft)	1.165
24-Hr Clear Runoff Volume (cu-ft)	50745.2465



Peak Flow Hydrologic Analysis

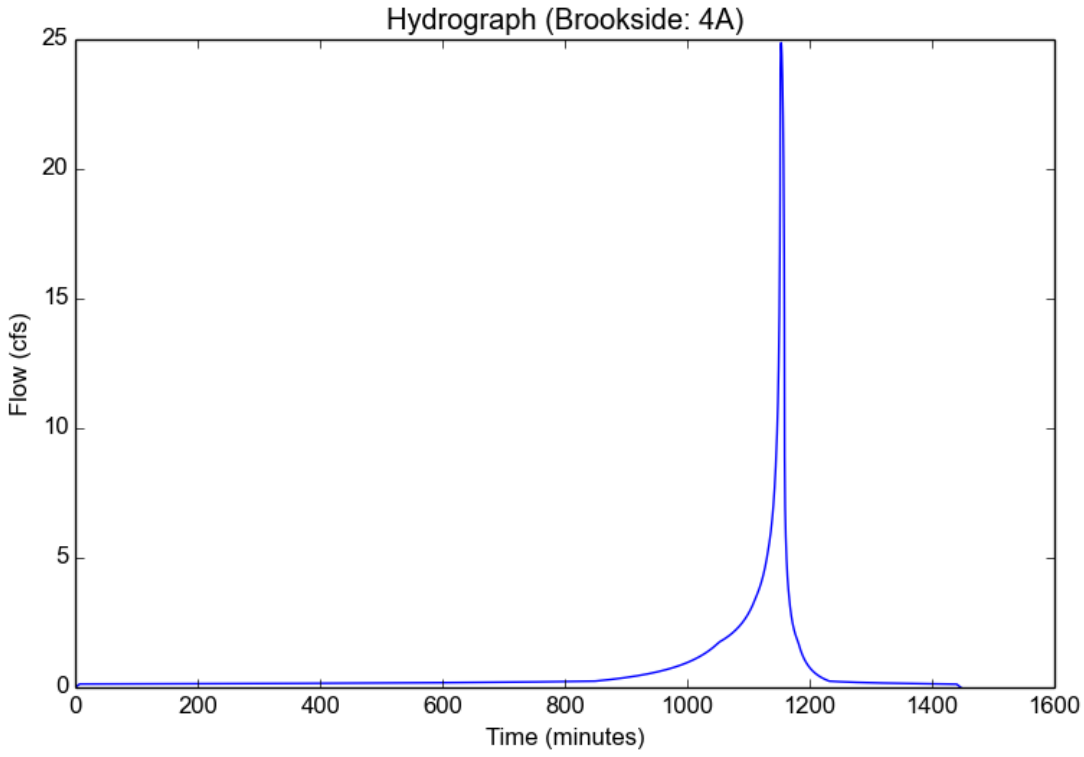
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/100yr/Brookside Existing - 4A - 100yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	7.44
Flow Path Length (ft)	949.3
Flow Path Slope (vft/hft)	0.05794
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	100-yr
Fire Factor	0
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	7.293
Peak Intensity (in/hr)	3.7147
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	24.8739
Burned Peak Flow Rate (cfs)	24.8739
24-Hr Clear Runoff Volume (ac-ft)	1.3566
24-Hr Clear Runoff Volume (cu-ft)	59092.8335



Peak Flow Hydrologic Analysis

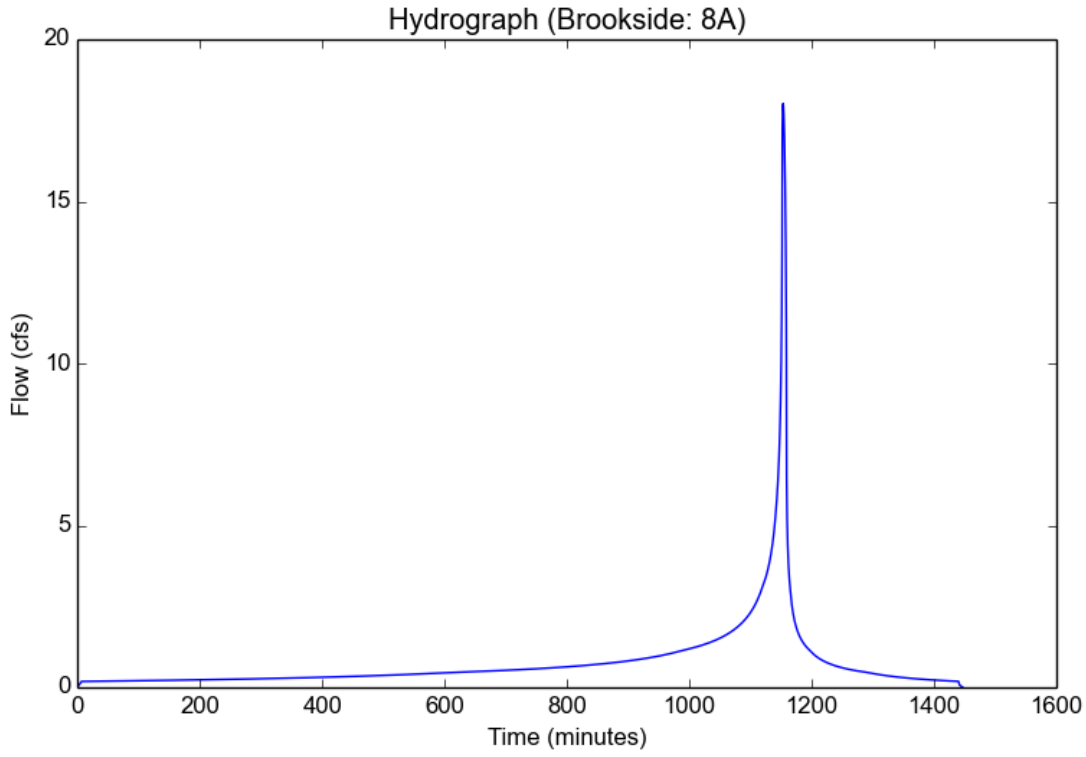
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/100yr/Brookside Existing - 8A - 100yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	8A
Area (ac)	5.39
Flow Path Length (ft)	1116.4
Flow Path Slope (vft/hft)	0.08151
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.016
Soil Type	2
Design Storm Frequency	100-yr
Fire Factor	0
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	7.293
Peak Intensity (in/hr)	3.7147
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	18.0202
Burned Peak Flow Rate (cfs)	18.0202
24-Hr Clear Runoff Volume (ac-ft)	1.547
24-Hr Clear Runoff Volume (cu-ft)	67388.9379



Peak Flow Hydrologic Analysis

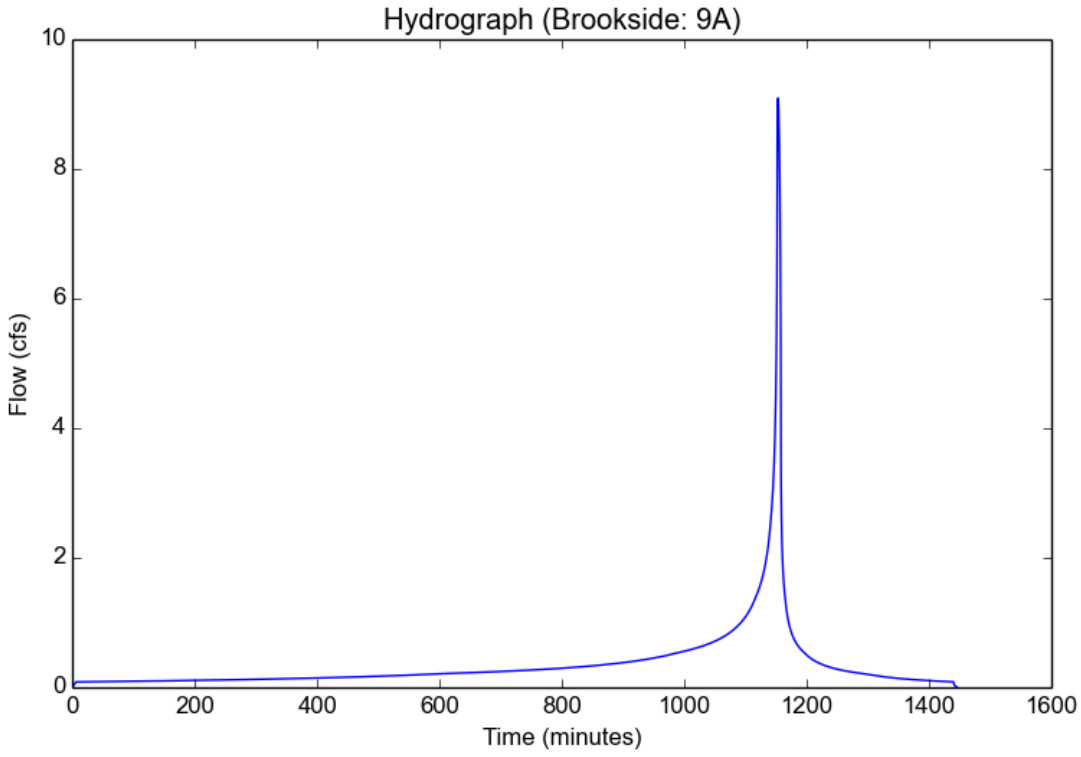
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/100yr/Brookside Existing - 9A - 100yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	2.53
Flow Path Length (ft)	912.2
Flow Path Slope (vft/hft)	0.05591
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	100-yr
Fire Factor	0
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	7.293
Peak Intensity (in/hr)	3.9939
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	9.094
Burned Peak Flow Rate (cfs)	9.094
24-Hr Clear Runoff Volume (ac-ft)	0.7221
24-Hr Clear Runoff Volume (cu-ft)	31455.4458



Peak Flow Hydrologic Analysis

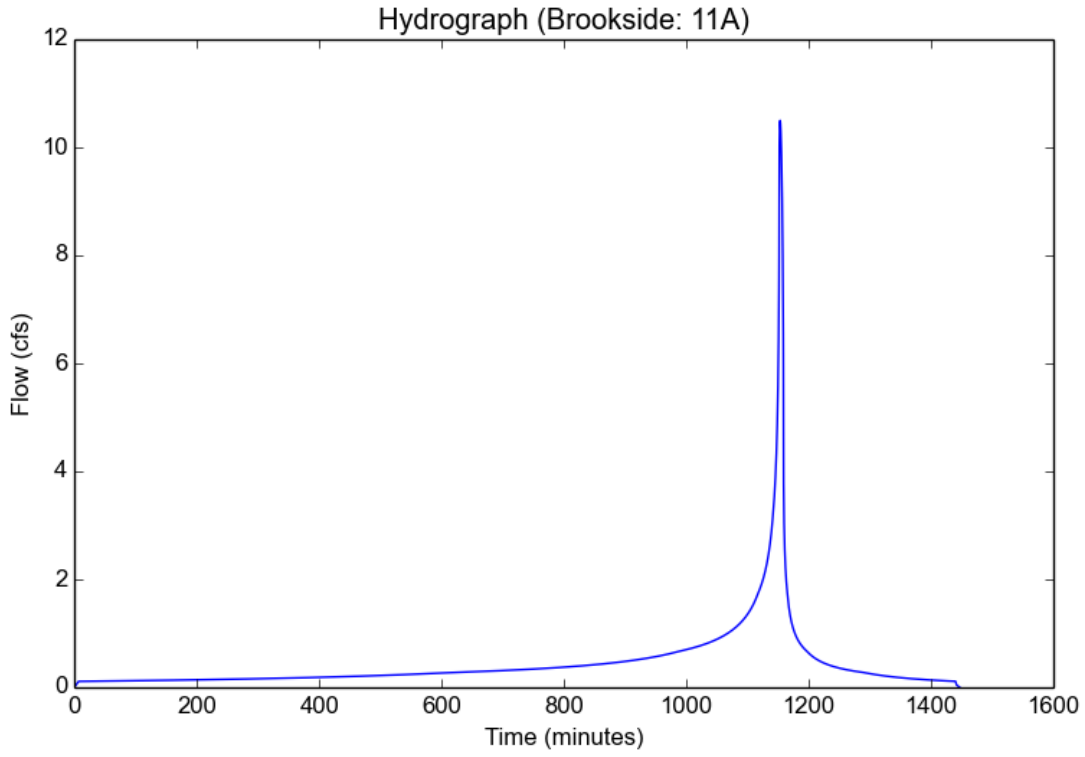
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/100yr/Brookside Existing - 11A - 100yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	3.14
Flow Path Length (ft)	890.9
Flow Path Slope (vft/hft)	0.02469
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.028
Soil Type	2
Design Storm Frequency	100-yr
Fire Factor	0
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	7.293
Peak Intensity (in/hr)	3.7147
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	10.4979
Burned Peak Flow Rate (cfs)	10.4979
24-Hr Clear Runoff Volume (ac-ft)	0.911
24-Hr Clear Runoff Volume (cu-ft)	39684.1927



Peak Flow Hydrologic Analysis

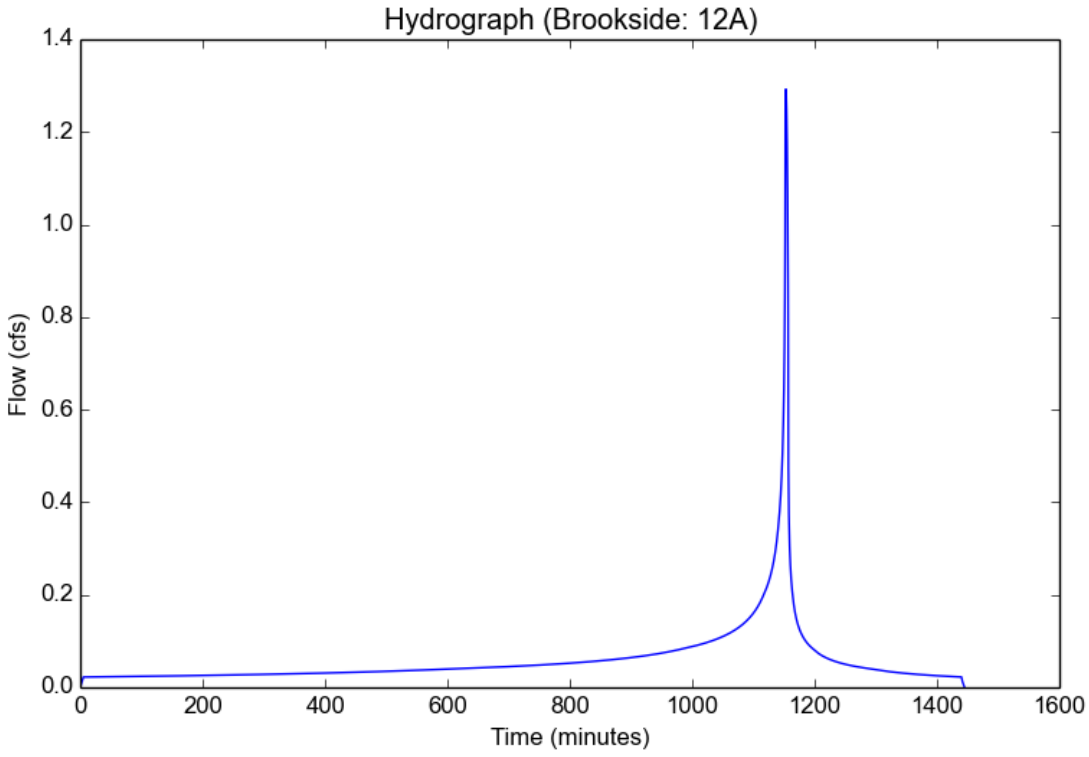
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Existing/100yr/Brookside Existing - 12A - 100yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.33
Flow Path Length (ft)	406.0
Flow Path Slope (vft/hft)	0.0197
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.314
Soil Type	2
Design Storm Frequency	100-yr
Fire Factor	0
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	7.293
Peak Intensity (in/hr)	4.3512
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.2923
Burned Peak Flow Rate (cfs)	1.2923
24-Hr Clear Runoff Volume (ac-ft)	0.1202
24-Hr Clear Runoff Volume (cu-ft)	5236.6735



Peak Flow Hydrologic Analysis

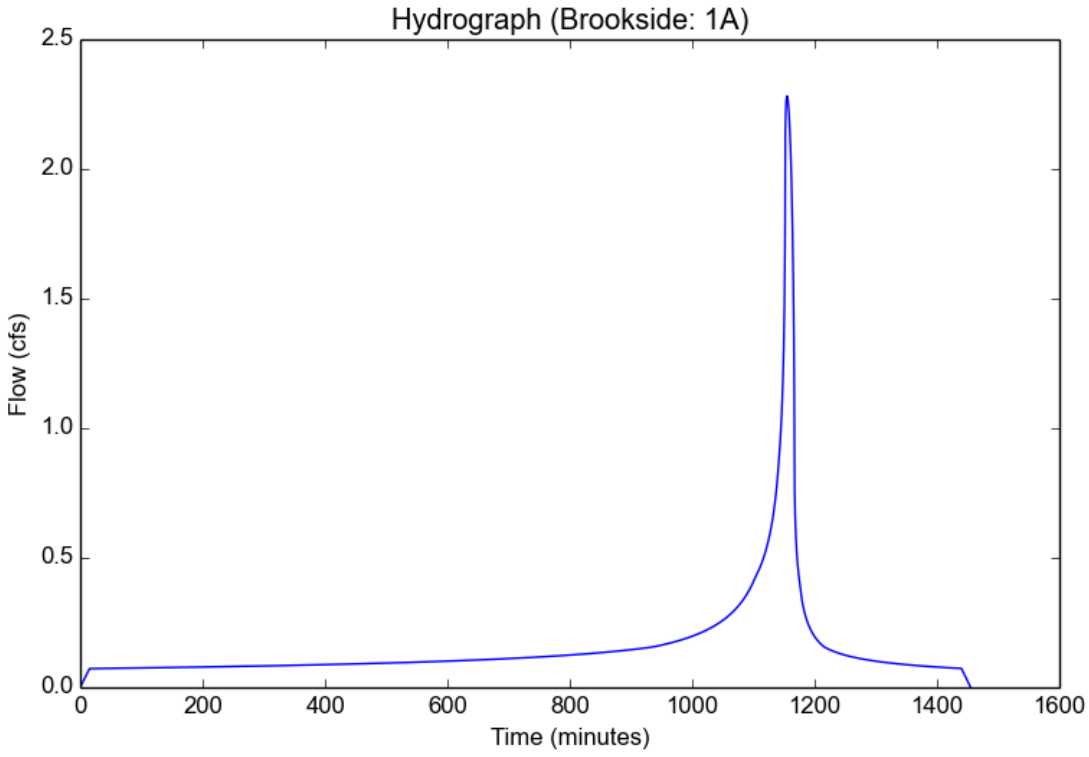
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/2yr/Brookside Proposed - 1A - 2yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1A
Area (ac)	3.28
Flow Path Length (ft)	866.7
Flow Path Slope (vft/hft)	0.04038
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.37
Soil Type	2
Design Storm Frequency	2-yr
Fire Factor	0
LID	False

Output Results

Modeled (2-yr) Rainfall Depth (in)	2.5155
Peak Intensity (in/hr)	0.8955
Undeveloped Runoff Coefficient (Cu)	0.7045
Developed Runoff Coefficient (Cd)	0.7768
Time of Concentration (min)	15.0
Clear Peak Flow Rate (cfs)	2.2818
Burned Peak Flow Rate (cfs)	2.2818
24-Hr Clear Runoff Volume (ac-ft)	0.3191
24-Hr Clear Runoff Volume (cu-ft)	13899.0631



Peak Flow Hydrologic Analysis

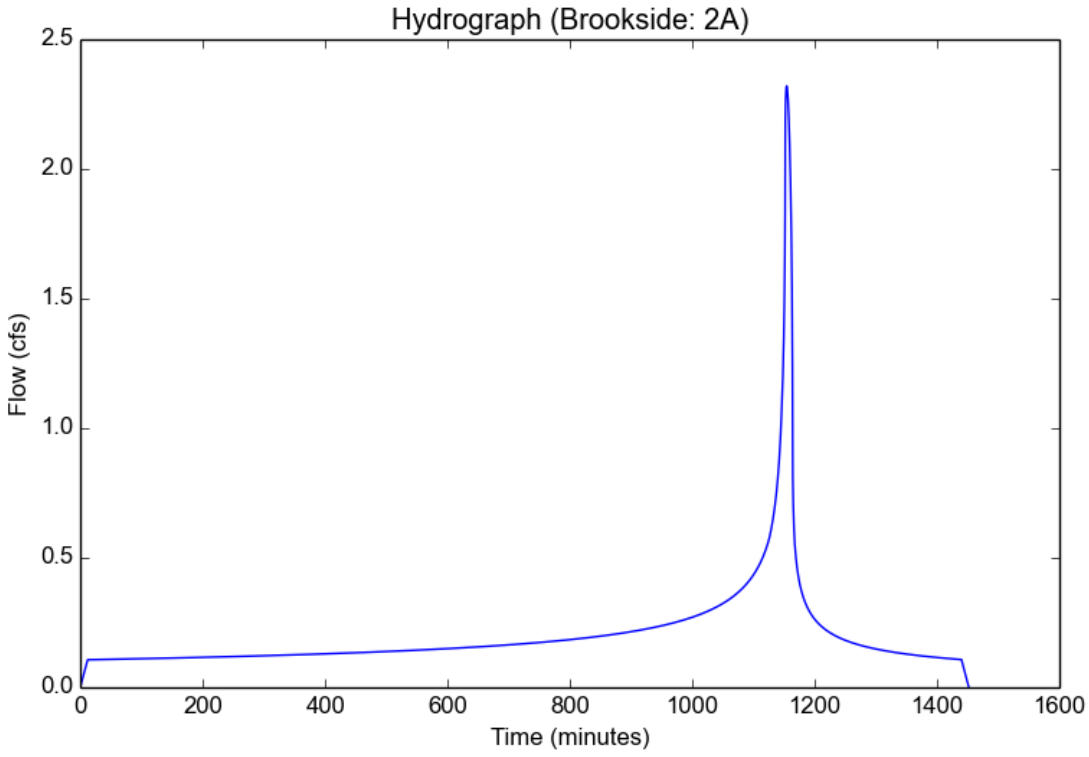
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/2yr/Brookside Proposed - 2A - 2yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	2.75
Flow Path Length (ft)	652.4
Flow Path Slope (vft/hft)	0.04599
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.745
Soil Type	17
Design Storm Frequency	2-yr
Fire Factor	0
LID	False

Output Results

Modeled (2-yr) Rainfall Depth (in)	2.5155
Peak Intensity (in/hr)	0.9946
Undeveloped Runoff Coefficient (Cu)	0.6976
Developed Runoff Coefficient (Cd)	0.8484
Time of Concentration (min)	12.0
Clear Peak Flow Rate (cfs)	2.3204
Burned Peak Flow Rate (cfs)	2.3204
24-Hr Clear Runoff Volume (ac-ft)	0.4064
24-Hr Clear Runoff Volume (cu-ft)	17701.4753



Peak Flow Hydrologic Analysis

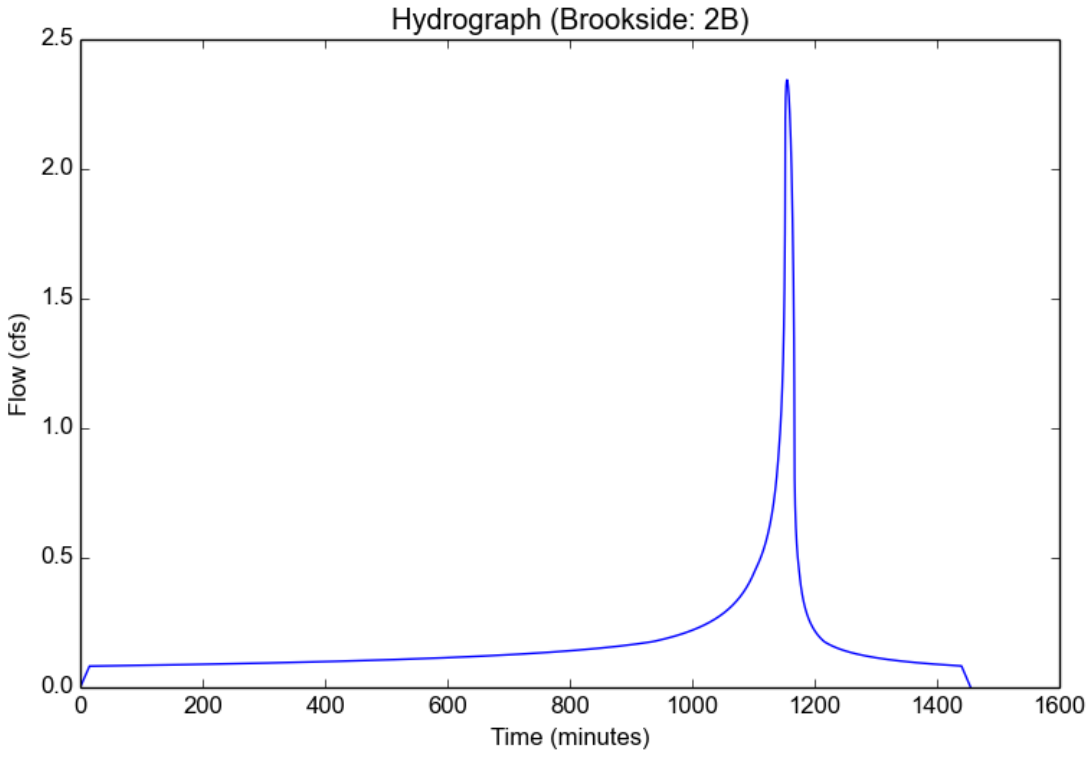
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/2yr/Brookside Proposed - 2B - 2yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2B
Area (ac)	3.32
Flow Path Length (ft)	861.6
Flow Path Slope (vft/hft)	0.03714
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.429
Soil Type	2
Design Storm Frequency	2-yr
Fire Factor	0
LID	False

Output Results

Modeled (2-yr) Rainfall Depth (in)	2.5155
Peak Intensity (in/hr)	0.8955
Undeveloped Runoff Coefficient (Cu)	0.7045
Developed Runoff Coefficient (Cd)	0.7884
Time of Concentration (min)	15.0
Clear Peak Flow Rate (cfs)	2.3439
Burned Peak Flow Rate (cfs)	2.3439
24-Hr Clear Runoff Volume (ac-ft)	0.3509
24-Hr Clear Runoff Volume (cu-ft)	15285.1105



Peak Flow Hydrologic Analysis

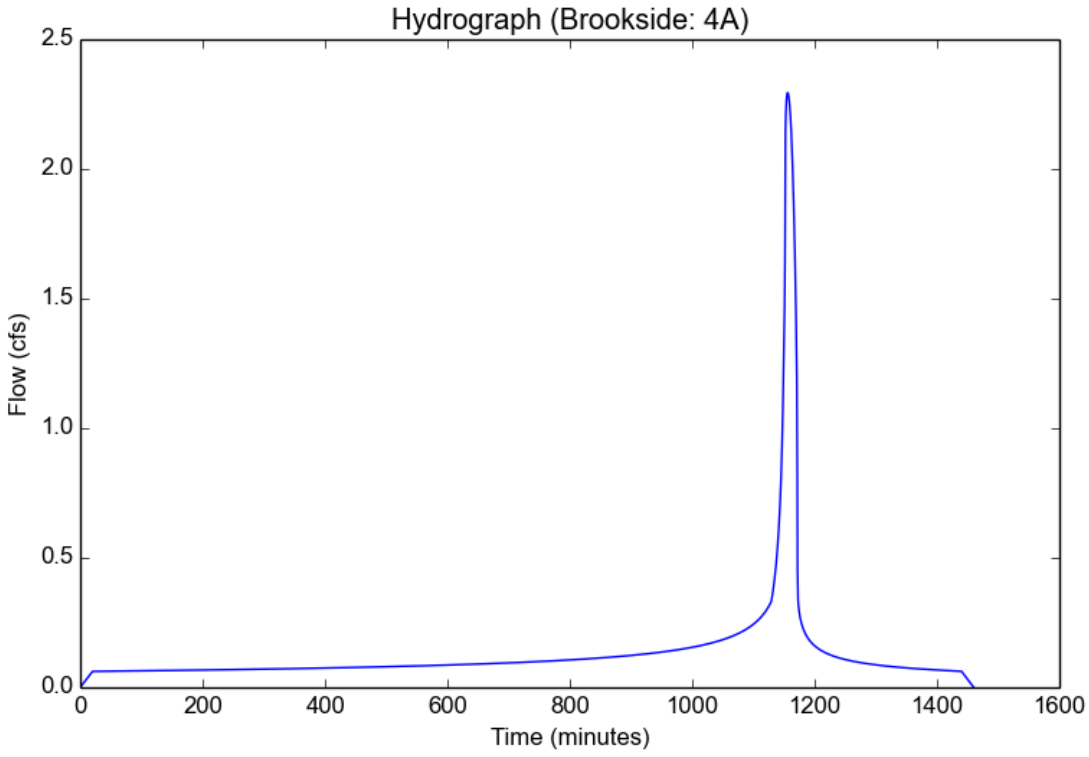
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/2yr/Brookside Proposed - 4A - 2yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	4.31
Flow Path Length (ft)	796.6
Flow Path Slope (vft/hft)	0.0113
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.196
Soil Type	17
Design Storm Frequency	2-yr
Fire Factor	0
LID	False

Output Results

Modeled (2-yr) Rainfall Depth (in)	2.5155
Peak Intensity (in/hr)	0.7823
Undeveloped Runoff Coefficient (Cu)	0.6271
Developed Runoff Coefficient (Cd)	0.6806
Time of Concentration (min)	20.0
Clear Peak Flow Rate (cfs)	2.2946
Burned Peak Flow Rate (cfs)	2.2946
24-Hr Clear Runoff Volume (ac-ft)	0.2712
24-Hr Clear Runoff Volume (cu-ft)	11811.4971



Peak Flow Hydrologic Analysis

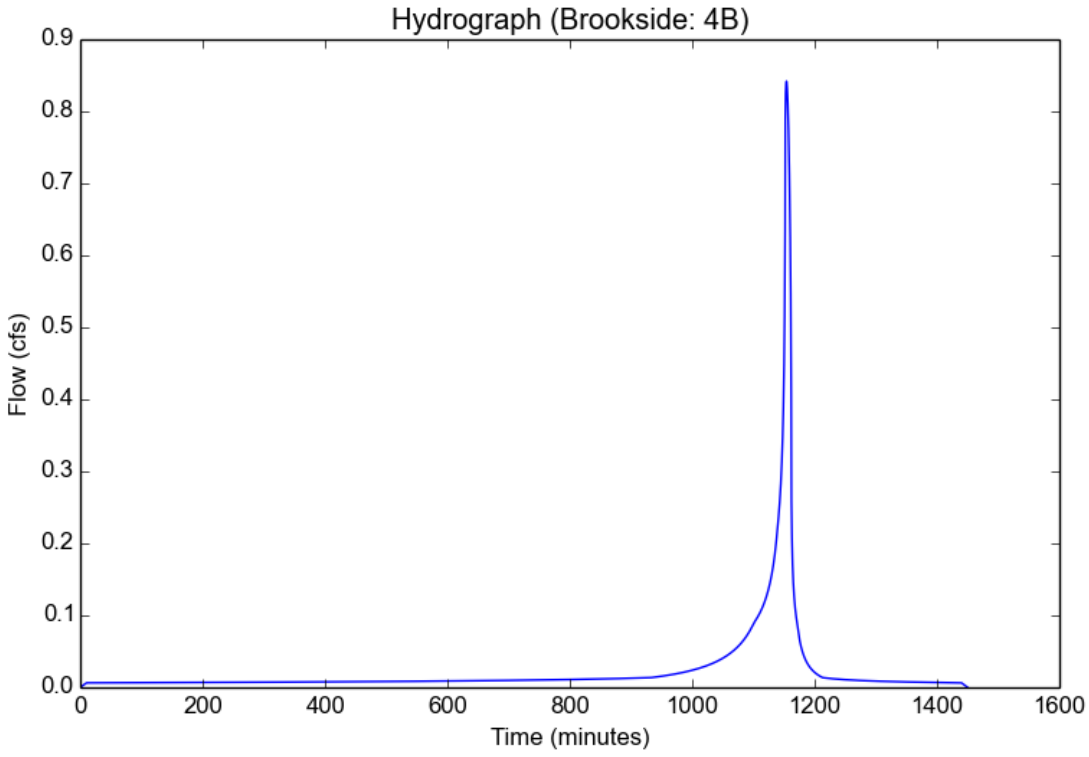
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/2yr/Brookside Proposed - 4B - 2yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4B
Area (ac)	1.05
Flow Path Length (ft)	377.9
Flow Path Slope (vft/hft)	0.02646
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	2-yr
Fire Factor	0
LID	False

Output Results

Modeled (2-yr) Rainfall Depth (in)	2.5155
Peak Intensity (in/hr)	1.0835
Undeveloped Runoff Coefficient (Cu)	0.7384
Developed Runoff Coefficient (Cd)	0.74
Time of Concentration (min)	10.0
Clear Peak Flow Rate (cfs)	0.8419
Burned Peak Flow Rate (cfs)	0.8419
24-Hr Clear Runoff Volume (ac-ft)	0.0484
24-Hr Clear Runoff Volume (cu-ft)	2107.9176



Peak Flow Hydrologic Analysis

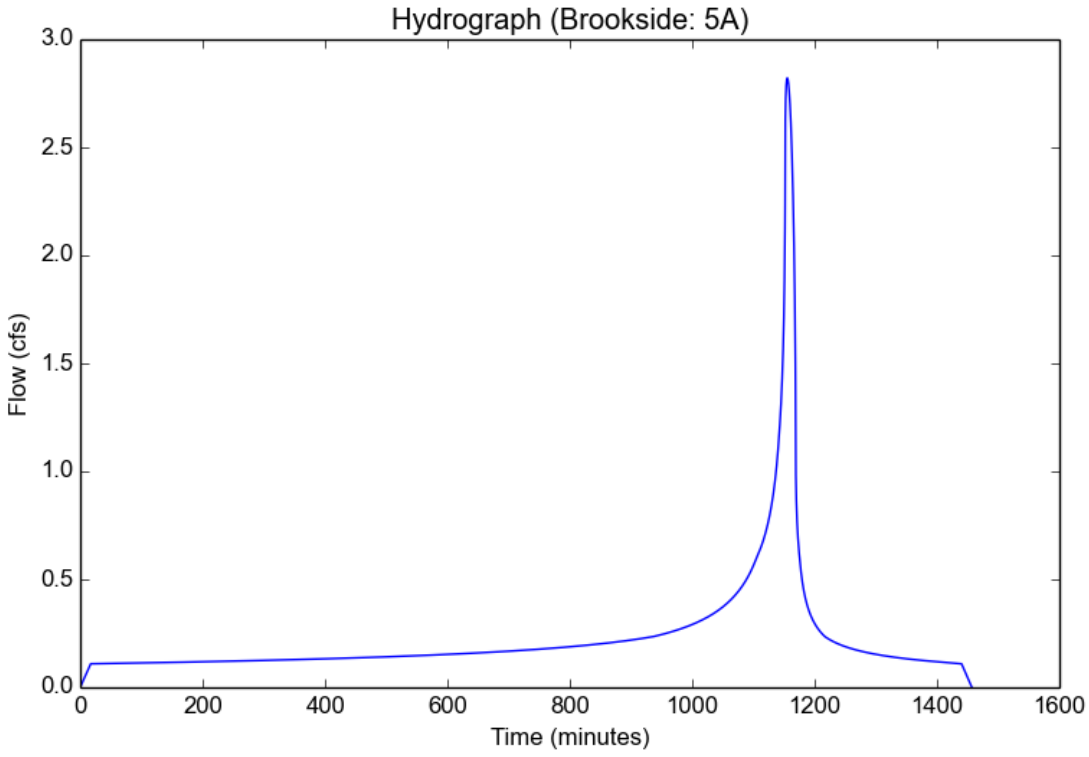
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/2yr/Brookside Proposed - 5A - 2yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5A
Area (ac)	4.24
Flow Path Length (ft)	954.1
Flow Path Slope (vft/hft)	0.03354
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.453
Soil Type	2
Design Storm Frequency	2-yr
Fire Factor	0
LID	False

Output Results

Modeled (2-yr) Rainfall Depth (in)	2.5155
Peak Intensity (in/hr)	0.8444
Undeveloped Runoff Coefficient (Cu)	0.6953
Developed Runoff Coefficient (Cd)	0.788
Time of Concentration (min)	17.0
Clear Peak Flow Rate (cfs)	2.8212
Burned Peak Flow Rate (cfs)	2.8212
24-Hr Clear Runoff Volume (ac-ft)	0.4625
24-Hr Clear Runoff Volume (cu-ft)	20147.6006



Peak Flow Hydrologic Analysis

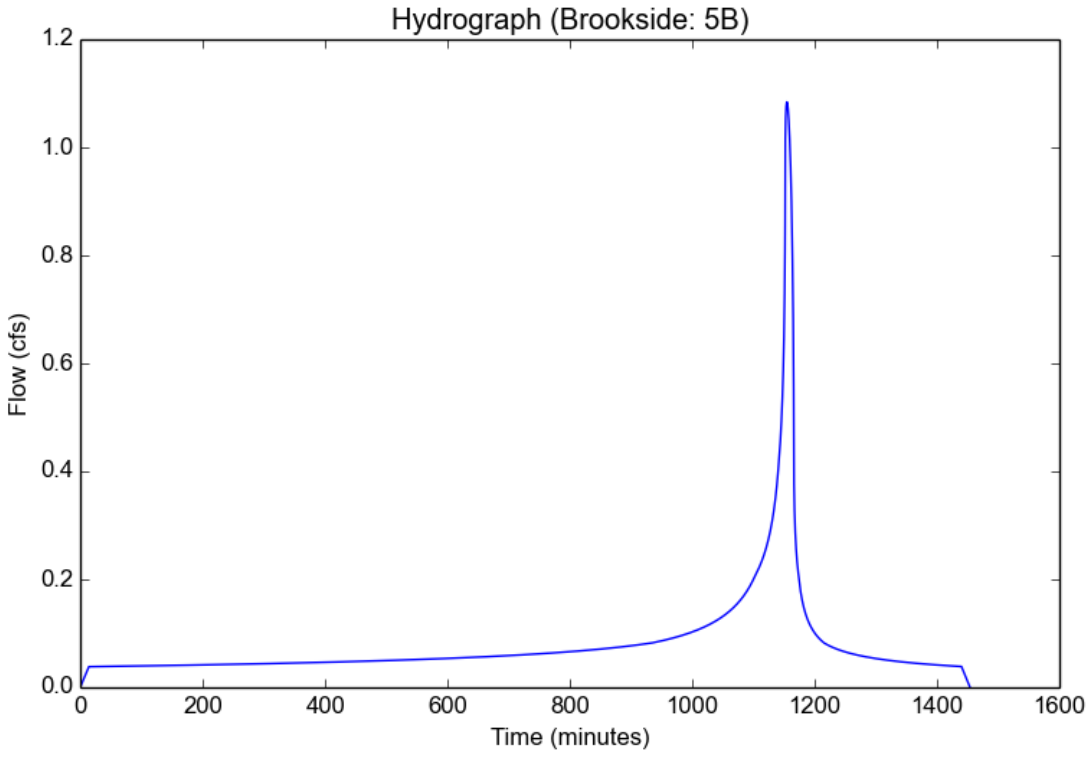
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/2yr/Brookside Proposed - 5B - 2yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5B
Area (ac)	1.47
Flow Path Length (ft)	542.7
Flow Path Slope (vft/hft)	0.0129
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.46
Soil Type	2
Design Storm Frequency	2-yr
Fire Factor	0
LID	False

Output Results

Modeled (2-yr) Rainfall Depth (in)	2.5155
Peak Intensity (in/hr)	0.925
Undeveloped Runoff Coefficient (Cu)	0.7098
Developed Runoff Coefficient (Cd)	0.7973
Time of Concentration (min)	14.0
Clear Peak Flow Rate (cfs)	1.0842
Burned Peak Flow Rate (cfs)	1.0842
24-Hr Clear Runoff Volume (ac-ft)	0.1619
24-Hr Clear Runoff Volume (cu-ft)	7051.6355



Peak Flow Hydrologic Analysis

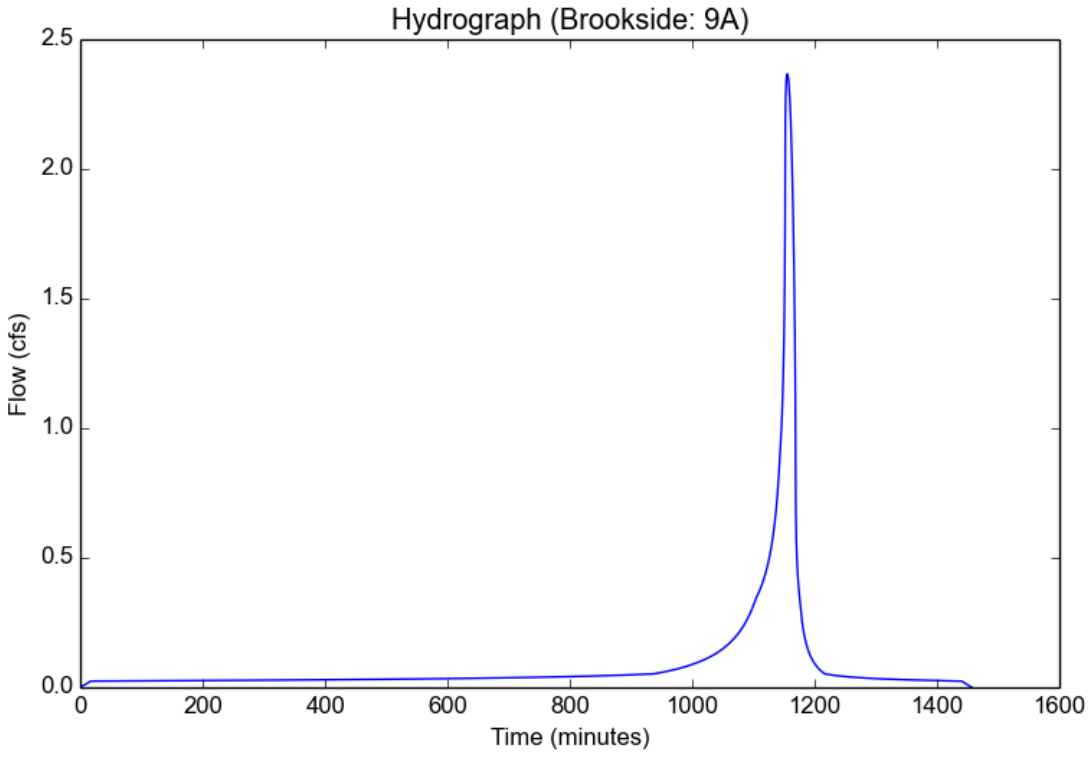
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/2yr/Brookside Proposed - 9A - 2yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	4.02
Flow Path Length (ft)	958.0
Flow Path Slope (vft/hft)	0.05323
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	2-yr
Fire Factor	0
LID	False

Output Results

Modeled (2-yr) Rainfall Depth (in)	2.5155
Peak Intensity (in/hr)	0.8444
Undeveloped Runoff Coefficient (Cu)	0.6953
Developed Runoff Coefficient (Cd)	0.6973
Time of Concentration (min)	17.0
Clear Peak Flow Rate (cfs)	2.3669
Burned Peak Flow Rate (cfs)	2.3669
24-Hr Clear Runoff Volume (ac-ft)	0.1845
24-Hr Clear Runoff Volume (cu-ft)	8037.8983



Peak Flow Hydrologic Analysis

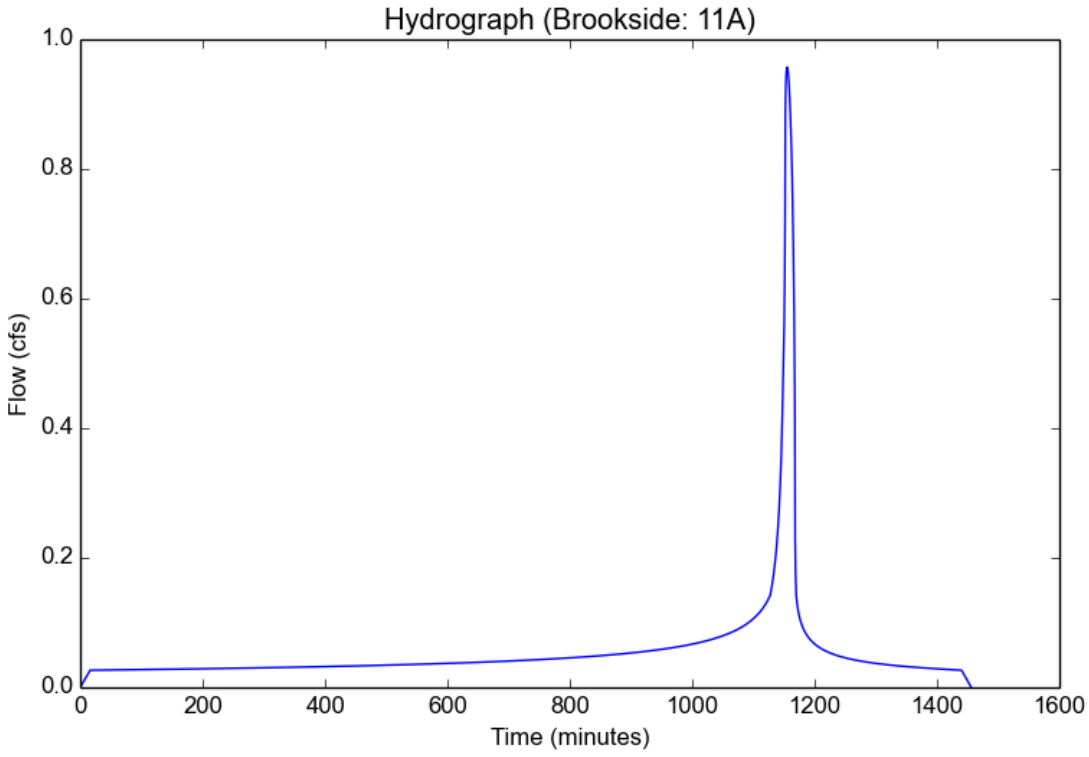
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/2yr/Brookside Proposed - 11A - 2yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	1.53
Flow Path Length (ft)	494.1
Flow Path Slope (vft/hft)	0.00607
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.263
Soil Type	17
Design Storm Frequency	2-yr
Fire Factor	0
LID	False

Output Results

Modeled (2-yr) Rainfall Depth (in)	2.5155
Peak Intensity (in/hr)	0.8688
Undeveloped Runoff Coefficient (Cu)	0.6558
Developed Runoff Coefficient (Cd)	0.72
Time of Concentration (min)	16.0
Clear Peak Flow Rate (cfs)	0.9571
Burned Peak Flow Rate (cfs)	0.9571
24-Hr Clear Runoff Volume (ac-ft)	0.1122
24-Hr Clear Runoff Volume (cu-ft)	4887.562



Peak Flow Hydrologic Analysis

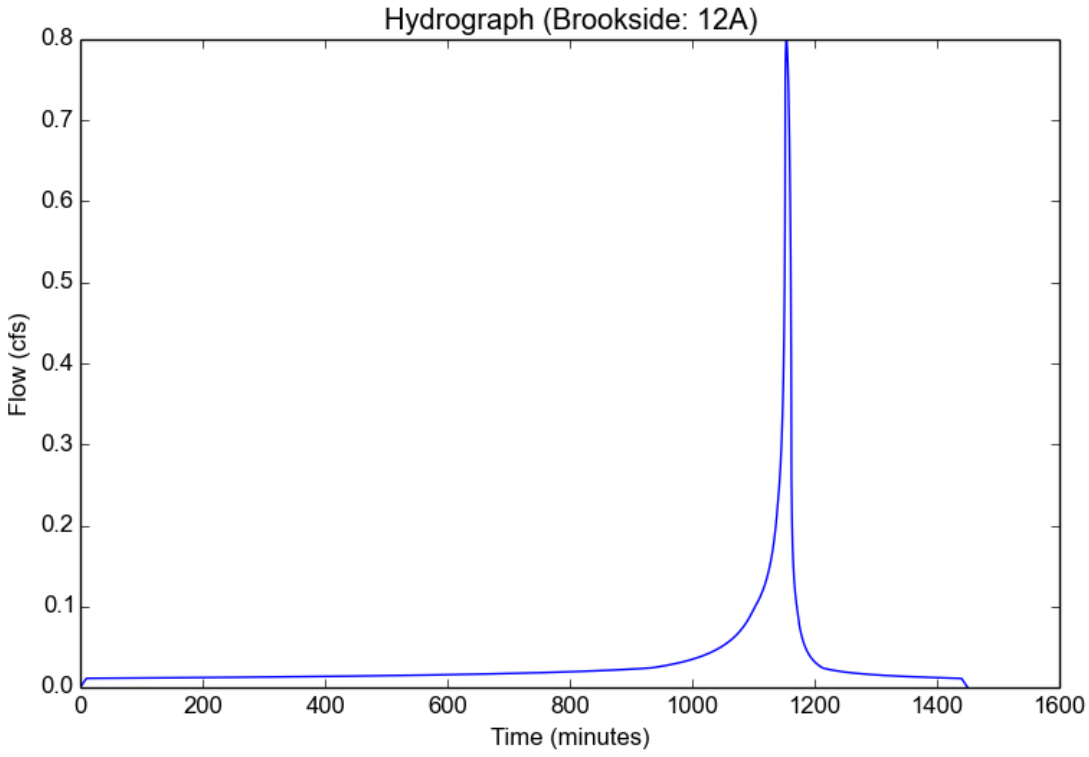
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/2yr/Brookside Proposed - 12A - 2yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.97
Flow Path Length (ft)	512.5
Flow Path Slope (vft/hft)	0.07414
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.133
Soil Type	2
Design Storm Frequency	2-yr
Fire Factor	0
LID	False

Output Results

Modeled (2-yr) Rainfall Depth (in)	2.5155
Peak Intensity (in/hr)	1.0835
Undeveloped Runoff Coefficient (Cu)	0.7384
Developed Runoff Coefficient (Cd)	0.7599
Time of Concentration (min)	10.0
Clear Peak Flow Rate (cfs)	0.7986
Burned Peak Flow Rate (cfs)	0.7986
24-Hr Clear Runoff Volume (ac-ft)	0.0617
24-Hr Clear Runoff Volume (cu-ft)	2687.6015



Peak Flow Hydrologic Analysis

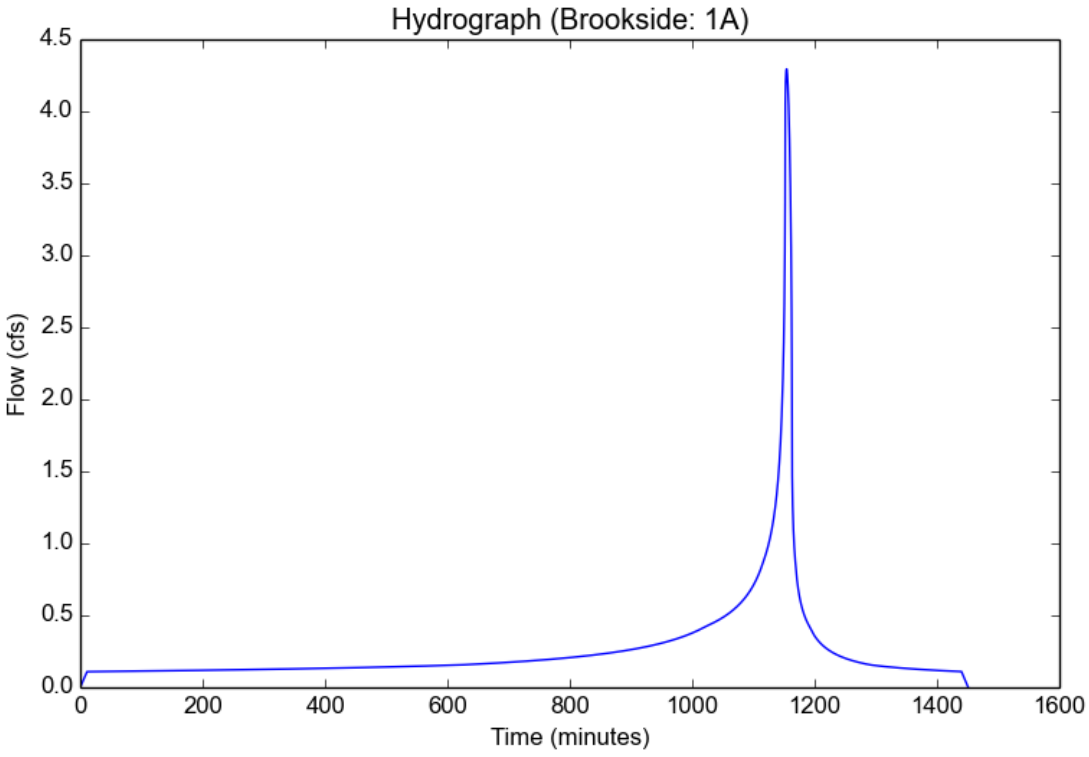
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/5yr/Brookside Proposed - 1A - 5yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1A
Area (ac)	3.28
Flow Path Length (ft)	866.7
Flow Path Slope (vft/hft)	0.04038
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.37
Soil Type	2
Design Storm Frequency	5-yr
Fire Factor	0
LID	False

Output Results

Modeled (5-yr) Rainfall Depth (in)	3.796
Peak Intensity (in/hr)	1.5635
Undeveloped Runoff Coefficient (Cu)	0.8007
Developed Runoff Coefficient (Cd)	0.8375
Time of Concentration (min)	11.0
Clear Peak Flow Rate (cfs)	4.2947
Burned Peak Flow Rate (cfs)	4.2947
24-Hr Clear Runoff Volume (ac-ft)	0.5269
24-Hr Clear Runoff Volume (cu-ft)	22952.2673



Peak Flow Hydrologic Analysis

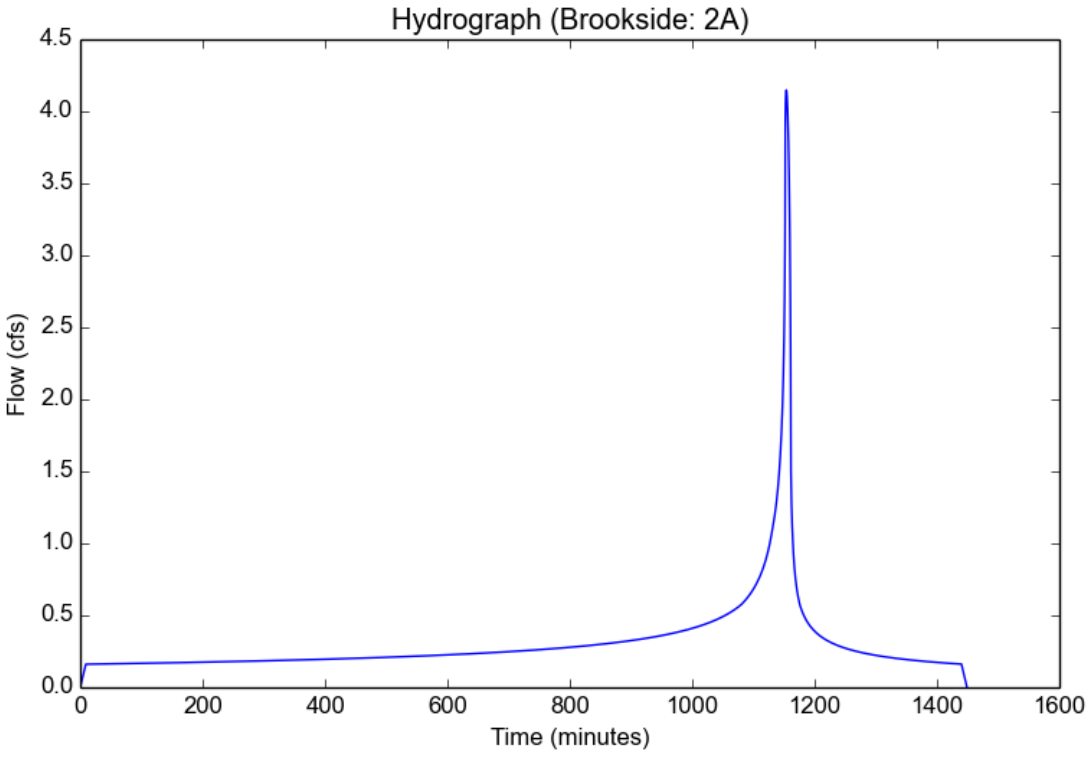
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/5yr/Brookside Proposed - 2A - 5yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	2.75
Flow Path Length (ft)	652.4
Flow Path Slope (vft/hft)	0.04599
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.745
Soil Type	17
Design Storm Frequency	5-yr
Fire Factor	0
LID	False

Output Results

Modeled (5-yr) Rainfall Depth (in)	3.796
Peak Intensity (in/hr)	1.7181
Undeveloped Runoff Coefficient (Cu)	0.8131
Developed Runoff Coefficient (Cd)	0.8778
Time of Concentration (min)	9.0
Clear Peak Flow Rate (cfs)	4.1476
Burned Peak Flow Rate (cfs)	4.1476
24-Hr Clear Runoff Volume (ac-ft)	0.6211
24-Hr Clear Runoff Volume (cu-ft)	27053.7133



Peak Flow Hydrologic Analysis

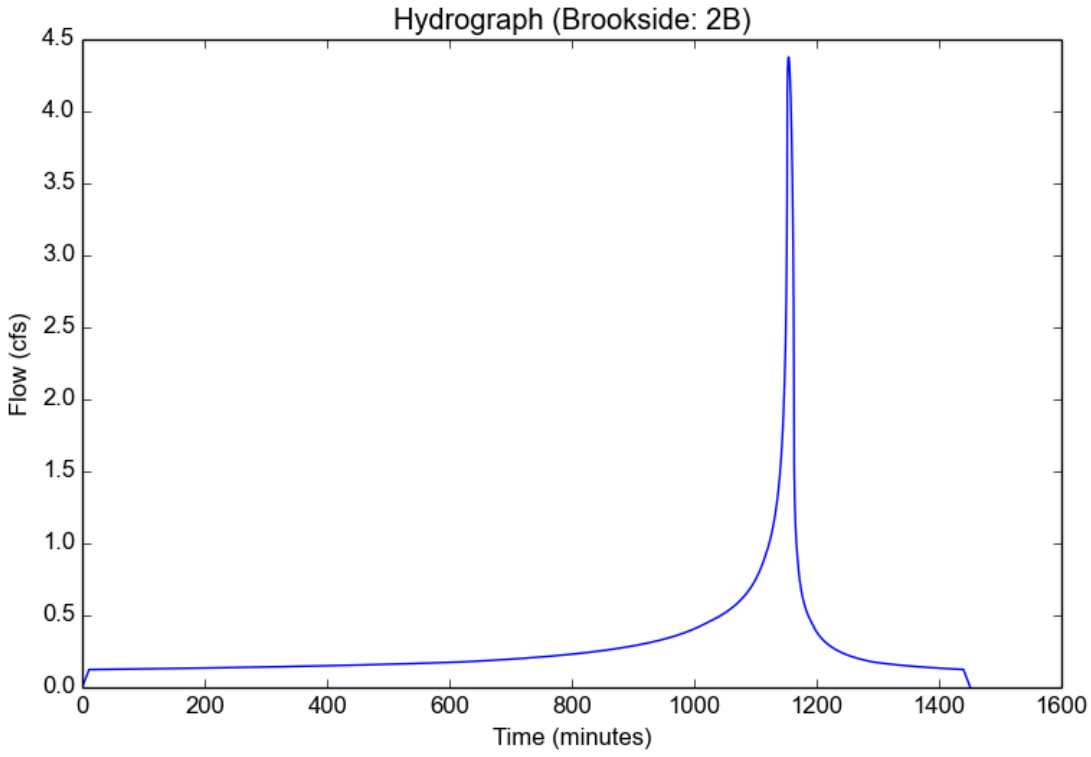
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/5yr/Brookside Proposed - 2B - 5yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2B
Area (ac)	3.32
Flow Path Length (ft)	861.6
Flow Path Slope (vft/hft)	0.03714
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.429
Soil Type	2
Design Storm Frequency	5-yr
Fire Factor	0
LID	False

Output Results

Modeled (5-yr) Rainfall Depth (in)	3.796
Peak Intensity (in/hr)	1.5635
Undeveloped Runoff Coefficient (Cu)	0.8007
Developed Runoff Coefficient (Cd)	0.8433
Time of Concentration (min)	11.0
Clear Peak Flow Rate (cfs)	4.3774
Burned Peak Flow Rate (cfs)	4.3774
24-Hr Clear Runoff Volume (ac-ft)	0.5712
24-Hr Clear Runoff Volume (cu-ft)	24880.4927



Peak Flow Hydrologic Analysis

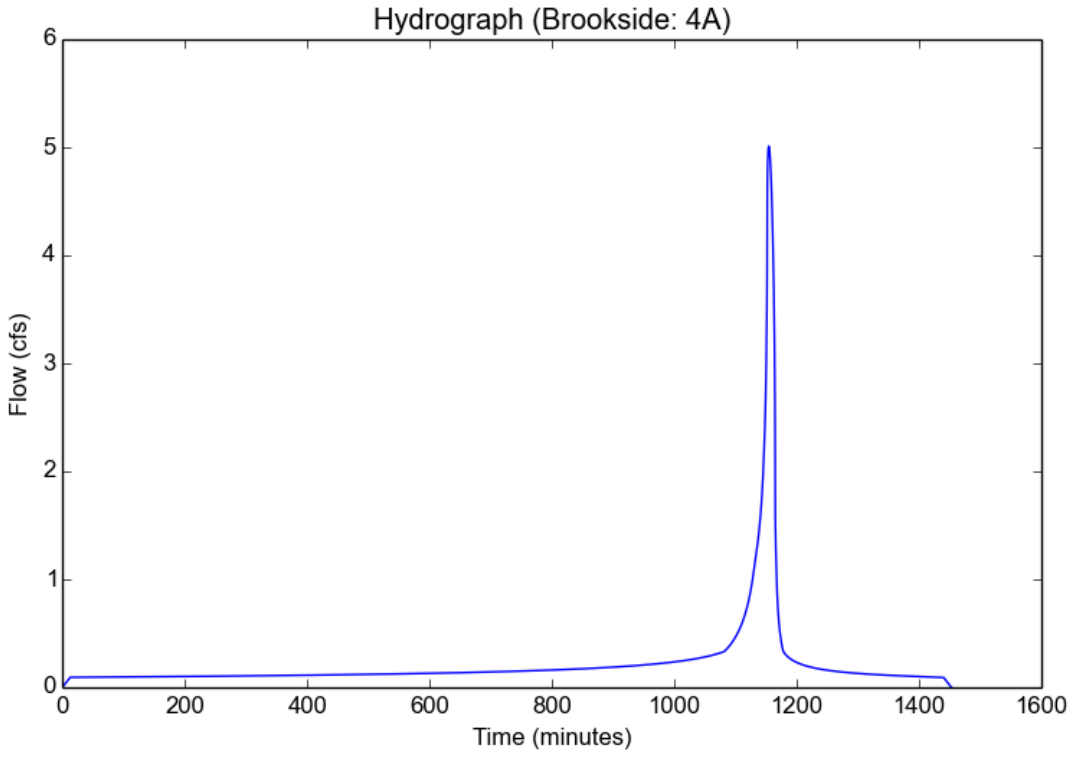
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/5yr/Brookside Proposed - 4A - 5yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	4.31
Flow Path Length (ft)	796.6
Flow Path Slope (vft/hft)	0.0113
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.196
Soil Type	17
Design Storm Frequency	5-yr
Fire Factor	0
LID	False

Output Results

Modeled (5-yr) Rainfall Depth (in)	3.796
Peak Intensity (in/hr)	1.4454
Undeveloped Runoff Coefficient (Cu)	0.7812
Developed Runoff Coefficient (Cd)	0.8045
Time of Concentration (min)	13.0
Clear Peak Flow Rate (cfs)	5.0116
Burned Peak Flow Rate (cfs)	5.0116
24-Hr Clear Runoff Volume (ac-ft)	0.4486
24-Hr Clear Runoff Volume (cu-ft)	19541.5831



Peak Flow Hydrologic Analysis

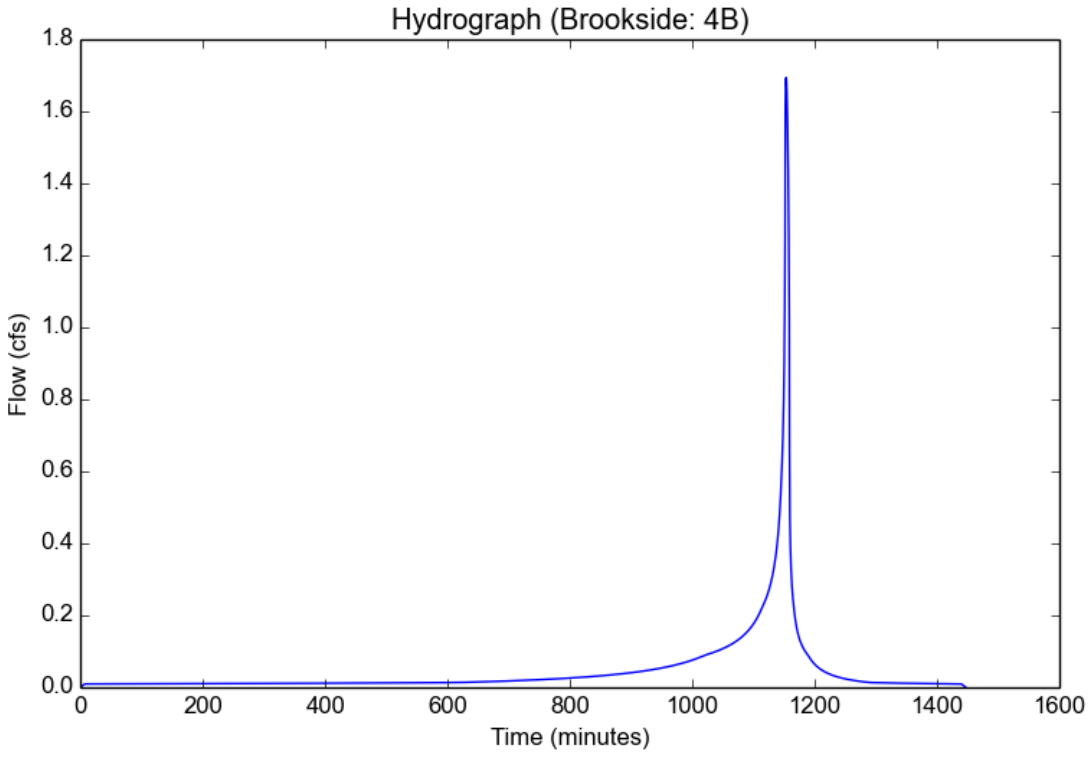
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/5yr/Brookside Proposed - 4B - 5yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4B
Area (ac)	1.05
Flow Path Length (ft)	377.9
Flow Path Slope (vft/hft)	0.02646
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	5-yr
Fire Factor	0
LID	False

Output Results

Modeled (5-yr) Rainfall Depth (in)	3.796
Peak Intensity (in/hr)	1.9335
Undeveloped Runoff Coefficient (Cu)	0.8336
Developed Runoff Coefficient (Cd)	0.8342
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	1.6936
Burned Peak Flow Rate (cfs)	1.6936
24-Hr Clear Runoff Volume (ac-ft)	0.0958
24-Hr Clear Runoff Volume (cu-ft)	4173.5732



Peak Flow Hydrologic Analysis

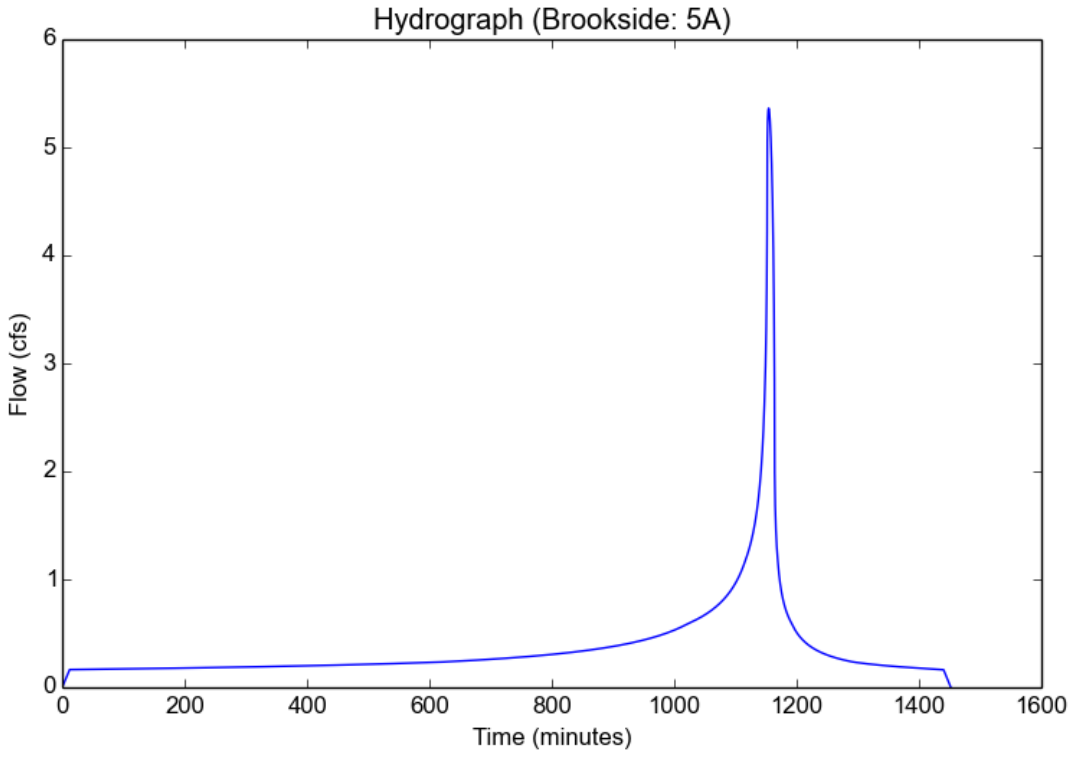
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/5yr/Brookside Proposed - 5A - 5yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5A
Area (ac)	4.24
Flow Path Length (ft)	954.1
Flow Path Slope (vft/hft)	0.03354
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.453
Soil Type	2
Design Storm Frequency	5-yr
Fire Factor	0
LID	False

Output Results

Modeled (5-yr) Rainfall Depth (in)	3.796
Peak Intensity (in/hr)	1.5008
Undeveloped Runoff Coefficient (Cu)	0.7952
Developed Runoff Coefficient (Cd)	0.8427
Time of Concentration (min)	12.0
Clear Peak Flow Rate (cfs)	5.3623
Burned Peak Flow Rate (cfs)	5.3623
24-Hr Clear Runoff Volume (ac-ft)	0.7491
24-Hr Clear Runoff Volume (cu-ft)	32629.1449



Peak Flow Hydrologic Analysis

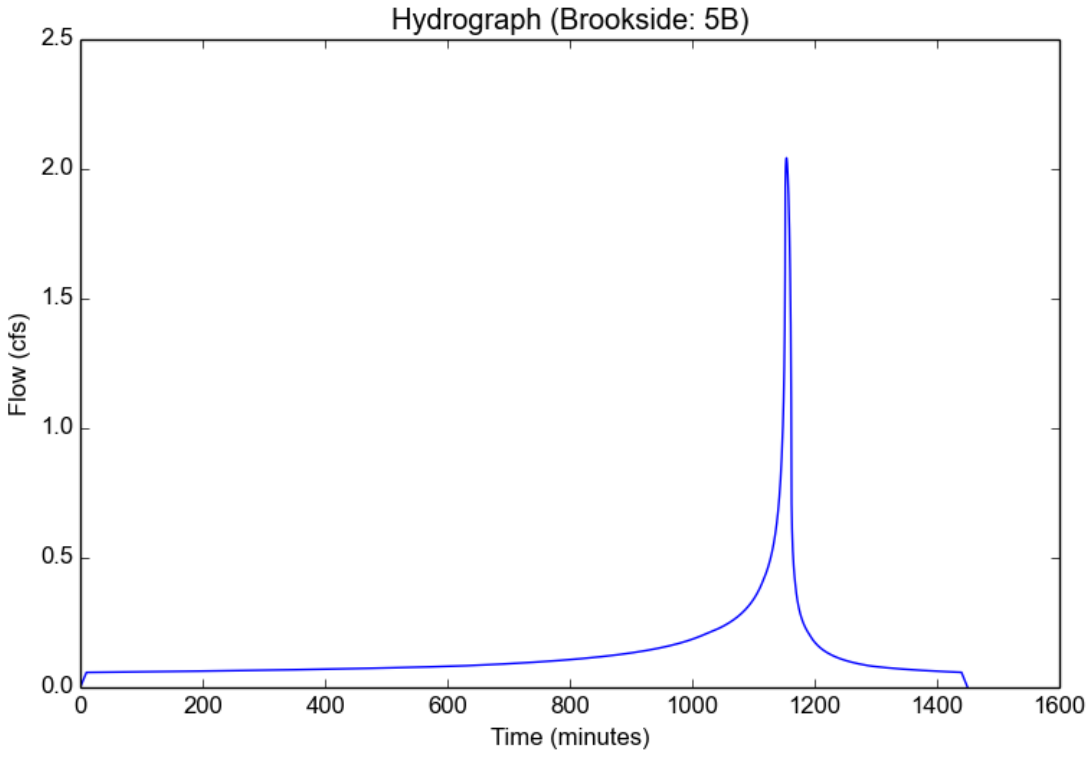
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/5yr/Brookside Proposed - 5B - 5yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5B
Area (ac)	1.47
Flow Path Length (ft)	542.7
Flow Path Slope (vft/hft)	0.0129
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.46
Soil Type	2
Design Storm Frequency	5-yr
Fire Factor	0
LID	False

Output Results

Modeled (5-yr) Rainfall Depth (in)	3.796
Peak Intensity (in/hr)	1.6351
Undeveloped Runoff Coefficient (Cu)	0.8071
Developed Runoff Coefficient (Cd)	0.8498
Time of Concentration (min)	10.0
Clear Peak Flow Rate (cfs)	2.0426
Burned Peak Flow Rate (cfs)	2.0426
24-Hr Clear Runoff Volume (ac-ft)	0.2617
24-Hr Clear Runoff Volume (cu-ft)	11400.7719



Peak Flow Hydrologic Analysis

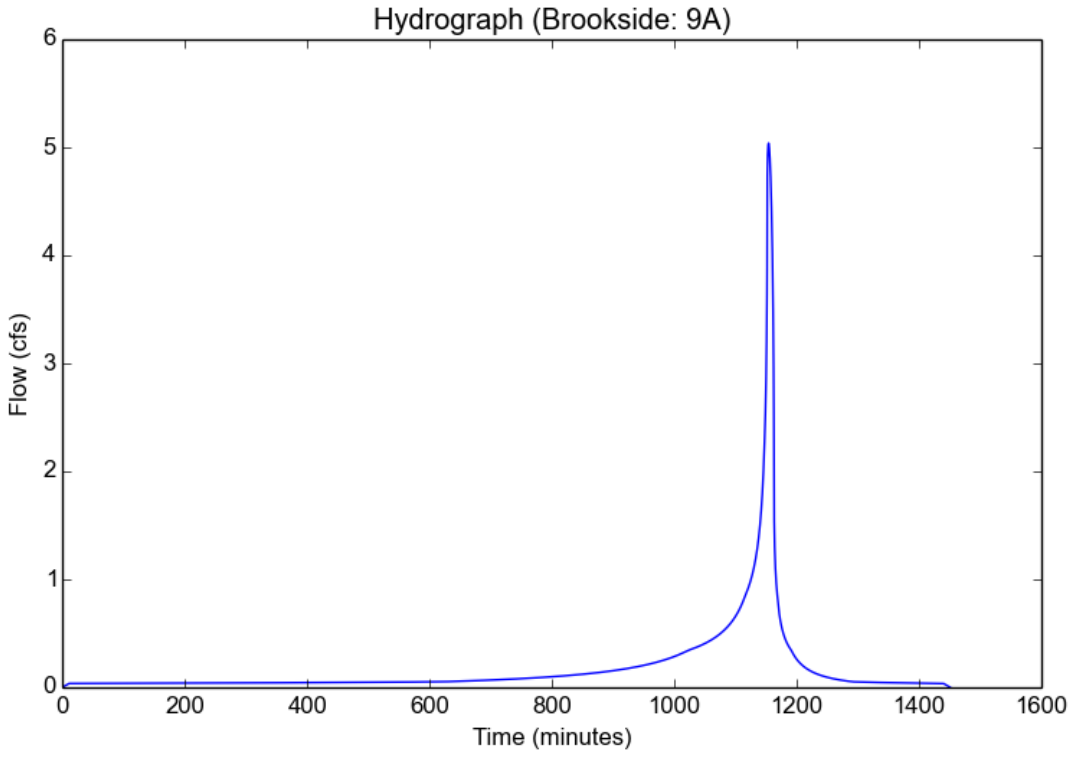
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/5yr/Brookside Proposed - 9A - 5yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	4.02
Flow Path Length (ft)	958.0
Flow Path Slope (vft/hft)	0.05323
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	5-yr
Fire Factor	0
LID	False

Output Results

Modeled (5-yr) Rainfall Depth (in)	3.796
Peak Intensity (in/hr)	1.5635
Undeveloped Runoff Coefficient (Cu)	0.8007
Developed Runoff Coefficient (Cd)	0.8017
Time of Concentration (min)	11.0
Clear Peak Flow Rate (cfs)	5.039
Burned Peak Flow Rate (cfs)	5.039
24-Hr Clear Runoff Volume (ac-ft)	0.3662
24-Hr Clear Runoff Volume (cu-ft)	15952.4123



Peak Flow Hydrologic Analysis

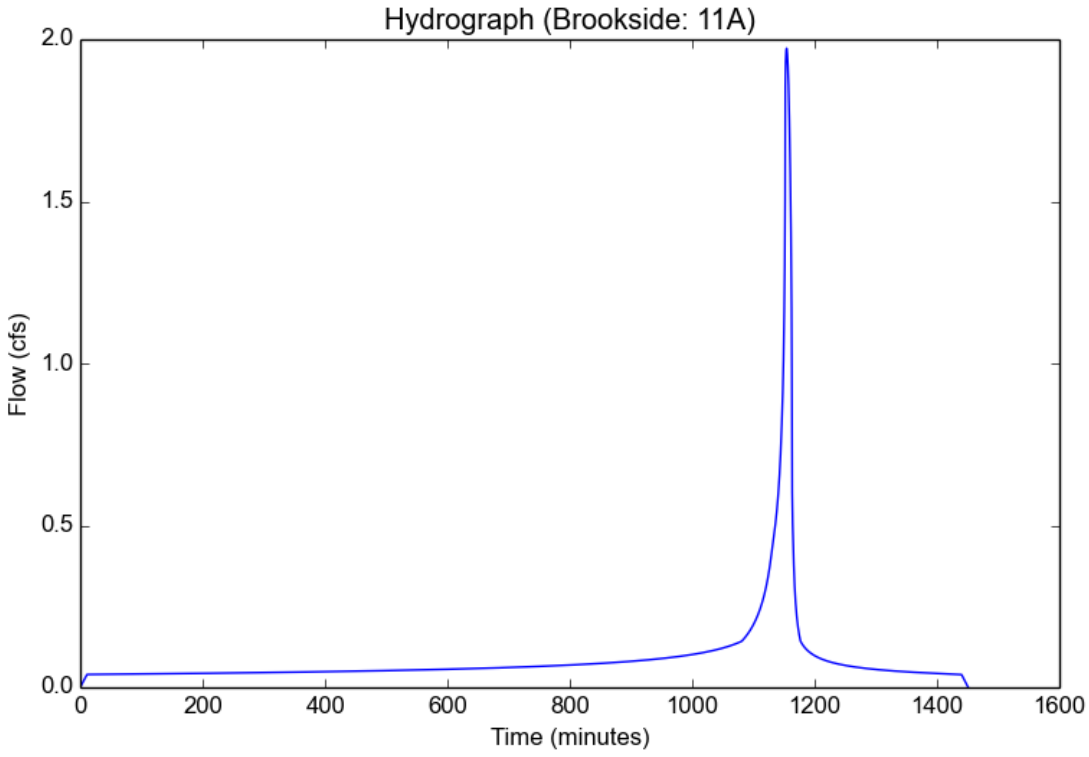
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/5yr/Brookside Proposed - 11A - 5yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	1.53
Flow Path Length (ft)	494.1
Flow Path Slope (vft/hft)	0.00607
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.263
Soil Type	17
Design Storm Frequency	5-yr
Fire Factor	0
LID	False

Output Results

Modeled (5-yr) Rainfall Depth (in)	3.796
Peak Intensity (in/hr)	1.5635
Undeveloped Runoff Coefficient (Cu)	0.7976
Developed Runoff Coefficient (Cd)	0.8245
Time of Concentration (min)	11.0
Clear Peak Flow Rate (cfs)	1.9723
Burned Peak Flow Rate (cfs)	1.9723
24-Hr Clear Runoff Volume (ac-ft)	0.1821
24-Hr Clear Runoff Volume (cu-ft)	7931.5792



Peak Flow Hydrologic Analysis

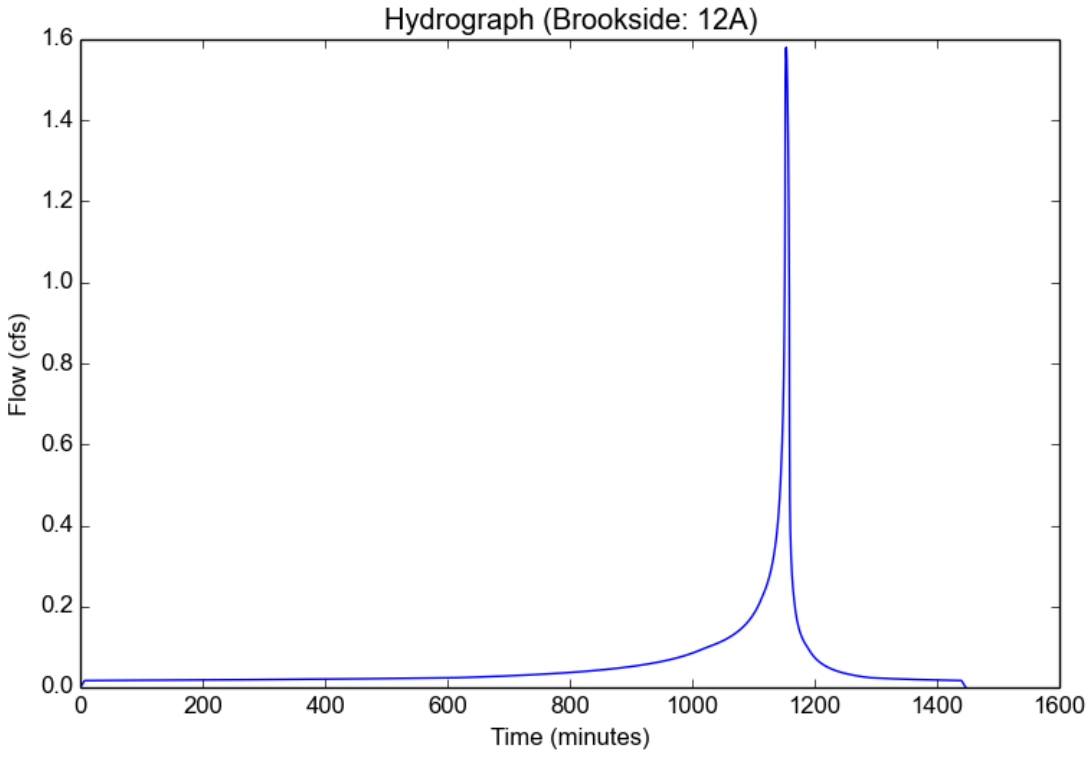
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/5yr/Brookside Proposed - 12A - 5yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.97
Flow Path Length (ft)	512.5
Flow Path Slope (vft/hft)	0.07414
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.133
Soil Type	2
Design Storm Frequency	5-yr
Fire Factor	0
LID	False

Output Results

Modeled (5-yr) Rainfall Depth (in)	3.796
Peak Intensity (in/hr)	1.9335
Undeveloped Runoff Coefficient (Cu)	0.8336
Developed Runoff Coefficient (Cd)	0.8424
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	1.5799
Burned Peak Flow Rate (cfs)	1.5799
24-Hr Clear Runoff Volume (ac-ft)	0.1115
24-Hr Clear Runoff Volume (cu-ft)	4858.7808



Peak Flow Hydrologic Analysis

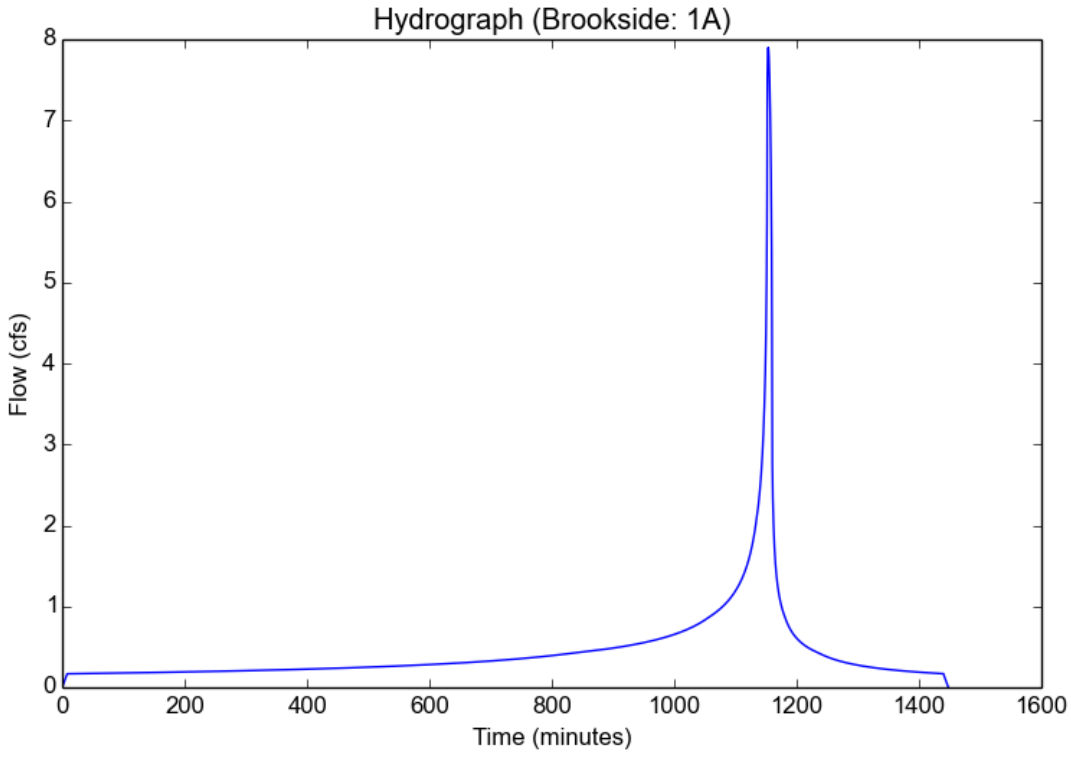
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/25yr/Brookside Proposed - 1A - 25yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1A
Area (ac)	3.28
Flow Path Length (ft)	866.7
Flow Path Slope (vft/hft)	0.04038
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.37
Soil Type	2
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.707
Peak Intensity (in/hr)	2.7301
Undeveloped Runoff Coefficient (Cu)	0.8717
Developed Runoff Coefficient (Cd)	0.8822
Time of Concentration (min)	8.0
Clear Peak Flow Rate (cfs)	7.8997
Burned Peak Flow Rate (cfs)	7.8997
24-Hr Clear Runoff Volume (ac-ft)	0.8979
24-Hr Clear Runoff Volume (cu-ft)	39112.497



Peak Flow Hydrologic Analysis

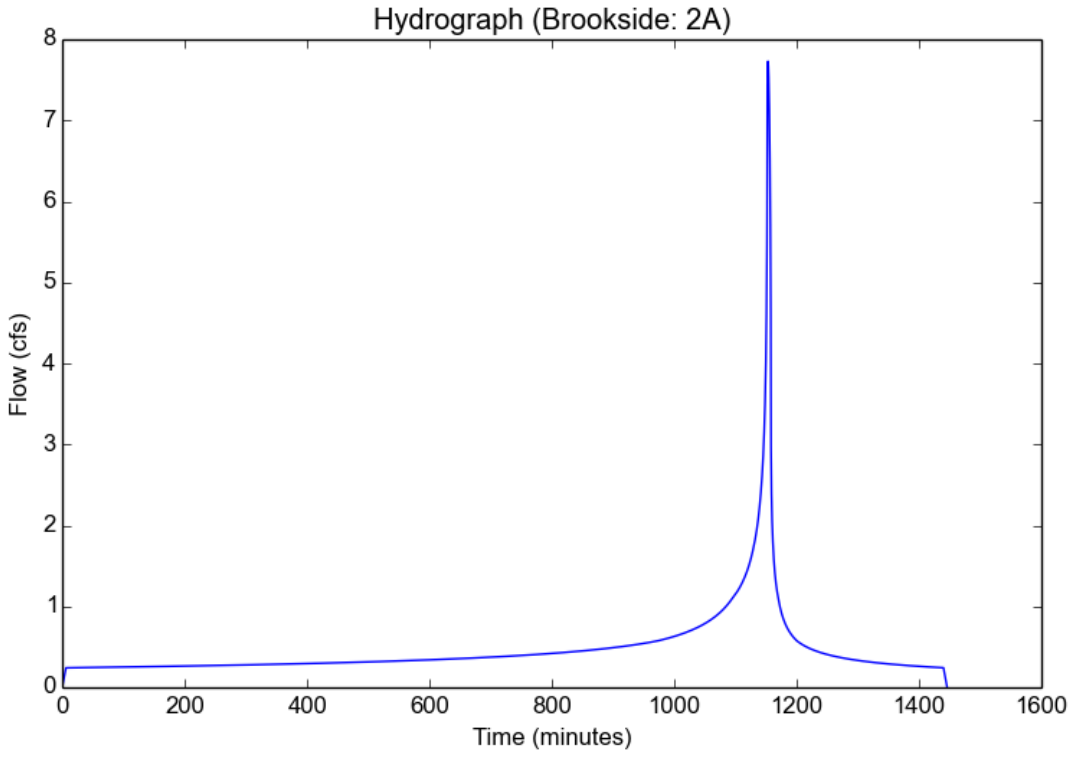
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/25yr/Brookside Proposed - 2A - 25yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	2.75
Flow Path Length (ft)	652.4
Flow Path Slope (vft/hft)	0.04599
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.745
Soil Type	17
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.707
Peak Intensity (in/hr)	3.1253
Undeveloped Runoff Coefficient (Cu)	0.8973
Developed Runoff Coefficient (Cd)	0.8993
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	7.7294
Burned Peak Flow Rate (cfs)	7.7294
24-Hr Clear Runoff Volume (ac-ft)	0.9521
24-Hr Clear Runoff Volume (cu-ft)	41474.0223



Peak Flow Hydrologic Analysis

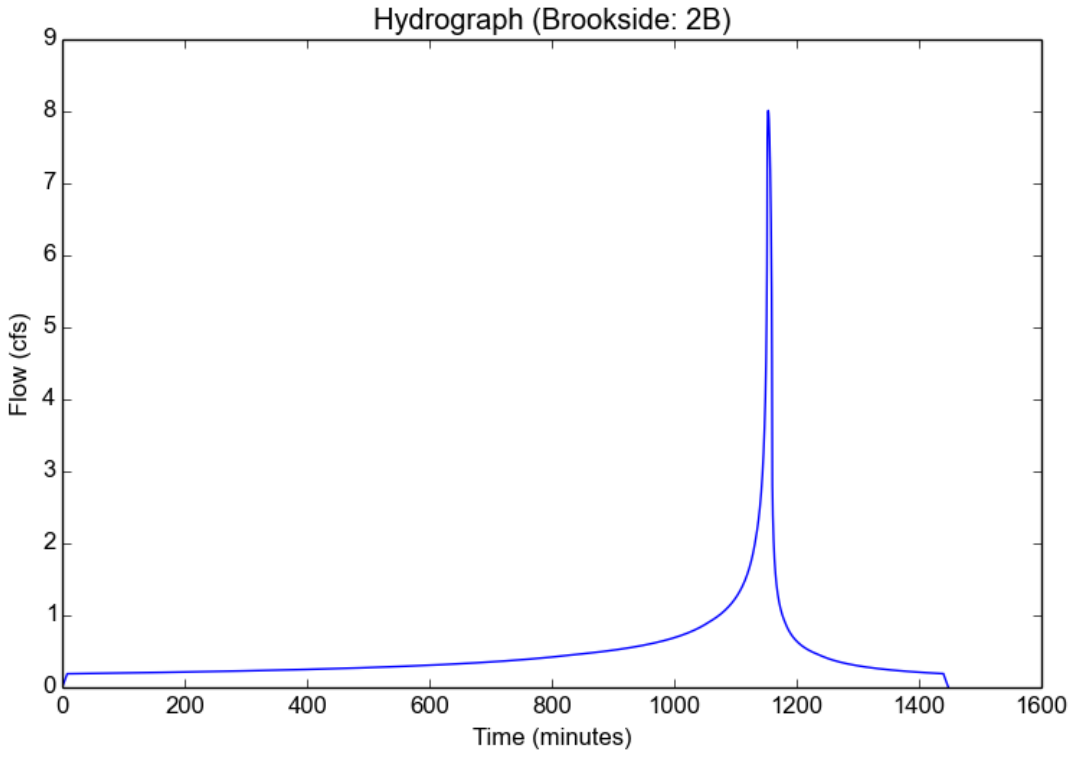
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/25yr/Brookside Proposed - 2B- 25yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2B
Area (ac)	3.32
Flow Path Length (ft)	861.6
Flow Path Slope (vft/hft)	0.03714
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.429
Soil Type	2
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.707
Peak Intensity (in/hr)	2.7301
Undeveloped Runoff Coefficient (Cu)	0.8717
Developed Runoff Coefficient (Cd)	0.8839
Time of Concentration (min)	8.0
Clear Peak Flow Rate (cfs)	8.0112
Burned Peak Flow Rate (cfs)	8.0112
24-Hr Clear Runoff Volume (ac-ft)	0.9557
24-Hr Clear Runoff Volume (cu-ft)	41631.0312



Peak Flow Hydrologic Analysis

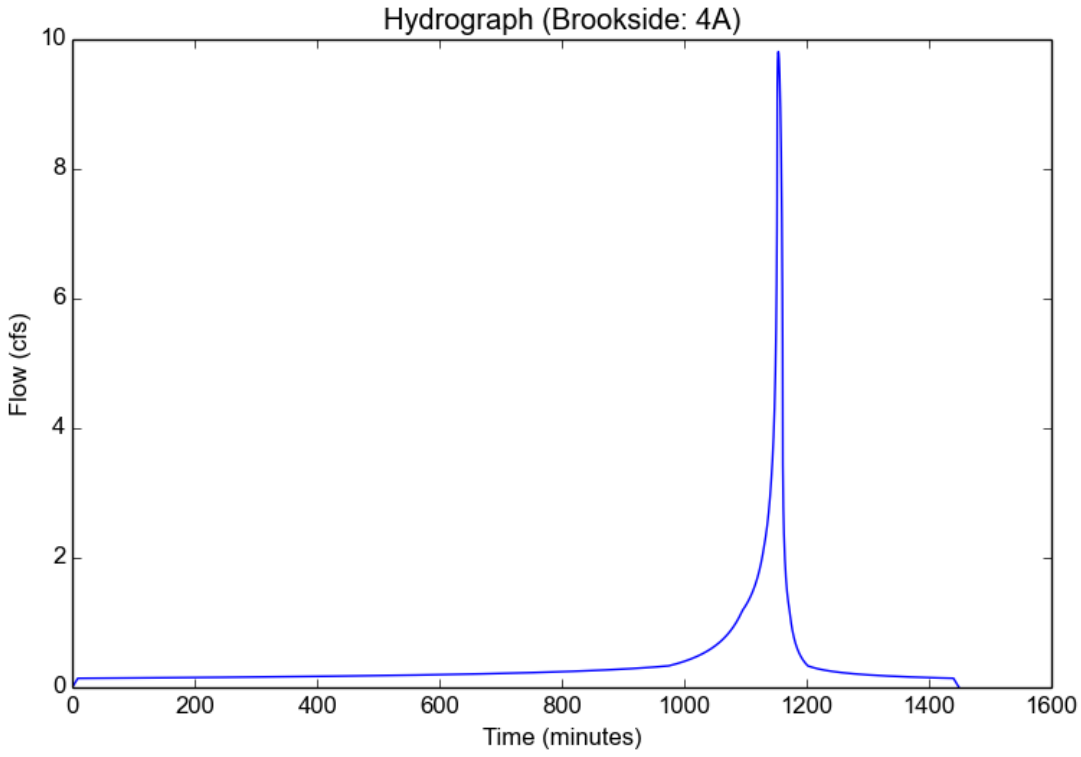
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/25yr/Brookside Proposed - 4A - 25yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	4.31
Flow Path Length (ft)	796.6
Flow Path Slope (vft/hft)	0.0113
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.196
Soil Type	17
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.707
Peak Intensity (in/hr)	2.5831
Undeveloped Runoff Coefficient (Cu)	0.8766
Developed Runoff Coefficient (Cd)	0.8811
Time of Concentration (min)	9.0
Clear Peak Flow Rate (cfs)	9.8098
Burned Peak Flow Rate (cfs)	9.8098
24-Hr Clear Runoff Volume (ac-ft)	0.7659
24-Hr Clear Runoff Volume (cu-ft)	33360.8141



Peak Flow Hydrologic Analysis

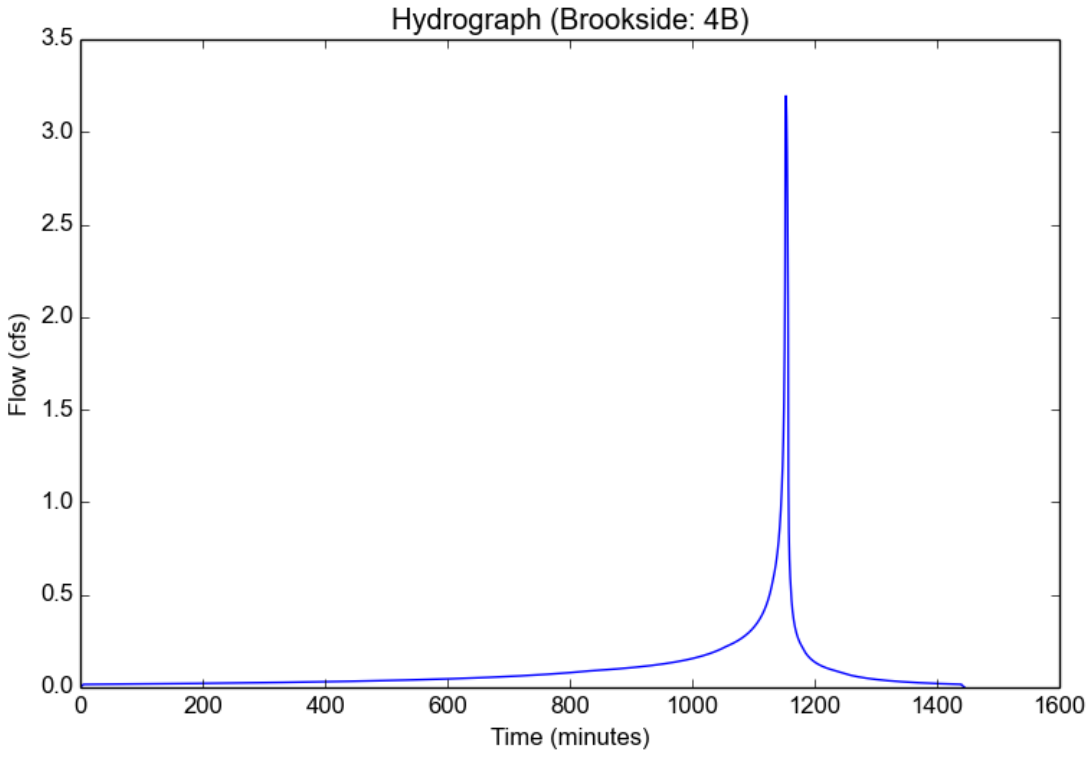
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/25yr/Brookside Proposed - 4B- 25yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4B
Area (ac)	1.05
Flow Path Length (ft)	377.9
Flow Path Slope (vft/hft)	0.02646
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.707
Peak Intensity (in/hr)	3.405
Undeveloped Runoff Coefficient (Cu)	0.8934
Developed Runoff Coefficient (Cd)	0.8935
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	3.1945
Burned Peak Flow Rate (cfs)	3.1945
24-Hr Clear Runoff Volume (ac-ft)	0.1971
24-Hr Clear Runoff Volume (cu-ft)	8586.9963



Peak Flow Hydrologic Analysis

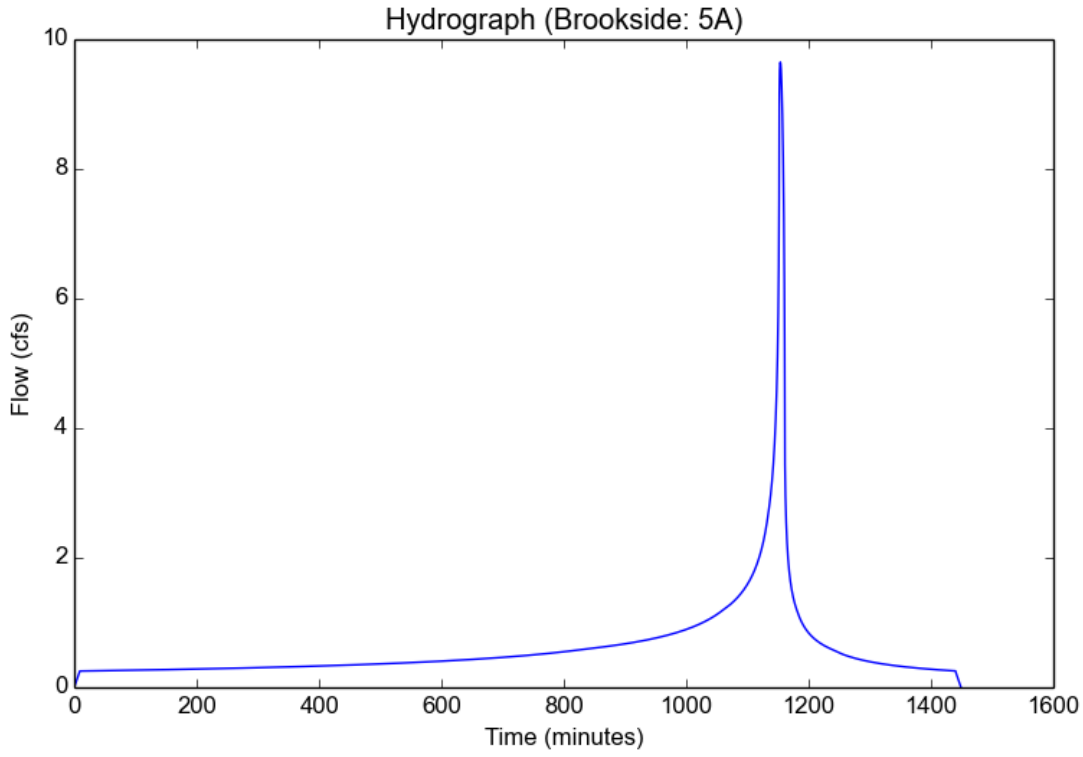
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/25yr/Brookside Proposed - 5A - 25yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5A
Area (ac)	4.24
Flow Path Length (ft)	954.1
Flow Path Slope (vft/hft)	0.03354
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.453
Soil Type	2
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.707
Peak Intensity (in/hr)	2.5831
Undeveloped Runoff Coefficient (Cu)	0.8652
Developed Runoff Coefficient (Cd)	0.881
Time of Concentration (min)	9.0
Clear Peak Flow Rate (cfs)	9.6486
Burned Peak Flow Rate (cfs)	9.6486
24-Hr Clear Runoff Volume (ac-ft)	1.2448
24-Hr Clear Runoff Volume (cu-ft)	54223.7375



Peak Flow Hydrologic Analysis

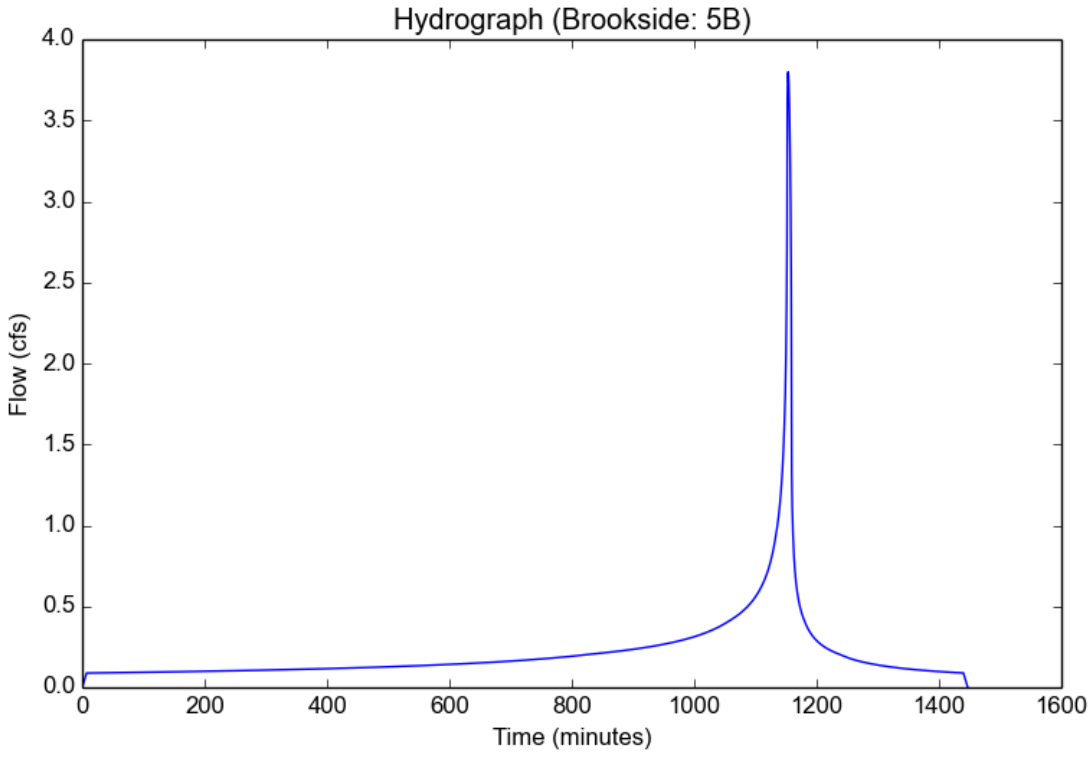
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/25yr/Brookside Proposed - 5B - 25yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5B
Area (ac)	1.47
Flow Path Length (ft)	542.7
Flow Path Slope (vft/hft)	0.0129
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.46
Soil Type	2
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.707
Peak Intensity (in/hr)	2.9069
Undeveloped Runoff Coefficient (Cu)	0.8796
Developed Runoff Coefficient (Cd)	0.889
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	3.7987
Burned Peak Flow Rate (cfs)	3.7987
24-Hr Clear Runoff Volume (ac-ft)	0.4341
24-Hr Clear Runoff Volume (cu-ft)	18909.7991



Peak Flow Hydrologic Analysis

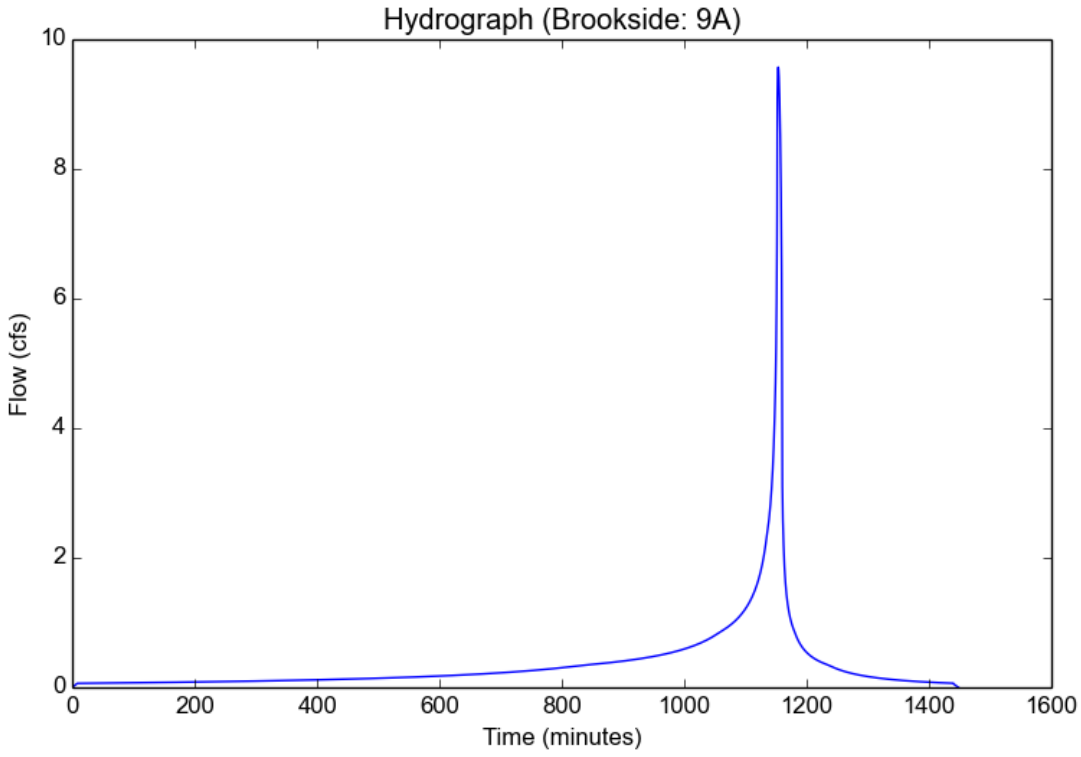
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/25yr/Brookside Proposed - 9A - 25yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	4.02
Flow Path Length (ft)	958.0
Flow Path Slope (vft/hft)	0.05323
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.707
Peak Intensity (in/hr)	2.7301
Undeveloped Runoff Coefficient (Cu)	0.8717
Developed Runoff Coefficient (Cd)	0.872
Time of Concentration (min)	8.0
Clear Peak Flow Rate (cfs)	9.5703
Burned Peak Flow Rate (cfs)	9.5703
24-Hr Clear Runoff Volume (ac-ft)	0.7542
24-Hr Clear Runoff Volume (cu-ft)	32853.2662



Peak Flow Hydrologic Analysis

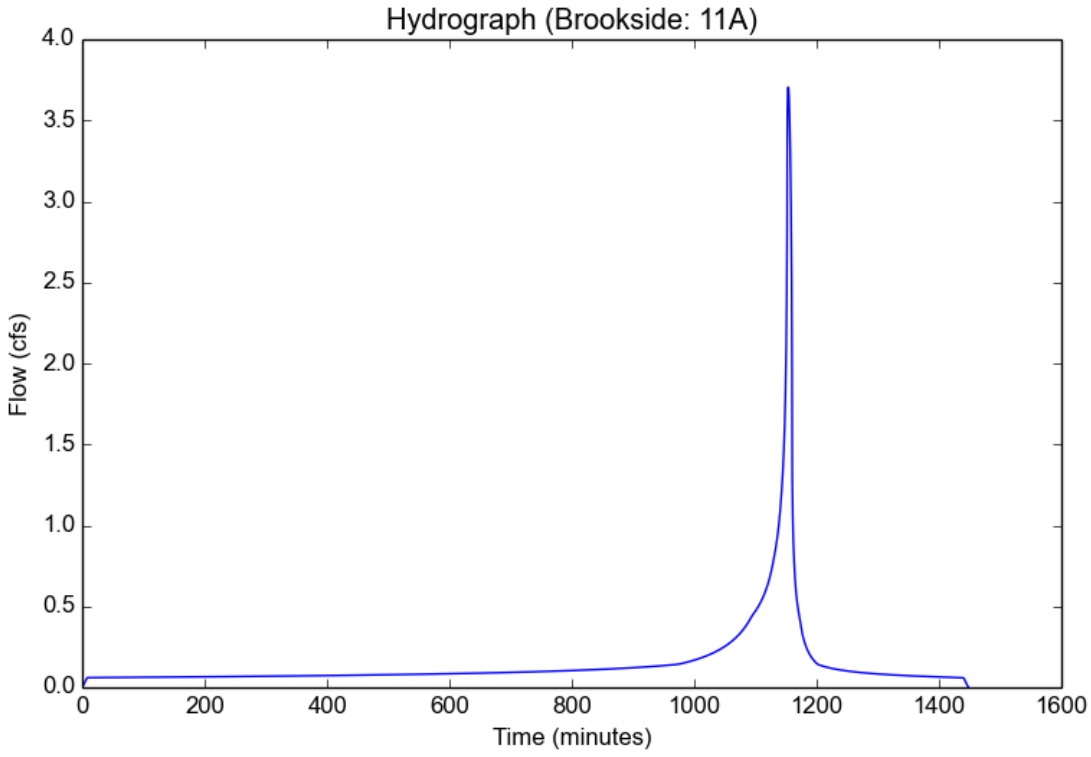
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/25yr/Brookside Proposed - 11A - 25yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	1.53
Flow Path Length (ft)	494.1
Flow Path Slope (vft/hft)	0.00607
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.263
Soil Type	17
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.707
Peak Intensity (in/hr)	2.7301
Undeveloped Runoff Coefficient (Cu)	0.8822
Developed Runoff Coefficient (Cd)	0.8869
Time of Concentration (min)	8.0
Clear Peak Flow Rate (cfs)	3.7045
Burned Peak Flow Rate (cfs)	3.7045
24-Hr Clear Runoff Volume (ac-ft)	0.3033
24-Hr Clear Runoff Volume (cu-ft)	13213.7521



Peak Flow Hydrologic Analysis

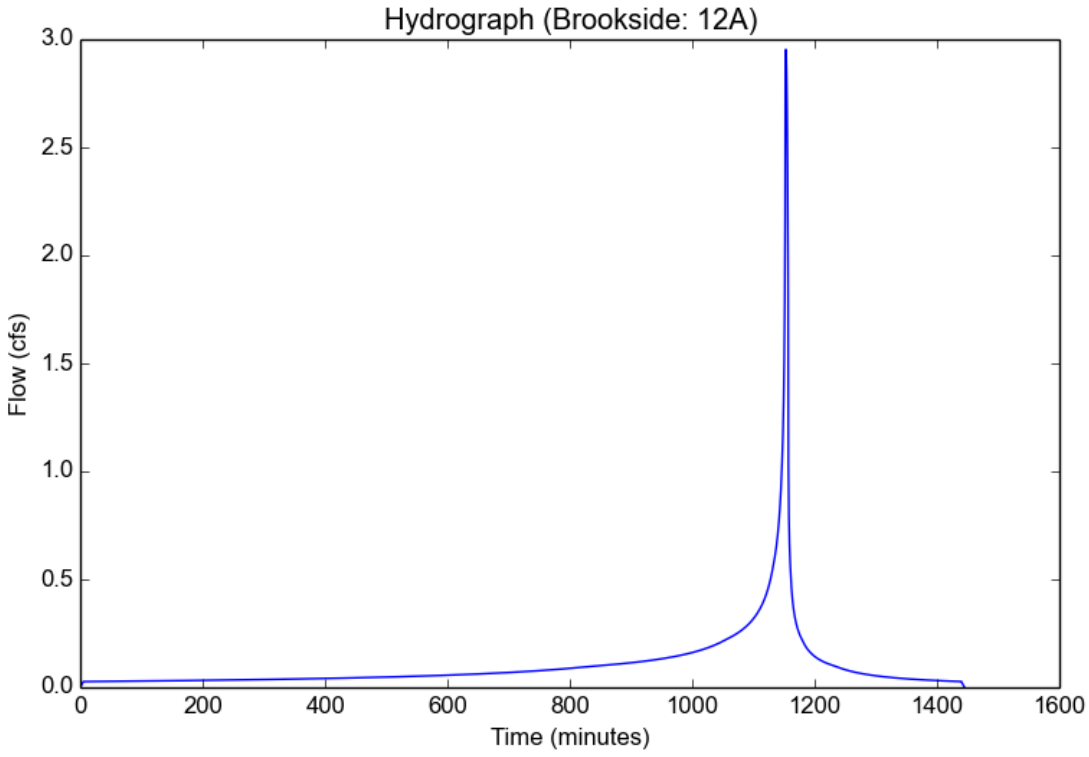
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/25yr/Brookside Proposed - 12A - 25yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.97
Flow Path Length (ft)	512.5
Flow Path Slope (vft/hft)	0.07414
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.133
Soil Type	2
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.707
Peak Intensity (in/hr)	3.405
Undeveloped Runoff Coefficient (Cu)	0.8934
Developed Runoff Coefficient (Cd)	0.8943
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	2.9538
Burned Peak Flow Rate (cfs)	2.9538
24-Hr Clear Runoff Volume (ac-ft)	0.2106
24-Hr Clear Runoff Volume (cu-ft)	9175.5728



Peak Flow Hydrologic Analysis

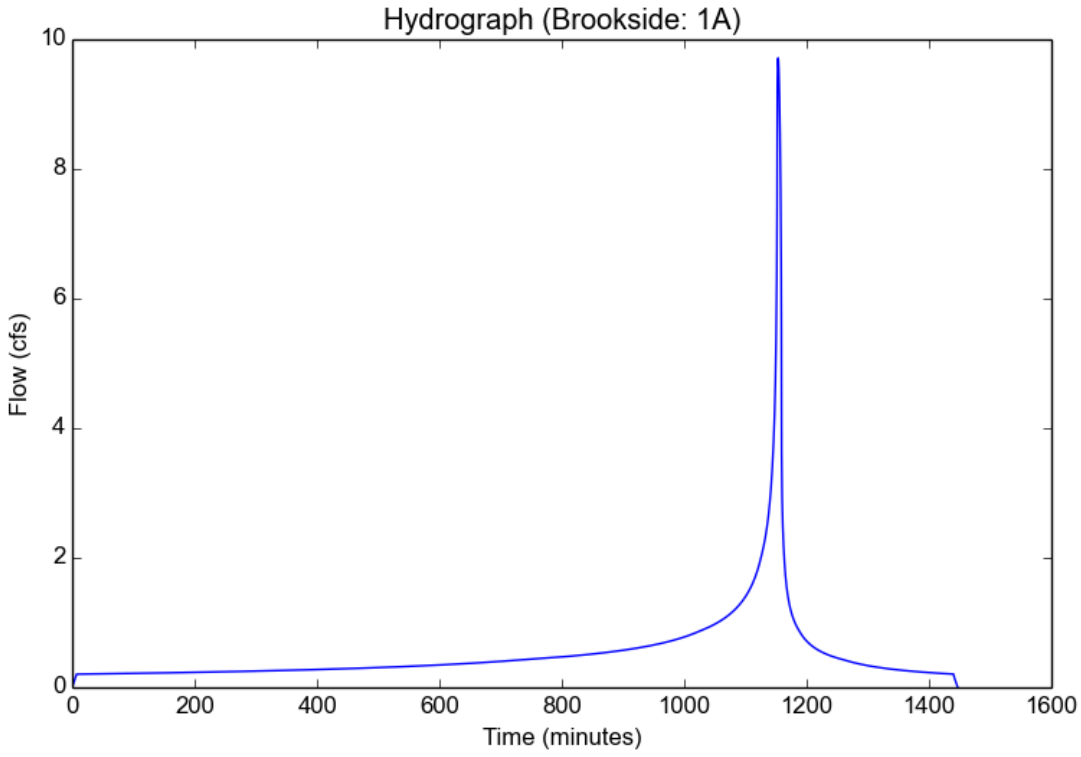
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/50yr/Brookside Proposed - 1A - 50yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1A
Area (ac)	3.28
Flow Path Length (ft)	866.7
Flow Path Slope (vft/hft)	0.04038
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.37
Soil Type	2
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.5
Peak Intensity (in/hr)	3.3108
Undeveloped Runoff Coefficient (Cu)	0.8912
Developed Runoff Coefficient (Cd)	0.8944
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	9.7132
Burned Peak Flow Rate (cfs)	9.7132
24-Hr Clear Runoff Volume (ac-ft)	1.0682
24-Hr Clear Runoff Volume (cu-ft)	46530.3285



Peak Flow Hydrologic Analysis

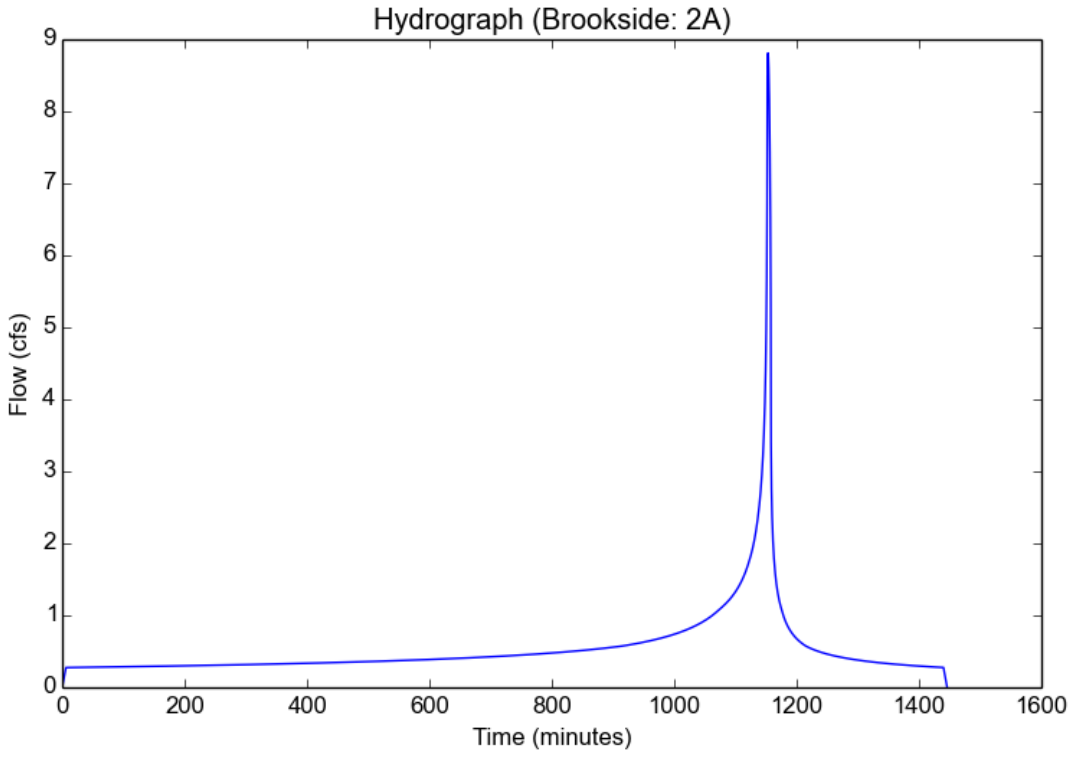
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/50yr/Brookside Proposed - 2A - 50yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	2.75
Flow Path Length (ft)	652.4
Flow Path Slope (vft/hft)	0.04599
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.745
Soil Type	17
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.5
Peak Intensity (in/hr)	3.5596
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	8.81
Burned Peak Flow Rate (cfs)	8.81
24-Hr Clear Runoff Volume (ac-ft)	1.0932
24-Hr Clear Runoff Volume (cu-ft)	47621.0863



Peak Flow Hydrologic Analysis

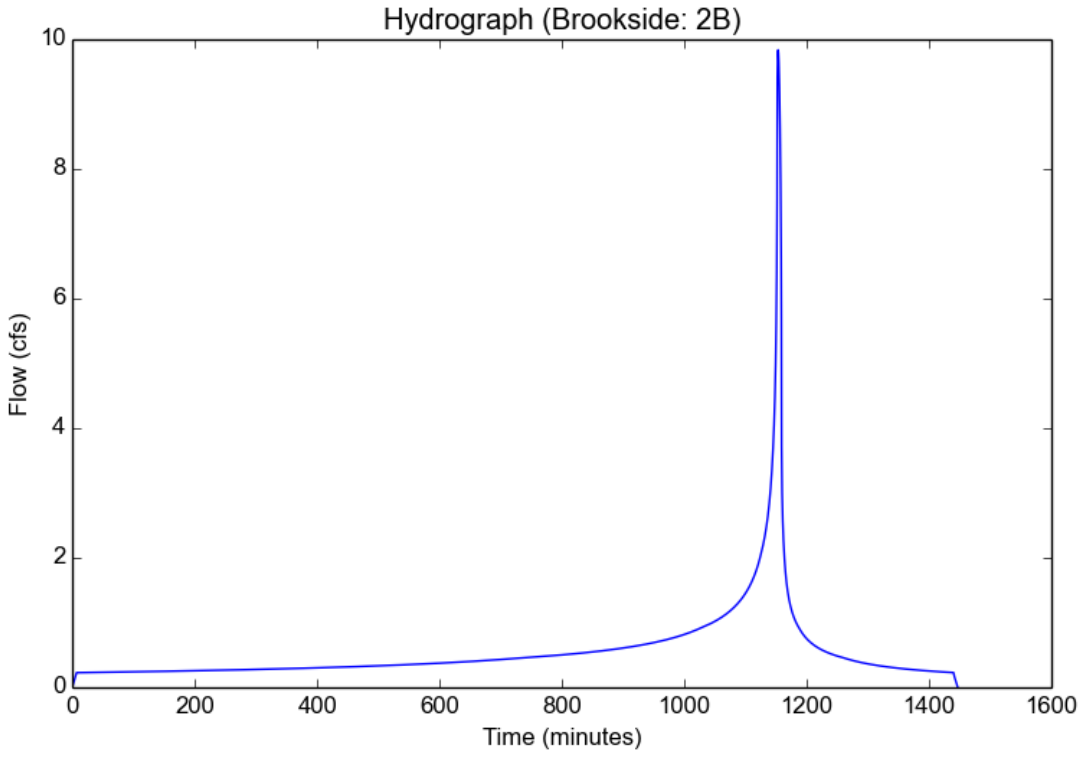
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/50yr/Brookside Proposed - 2B - 50yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2B
Area (ac)	3.32
Flow Path Length (ft)	861.6
Flow Path Slope (vft/hft)	0.03714
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.429
Soil Type	2
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.5
Peak Intensity (in/hr)	3.3108
Undeveloped Runoff Coefficient (Cu)	0.8912
Developed Runoff Coefficient (Cd)	0.895
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	9.8374
Burned Peak Flow Rate (cfs)	9.8374
24-Hr Clear Runoff Volume (ac-ft)	1.1303
24-Hr Clear Runoff Volume (cu-ft)	49235.0204



Peak Flow Hydrologic Analysis

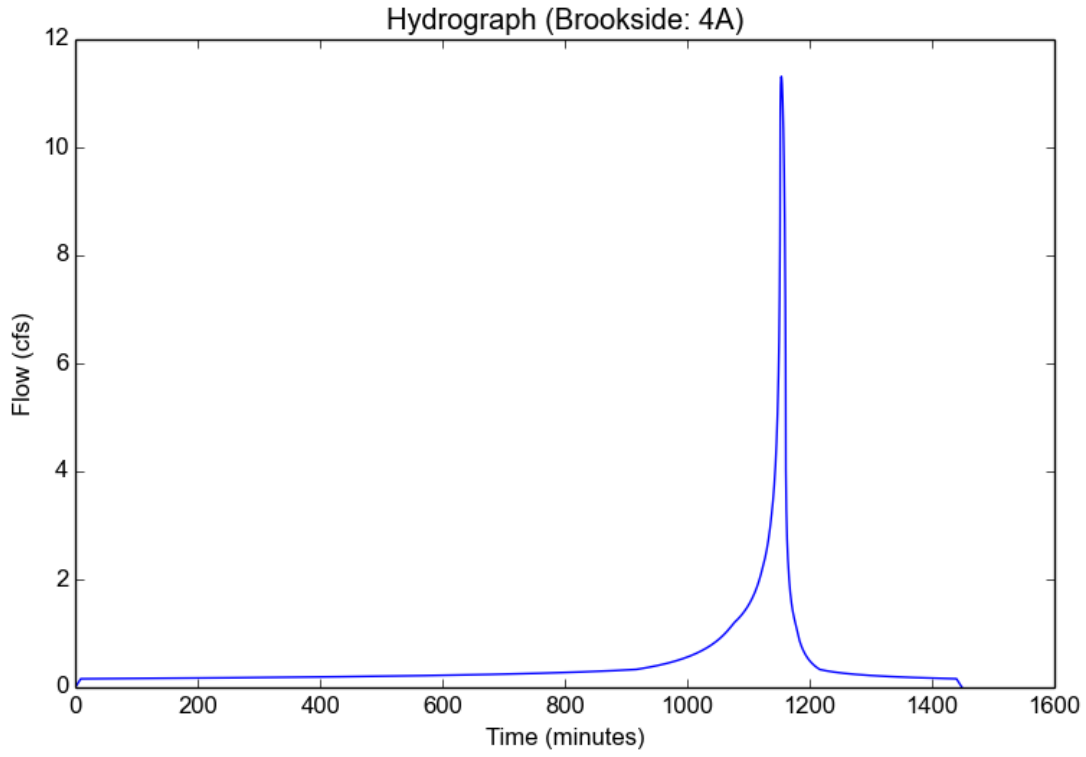
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/50yr/Brookside Proposed - 4A - 50yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	4.31
Flow Path Length (ft)	796.6
Flow Path Slope (vft/hft)	0.0113
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.196
Soil Type	17
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.5
Peak Intensity (in/hr)	2.942
Undeveloped Runoff Coefficient (Cu)	0.8903
Developed Runoff Coefficient (Cd)	0.8922
Time of Concentration (min)	9.0
Clear Peak Flow Rate (cfs)	11.3132
Burned Peak Flow Rate (cfs)	11.3132
24-Hr Clear Runoff Volume (ac-ft)	0.9162
24-Hr Clear Runoff Volume (cu-ft)	39911.7892



Peak Flow Hydrologic Analysis

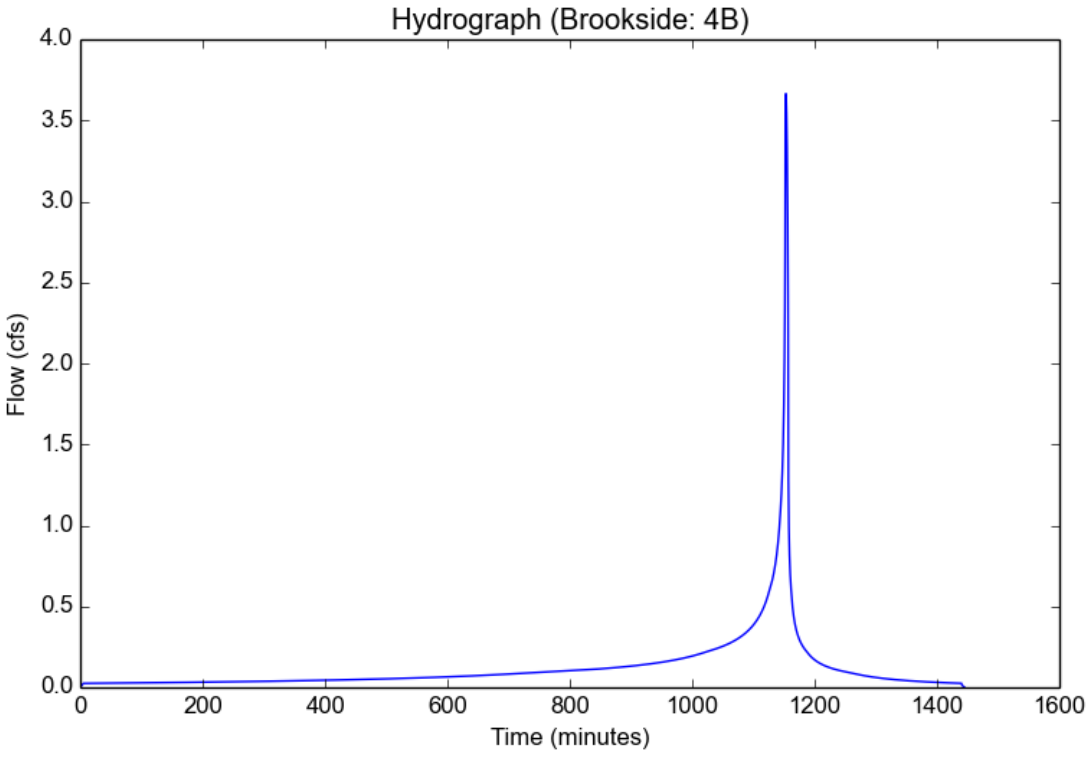
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/50yr/Brookside Proposed - 4B - 50yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4B
Area (ac)	1.05
Flow Path Length (ft)	377.9
Flow Path Slope (vft/hft)	0.02646
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.5
Peak Intensity (in/hr)	3.8781
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	3.6648
Burned Peak Flow Rate (cfs)	3.6648
24-Hr Clear Runoff Volume (ac-ft)	0.2473
24-Hr Clear Runoff Volume (cu-ft)	10772.287



Peak Flow Hydrologic Analysis

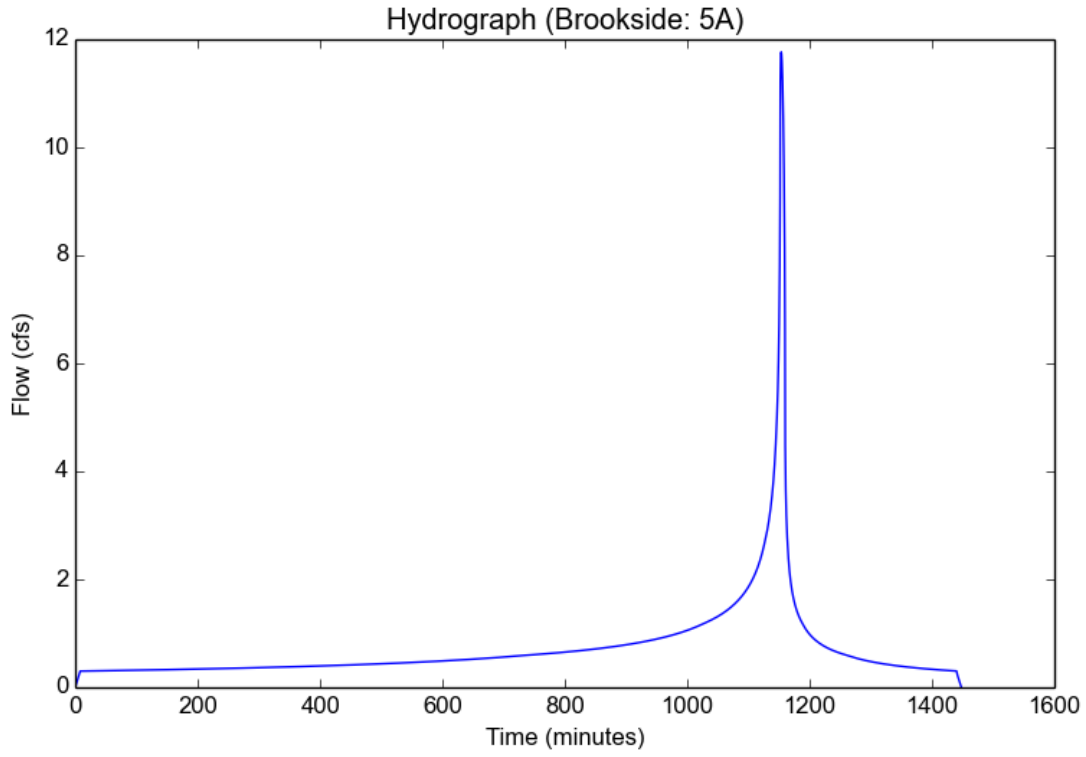
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/50yr/Brookside Proposed - 5A - 50yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5A
Area (ac)	4.24
Flow Path Length (ft)	954.1
Flow Path Slope (vft/hft)	0.03354
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.453
Soil Type	2
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.5
Peak Intensity (in/hr)	3.1094
Undeveloped Runoff Coefficient (Cu)	0.8863
Developed Runoff Coefficient (Cd)	0.8925
Time of Concentration (min)	8.0
Clear Peak Flow Rate (cfs)	11.7669
Burned Peak Flow Rate (cfs)	11.7669
24-Hr Clear Runoff Volume (ac-ft)	1.4689
24-Hr Clear Runoff Volume (cu-ft)	63985.6757



Peak Flow Hydrologic Analysis

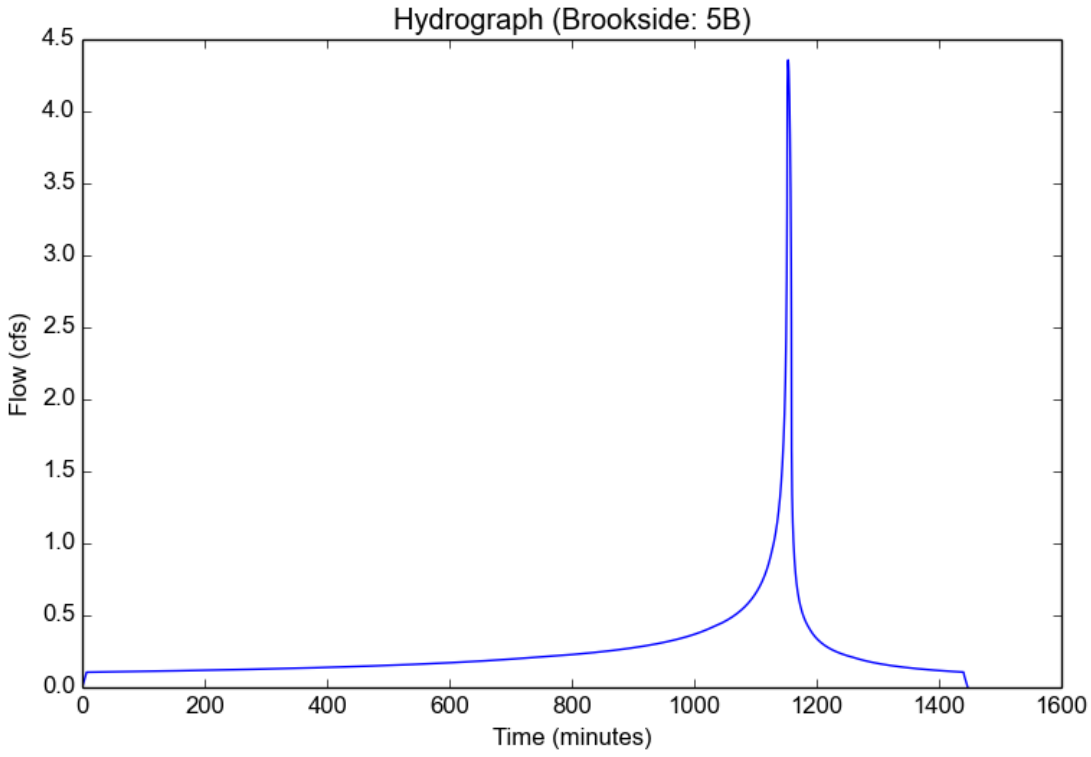
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/50yr/Brookside Proposed - 5B - 50yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5B
Area (ac)	1.47
Flow Path Length (ft)	542.7
Flow Path Slope (vft/hft)	0.0129
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.46
Soil Type	2
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.5
Peak Intensity (in/hr)	3.3108
Undeveloped Runoff Coefficient (Cu)	0.8912
Developed Runoff Coefficient (Cd)	0.8952
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	4.357
Burned Peak Flow Rate (cfs)	4.357
24-Hr Clear Runoff Volume (ac-ft)	0.5119
24-Hr Clear Runoff Volume (cu-ft)	22297.0582



Peak Flow Hydrologic Analysis

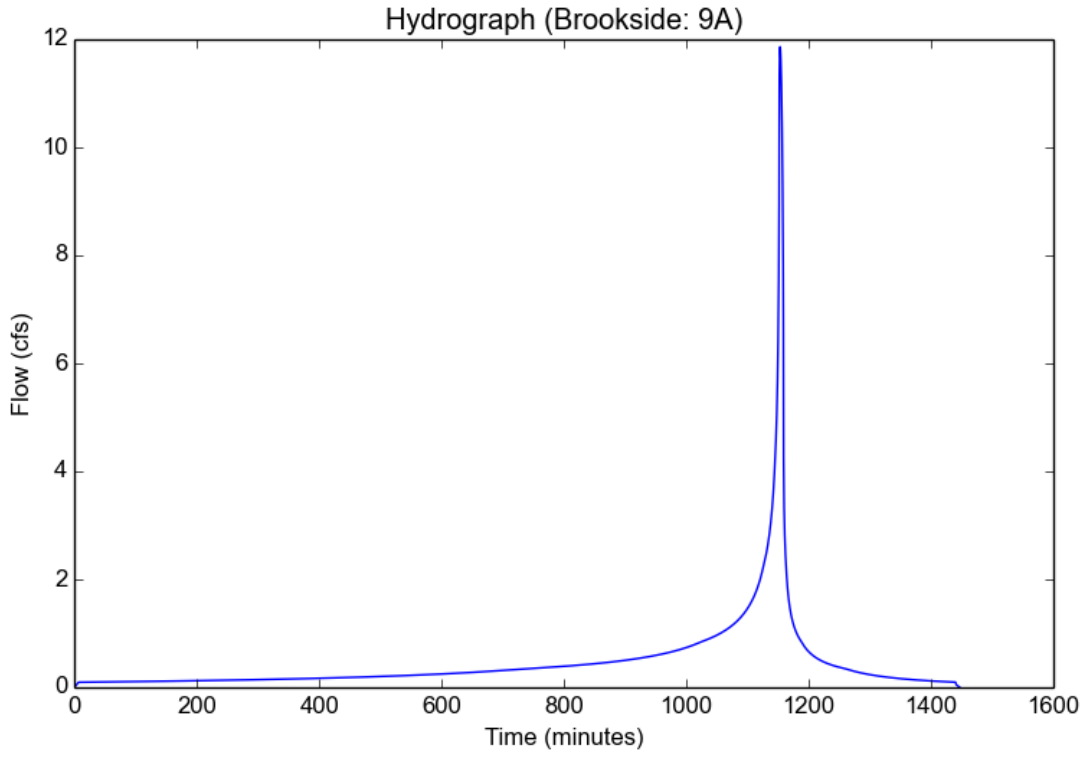
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/50yr/Brookside Proposed - 9A - 50yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	4.02
Flow Path Length (ft)	958.0
Flow Path Slope (vft/hft)	0.05323
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.5
Peak Intensity (in/hr)	3.3108
Undeveloped Runoff Coefficient (Cu)	0.8912
Developed Runoff Coefficient (Cd)	0.8913
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	11.8623
Burned Peak Flow Rate (cfs)	11.8623
24-Hr Clear Runoff Volume (ac-ft)	0.9467
24-Hr Clear Runoff Volume (cu-ft)	41237.6088



Peak Flow Hydrologic Analysis

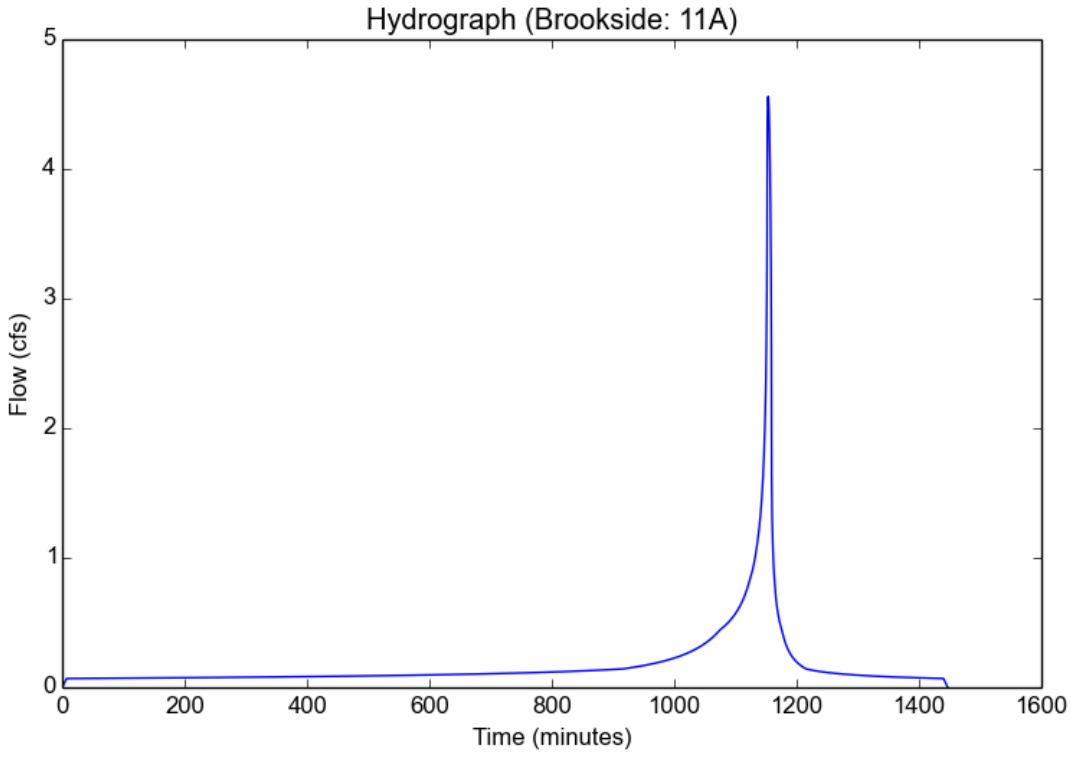
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/50yr/Brookside Proposed - 11A - 50yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	1.53
Flow Path Length (ft)	494.1
Flow Path Slope (vft/hft)	0.00607
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.263
Soil Type	17
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.5
Peak Intensity (in/hr)	3.3108
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	4.559
Burned Peak Flow Rate (cfs)	4.559
24-Hr Clear Runoff Volume (ac-ft)	0.3598
24-Hr Clear Runoff Volume (cu-ft)	15673.4604



Peak Flow Hydrologic Analysis

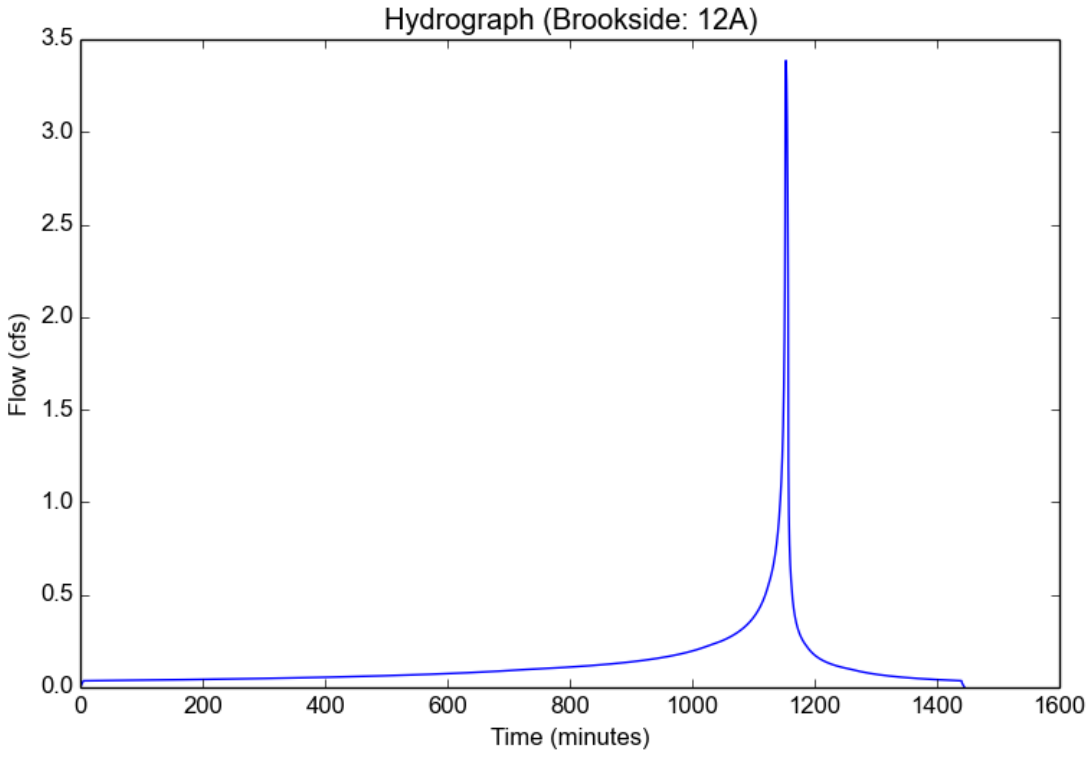
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/50yr/Brookside Proposed - 12A - 50yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.97
Flow Path Length (ft)	512.5
Flow Path Slope (vft/hft)	0.07414
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.133
Soil Type	2
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.5
Peak Intensity (in/hr)	3.8781
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	3.3856
Burned Peak Flow Rate (cfs)	3.3856
24-Hr Clear Runoff Volume (ac-ft)	0.2583
24-Hr Clear Runoff Volume (cu-ft)	11253.1876



Peak Flow Hydrologic Analysis

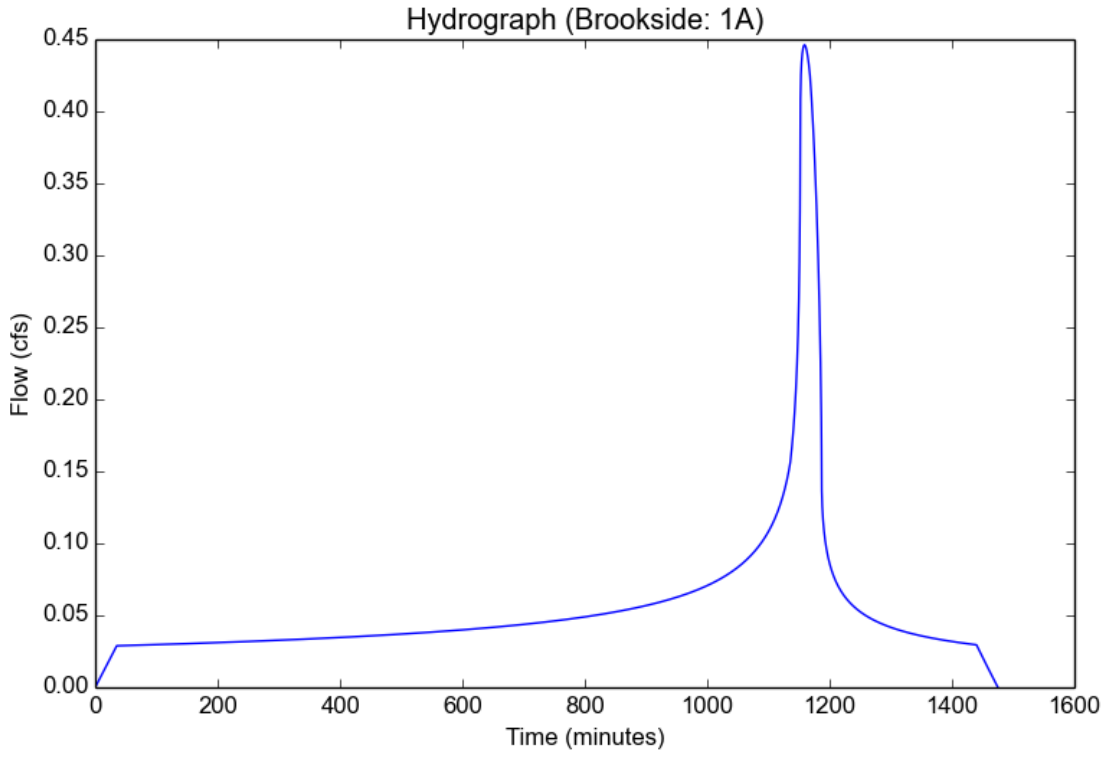
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/85th Percentile/Brookside Proposed - 1A - 85th Percentile.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1A
Area (ac)	3.28
Flow Path Length (ft)	866.7
Flow Path Slope (vft/hft)	0.04038
85th Percentile Rainfall Depth (in)	1.0
Percent Impervious	0.37
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.0
Peak Intensity (in/hr)	0.2391
Undeveloped Runoff Coefficient (Cu)	0.3746
Developed Runoff Coefficient (Cd)	0.569
Time of Concentration (min)	35.0
Clear Peak Flow Rate (cfs)	0.4462
Burned Peak Flow Rate (cfs)	0.4462
24-Hr Clear Runoff Volume (ac-ft)	0.1128
24-Hr Clear Runoff Volume (cu-ft)	4912.7031



Peak Flow Hydrologic Analysis

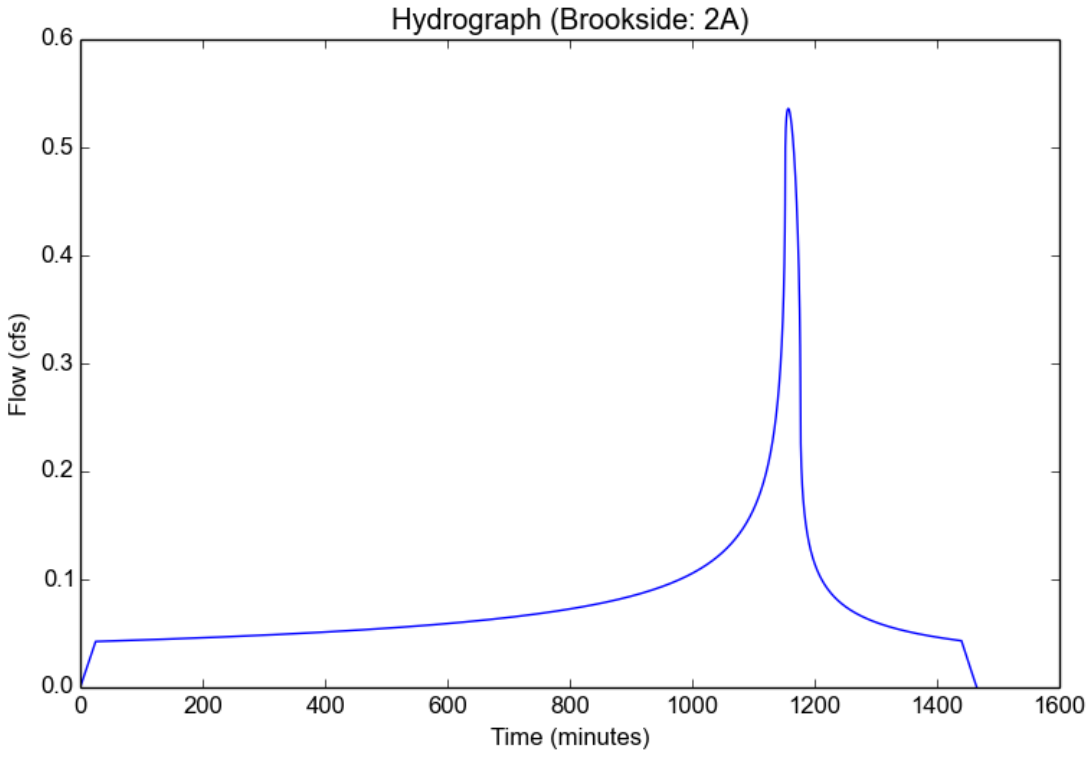
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/85th Percentile/Brookside Proposed - 2A - 85th Percentile.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	2.75
Flow Path Length (ft)	652.4
Flow Path Slope (vft/hft)	0.04599
85th Percentile Rainfall Depth (in)	1.0
Percent Impervious	0.745
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.0
Peak Intensity (in/hr)	0.28
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.696
Time of Concentration (min)	25.0
Clear Peak Flow Rate (cfs)	0.536
Burned Peak Flow Rate (cfs)	0.536
24-Hr Clear Runoff Volume (ac-ft)	0.1582
24-Hr Clear Runoff Volume (cu-ft)	6890.4548



Peak Flow Hydrologic Analysis

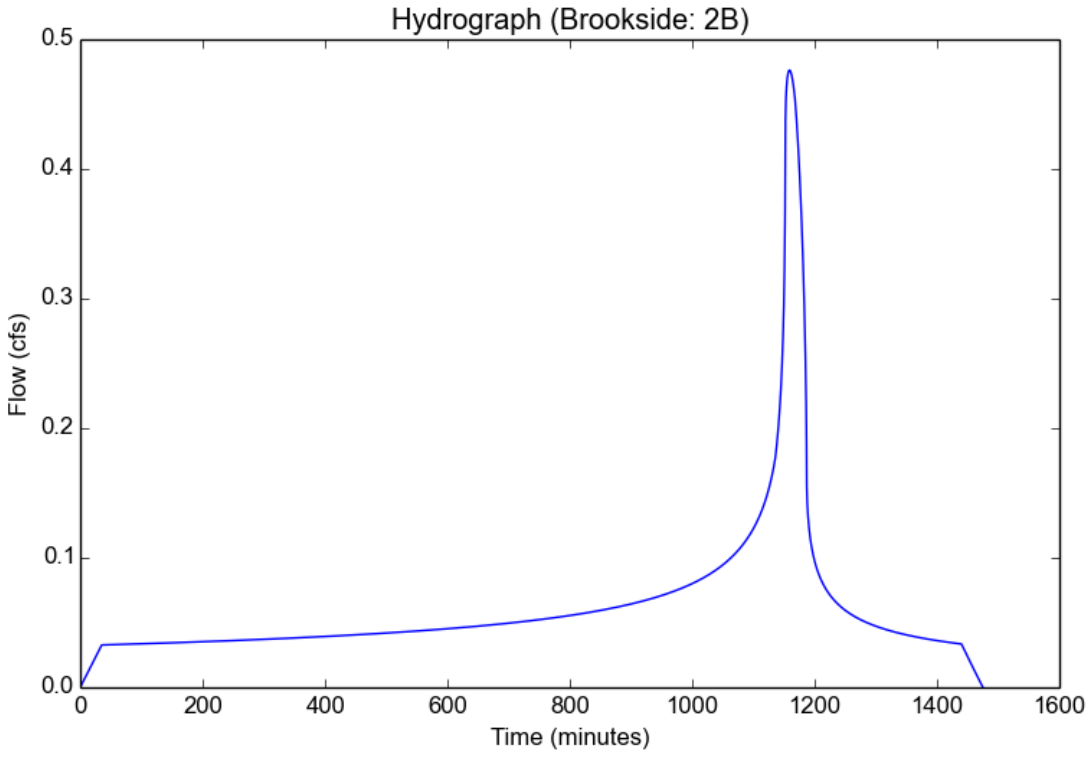
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/85th Percentile/Brookside Proposed - 2B - 85th Percentile.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2B
Area (ac)	3.32
Flow Path Length (ft)	861.6
Flow Path Slope (vft/hft)	0.03714
85th Percentile Rainfall Depth (in)	1.0
Percent Impervious	0.429
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.0
Peak Intensity (in/hr)	0.2391
Undeveloped Runoff Coefficient (Cu)	0.3746
Developed Runoff Coefficient (Cd)	0.6
Time of Concentration (min)	35.0
Clear Peak Flow Rate (cfs)	0.4762
Burned Peak Flow Rate (cfs)	0.4762
24-Hr Clear Runoff Volume (ac-ft)	0.1266
24-Hr Clear Runoff Volume (cu-ft)	5514.3235



Peak Flow Hydrologic Analysis

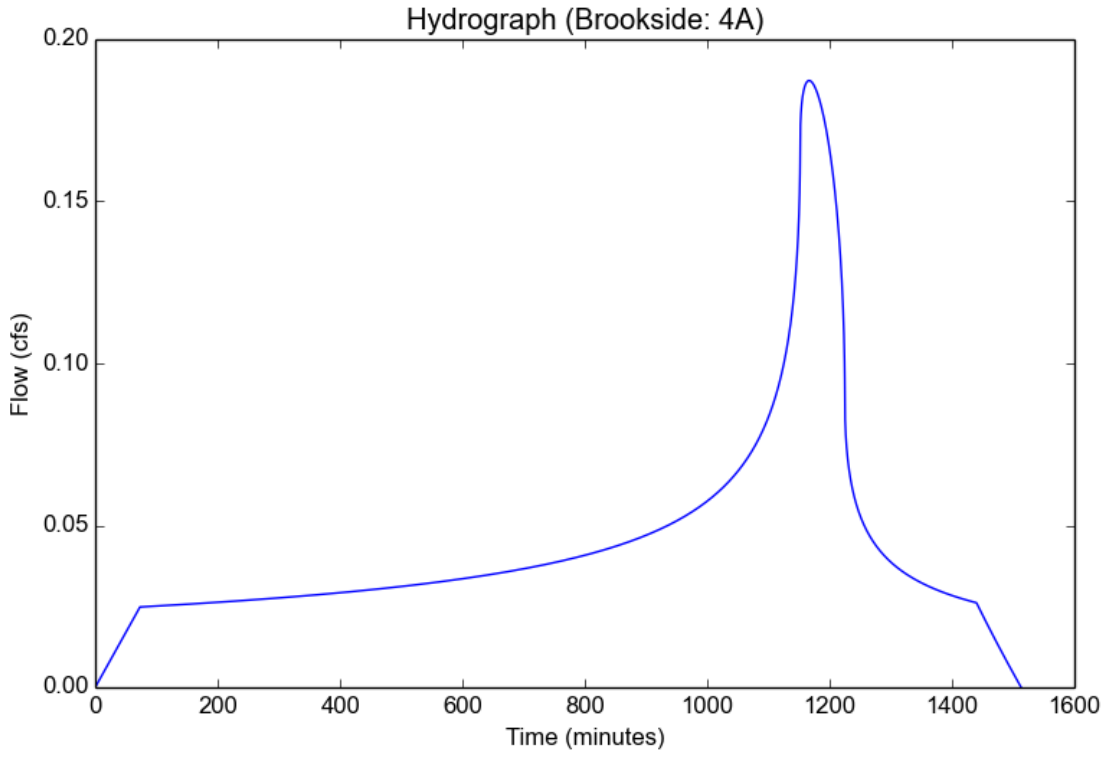
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/85th Percentile/Brookside Proposed - 4A - 85th Percentile.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	4.31
Flow Path Length (ft)	796.6
Flow Path Slope (vft/hft)	0.0113
85th Percentile Rainfall Depth (in)	1.0
Percent Impervious	0.196
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.0
Peak Intensity (in/hr)	0.1692
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.2568
Time of Concentration (min)	73.0
Clear Peak Flow Rate (cfs)	0.1873
Burned Peak Flow Rate (cfs)	0.1873
24-Hr Clear Runoff Volume (ac-ft)	0.0915
24-Hr Clear Runoff Volume (cu-ft)	3984.7875



Peak Flow Hydrologic Analysis

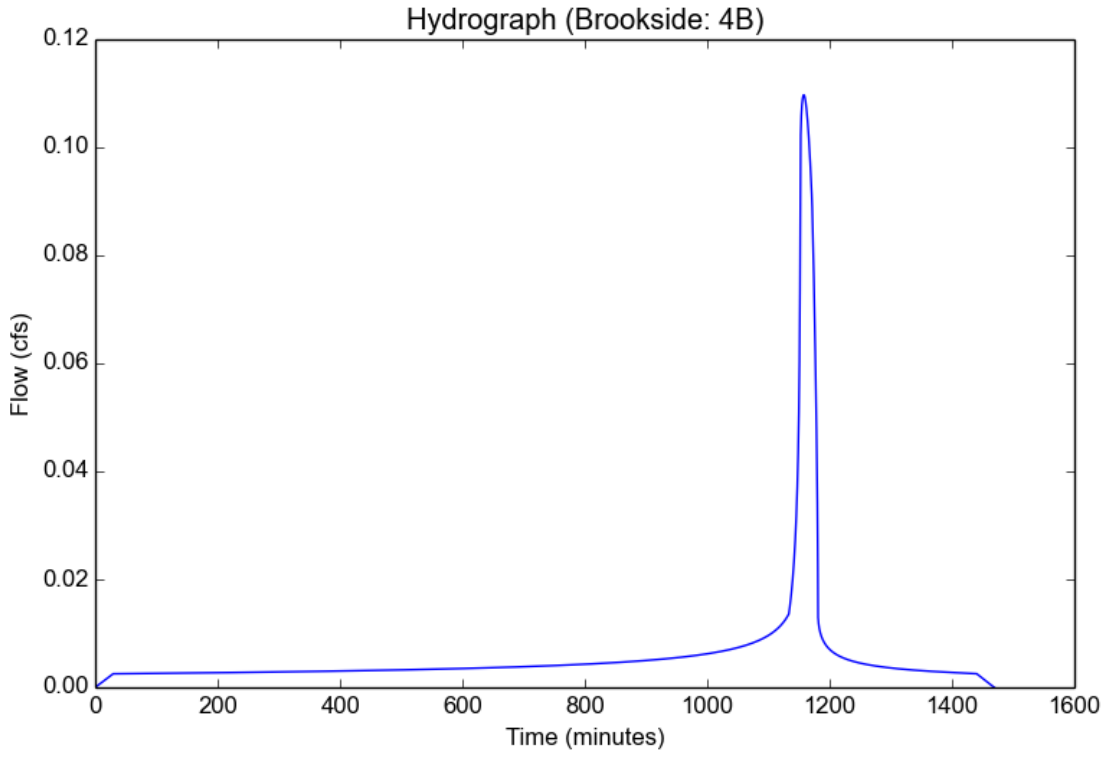
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/85th Percentile/Brookside Proposed - 4B - 85th Percentile.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4B
Area (ac)	1.05
Flow Path Length (ft)	377.9
Flow Path Slope (vft/hft)	0.02646
85th Percentile Rainfall Depth (in)	1.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.0
Peak Intensity (in/hr)	0.2612
Undeveloped Runoff Coefficient (Cu)	0.3951
Developed Runoff Coefficient (Cd)	0.4001
Time of Concentration (min)	29.0
Clear Peak Flow Rate (cfs)	0.1097
Burned Peak Flow Rate (cfs)	0.1097
24-Hr Clear Runoff Volume (ac-ft)	0.0122
24-Hr Clear Runoff Volume (cu-ft)	533.1732



Peak Flow Hydrologic Analysis

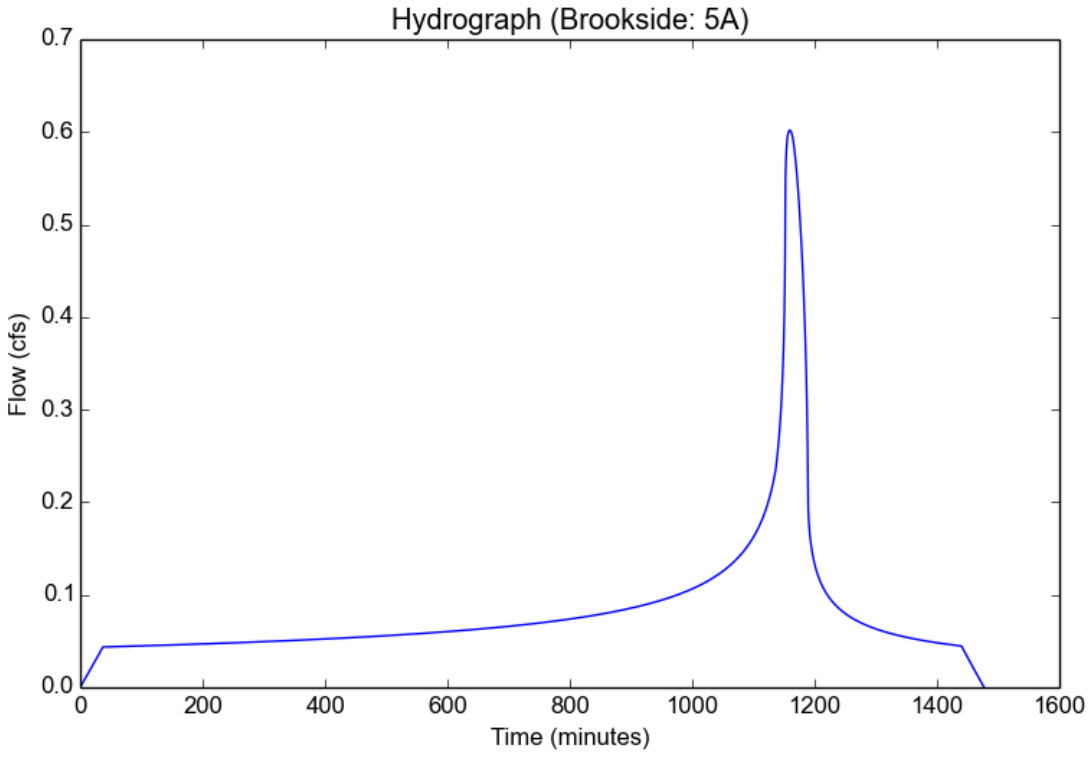
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/85th Percentile/Brookside Proposed - 5A - 85th Percentile.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5A
Area (ac)	4.24
Flow Path Length (ft)	954.1
Flow Path Slope (vft/hft)	0.03354
85th Percentile Rainfall Depth (in)	1.0
Percent Impervious	0.453
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.0
Peak Intensity (in/hr)	0.2329
Undeveloped Runoff Coefficient (Cu)	0.3689
Developed Runoff Coefficient (Cd)	0.6095
Time of Concentration (min)	37.0
Clear Peak Flow Rate (cfs)	0.6019
Burned Peak Flow Rate (cfs)	0.6019
24-Hr Clear Runoff Volume (ac-ft)	0.168
24-Hr Clear Runoff Volume (cu-ft)	7317.8436



Peak Flow Hydrologic Analysis

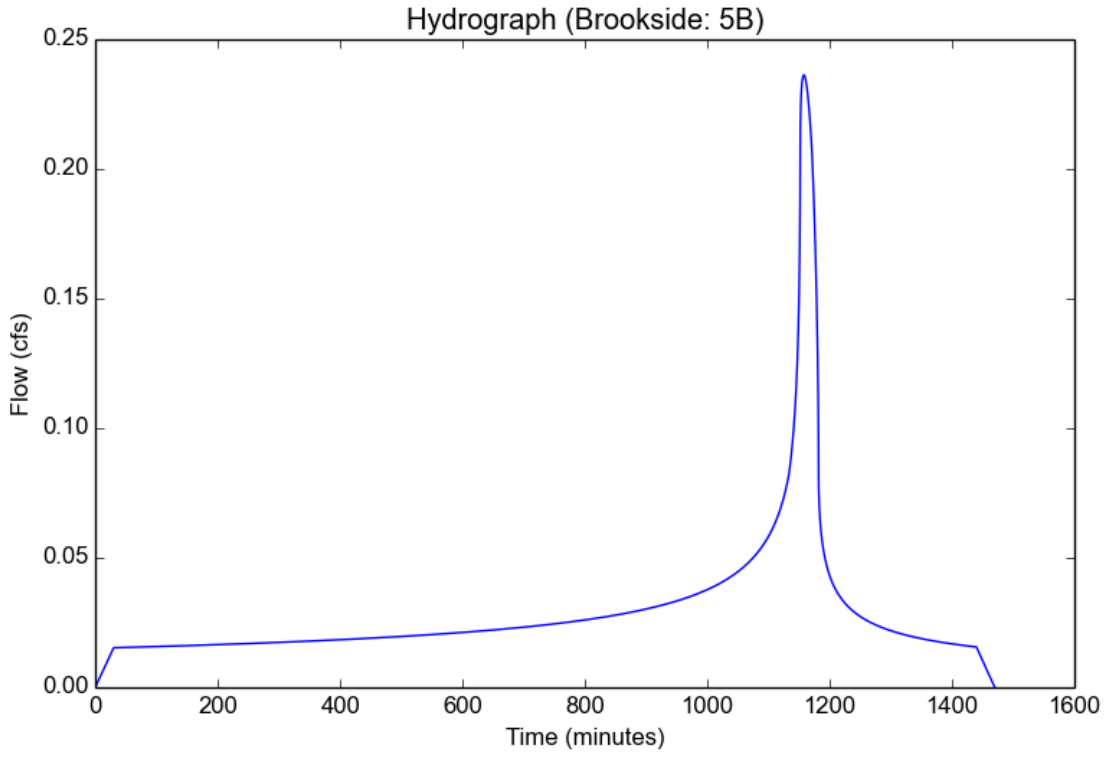
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/85th Percentile/Brookside Proposed - 5B - 85th Percentile.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5B
Area (ac)	1.47
Flow Path Length (ft)	542.7
Flow Path Slope (vft/hft)	0.0129
85th Percentile Rainfall Depth (in)	1.0
Percent Impervious	0.46
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.0
Peak Intensity (in/hr)	0.257
Undeveloped Runoff Coefficient (Cu)	0.3913
Developed Runoff Coefficient (Cd)	0.6253
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	0.2362
Burned Peak Flow Rate (cfs)	0.2362
24-Hr Clear Runoff Volume (ac-ft)	0.059
24-Hr Clear Runoff Volume (cu-ft)	2571.4258



Peak Flow Hydrologic Analysis

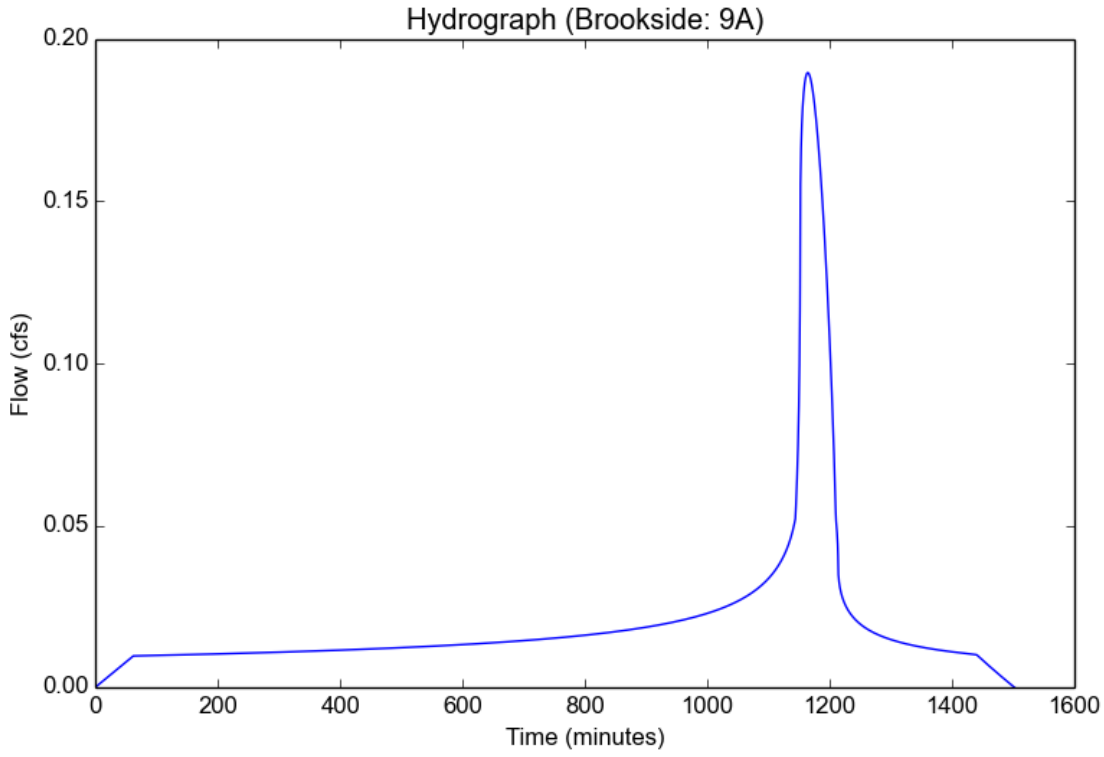
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/85th Percentile/Brookside Proposed - 9A - 85th Percentile.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	4.02
Flow Path Length (ft)	958.0
Flow Path Slope (vft/hft)	0.05323
85th Percentile Rainfall Depth (in)	1.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.0
Peak Intensity (in/hr)	0.1827
Undeveloped Runoff Coefficient (Cu)	0.2518
Developed Runoff Coefficient (Cd)	0.2583
Time of Concentration (min)	62.0
Clear Peak Flow Rate (cfs)	0.1897
Burned Peak Flow Rate (cfs)	0.1897
24-Hr Clear Runoff Volume (ac-ft)	0.0424
24-Hr Clear Runoff Volume (cu-ft)	1846.5365



Peak Flow Hydrologic Analysis

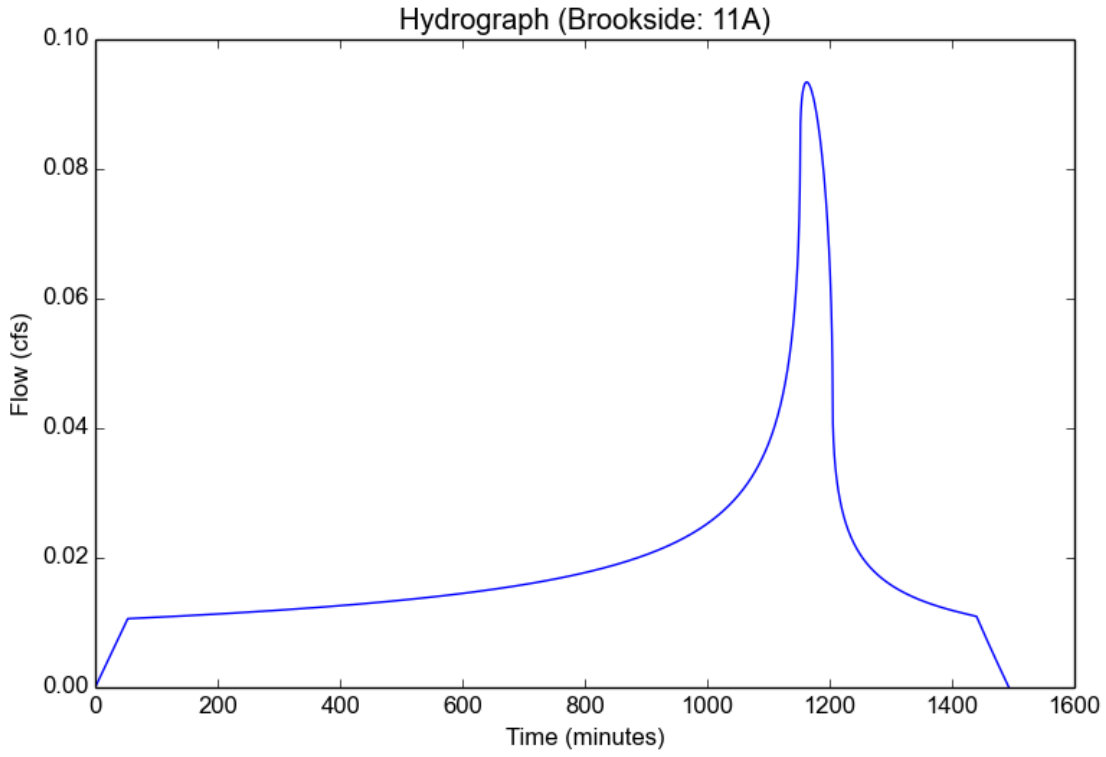
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/85th Percentile/Brookside Proposed - 11A - 85th Percentile.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	1.53
Flow Path Length (ft)	494.1
Flow Path Slope (vft/hft)	0.00607
85th Percentile Rainfall Depth (in)	1.0
Percent Impervious	0.263
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.0
Peak Intensity (in/hr)	0.1967
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3104
Time of Concentration (min)	53.0
Clear Peak Flow Rate (cfs)	0.0934
Burned Peak Flow Rate (cfs)	0.0934
24-Hr Clear Runoff Volume (ac-ft)	0.0393
24-Hr Clear Runoff Volume (cu-ft)	1709.7454



Peak Flow Hydrologic Analysis

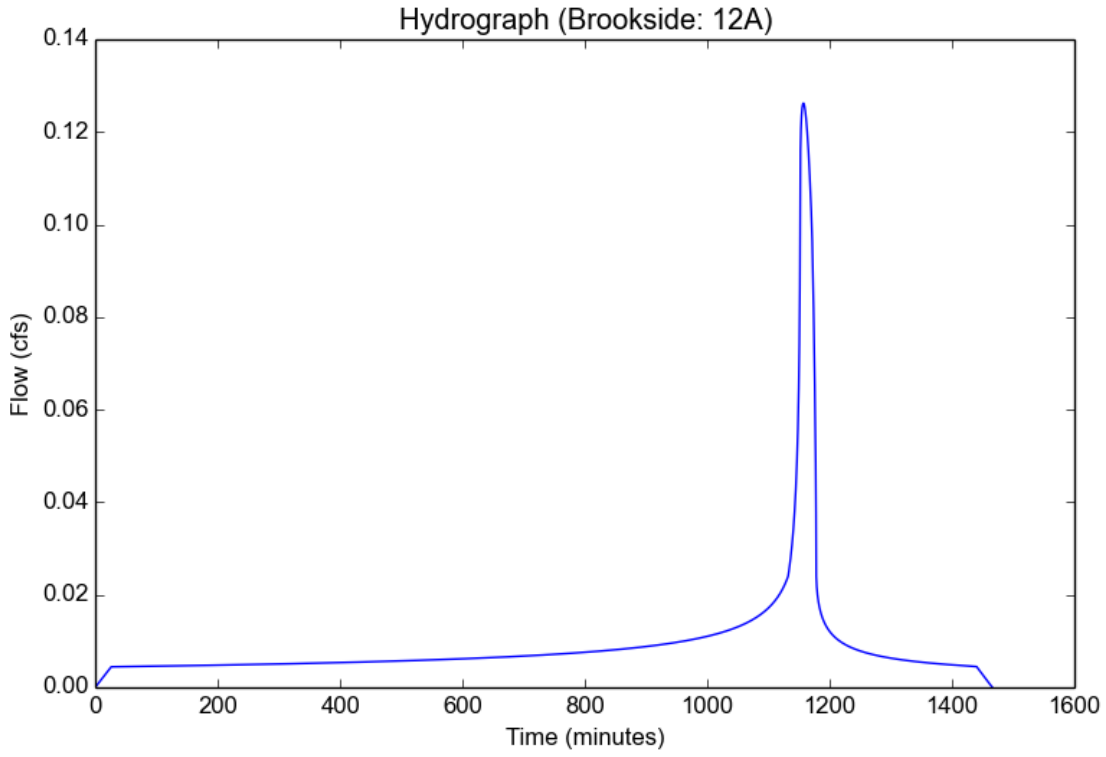
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/85th Percentile/Brookside Proposed - 12A - 85th Percentile.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.97
Flow Path Length (ft)	512.5
Flow Path Slope (vft/hft)	0.07414
85th Percentile Rainfall Depth (in)	1.0
Percent Impervious	0.133
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.0
Peak Intensity (in/hr)	0.2749
Undeveloped Runoff Coefficient (Cu)	0.4078
Developed Runoff Coefficient (Cd)	0.4733
Time of Concentration (min)	26.0
Clear Peak Flow Rate (cfs)	0.1262
Burned Peak Flow Rate (cfs)	0.1262
24-Hr Clear Runoff Volume (ac-ft)	0.0189
24-Hr Clear Runoff Volume (cu-ft)	823.8292



Peak Flow Hydrologic Analysis

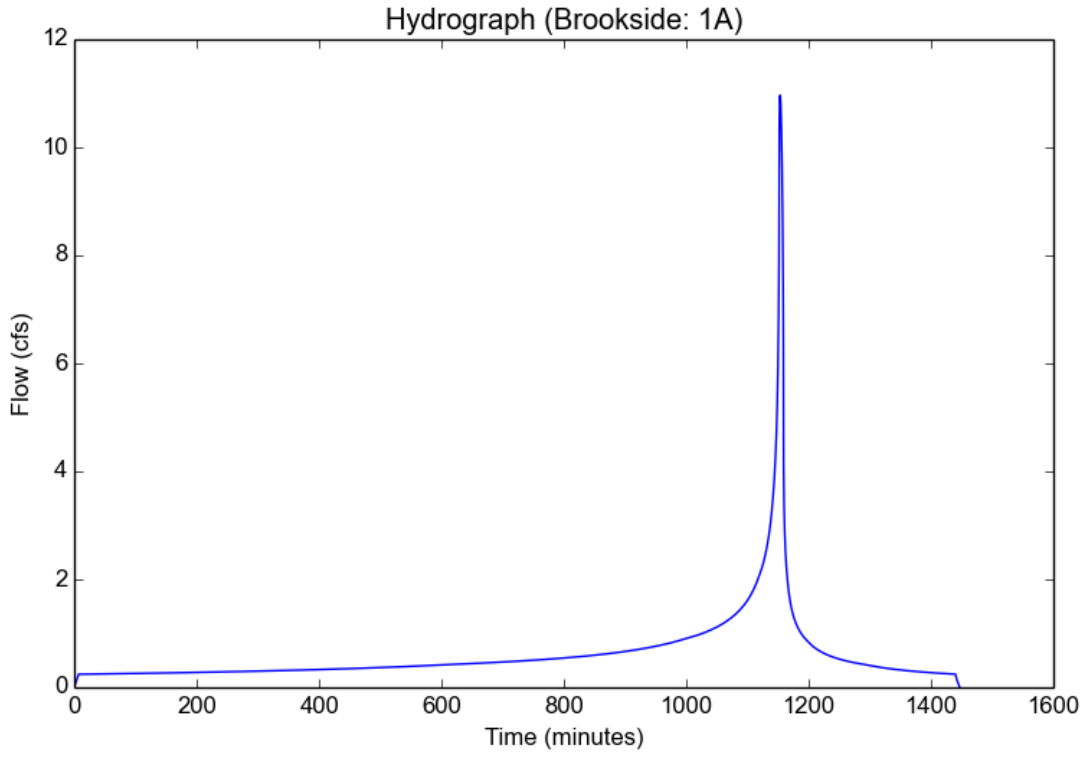
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/100yr/Brookside Proposed - 1A - 100yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1A
Area (ac)	3.28
Flow Path Length (ft)	866.7
Flow Path Slope (vft/hft)	0.04038
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.37
Soil Type	2
Design Storm Frequency	100-yr
Fire Factor	0
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	7.293
Peak Intensity (in/hr)	3.7147
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	10.9659
Burned Peak Flow Rate (cfs)	10.9659
24-Hr Clear Runoff Volume (ac-ft)	1.2428
24-Hr Clear Runoff Volume (cu-ft)	54138.0451



Peak Flow Hydrologic Analysis

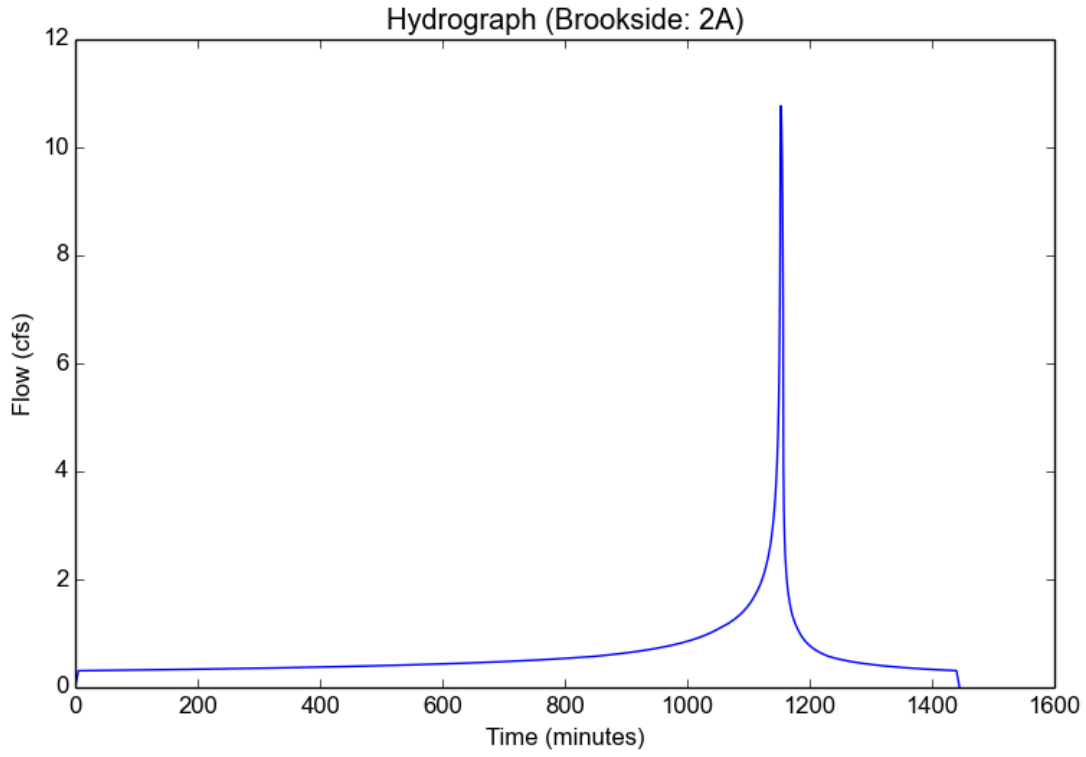
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/100yr/Brookside Proposed - 2A - 100yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	2.75
Flow Path Length (ft)	652.4
Flow Path Slope (vft/hft)	0.04599
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.745
Soil Type	17
Design Storm Frequency	100-yr
Fire Factor	0
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	7.293
Peak Intensity (in/hr)	4.3512
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	10.7692
Burned Peak Flow Rate (cfs)	10.7692
24-Hr Clear Runoff Volume (ac-ft)	1.2365
24-Hr Clear Runoff Volume (cu-ft)	53861.606



Peak Flow Hydrologic Analysis

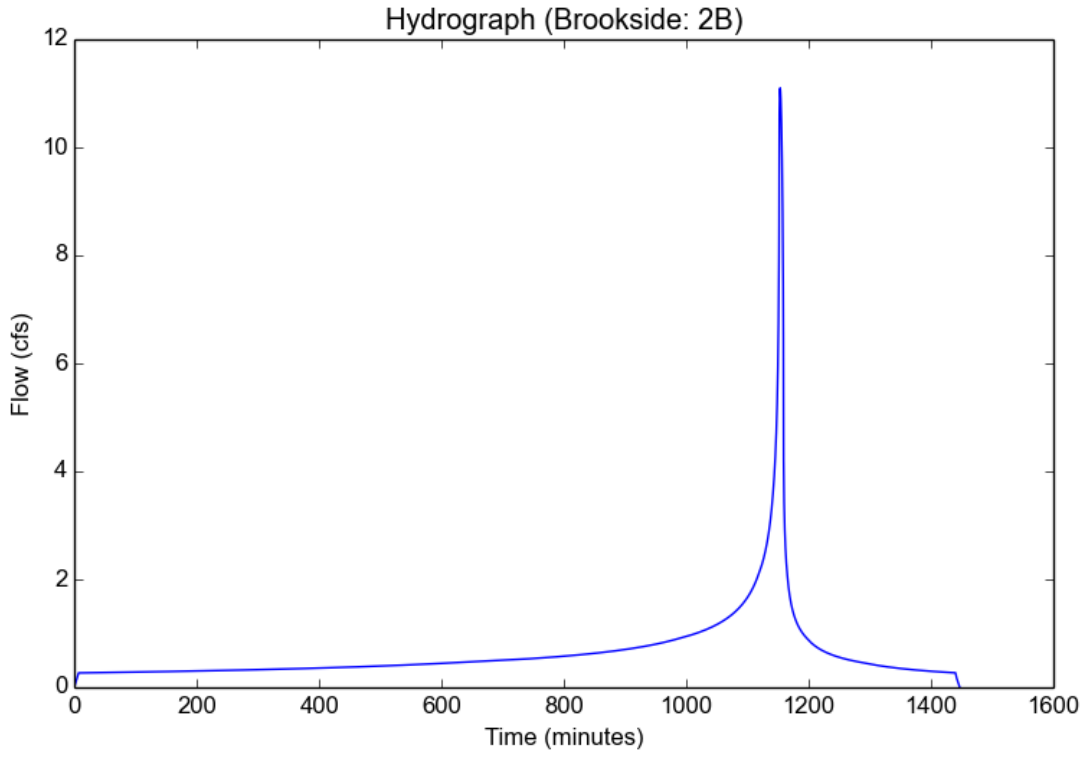
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/100yr/Brookside Proposed - 2B - 100yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2B
Area (ac)	3.32
Flow Path Length (ft)	861.6
Flow Path Slope (vft/hft)	0.03714
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.429
Soil Type	2
Design Storm Frequency	100-yr
Fire Factor	0
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	7.293
Peak Intensity (in/hr)	3.7147
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	11.0997
Burned Peak Flow Rate (cfs)	11.0997
24-Hr Clear Runoff Volume (ac-ft)	1.3088
24-Hr Clear Runoff Volume (cu-ft)	57013.2118



Peak Flow Hydrologic Analysis

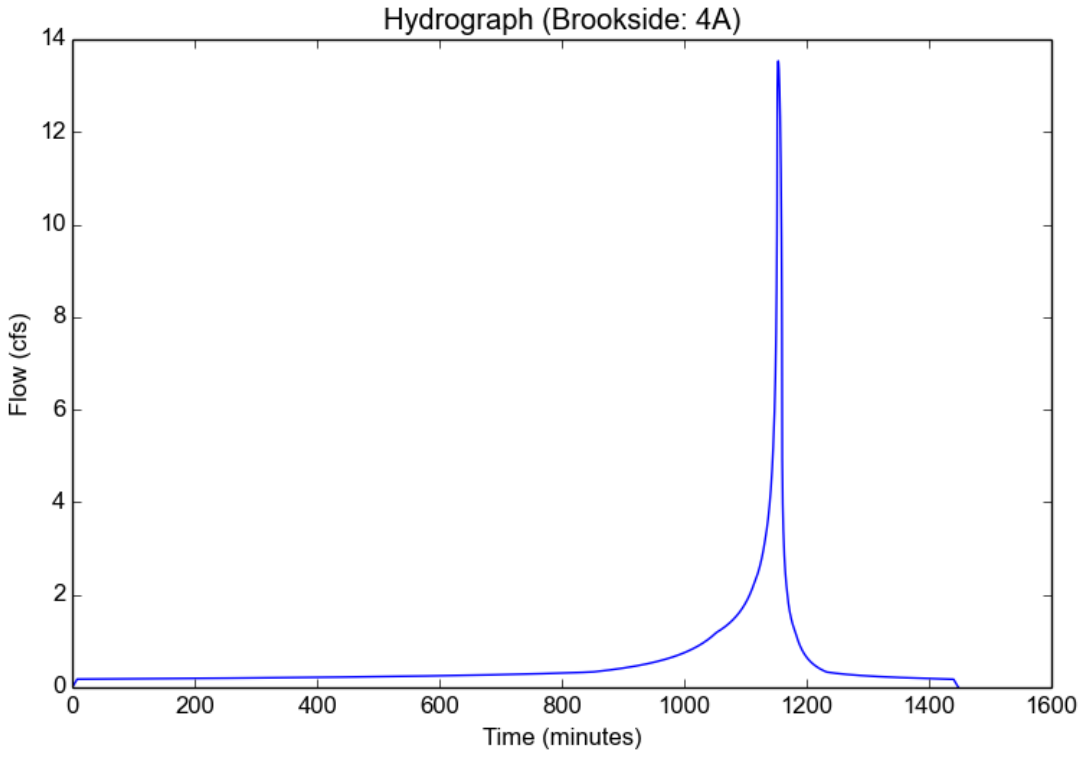
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/100yr/Brookside Proposed - 4A - 100yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	4.31
Flow Path Length (ft)	796.6
Flow Path Slope (vft/hft)	0.0113
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.196
Soil Type	17
Design Storm Frequency	100-yr
Fire Factor	0
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	7.293
Peak Intensity (in/hr)	3.4888
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	8.0
Clear Peak Flow Rate (cfs)	13.533
Burned Peak Flow Rate (cfs)	13.533
24-Hr Clear Runoff Volume (ac-ft)	1.0779
24-Hr Clear Runoff Volume (cu-ft)	46951.4126



Peak Flow Hydrologic Analysis

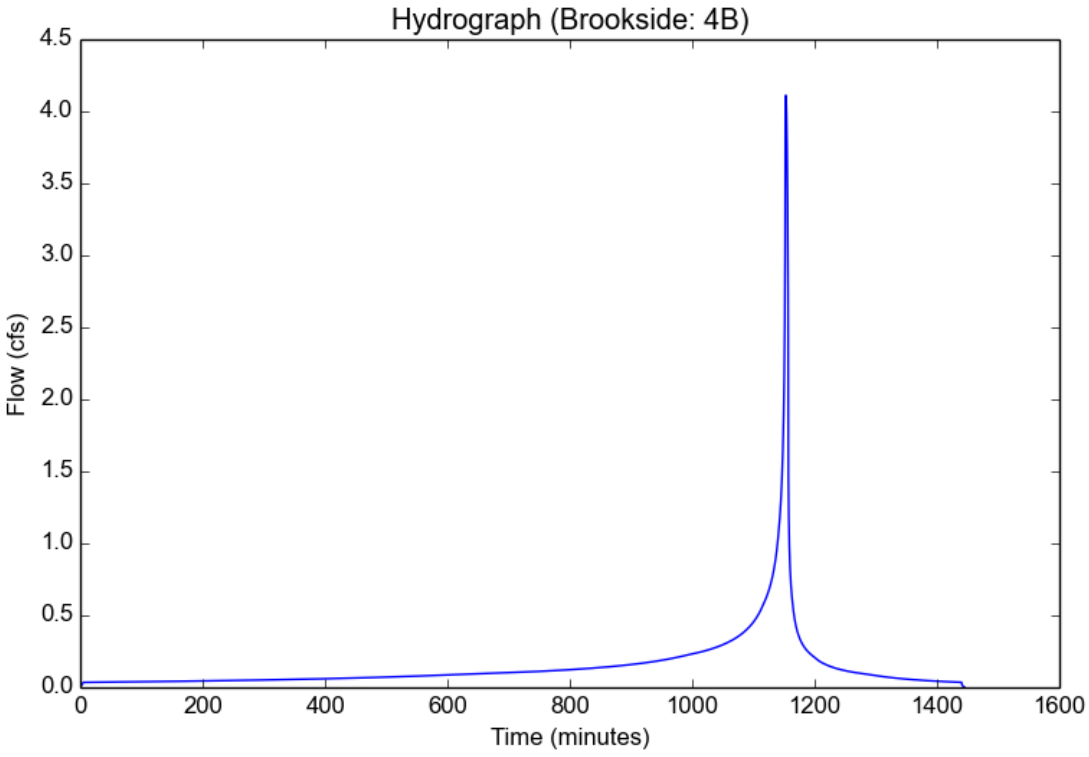
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/100yr/Brookside Proposed - 4B - 100yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4B
Area (ac)	1.05
Flow Path Length (ft)	377.9
Flow Path Slope (vft/hft)	0.02646
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	100-yr
Fire Factor	0
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	7.293
Peak Intensity (in/hr)	4.3512
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	4.1119
Burned Peak Flow Rate (cfs)	4.1119
24-Hr Clear Runoff Volume (ac-ft)	0.2996
24-Hr Clear Runoff Volume (cu-ft)	13051.079



Peak Flow Hydrologic Analysis

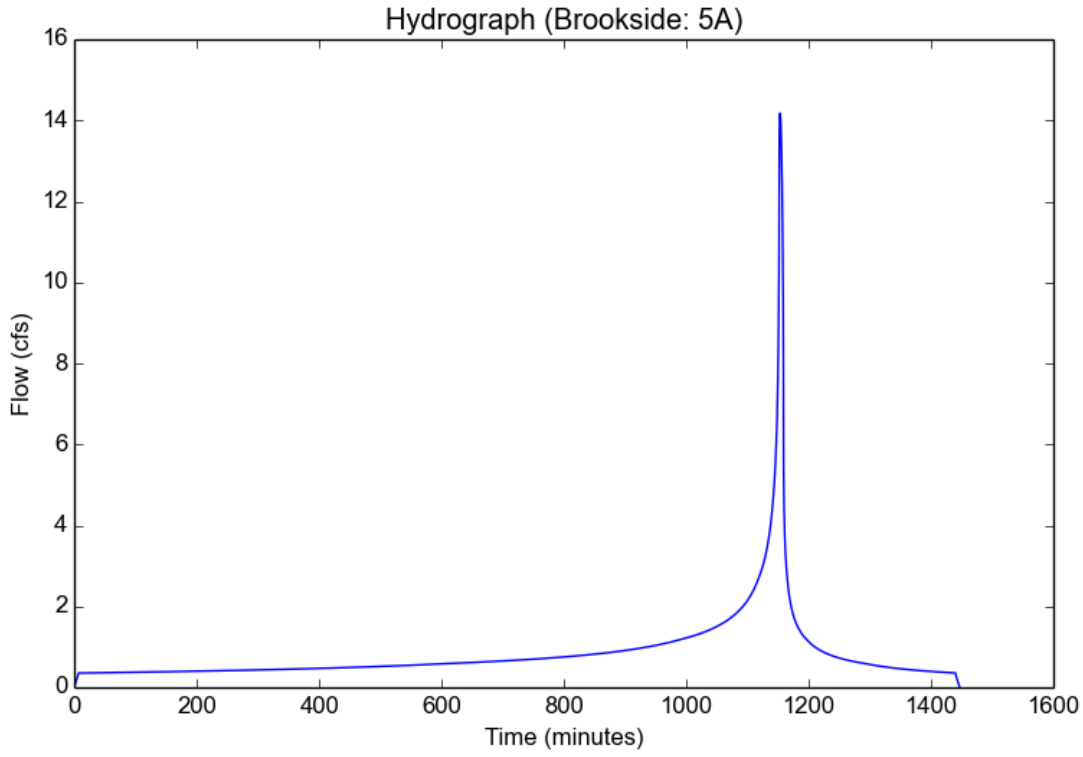
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/100yr/Brookside Proposed - 5A - 100yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5A
Area (ac)	4.24
Flow Path Length (ft)	954.1
Flow Path Slope (vft/hft)	0.03354
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.453
Soil Type	2
Design Storm Frequency	100-yr
Fire Factor	0
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	7.293
Peak Intensity (in/hr)	3.7147
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	14.1755
Burned Peak Flow Rate (cfs)	14.1755
24-Hr Clear Runoff Volume (ac-ft)	1.698
24-Hr Clear Runoff Volume (cu-ft)	73962.7223



Peak Flow Hydrologic Analysis

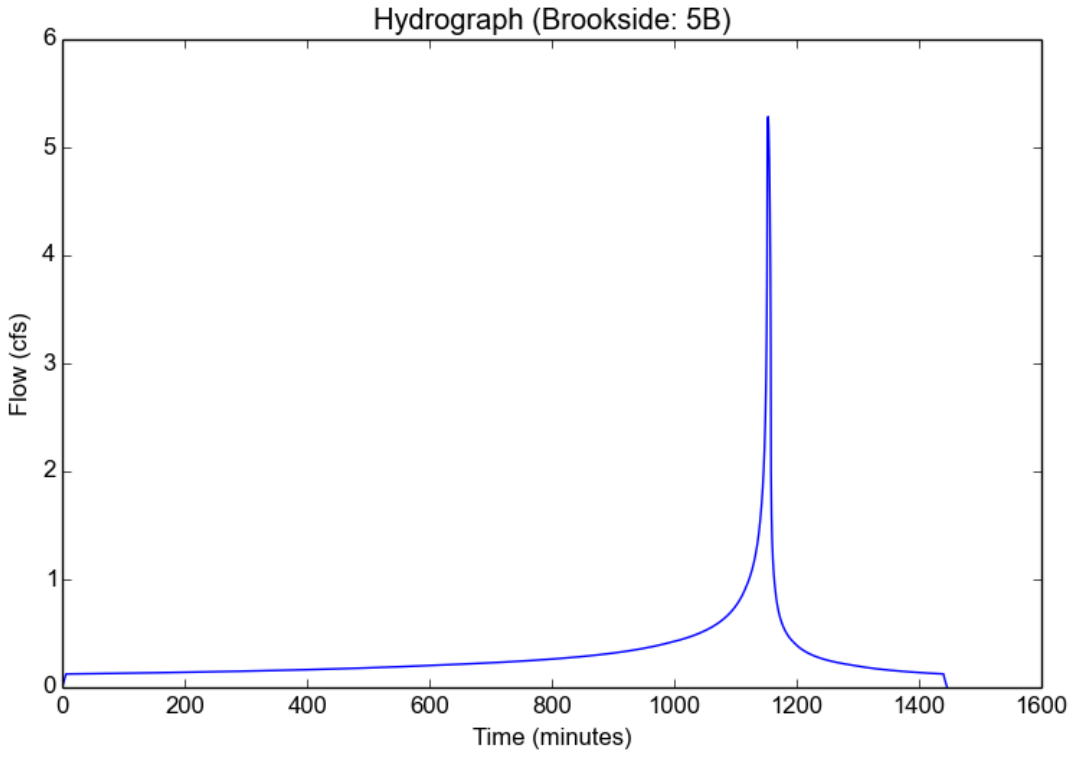
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/100yr/Brookside Proposed - 5B - 100yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5B
Area (ac)	1.47
Flow Path Length (ft)	542.7
Flow Path Slope (vft/hft)	0.0129
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.46
Soil Type	2
Design Storm Frequency	100-yr
Fire Factor	0
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	7.293
Peak Intensity (in/hr)	3.9939
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	5.2839
Burned Peak Flow Rate (cfs)	5.2839
24-Hr Clear Runoff Volume (ac-ft)	0.5913
24-Hr Clear Runoff Volume (cu-ft)	25757.6806



Peak Flow Hydrologic Analysis

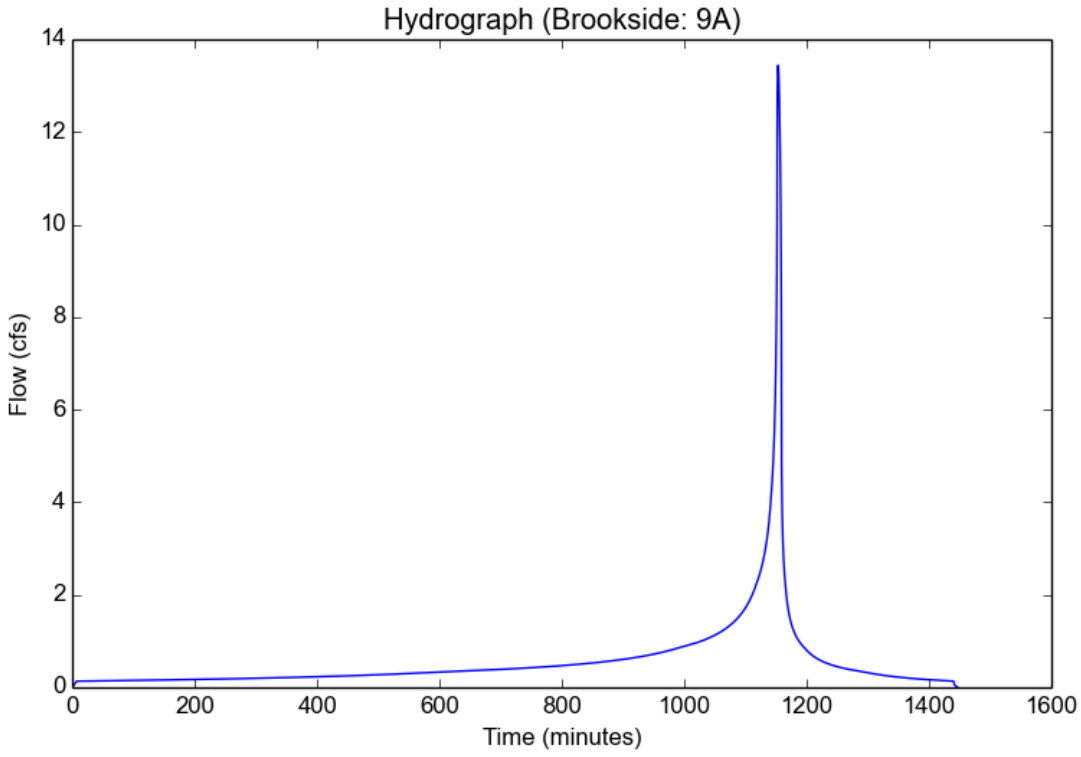
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/100yr/Brookside Proposed - 9A - 100yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	4.02
Flow Path Length (ft)	958.0
Flow Path Slope (vft/hft)	0.05323
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	100-yr
Fire Factor	0
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	7.293
Peak Intensity (in/hr)	3.7147
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	13.44
Burned Peak Flow Rate (cfs)	13.44
24-Hr Clear Runoff Volume (ac-ft)	1.1476
24-Hr Clear Runoff Volume (cu-ft)	49987.6542



Peak Flow Hydrologic Analysis

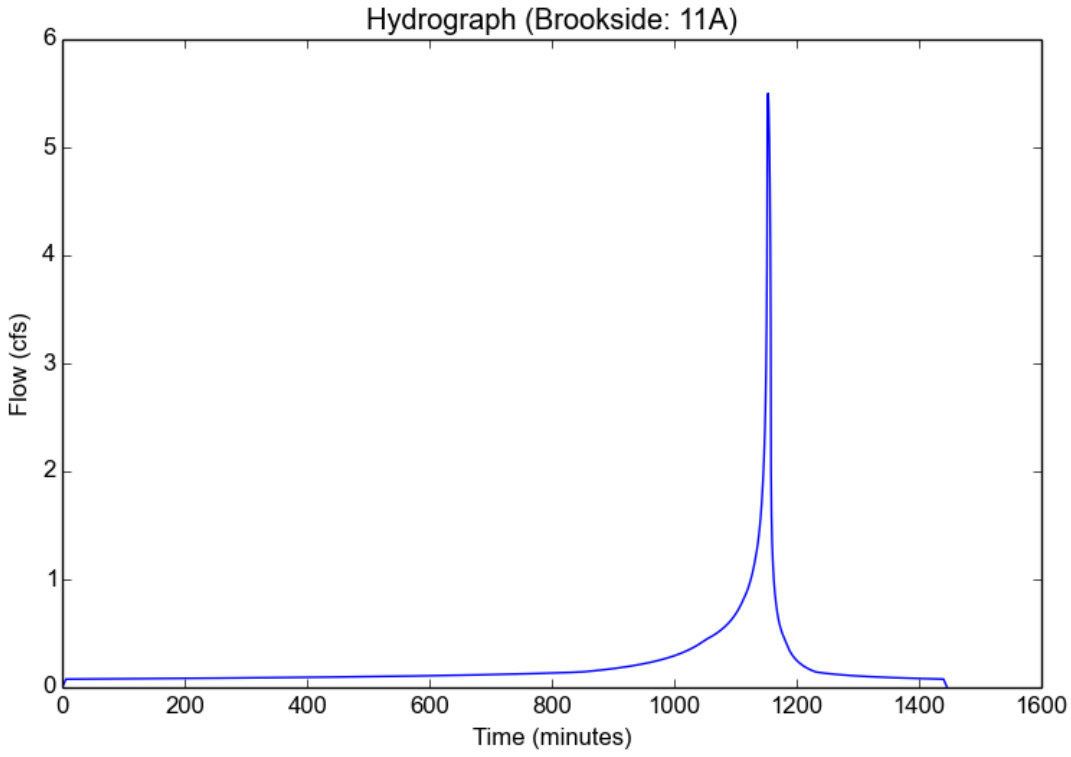
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/100yr/Brookside Proposed - 11A - 100yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	1.53
Flow Path Length (ft)	494.1
Flow Path Slope (vft/hft)	0.00607
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.263
Soil Type	17
Design Storm Frequency	100-yr
Fire Factor	0
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	7.293
Peak Intensity (in/hr)	3.9939
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	5.4996
Burned Peak Flow Rate (cfs)	5.4996
24-Hr Clear Runoff Volume (ac-ft)	0.4196
24-Hr Clear Runoff Volume (cu-ft)	18279.7039



Peak Flow Hydrologic Analysis

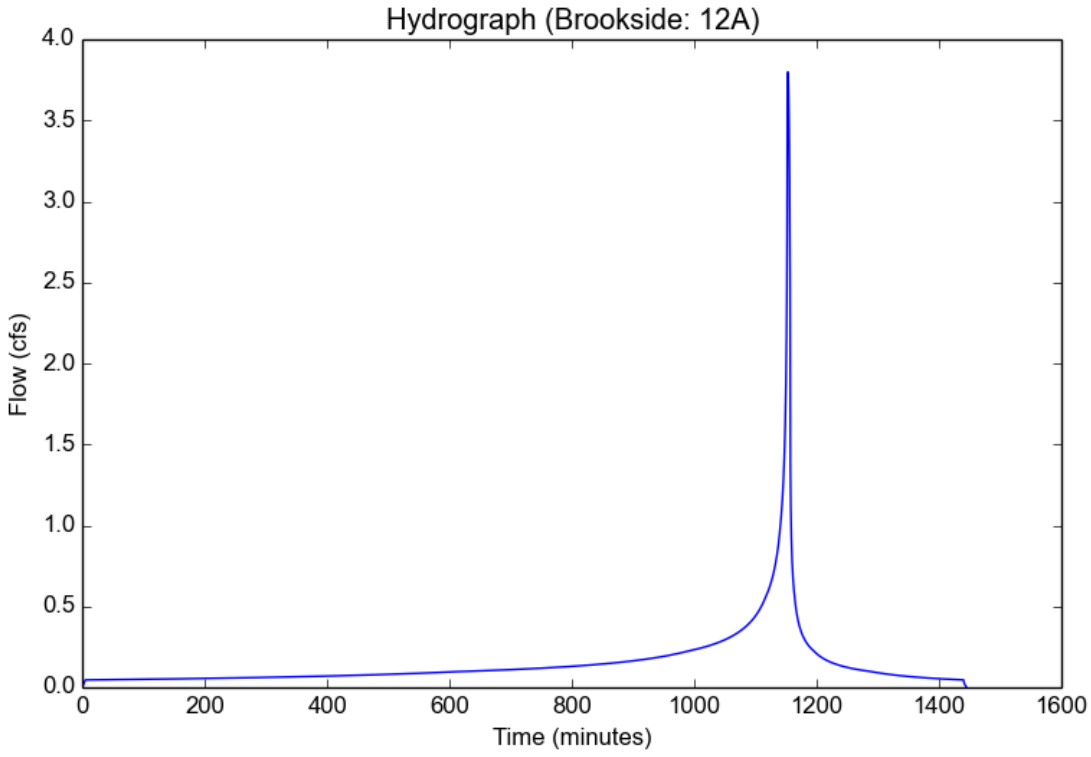
File location: P:/B852/Engineering/Hydrology/On-Site/HydroCalc/Proposed/100yr/Brookside Proposed - 12A - 100yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.97
Flow Path Length (ft)	512.5
Flow Path Slope (vft/hft)	0.07414
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.133
Soil Type	2
Design Storm Frequency	100-yr
Fire Factor	0
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	7.293
Peak Intensity (in/hr)	4.3512
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	3.7986
Burned Peak Flow Rate (cfs)	3.7986
24-Hr Clear Runoff Volume (ac-ft)	0.3078
24-Hr Clear Runoff Volume (cu-ft)	13406.448



APPENDIX A - HYDROCALC RESULTS:
WATER QUALITY ANALYSIS - PROPOSED CONDITIONS ANALYSIS

Peak Flow Hydrologic Analysis

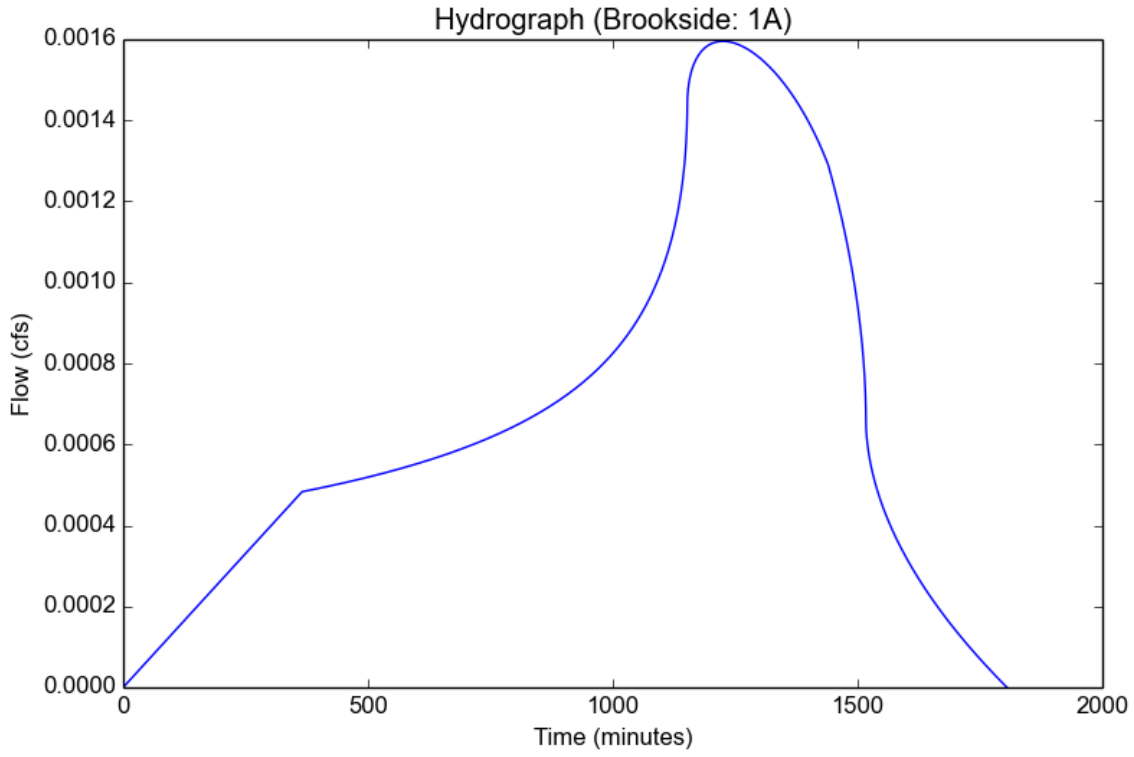
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.1-in Storm/Brookside - 1A_@.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1A
Area (ac)	1.86
Flow Path Length (ft)	623.8
Flow Path Slope (vft/hft)	0.11061
85th Percentile Rainfall Depth (in)	0.1
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.1
Peak Intensity (in/hr)	0.0079
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	365.0
Clear Peak Flow Rate (cfs)	0.0016
Burned Peak Flow Rate (cfs)	0.0016
24-Hr Clear Runoff Volume (ac-ft)	0.0017
24-Hr Clear Runoff Volume (cu-ft)	72.4742



Peak Flow Hydrologic Analysis

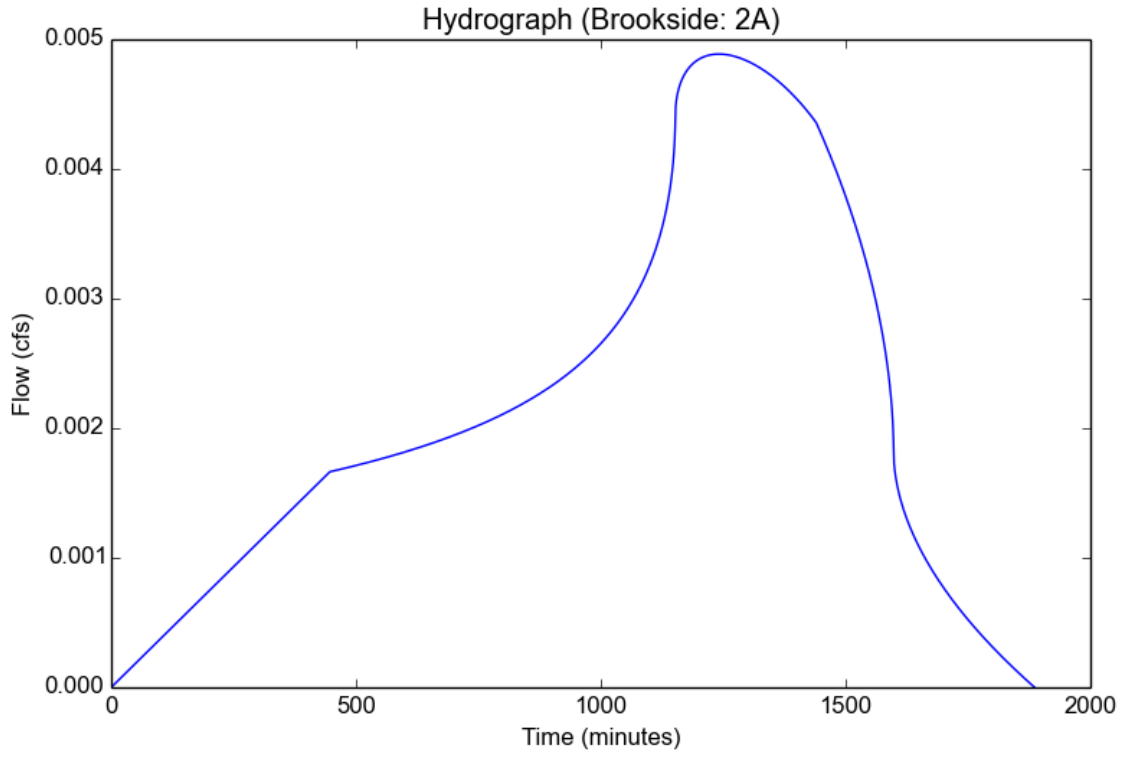
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.1-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	6.26
Flow Path Length (ft)	739.9
Flow Path Slope (vft/hft)	0.06623
85th Percentile Rainfall Depth (in)	0.1
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.1
Peak Intensity (in/hr)	0.0072
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	446.0
Clear Peak Flow Rate (cfs)	0.0049
Burned Peak Flow Rate (cfs)	0.0049
24-Hr Clear Runoff Volume (ac-ft)	0.0056
24-Hr Clear Runoff Volume (cu-ft)	244.238



Peak Flow Hydrologic Analysis

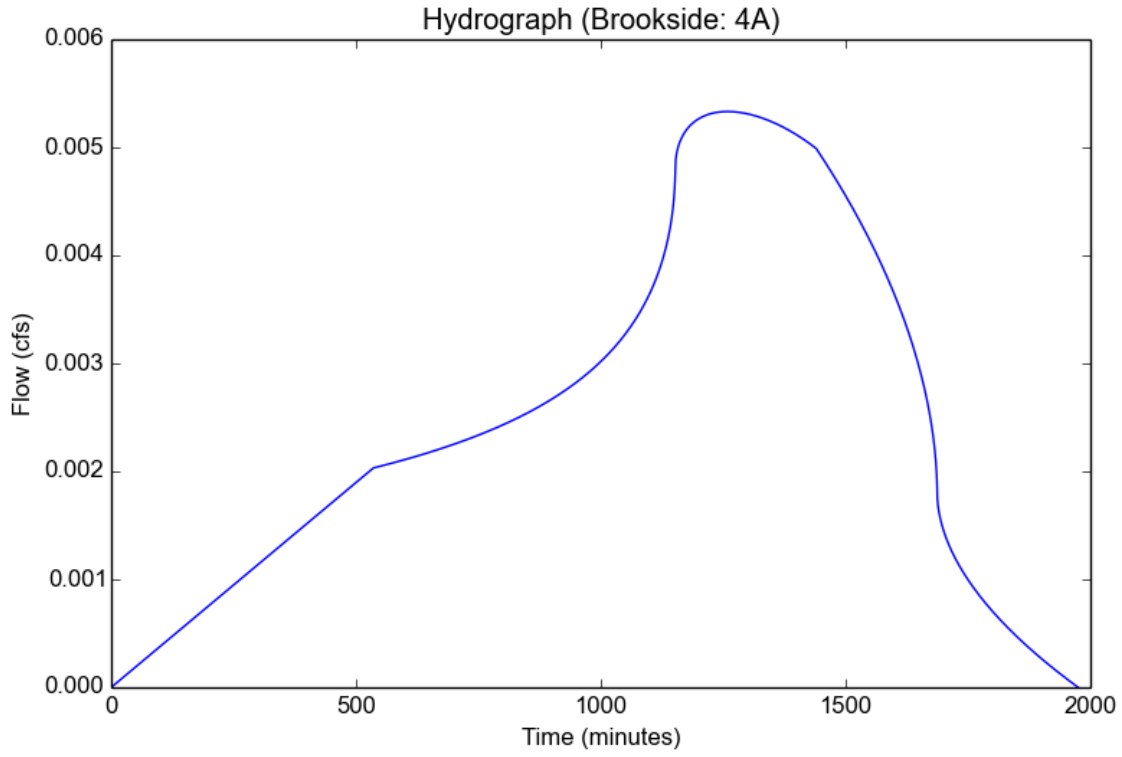
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.1-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	7.44
Flow Path Length (ft)	949.3
Flow Path Slope (vft/hft)	0.05794
85th Percentile Rainfall Depth (in)	0.1
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.1
Peak Intensity (in/hr)	0.0066
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	535.0
Clear Peak Flow Rate (cfs)	0.0053
Burned Peak Flow Rate (cfs)	0.0053
24-Hr Clear Runoff Volume (ac-ft)	0.0067
24-Hr Clear Runoff Volume (cu-ft)	290.8485



Peak Flow Hydrologic Analysis

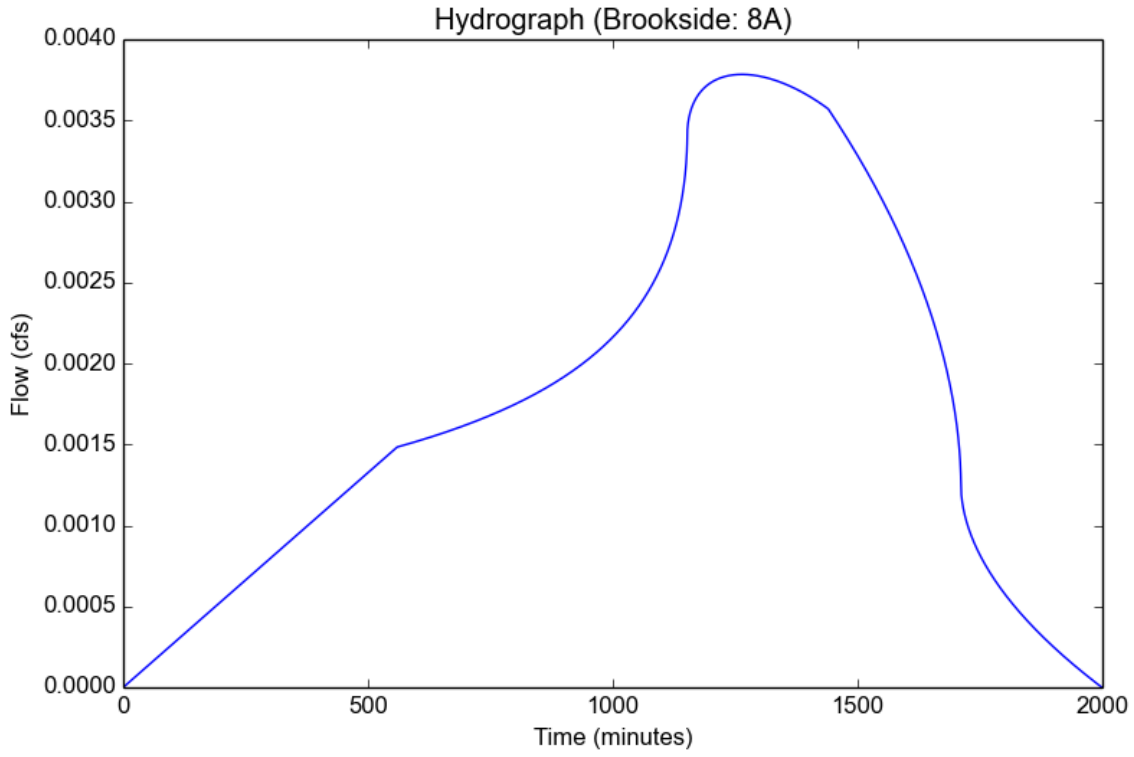
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.1-in Storm/Brookside - 8A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	8A
Area (ac)	5.39
Flow Path Length (ft)	1116.4
Flow Path Slope (vft/hft)	0.08151
85th Percentile Rainfall Depth (in)	0.1
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.1
Peak Intensity (in/hr)	0.0065
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	559.0
Clear Peak Flow Rate (cfs)	0.0038
Burned Peak Flow Rate (cfs)	0.0038
24-Hr Clear Runoff Volume (ac-ft)	0.0048
24-Hr Clear Runoff Volume (cu-ft)	210.8448



Peak Flow Hydrologic Analysis

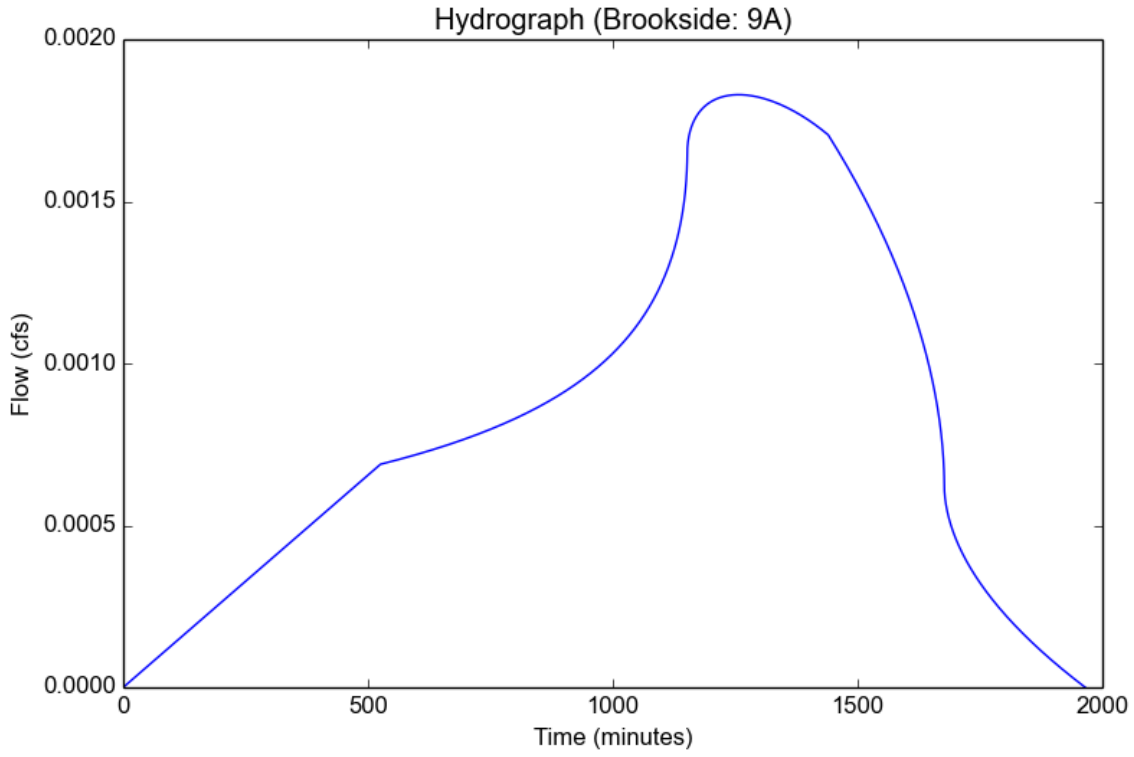
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.1-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	2.53
Flow Path Length (ft)	912.2
Flow Path Slope (vft/hft)	0.05591
85th Percentile Rainfall Depth (in)	0.1
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.1
Peak Intensity (in/hr)	0.0067
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	525.0
Clear Peak Flow Rate (cfs)	0.0018
Burned Peak Flow Rate (cfs)	0.0018
24-Hr Clear Runoff Volume (ac-ft)	0.0023
24-Hr Clear Runoff Volume (cu-ft)	98.8791



Peak Flow Hydrologic Analysis

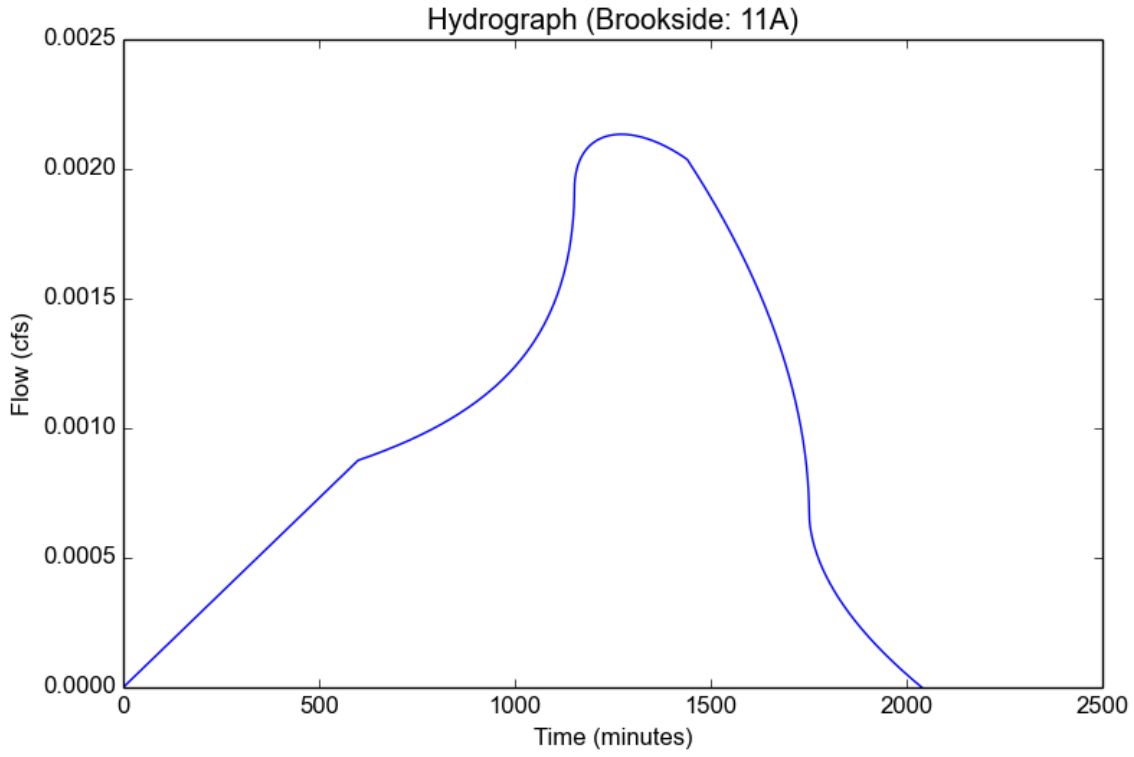
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.1-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	3.14
Flow Path Length (ft)	890.9
Flow Path Slope (vft/hft)	0.02469
85th Percentile Rainfall Depth (in)	0.1
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.1
Peak Intensity (in/hr)	0.0063
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	599.0
Clear Peak Flow Rate (cfs)	0.0021
Burned Peak Flow Rate (cfs)	0.0021
24-Hr Clear Runoff Volume (ac-ft)	0.0028
24-Hr Clear Runoff Volume (cu-ft)	122.9776



Peak Flow Hydrologic Analysis

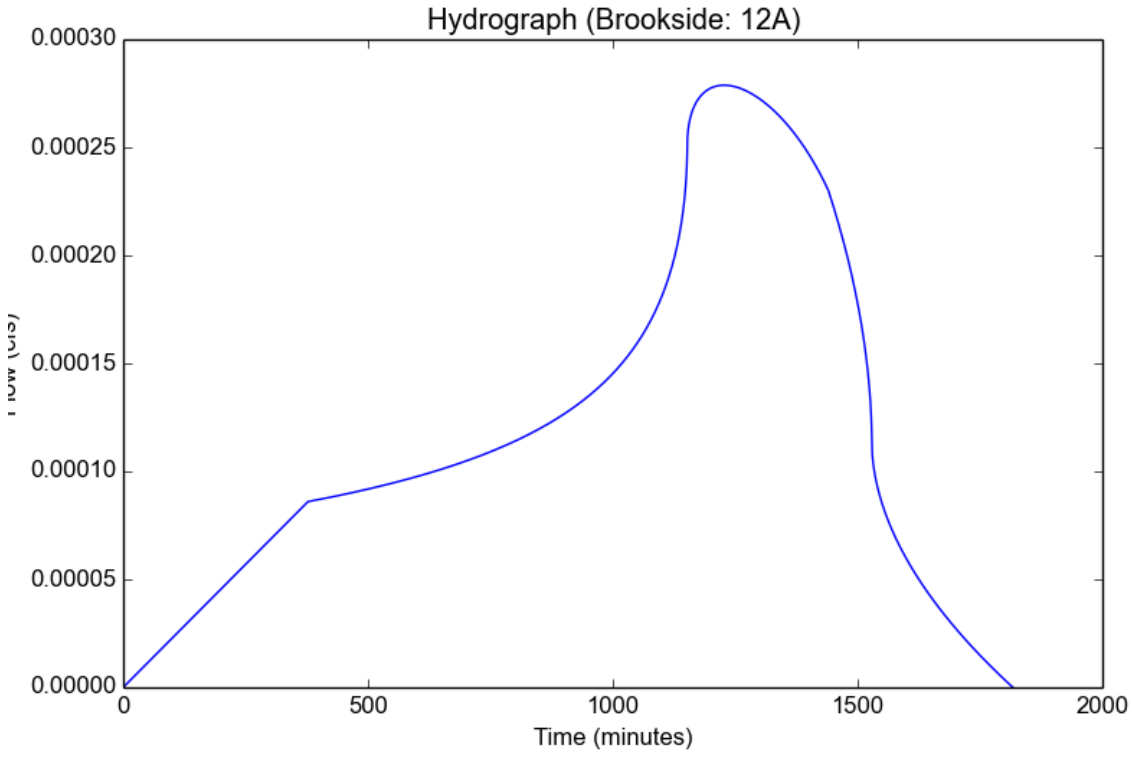
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.1-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.33
Flow Path Length (ft)	406.0
Flow Path Slope (vft/hft)	0.0197
85th Percentile Rainfall Depth (in)	0.1
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.1
Peak Intensity (in/hr)	0.0078
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	377.0
Clear Peak Flow Rate (cfs)	0.0003
Burned Peak Flow Rate (cfs)	0.0003
24-Hr Clear Runoff Volume (ac-ft)	0.0003
24-Hr Clear Runoff Volume (cu-ft)	12.8605



Peak Flow Hydrologic Analysis

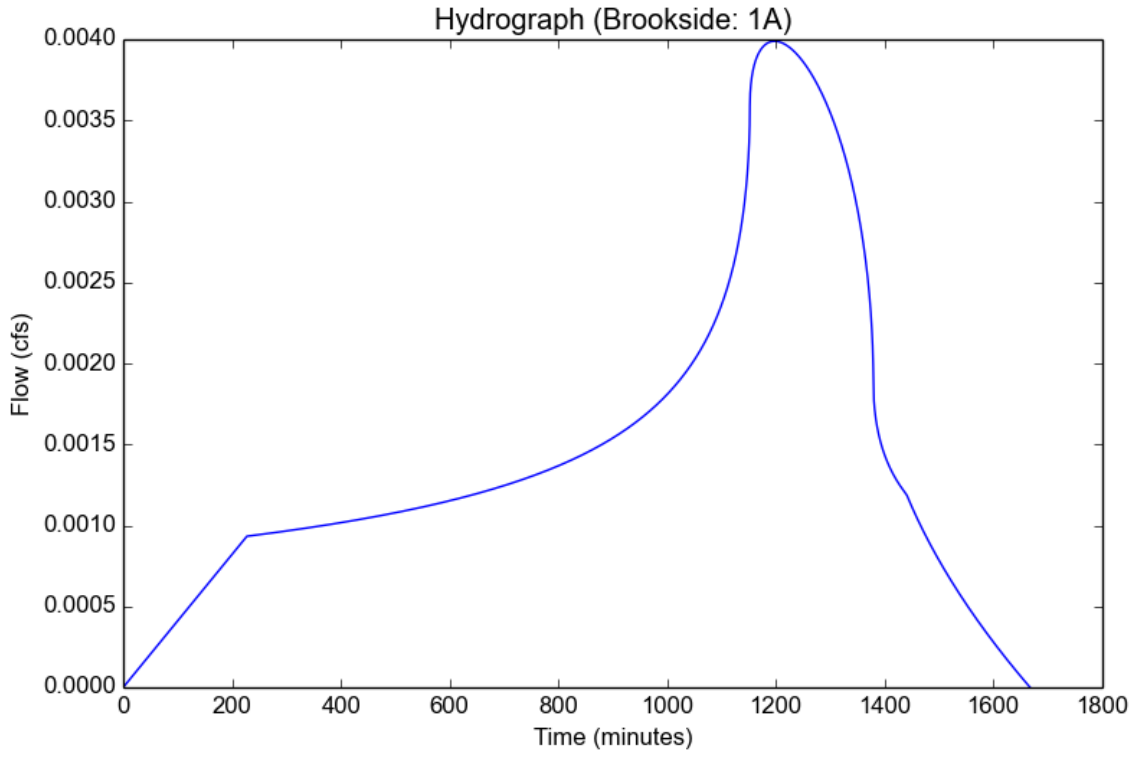
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.2-in Storm/Brookside - 1A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1A
Area (ac)	1.86
Flow Path Length (ft)	623.8
Flow Path Slope (vft/hft)	0.11061
85th Percentile Rainfall Depth (in)	0.2
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.2
Peak Intensity (in/hr)	0.0199
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	227.0
Clear Peak Flow Rate (cfs)	0.004
Burned Peak Flow Rate (cfs)	0.004
24-Hr Clear Runoff Volume (ac-ft)	0.0033
24-Hr Clear Runoff Volume (cu-ft)	144.7427



Peak Flow Hydrologic Analysis

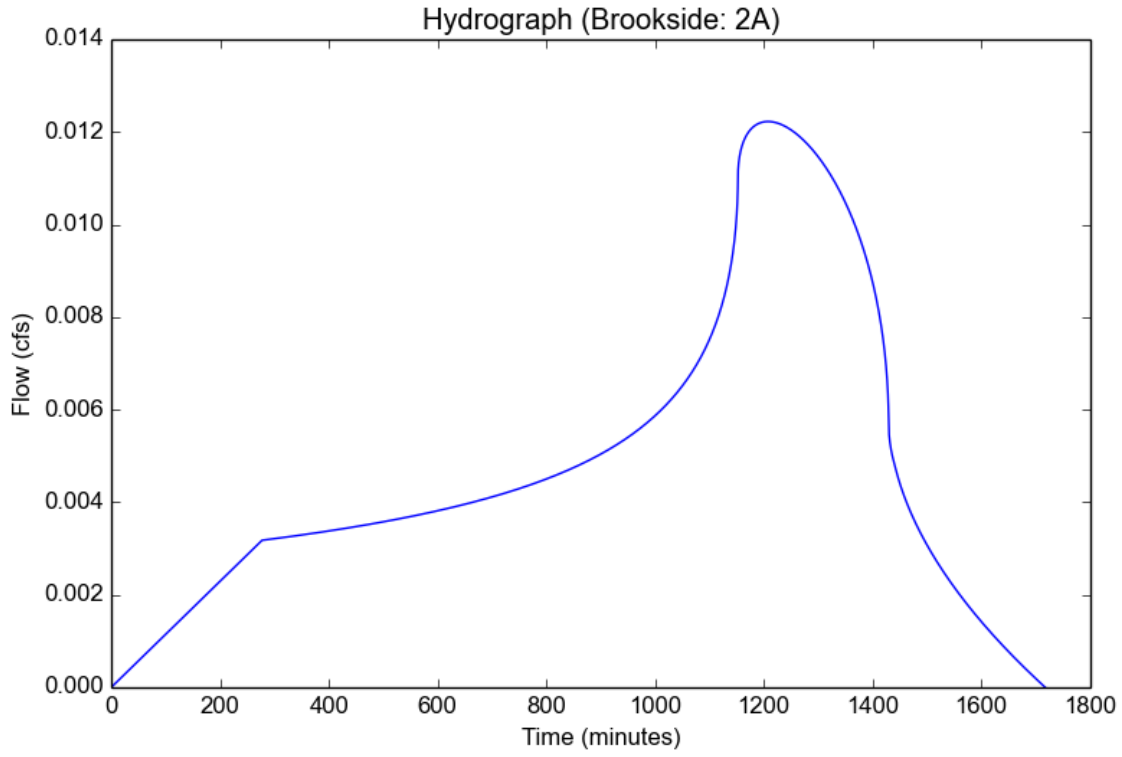
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.2-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	6.26
Flow Path Length (ft)	739.9
Flow Path Slope (vft/hft)	0.06623
85th Percentile Rainfall Depth (in)	0.2
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.2
Peak Intensity (in/hr)	0.0181
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	277.0
Clear Peak Flow Rate (cfs)	0.0122
Burned Peak Flow Rate (cfs)	0.0122
24-Hr Clear Runoff Volume (ac-ft)	0.0112
24-Hr Clear Runoff Volume (cu-ft)	487.3457



Peak Flow Hydrologic Analysis

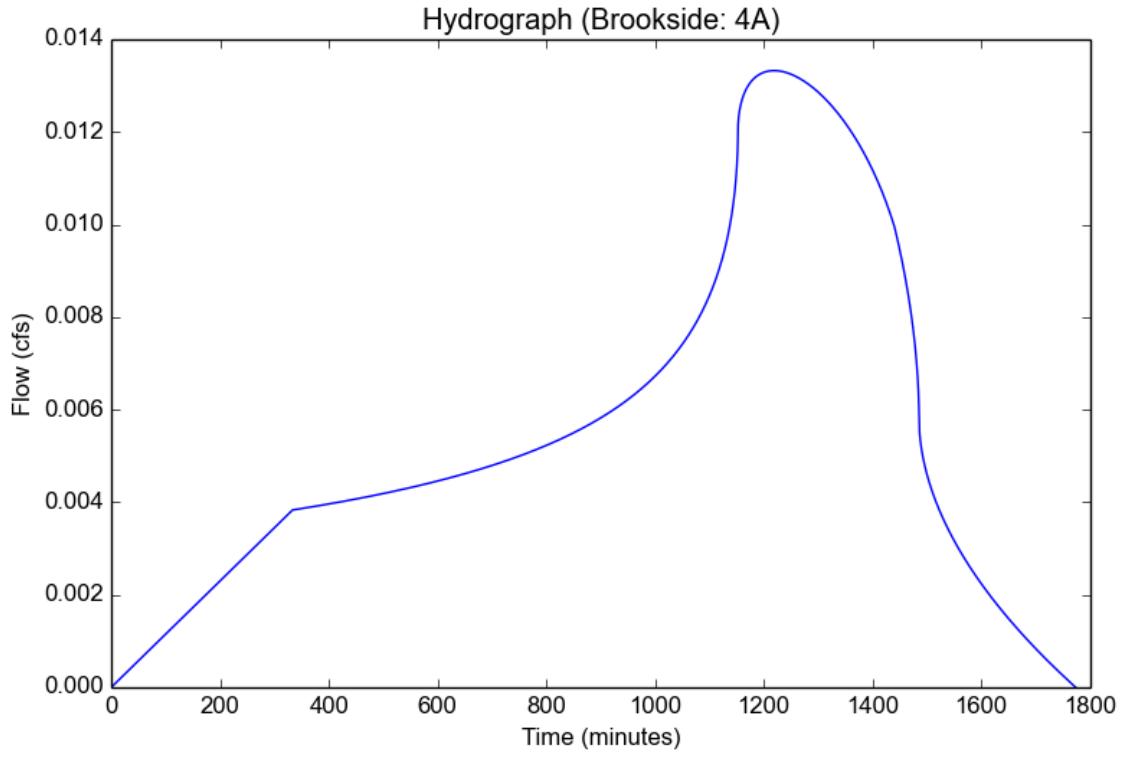
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.2-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	7.44
Flow Path Length (ft)	949.3
Flow Path Slope (vft/hft)	0.05794
85th Percentile Rainfall Depth (in)	0.2
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.2
Peak Intensity (in/hr)	0.0166
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	333.0
Clear Peak Flow Rate (cfs)	0.0133
Burned Peak Flow Rate (cfs)	0.0133
24-Hr Clear Runoff Volume (ac-ft)	0.0133
24-Hr Clear Runoff Volume (cu-ft)	579.5549



Peak Flow Hydrologic Analysis

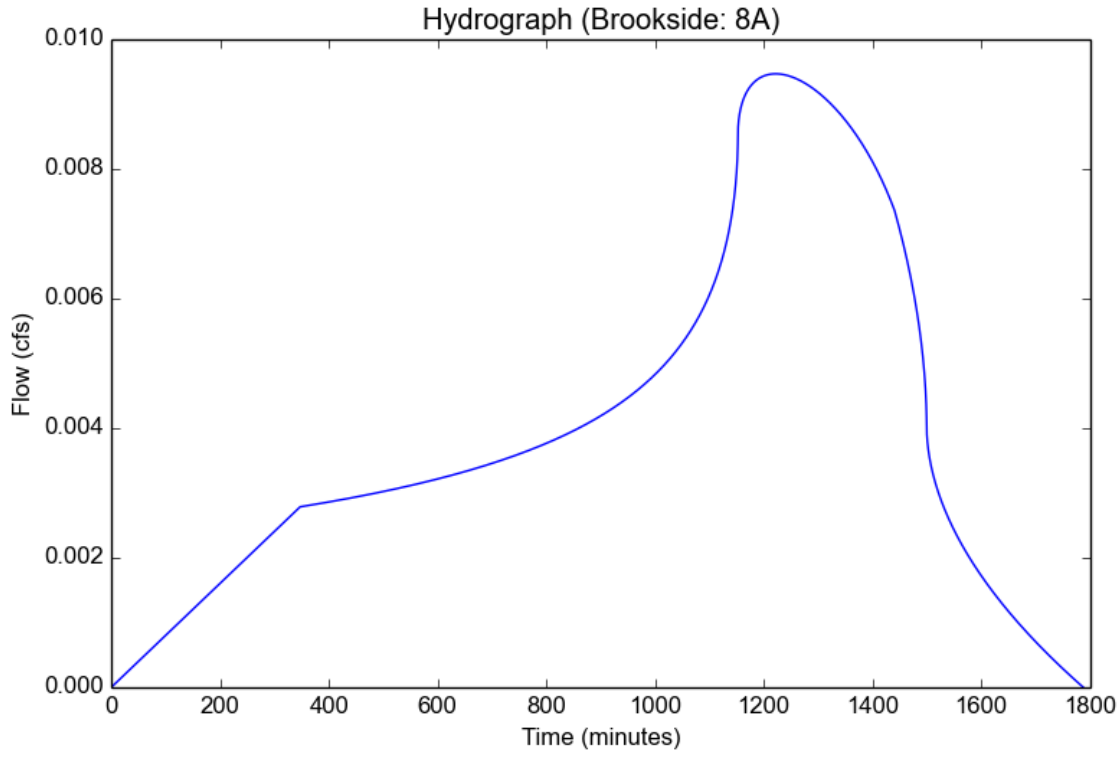
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.2-in Storm/Brookside - 8A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	8A
Area (ac)	5.39
Flow Path Length (ft)	1116.4
Flow Path Slope (vft/hft)	0.08151
85th Percentile Rainfall Depth (in)	0.2
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.2
Peak Intensity (in/hr)	0.0163
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	347.0
Clear Peak Flow Rate (cfs)	0.0095
Burned Peak Flow Rate (cfs)	0.0095
24-Hr Clear Runoff Volume (ac-ft)	0.0096
24-Hr Clear Runoff Volume (cu-ft)	419.9385



Peak Flow Hydrologic Analysis

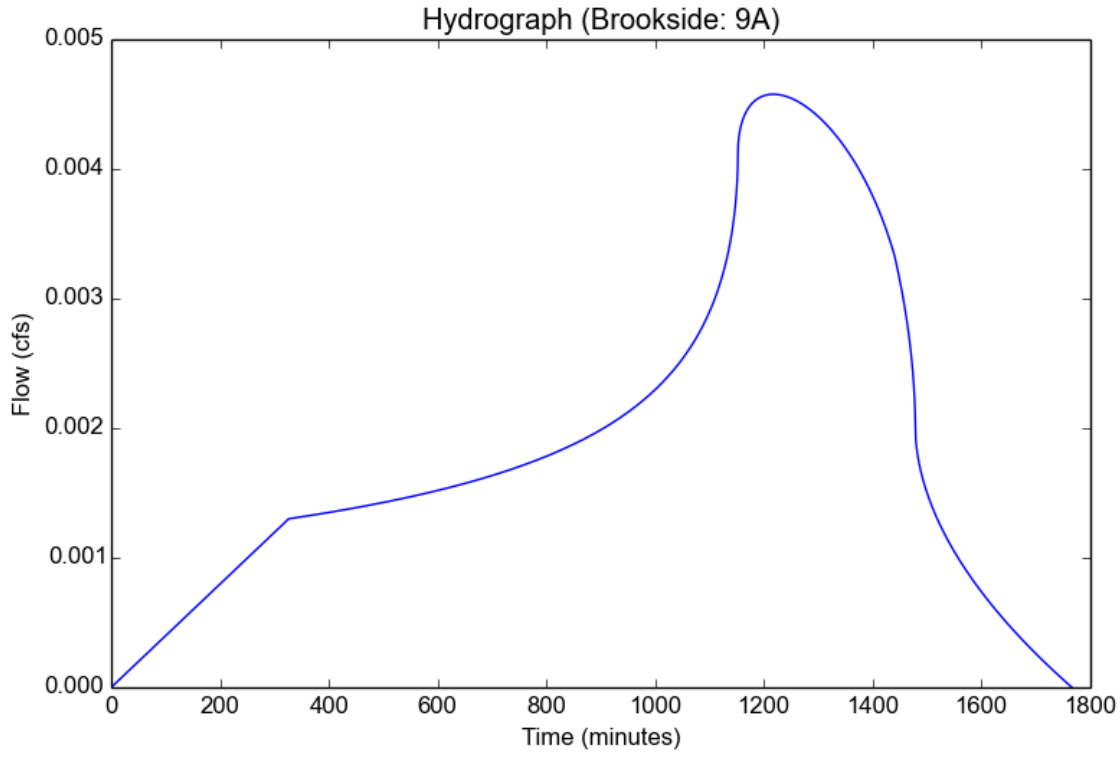
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.2-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	2.53
Flow Path Length (ft)	912.2
Flow Path Slope (vft/hft)	0.05591
85th Percentile Rainfall Depth (in)	0.2
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.2
Peak Intensity (in/hr)	0.0168
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	326.0
Clear Peak Flow Rate (cfs)	0.0046
Burned Peak Flow Rate (cfs)	0.0046
24-Hr Clear Runoff Volume (ac-ft)	0.0045
24-Hr Clear Runoff Volume (cu-ft)	197.0635



Peak Flow Hydrologic Analysis

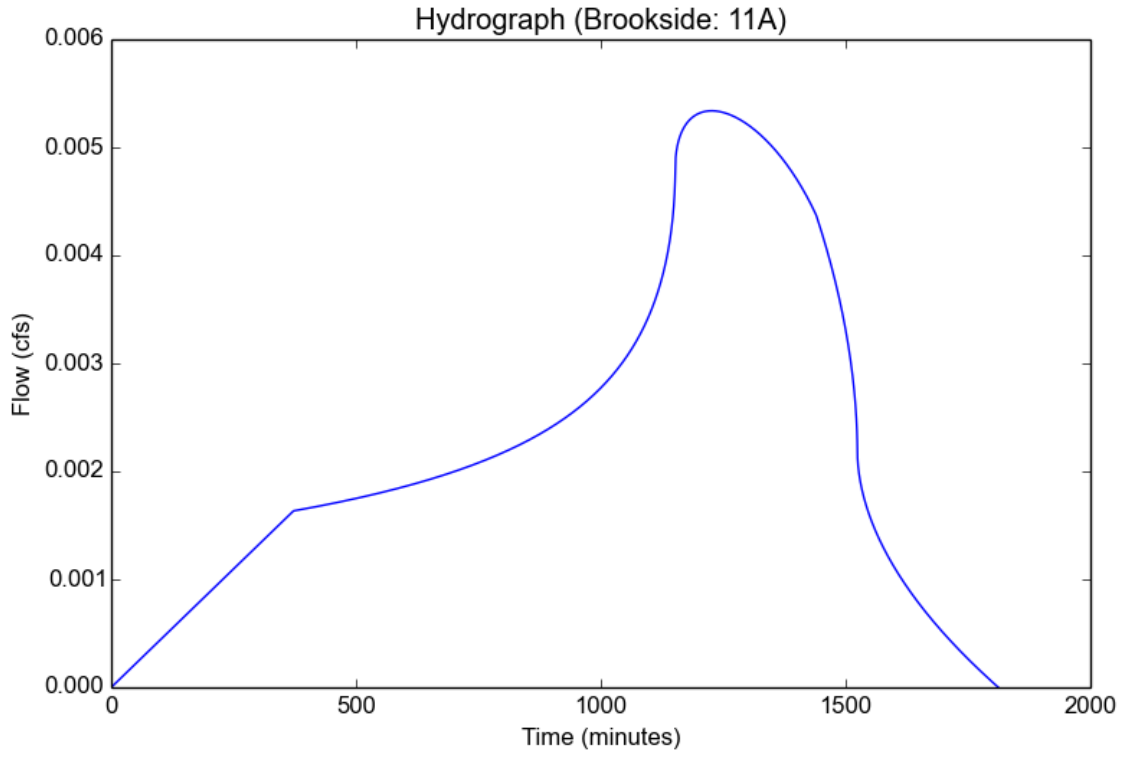
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.2-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	3.14
Flow Path Length (ft)	890.9
Flow Path Slope (vft/hft)	0.02469
85th Percentile Rainfall Depth (in)	0.2
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.2
Peak Intensity (in/hr)	0.0157
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	372.0
Clear Peak Flow Rate (cfs)	0.0053
Burned Peak Flow Rate (cfs)	0.0053
24-Hr Clear Runoff Volume (ac-ft)	0.0056
24-Hr Clear Runoff Volume (cu-ft)	244.7217



Peak Flow Hydrologic Analysis

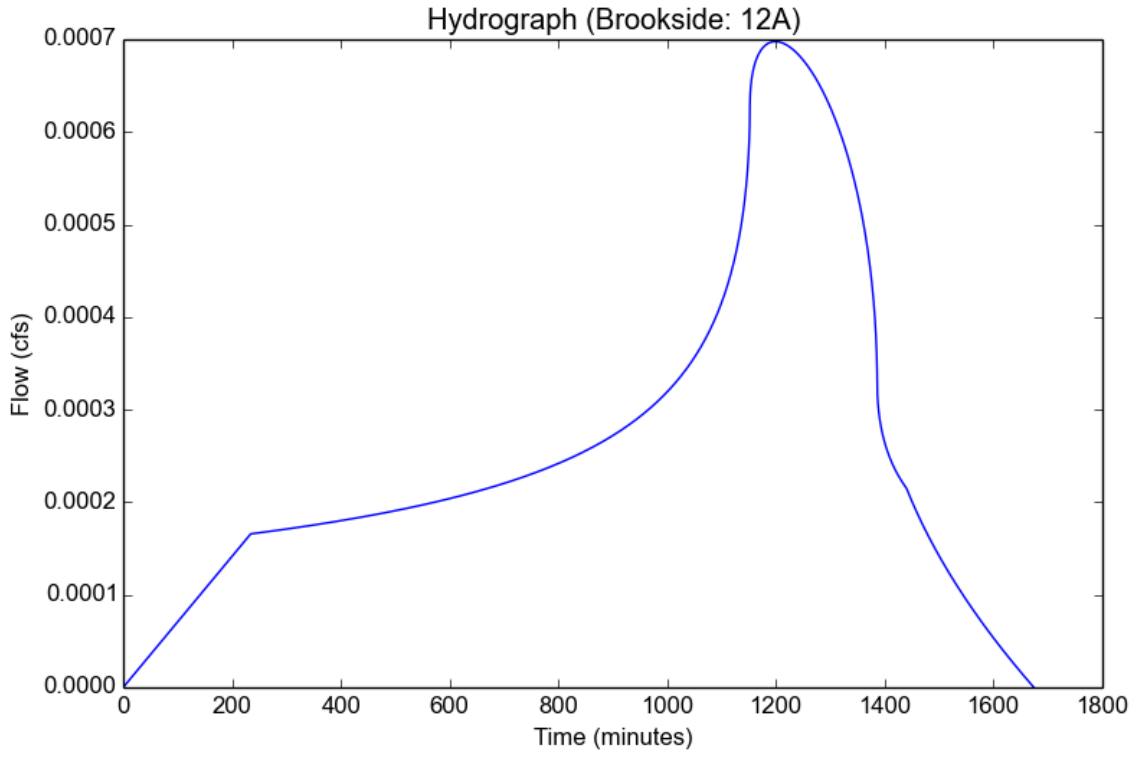
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.2-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.33
Flow Path Length (ft)	406.0
Flow Path Slope (vft/hft)	0.0197
85th Percentile Rainfall Depth (in)	0.2
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.2
Peak Intensity (in/hr)	0.0196
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	234.0
Clear Peak Flow Rate (cfs)	0.0007
Burned Peak Flow Rate (cfs)	0.0007
24-Hr Clear Runoff Volume (ac-ft)	0.0006
24-Hr Clear Runoff Volume (cu-ft)	25.6815



Peak Flow Hydrologic Analysis

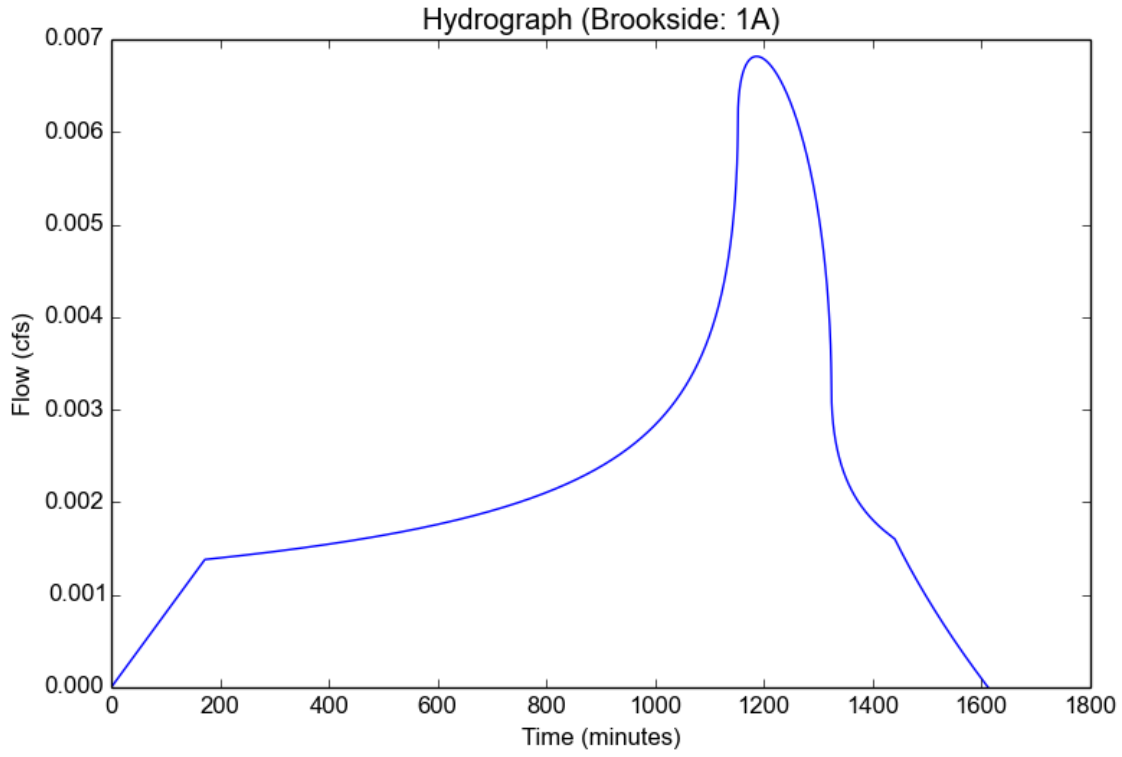
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.3-in Storm/Brookside - 1A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1A
Area (ac)	1.86
Flow Path Length (ft)	623.8
Flow Path Slope (vft/hft)	0.11061
85th Percentile Rainfall Depth (in)	0.3
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.3
Peak Intensity (in/hr)	0.0339
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	172.0
Clear Peak Flow Rate (cfs)	0.0068
Burned Peak Flow Rate (cfs)	0.0068
24-Hr Clear Runoff Volume (ac-ft)	0.005
24-Hr Clear Runoff Volume (cu-ft)	217.0406



Peak Flow Hydrologic Analysis

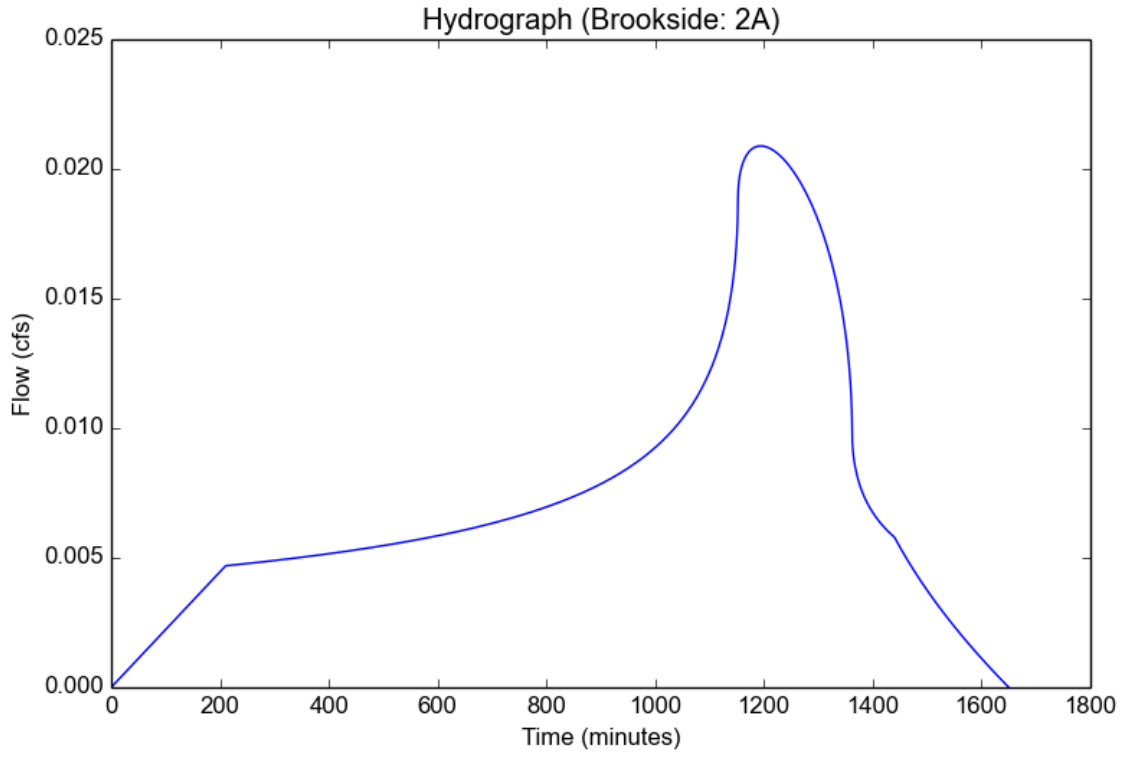
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.3-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	6.26
Flow Path Length (ft)	739.9
Flow Path Slope (vft/hft)	0.06623
85th Percentile Rainfall Depth (in)	0.3
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.3
Peak Intensity (in/hr)	0.0309
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	210.0
Clear Peak Flow Rate (cfs)	0.0209
Burned Peak Flow Rate (cfs)	0.0209
24-Hr Clear Runoff Volume (ac-ft)	0.0168
24-Hr Clear Runoff Volume (cu-ft)	730.6318



Peak Flow Hydrologic Analysis

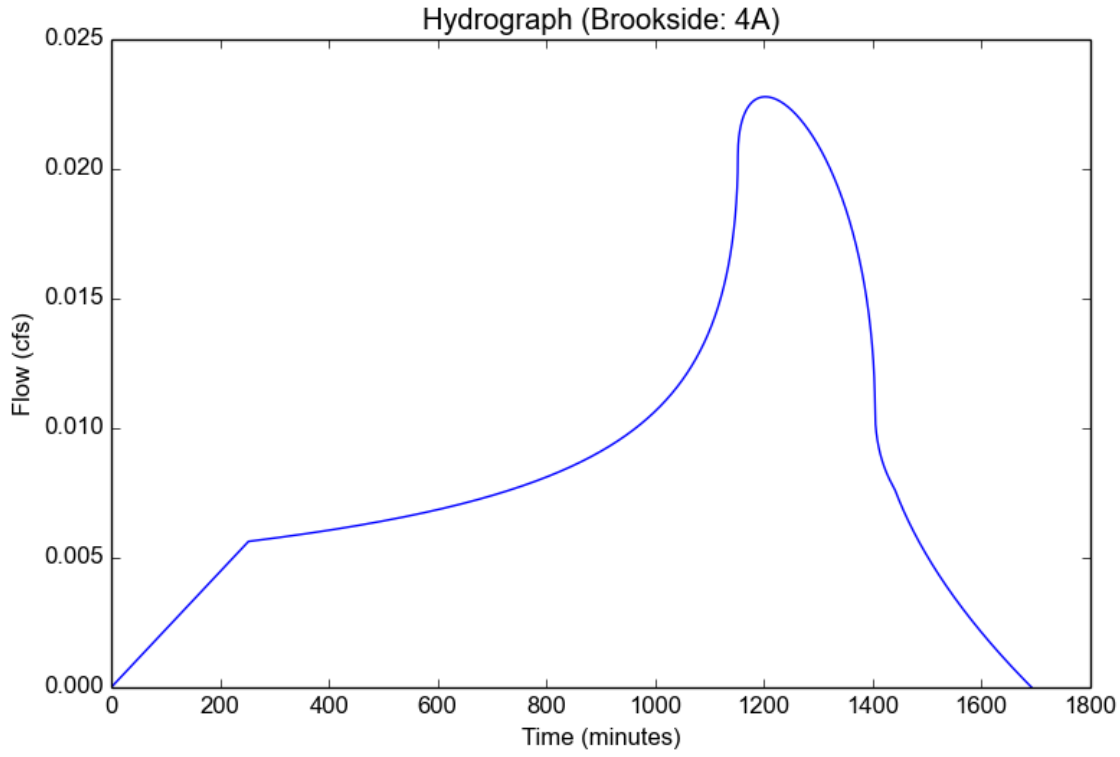
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.3-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	7.44
Flow Path Length (ft)	949.3
Flow Path Slope (vft/hft)	0.05794
85th Percentile Rainfall Depth (in)	0.3
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.3
Peak Intensity (in/hr)	0.0284
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	252.0
Clear Peak Flow Rate (cfs)	0.0228
Burned Peak Flow Rate (cfs)	0.0228
24-Hr Clear Runoff Volume (ac-ft)	0.0199
24-Hr Clear Runoff Volume (cu-ft)	868.6237



Peak Flow Hydrologic Analysis

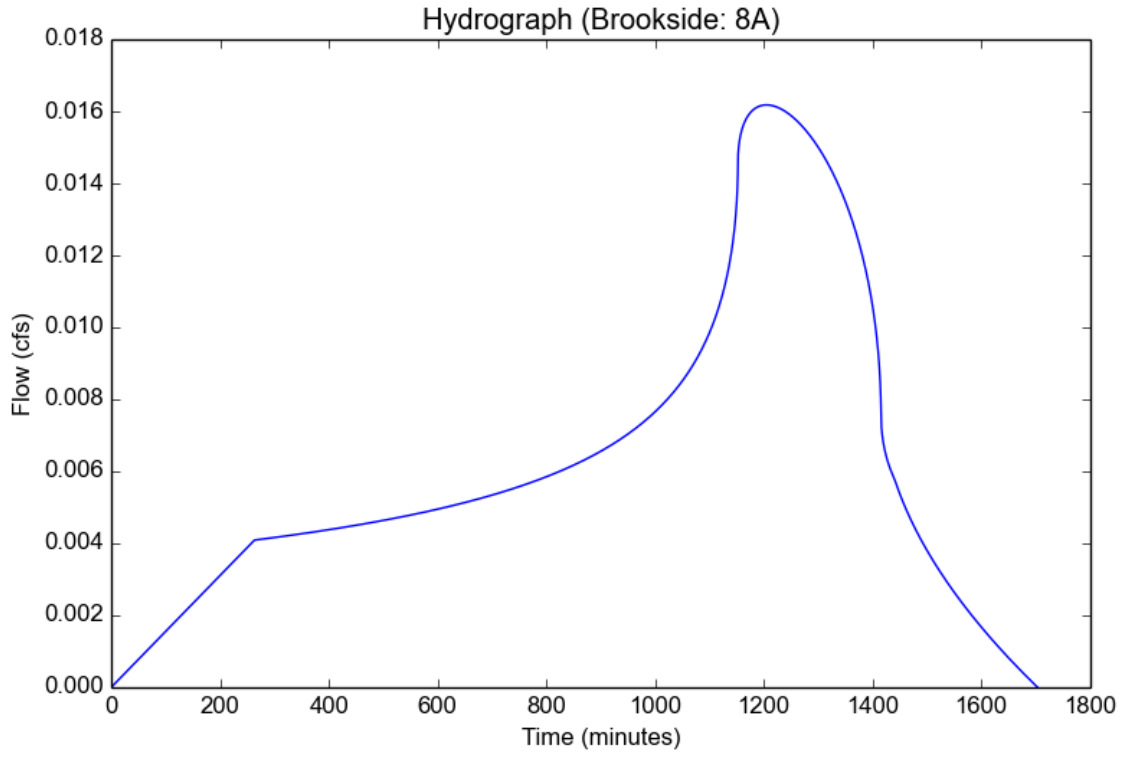
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.3-in Storm/Brookside - 8A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	8A
Area (ac)	5.39
Flow Path Length (ft)	1116.4
Flow Path Slope (vft/hft)	0.08151
85th Percentile Rainfall Depth (in)	0.3
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.3
Peak Intensity (in/hr)	0.0278
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	263.0
Clear Peak Flow Rate (cfs)	0.0162
Burned Peak Flow Rate (cfs)	0.0162
24-Hr Clear Runoff Volume (ac-ft)	0.0144
24-Hr Clear Runoff Volume (cu-ft)	629.3438



Peak Flow Hydrologic Analysis

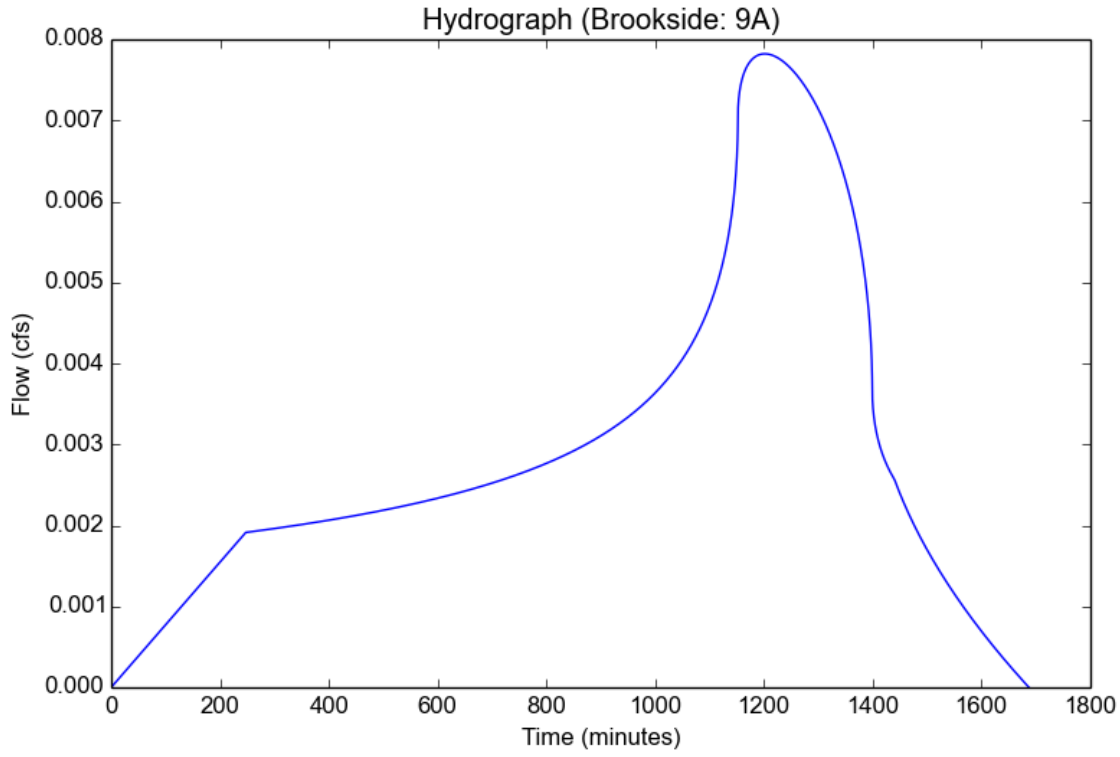
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.3-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	2.53
Flow Path Length (ft)	912.2
Flow Path Slope (vft/hft)	0.05591
85th Percentile Rainfall Depth (in)	0.3
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.3
Peak Intensity (in/hr)	0.0286
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	247.0
Clear Peak Flow Rate (cfs)	0.0078
Burned Peak Flow Rate (cfs)	0.0078
24-Hr Clear Runoff Volume (ac-ft)	0.0068
24-Hr Clear Runoff Volume (cu-ft)	295.3668



Peak Flow Hydrologic Analysis

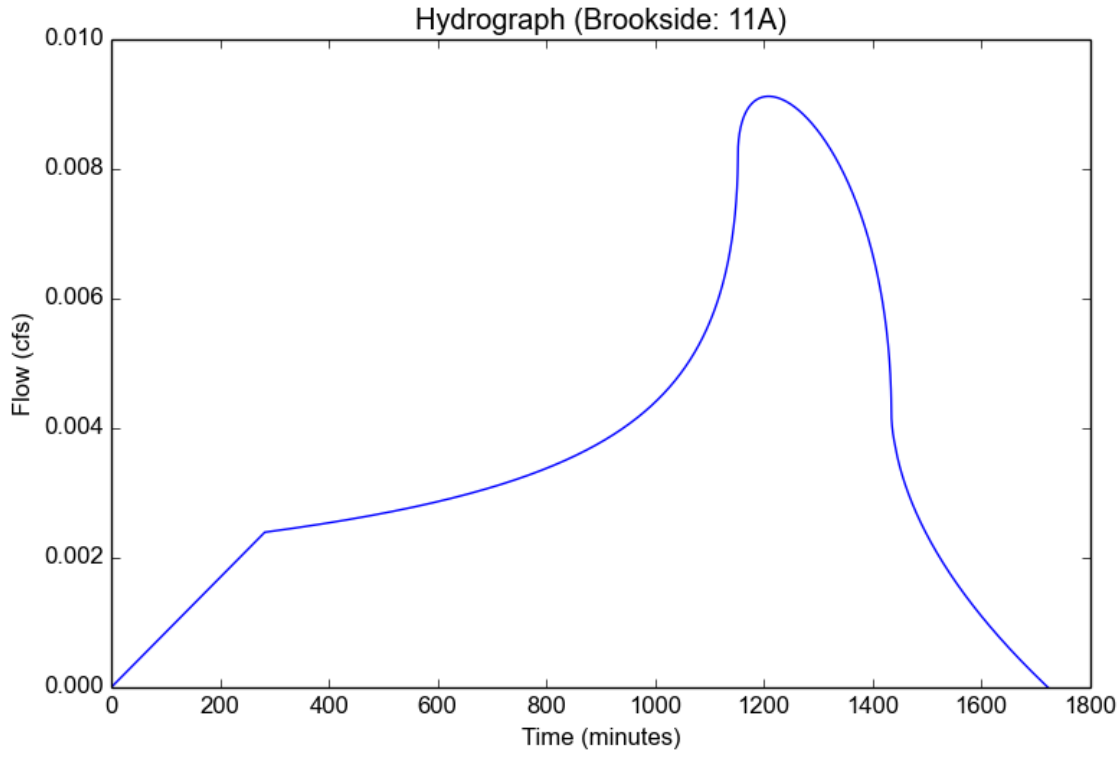
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.3-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	3.14
Flow Path Length (ft)	890.9
Flow Path Slope (vft/hft)	0.02469
85th Percentile Rainfall Depth (in)	0.3
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.3
Peak Intensity (in/hr)	0.0269
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	282.0
Clear Peak Flow Rate (cfs)	0.0091
Burned Peak Flow Rate (cfs)	0.0091
24-Hr Clear Runoff Volume (ac-ft)	0.0084
24-Hr Clear Runoff Volume (cu-ft)	366.6943



Peak Flow Hydrologic Analysis

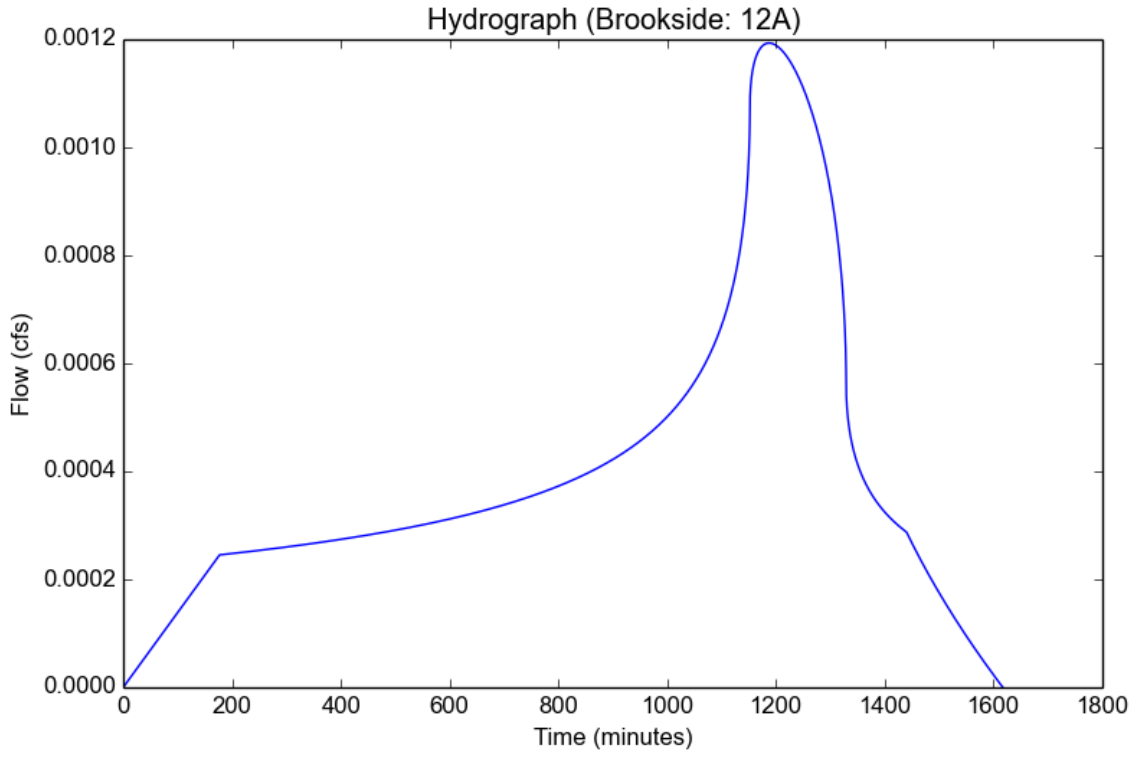
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.3-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.33
Flow Path Length (ft)	406.0
Flow Path Slope (vft/hft)	0.0197
85th Percentile Rainfall Depth (in)	0.3
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.3
Peak Intensity (in/hr)	0.0335
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	177.0
Clear Peak Flow Rate (cfs)	0.0012
Burned Peak Flow Rate (cfs)	0.0012
24-Hr Clear Runoff Volume (ac-ft)	0.0009
24-Hr Clear Runoff Volume (cu-ft)	38.5082



Peak Flow Hydrologic Analysis

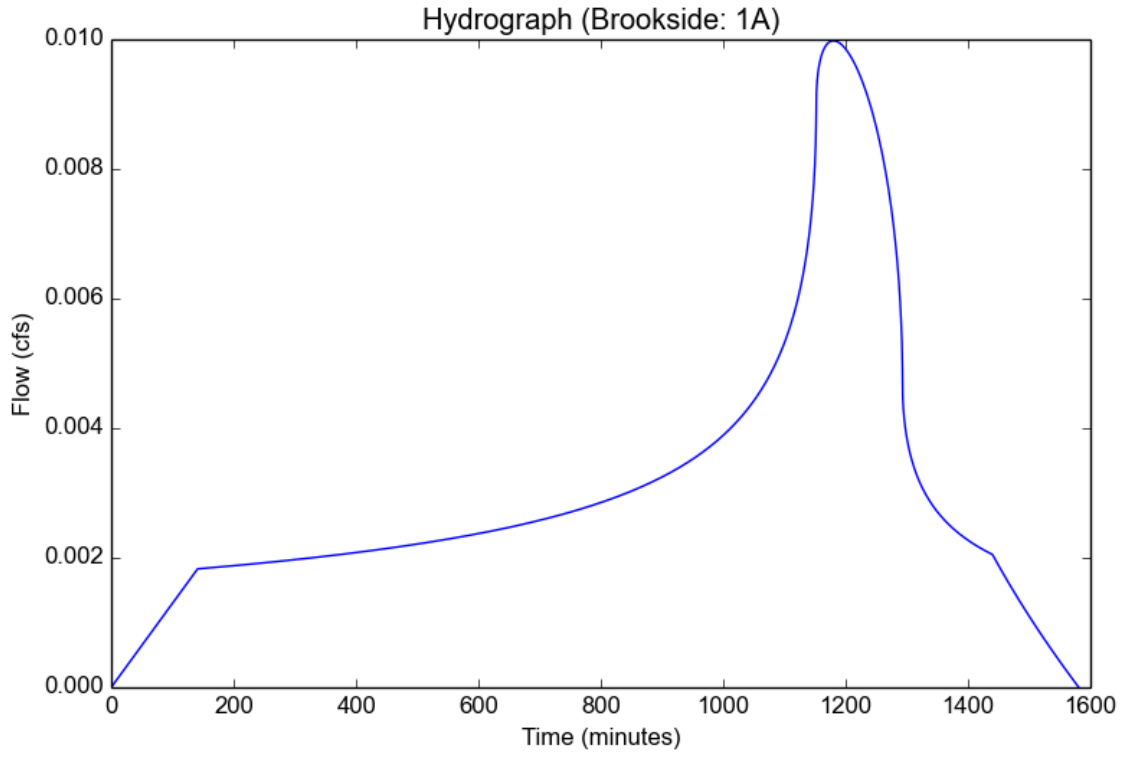
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.4-in Storm/Brookside - 1A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1A
Area (ac)	1.86
Flow Path Length (ft)	623.8
Flow Path Slope (vft/hft)	0.11061
85th Percentile Rainfall Depth (in)	0.4
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.4
Peak Intensity (in/hr)	0.0497
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	141.0
Clear Peak Flow Rate (cfs)	0.01
Burned Peak Flow Rate (cfs)	0.01
24-Hr Clear Runoff Volume (ac-ft)	0.0066
24-Hr Clear Runoff Volume (cu-ft)	289.3463



Peak Flow Hydrologic Analysis

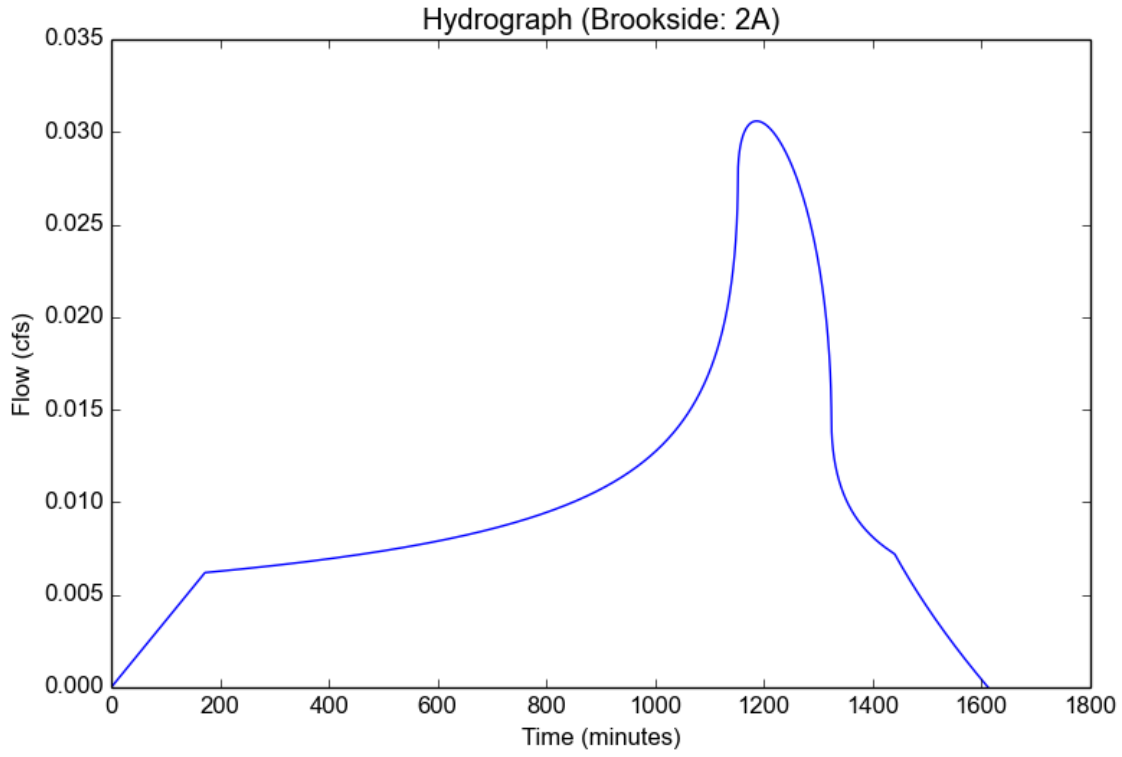
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.4-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	6.26
Flow Path Length (ft)	739.9
Flow Path Slope (vft/hft)	0.06623
85th Percentile Rainfall Depth (in)	0.4
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.4
Peak Intensity (in/hr)	0.0452
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	172.0
Clear Peak Flow Rate (cfs)	0.0306
Burned Peak Flow Rate (cfs)	0.0306
24-Hr Clear Runoff Volume (ac-ft)	0.0224
24-Hr Clear Runoff Volume (cu-ft)	973.9601



Peak Flow Hydrologic Analysis

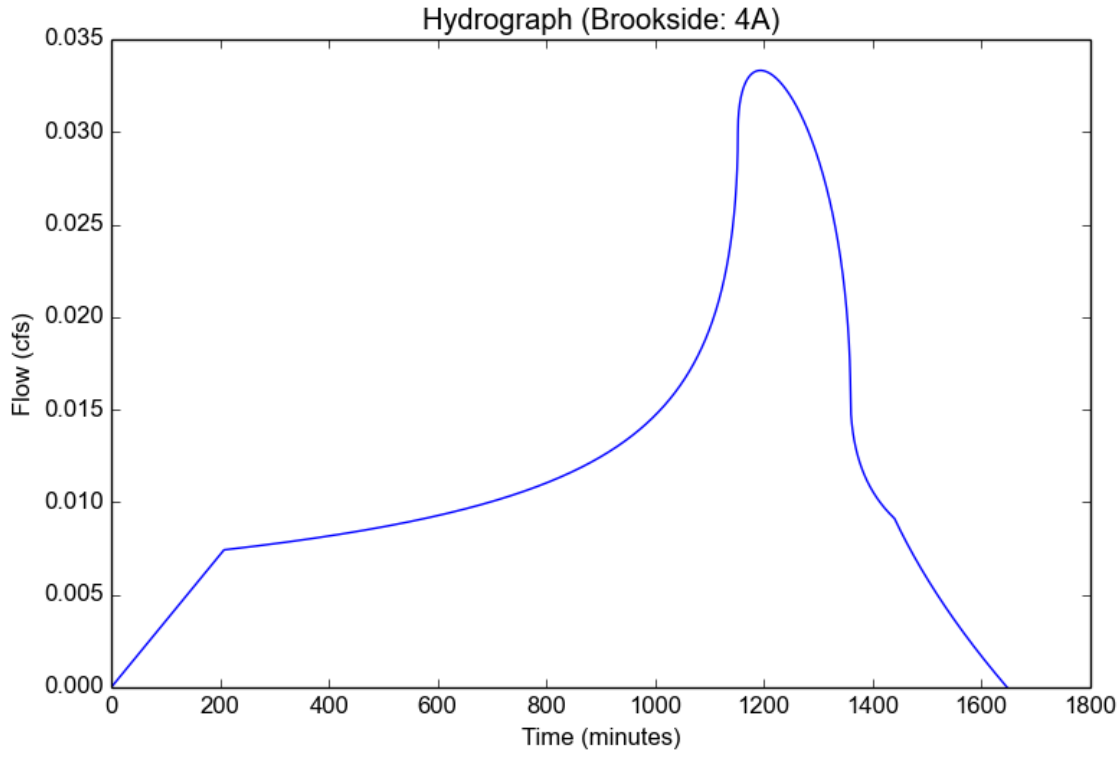
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.4-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	7.44
Flow Path Length (ft)	949.3
Flow Path Slope (vft/hft)	0.05794
85th Percentile Rainfall Depth (in)	0.4
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.4
Peak Intensity (in/hr)	0.0415
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	207.0
Clear Peak Flow Rate (cfs)	0.0333
Burned Peak Flow Rate (cfs)	0.0333
24-Hr Clear Runoff Volume (ac-ft)	0.0266
24-Hr Clear Runoff Volume (cu-ft)	1157.7838



Peak Flow Hydrologic Analysis

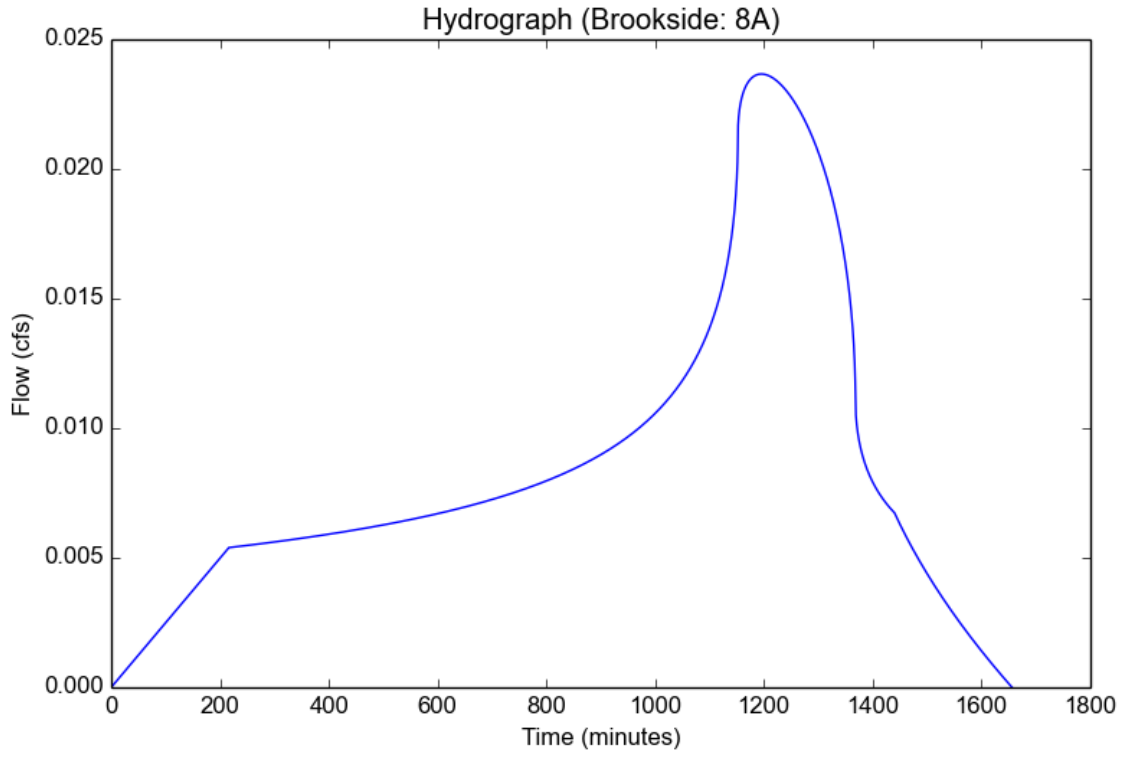
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.4-in Storm/Brookside - 8A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	8A
Area (ac)	5.39
Flow Path Length (ft)	1116.4
Flow Path Slope (vft/hft)	0.08151
85th Percentile Rainfall Depth (in)	0.4
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.4
Peak Intensity (in/hr)	0.0407
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	216.0
Clear Peak Flow Rate (cfs)	0.0237
Burned Peak Flow Rate (cfs)	0.0237
24-Hr Clear Runoff Volume (ac-ft)	0.0193
24-Hr Clear Runoff Volume (cu-ft)	838.8206



Peak Flow Hydrologic Analysis

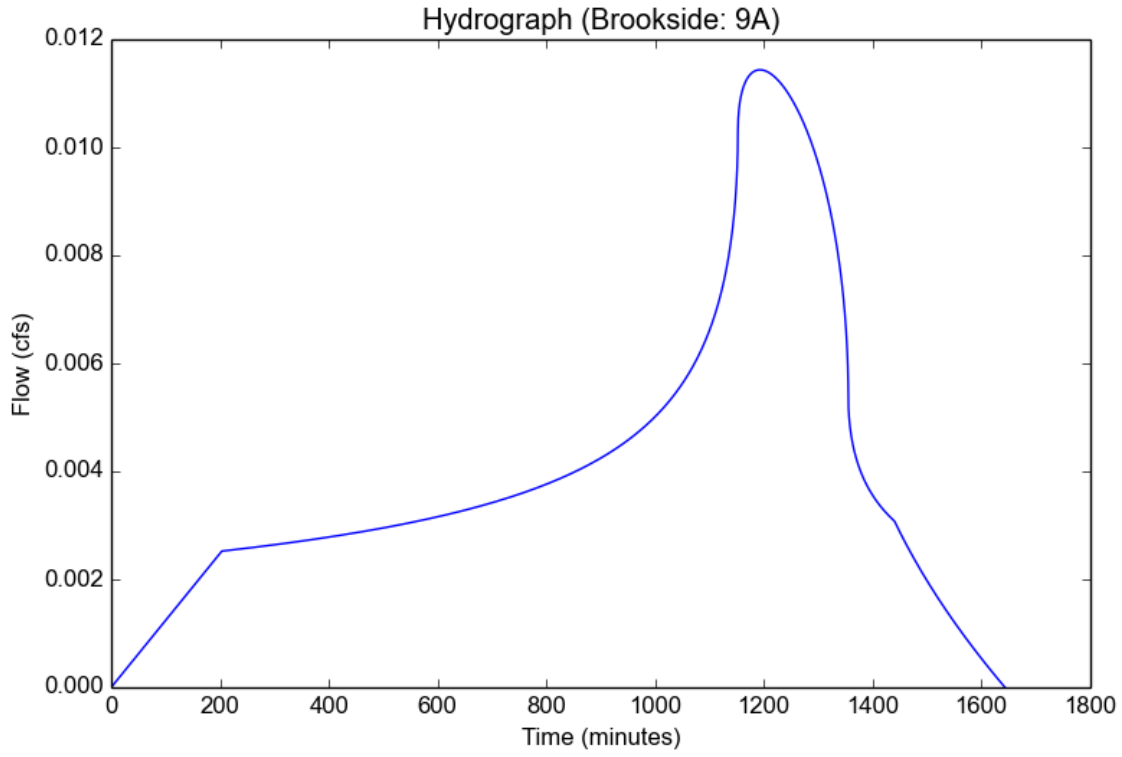
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.4-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	2.53
Flow Path Length (ft)	912.2
Flow Path Slope (vft/hft)	0.05591
85th Percentile Rainfall Depth (in)	0.4
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.4
Peak Intensity (in/hr)	0.0419
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	203.0
Clear Peak Flow Rate (cfs)	0.0114
Burned Peak Flow Rate (cfs)	0.0114
24-Hr Clear Runoff Volume (ac-ft)	0.009
24-Hr Clear Runoff Volume (cu-ft)	393.6988



Peak Flow Hydrologic Analysis

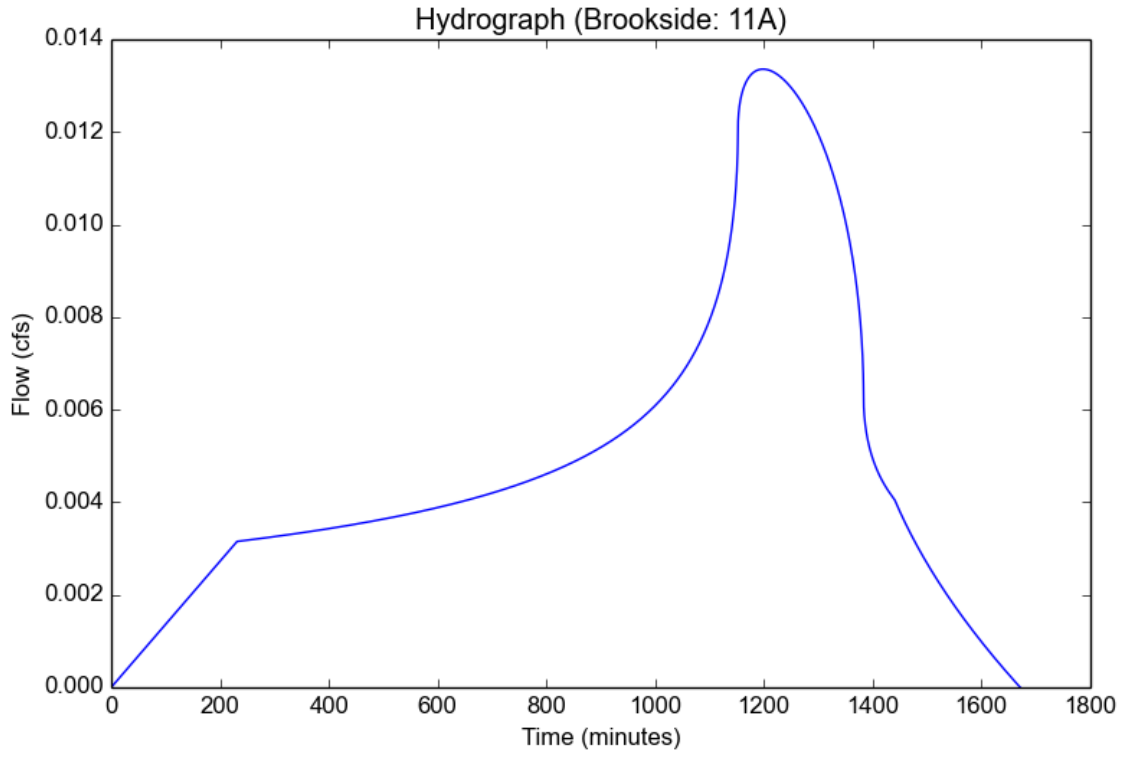
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.4-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	3.14
Flow Path Length (ft)	890.9
Flow Path Slope (vft/hft)	0.02469
85th Percentile Rainfall Depth (in)	0.4
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.4
Peak Intensity (in/hr)	0.0394
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	231.0
Clear Peak Flow Rate (cfs)	0.0134
Burned Peak Flow Rate (cfs)	0.0134
24-Hr Clear Runoff Volume (ac-ft)	0.0112
24-Hr Clear Runoff Volume (cu-ft)	488.7154



Peak Flow Hydrologic Analysis

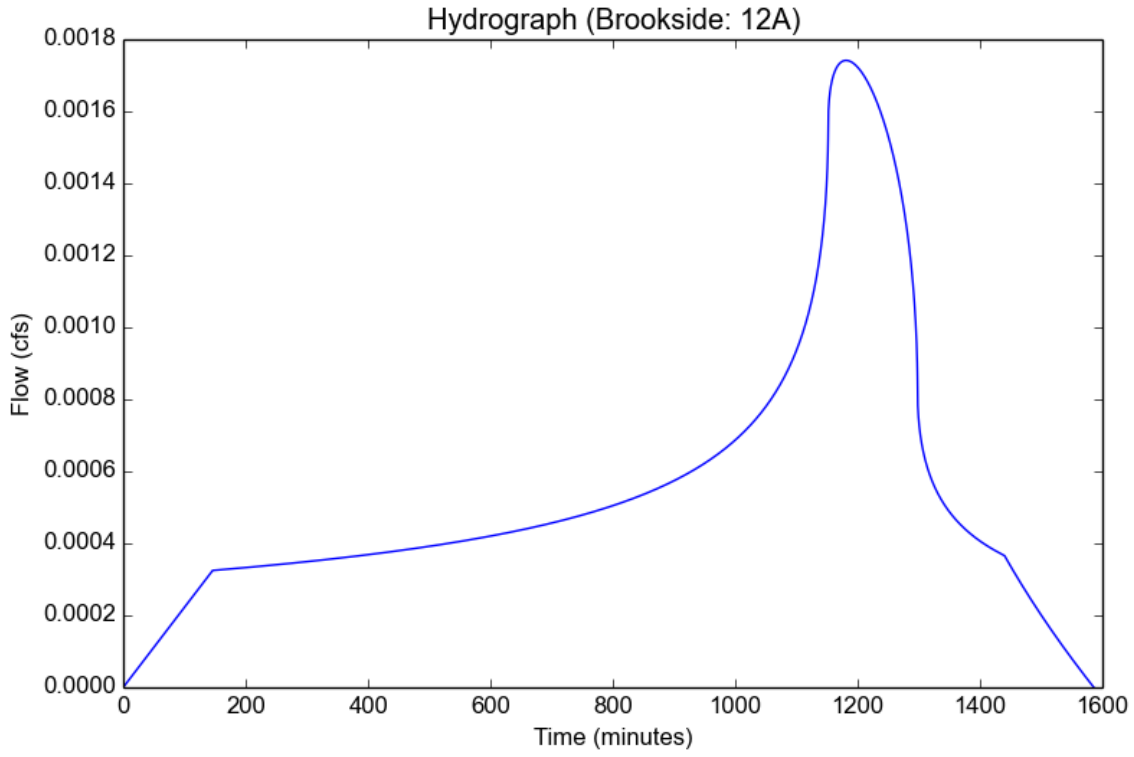
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.4-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.33
Flow Path Length (ft)	406.0
Flow Path Slope (vft/hft)	0.0197
85th Percentile Rainfall Depth (in)	0.4
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.4
Peak Intensity (in/hr)	0.0489
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	146.0
Clear Peak Flow Rate (cfs)	0.0017
Burned Peak Flow Rate (cfs)	0.0017
24-Hr Clear Runoff Volume (ac-ft)	0.0012
24-Hr Clear Runoff Volume (cu-ft)	51.3367



Peak Flow Hydrologic Analysis

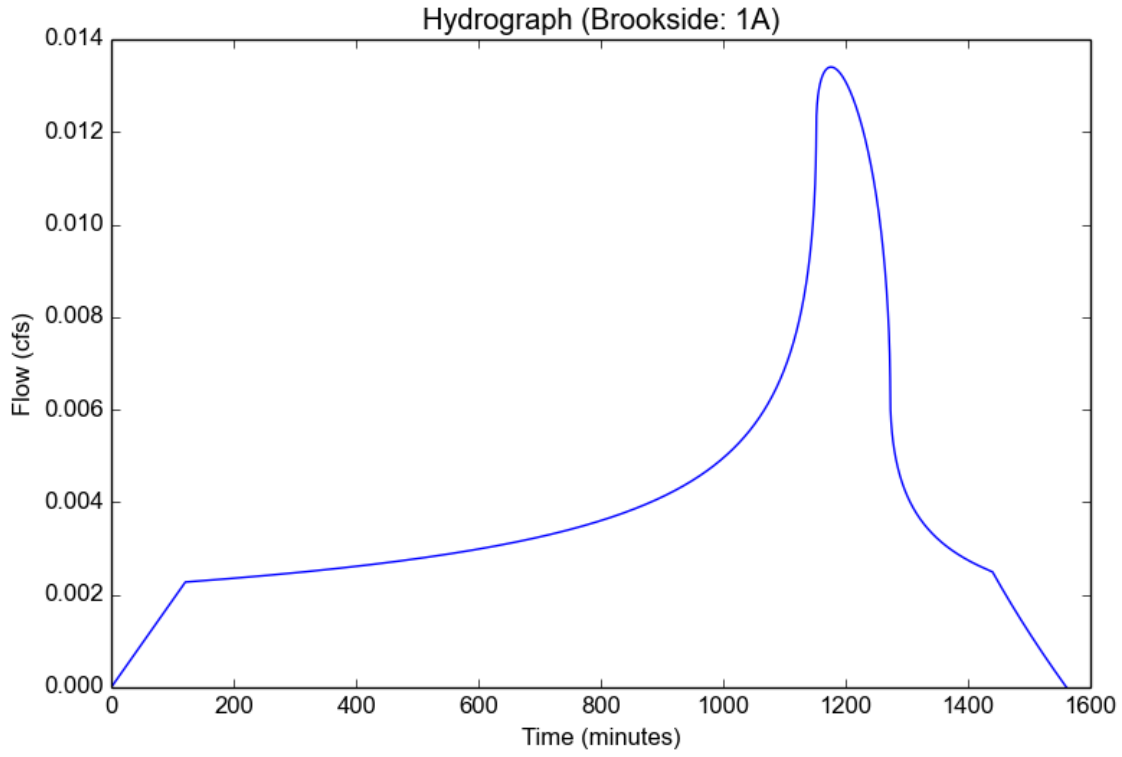
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.5-in Storm/Brookside - 1A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1A
Area (ac)	1.86
Flow Path Length (ft)	623.8
Flow Path Slope (vft/hft)	0.11061
85th Percentile Rainfall Depth (in)	0.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.5
Peak Intensity (in/hr)	0.0667
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	121.0
Clear Peak Flow Rate (cfs)	0.0134
Burned Peak Flow Rate (cfs)	0.0134
24-Hr Clear Runoff Volume (ac-ft)	0.0083
24-Hr Clear Runoff Volume (cu-ft)	361.6558



Peak Flow Hydrologic Analysis

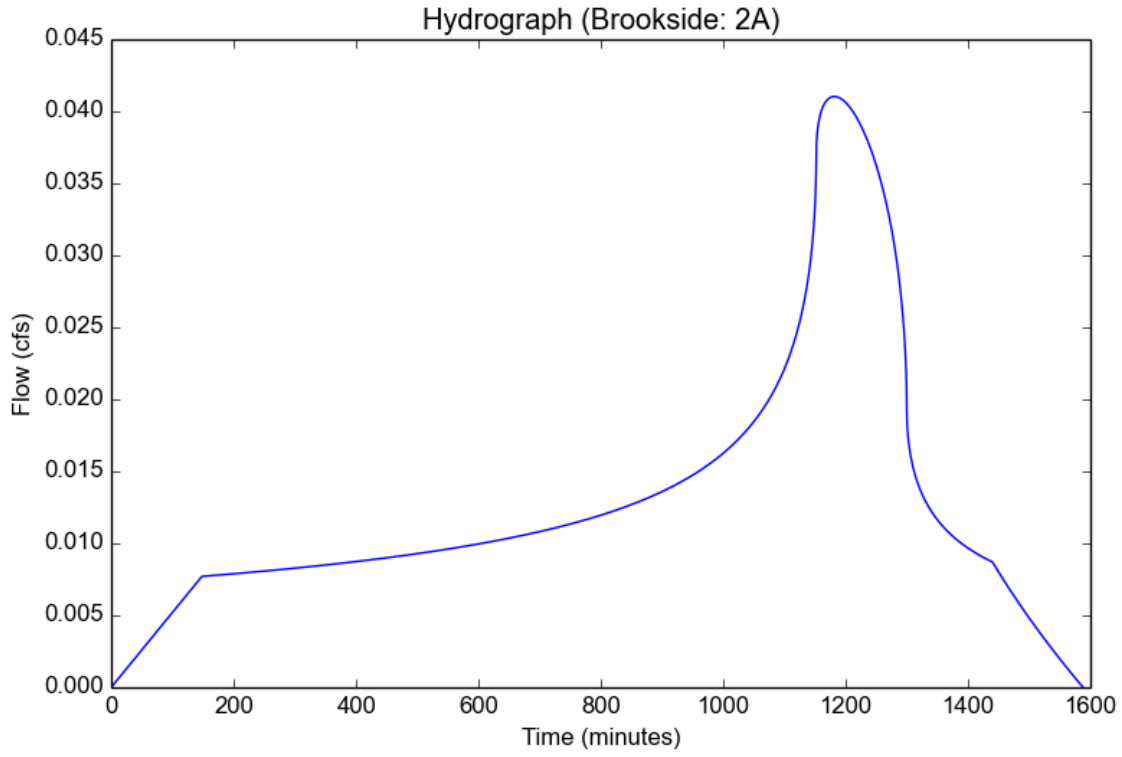
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.5-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	6.26
Flow Path Length (ft)	739.9
Flow Path Slope (vft/hft)	0.06623
85th Percentile Rainfall Depth (in)	0.5
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.5
Peak Intensity (in/hr)	0.0607
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	148.0
Clear Peak Flow Rate (cfs)	0.041
Burned Peak Flow Rate (cfs)	0.041
24-Hr Clear Runoff Volume (ac-ft)	0.0279
24-Hr Clear Runoff Volume (cu-ft)	1217.3124



Peak Flow Hydrologic Analysis

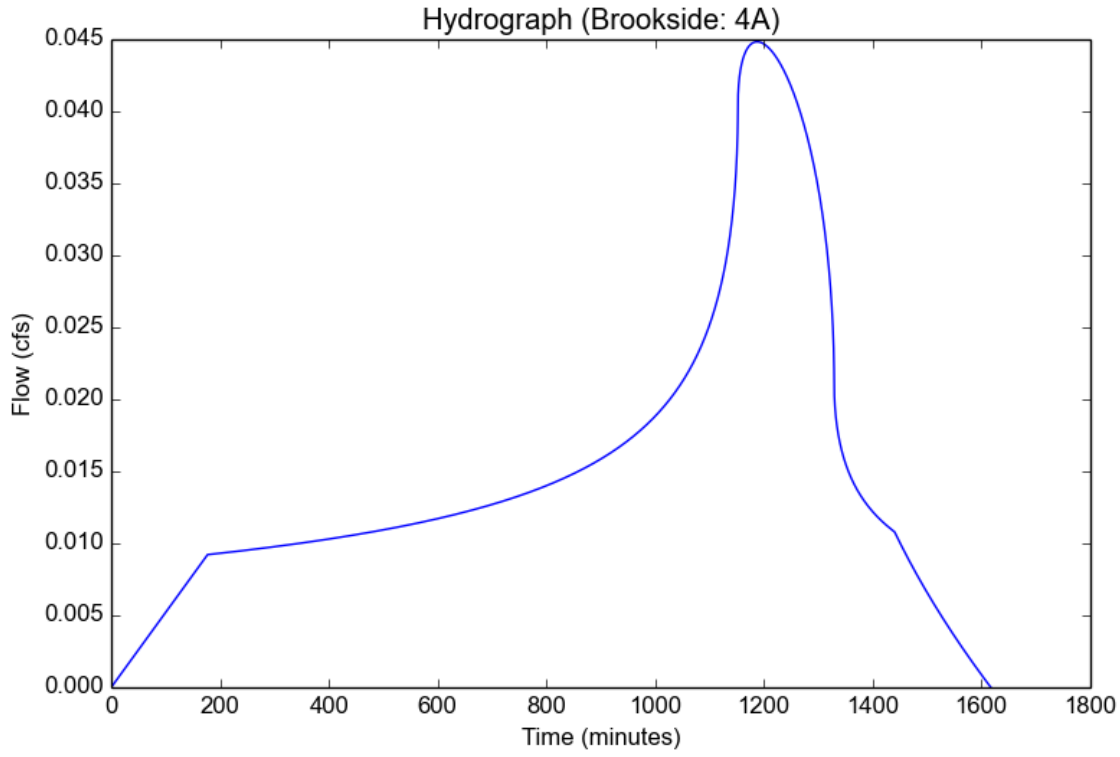
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.5-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	7.44
Flow Path Length (ft)	949.3
Flow Path Slope (vft/hft)	0.05794
85th Percentile Rainfall Depth (in)	0.5
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.5
Peak Intensity (in/hr)	0.0558
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	177.0
Clear Peak Flow Rate (cfs)	0.0448
Burned Peak Flow Rate (cfs)	0.0448
24-Hr Clear Runoff Volume (ac-ft)	0.0332
24-Hr Clear Runoff Volume (cu-ft)	1446.9753



Peak Flow Hydrologic Analysis

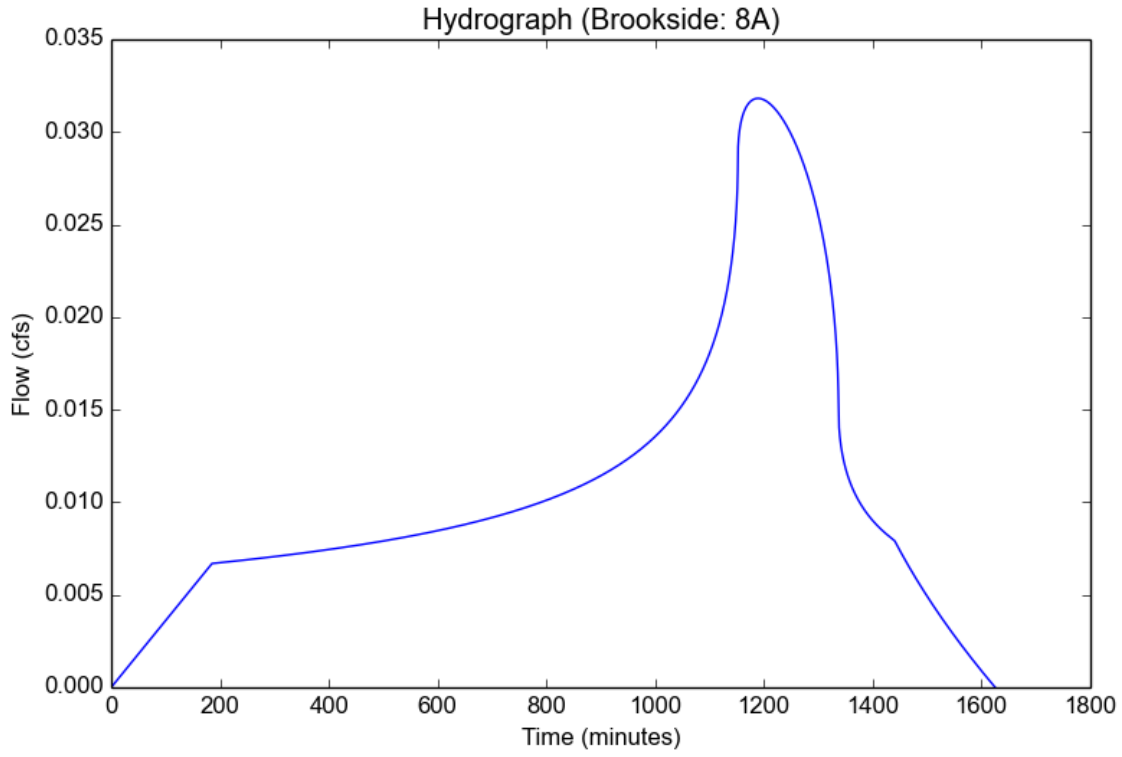
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.5-in Storm/Brookside - 8A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	8A
Area (ac)	5.39
Flow Path Length (ft)	1116.4
Flow Path Slope (vft/hft)	0.08151
85th Percentile Rainfall Depth (in)	0.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.5
Peak Intensity (in/hr)	0.0547
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	185.0
Clear Peak Flow Rate (cfs)	0.0318
Burned Peak Flow Rate (cfs)	0.0318
24-Hr Clear Runoff Volume (ac-ft)	0.0241
24-Hr Clear Runoff Volume (cu-ft)	1048.3249



Peak Flow Hydrologic Analysis

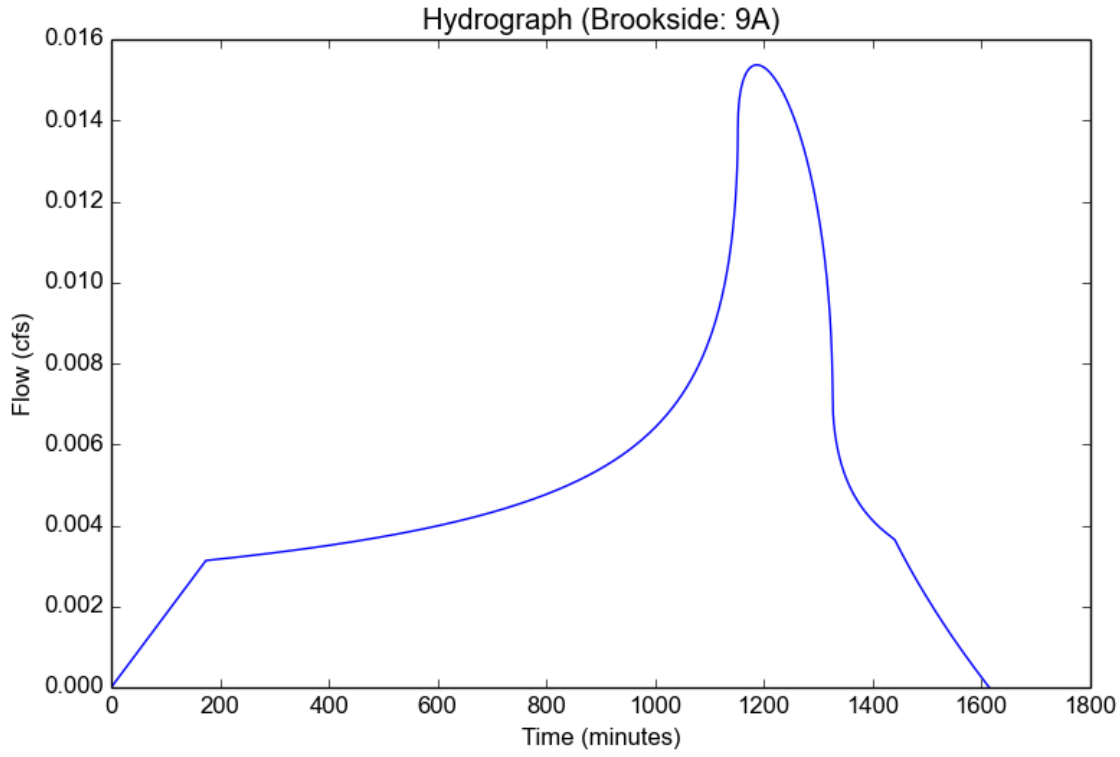
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.5-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	2.53
Flow Path Length (ft)	912.2
Flow Path Slope (vft/hft)	0.05591
85th Percentile Rainfall Depth (in)	0.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.5
Peak Intensity (in/hr)	0.0563
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	174.0
Clear Peak Flow Rate (cfs)	0.0154
Burned Peak Flow Rate (cfs)	0.0154
24-Hr Clear Runoff Volume (ac-ft)	0.0113
24-Hr Clear Runoff Volume (cu-ft)	492.0416



Peak Flow Hydrologic Analysis

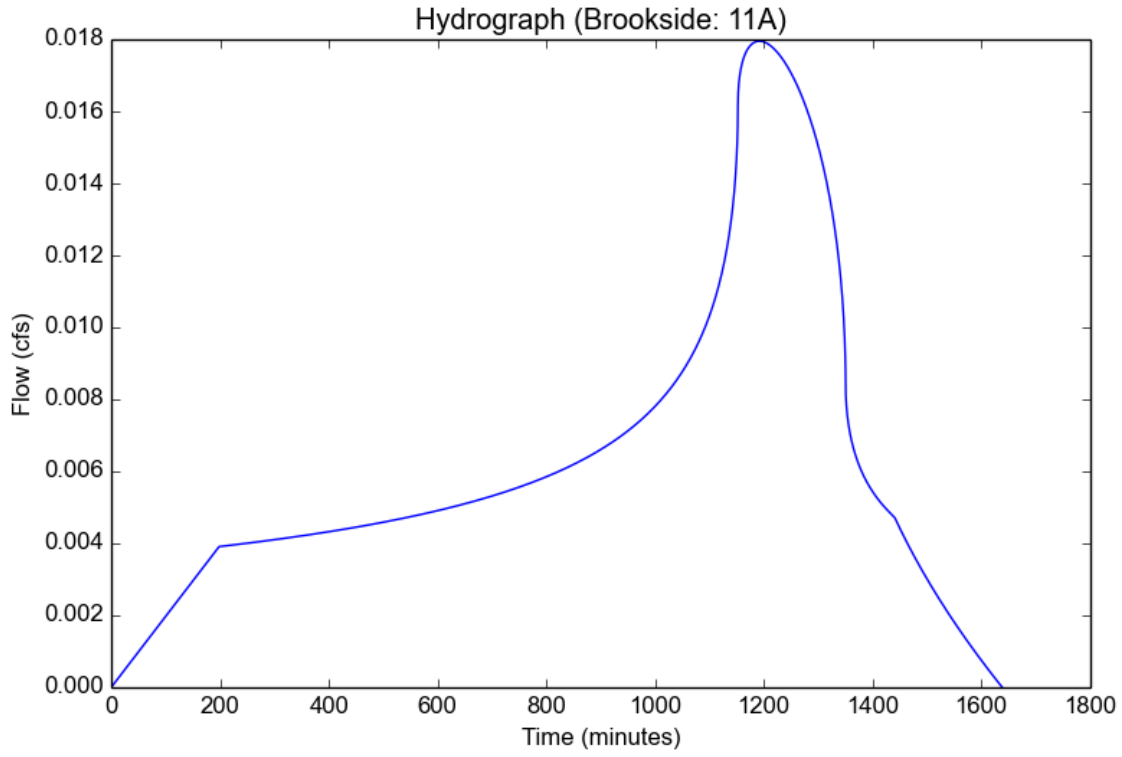
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.5-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	3.14
Flow Path Length (ft)	890.9
Flow Path Slope (vft/hft)	0.02469
85th Percentile Rainfall Depth (in)	0.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.5
Peak Intensity (in/hr)	0.0529
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	198.0
Clear Peak Flow Rate (cfs)	0.018
Burned Peak Flow Rate (cfs)	0.018
24-Hr Clear Runoff Volume (ac-ft)	0.014
24-Hr Clear Runoff Volume (cu-ft)	610.7588



Peak Flow Hydrologic Analysis

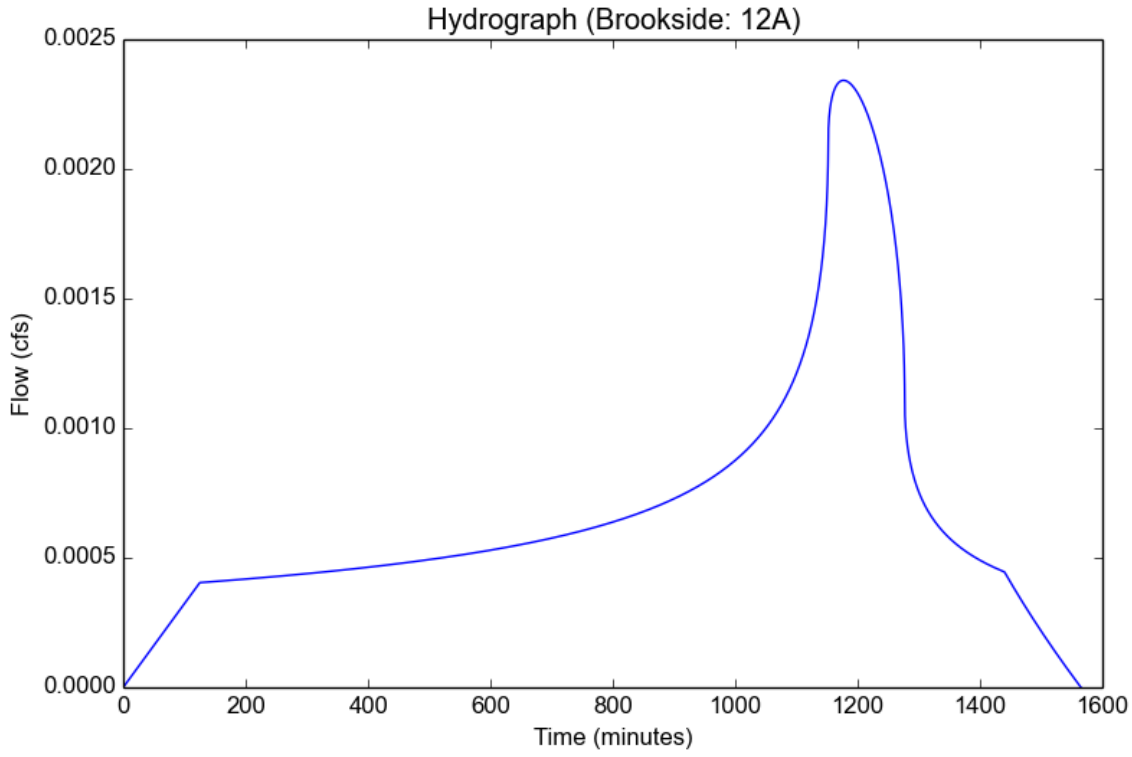
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.5-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.33
Flow Path Length (ft)	406.0
Flow Path Slope (vft/hft)	0.0197
85th Percentile Rainfall Depth (in)	0.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.5
Peak Intensity (in/hr)	0.0657
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	125.0
Clear Peak Flow Rate (cfs)	0.0023
Burned Peak Flow Rate (cfs)	0.0023
24-Hr Clear Runoff Volume (ac-ft)	0.0015
24-Hr Clear Runoff Volume (cu-ft)	64.1656



Peak Flow Hydrologic Analysis

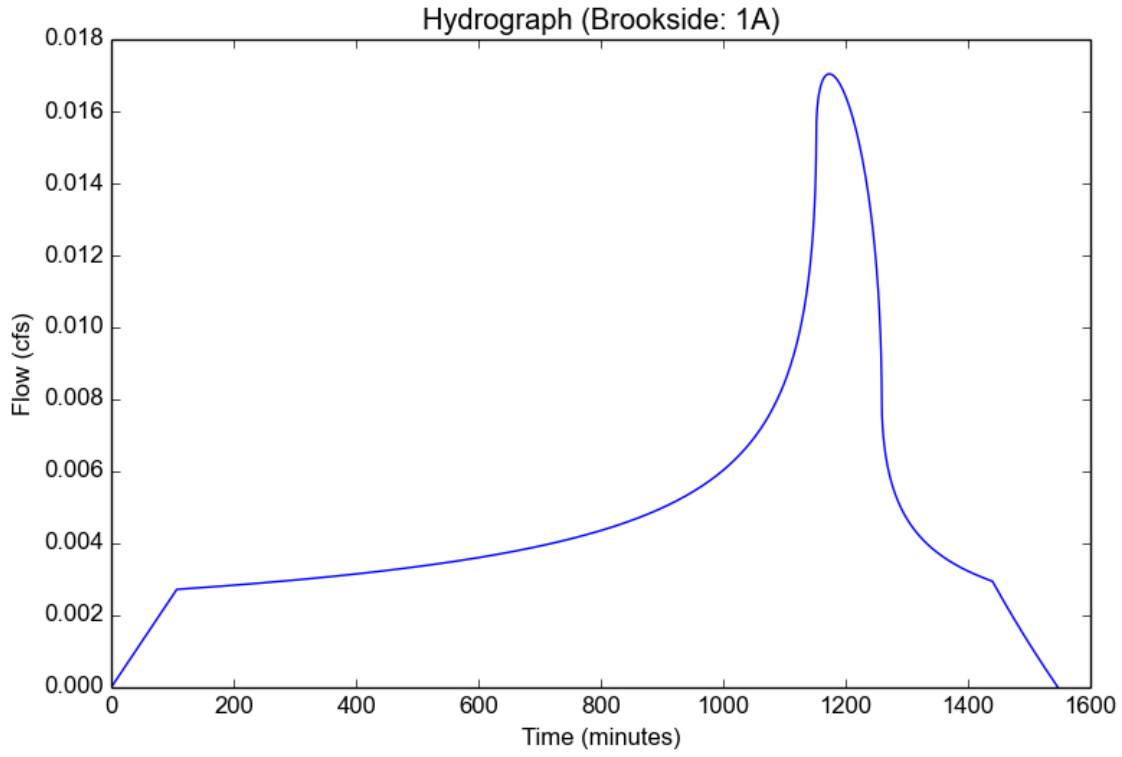
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.6-in Storm/Brookside - 1A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1A
Area (ac)	1.86
Flow Path Length (ft)	623.8
Flow Path Slope (vft/hft)	0.11061
85th Percentile Rainfall Depth (in)	0.6
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.6
Peak Intensity (in/hr)	0.0848
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	107.0
Clear Peak Flow Rate (cfs)	0.017
Burned Peak Flow Rate (cfs)	0.017
24-Hr Clear Runoff Volume (ac-ft)	0.01
24-Hr Clear Runoff Volume (cu-ft)	433.9675



Peak Flow Hydrologic Analysis

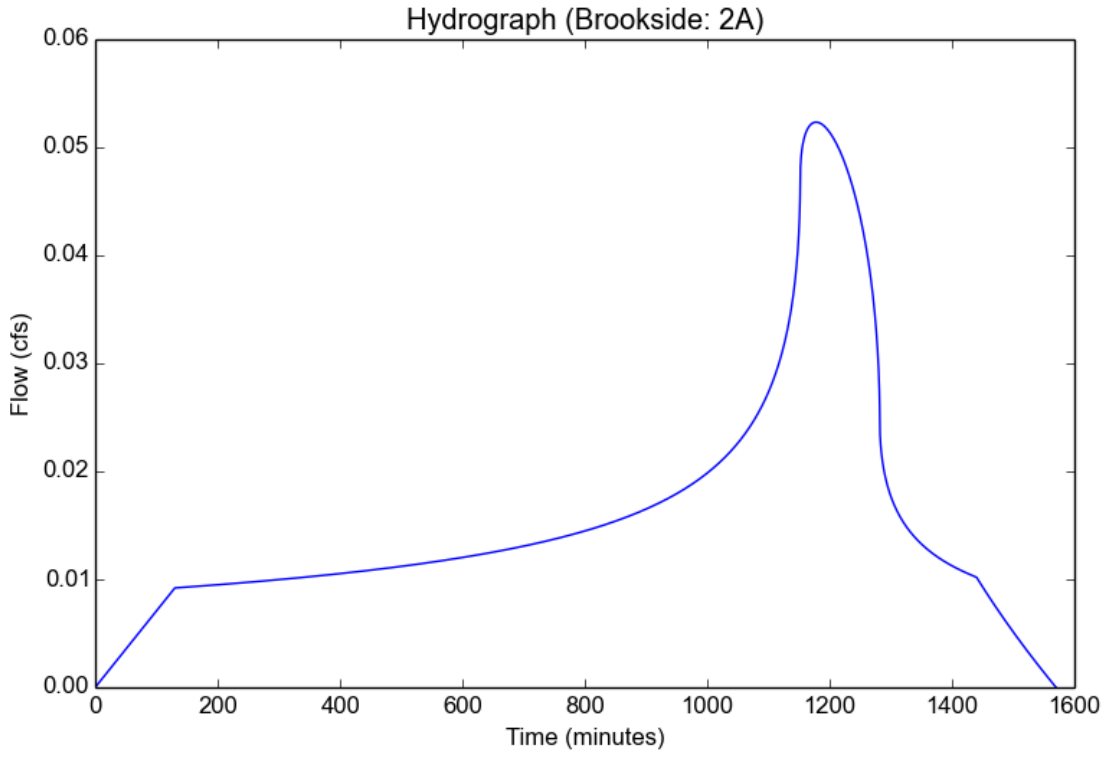
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.6-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	6.26
Flow Path Length (ft)	739.9
Flow Path Slope (vft/hft)	0.06623
85th Percentile Rainfall Depth (in)	0.6
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.6
Peak Intensity (in/hr)	0.0774
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	130.0
Clear Peak Flow Rate (cfs)	0.0523
Burned Peak Flow Rate (cfs)	0.0523
24-Hr Clear Runoff Volume (ac-ft)	0.0335
24-Hr Clear Runoff Volume (cu-ft)	1460.6696



Peak Flow Hydrologic Analysis

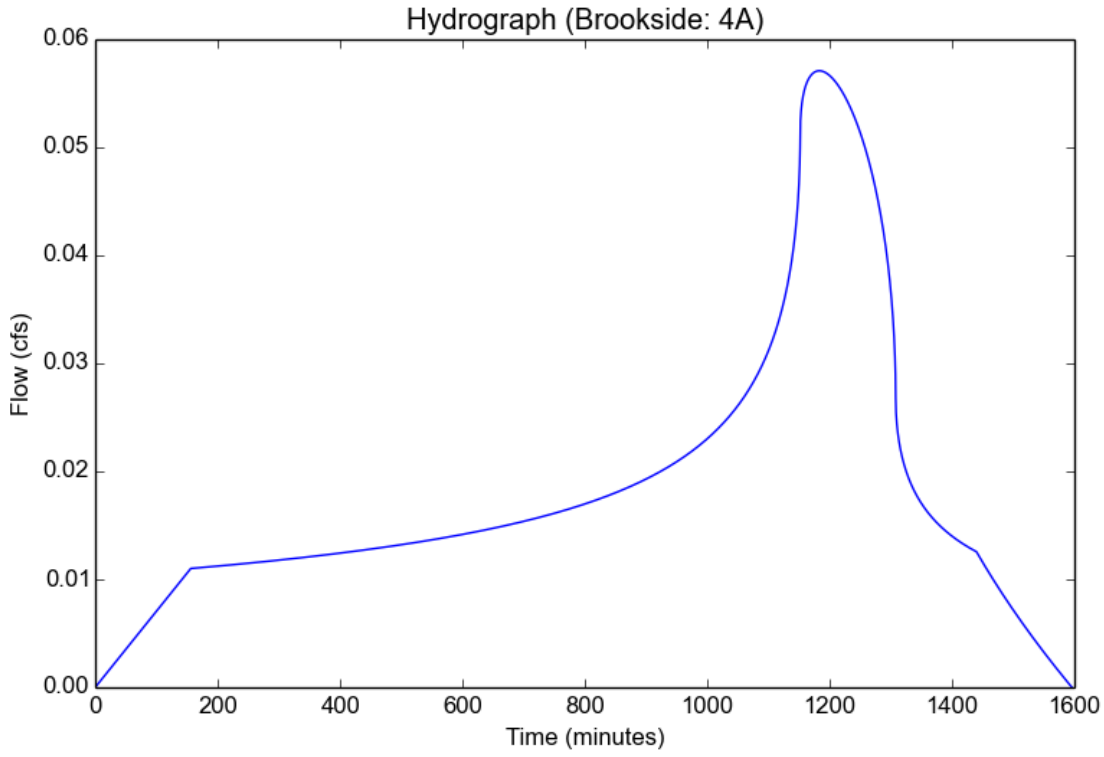
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.6-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	7.44
Flow Path Length (ft)	949.3
Flow Path Slope (vft/hft)	0.05794
85th Percentile Rainfall Depth (in)	0.6
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.6
Peak Intensity (in/hr)	0.0711
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	156.0
Clear Peak Flow Rate (cfs)	0.0571
Burned Peak Flow Rate (cfs)	0.0571
24-Hr Clear Runoff Volume (ac-ft)	0.0399
24-Hr Clear Runoff Volume (cu-ft)	1736.1902



Peak Flow Hydrologic Analysis

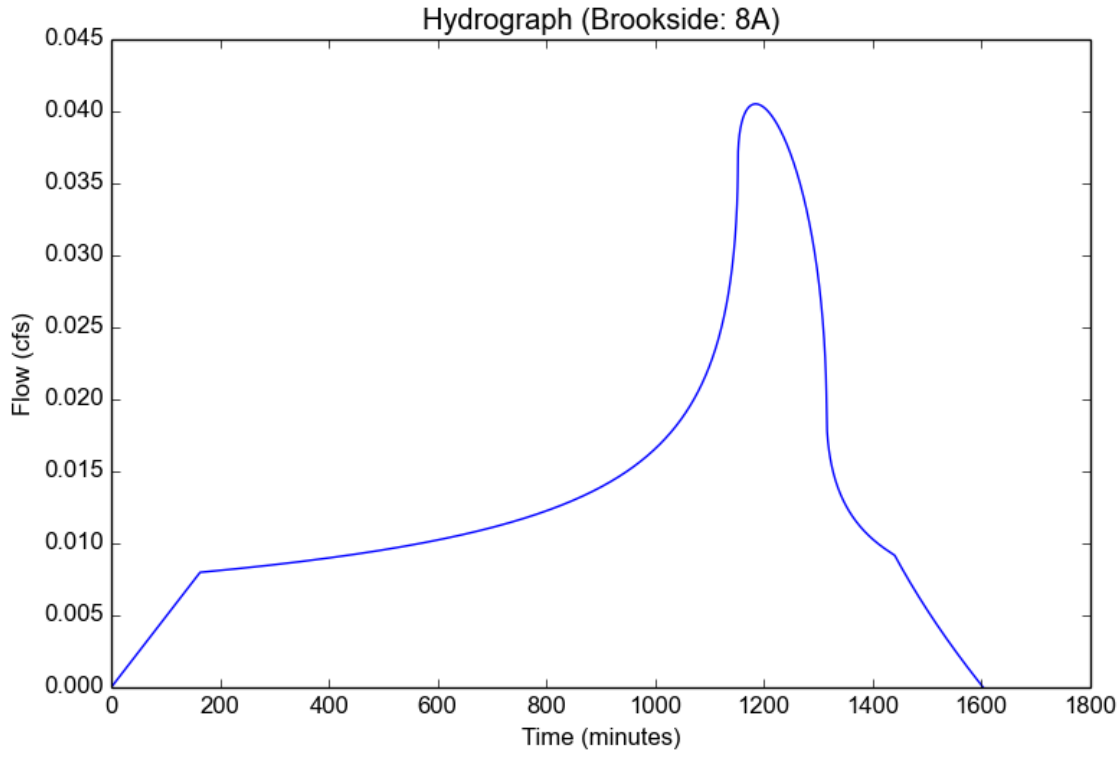
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.6-in Storm/Brookside - 8A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	8A
Area (ac)	5.39
Flow Path Length (ft)	1116.4
Flow Path Slope (vft/hft)	0.08151
85th Percentile Rainfall Depth (in)	0.6
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.6
Peak Intensity (in/hr)	0.0696
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	163.0
Clear Peak Flow Rate (cfs)	0.0405
Burned Peak Flow Rate (cfs)	0.0405
24-Hr Clear Runoff Volume (ac-ft)	0.0289
24-Hr Clear Runoff Volume (cu-ft)	1257.8458



Peak Flow Hydrologic Analysis

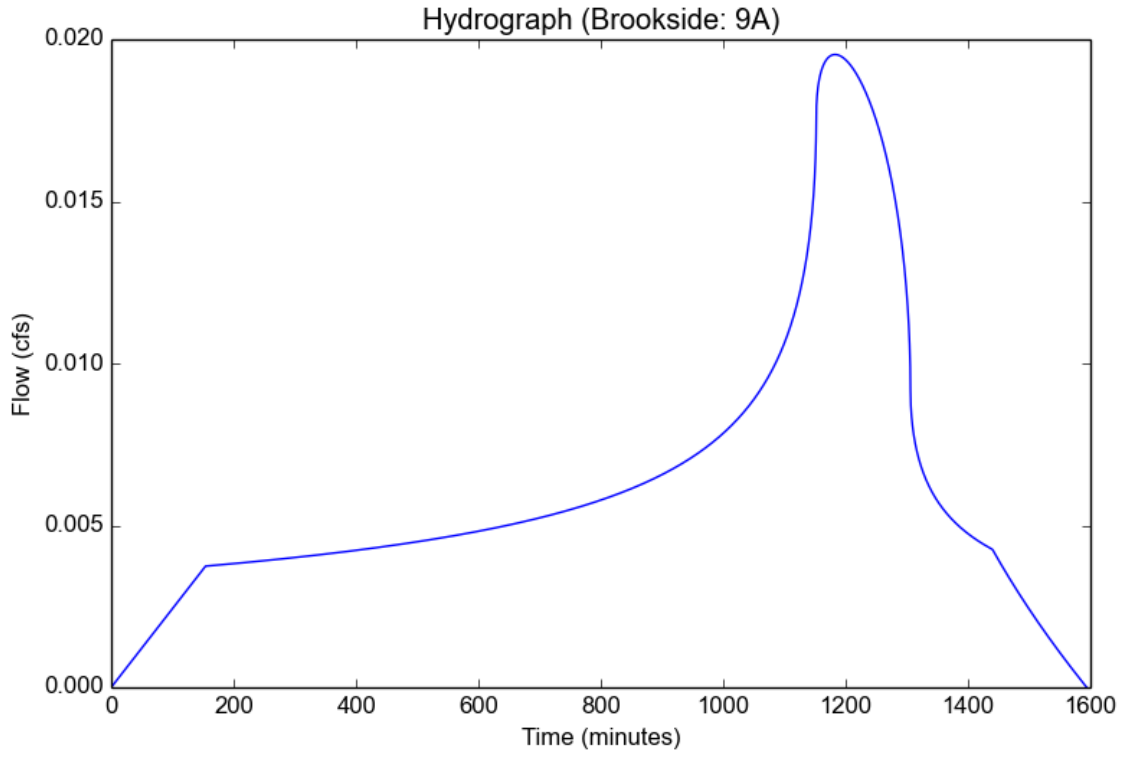
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.6-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	2.53
Flow Path Length (ft)	912.2
Flow Path Slope (vft/hft)	0.05591
85th Percentile Rainfall Depth (in)	0.6
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.6
Peak Intensity (in/hr)	0.0715
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	154.0
Clear Peak Flow Rate (cfs)	0.0195
Burned Peak Flow Rate (cfs)	0.0195
24-Hr Clear Runoff Volume (ac-ft)	0.0136
24-Hr Clear Runoff Volume (cu-ft)	590.3927



Peak Flow Hydrologic Analysis

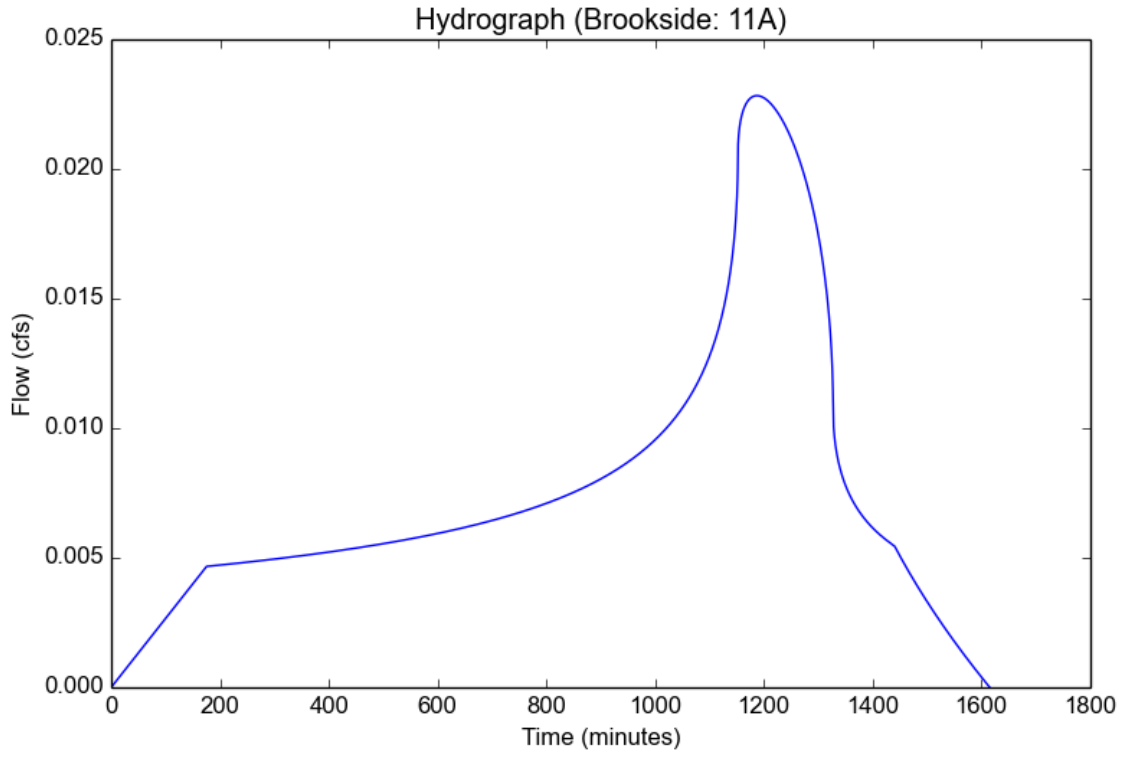
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.6-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	3.14
Flow Path Length (ft)	890.9
Flow Path Slope (vft/hft)	0.02469
85th Percentile Rainfall Depth (in)	0.6
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.6
Peak Intensity (in/hr)	0.0673
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	175.0
Clear Peak Flow Rate (cfs)	0.0228
Burned Peak Flow Rate (cfs)	0.0228
24-Hr Clear Runoff Volume (ac-ft)	0.0168
24-Hr Clear Runoff Volume (cu-ft)	732.8153



Peak Flow Hydrologic Analysis

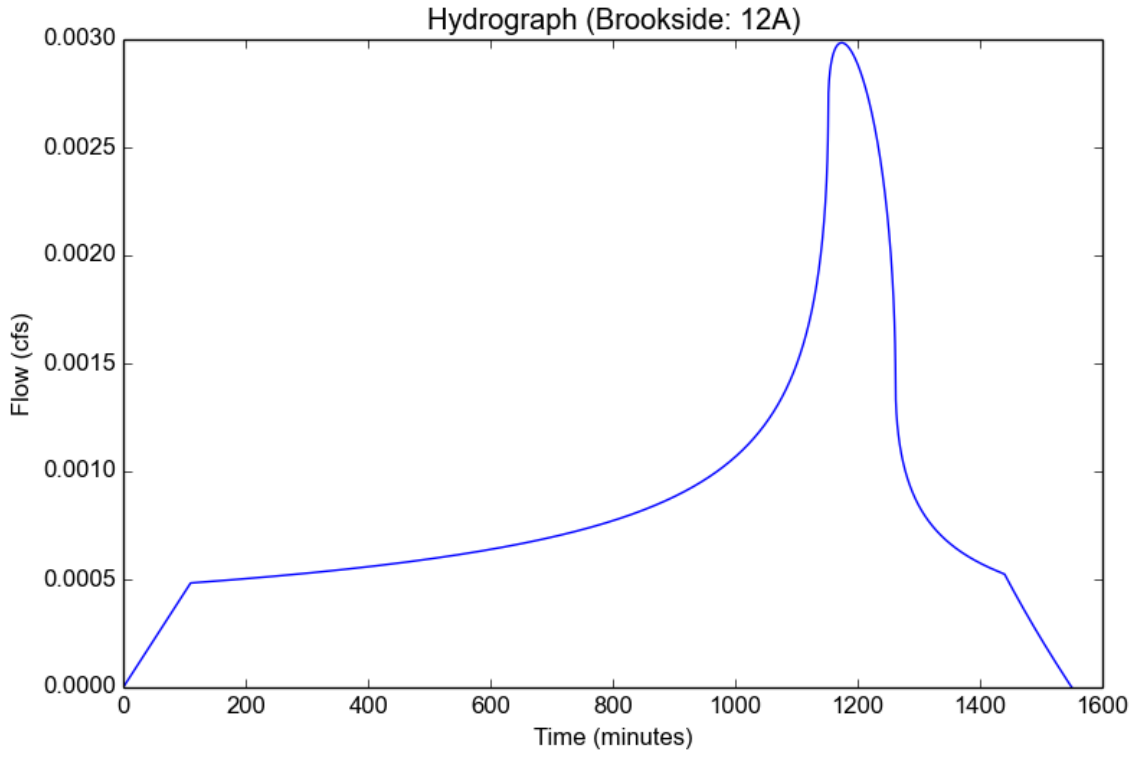
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.6-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.33
Flow Path Length (ft)	406.0
Flow Path Slope (vft/hft)	0.0197
85th Percentile Rainfall Depth (in)	0.6
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.6
Peak Intensity (in/hr)	0.0837
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	110.0
Clear Peak Flow Rate (cfs)	0.003
Burned Peak Flow Rate (cfs)	0.003
24-Hr Clear Runoff Volume (ac-ft)	0.0018
24-Hr Clear Runoff Volume (cu-ft)	76.9949



Peak Flow Hydrologic Analysis

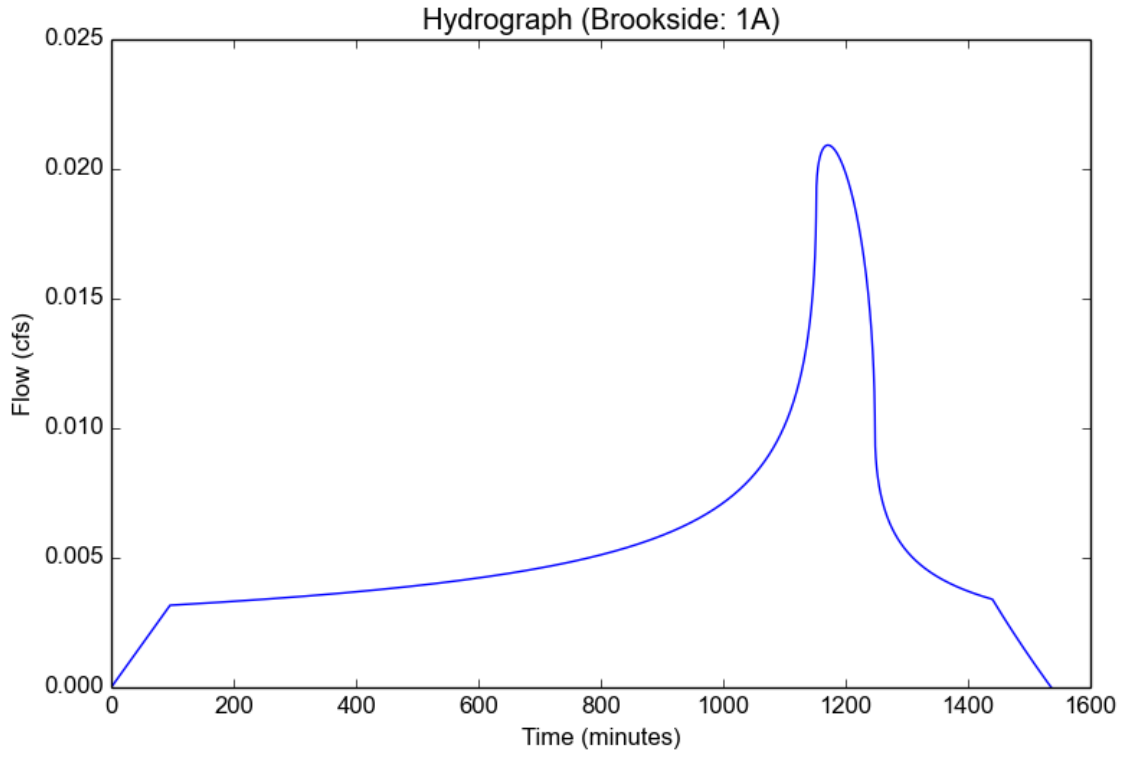
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.7-in Storm/Brookside - 1A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1A
Area (ac)	1.86
Flow Path Length (ft)	623.8
Flow Path Slope (vft/hft)	0.11061
85th Percentile Rainfall Depth (in)	0.7
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.7
Peak Intensity (in/hr)	0.1041
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	96.0
Clear Peak Flow Rate (cfs)	0.0209
Burned Peak Flow Rate (cfs)	0.0209
24-Hr Clear Runoff Volume (ac-ft)	0.0116
24-Hr Clear Runoff Volume (cu-ft)	506.2798



Peak Flow Hydrologic Analysis

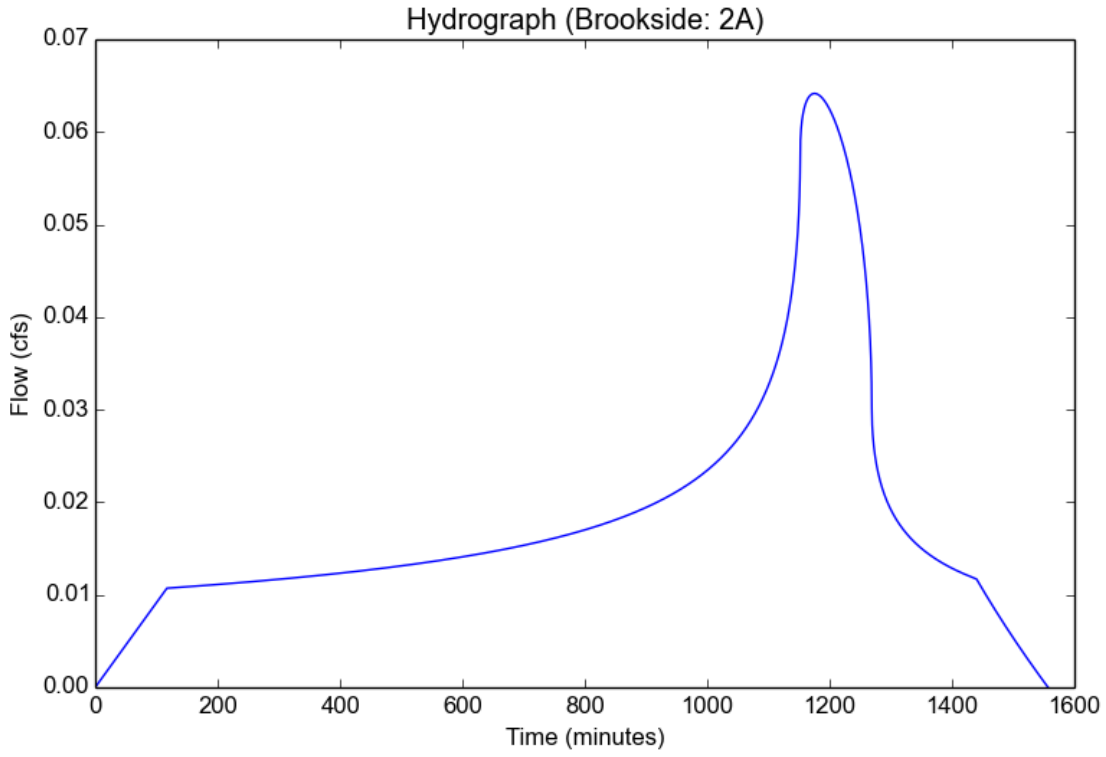
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.7-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	6.26
Flow Path Length (ft)	739.9
Flow Path Slope (vft/hft)	0.06623
85th Percentile Rainfall Depth (in)	0.7
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.7
Peak Intensity (in/hr)	0.0949
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	117.0
Clear Peak Flow Rate (cfs)	0.0642
Burned Peak Flow Rate (cfs)	0.0642
24-Hr Clear Runoff Volume (ac-ft)	0.0391
24-Hr Clear Runoff Volume (cu-ft)	1704.037



Peak Flow Hydrologic Analysis

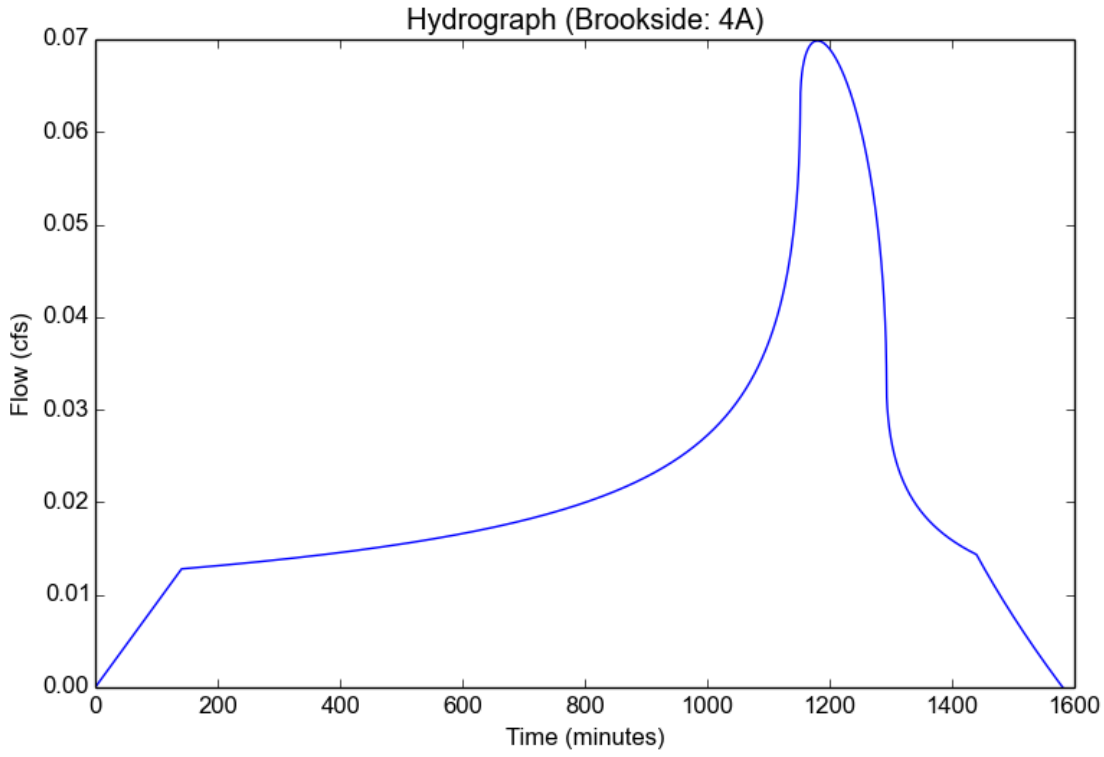
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.7-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	7.44
Flow Path Length (ft)	949.3
Flow Path Slope (vft/hft)	0.05794
85th Percentile Rainfall Depth (in)	0.7
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.7
Peak Intensity (in/hr)	0.0869
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	141.0
Clear Peak Flow Rate (cfs)	0.0699
Burned Peak Flow Rate (cfs)	0.0699
24-Hr Clear Runoff Volume (ac-ft)	0.0465
24-Hr Clear Runoff Volume (cu-ft)	2025.424



Peak Flow Hydrologic Analysis

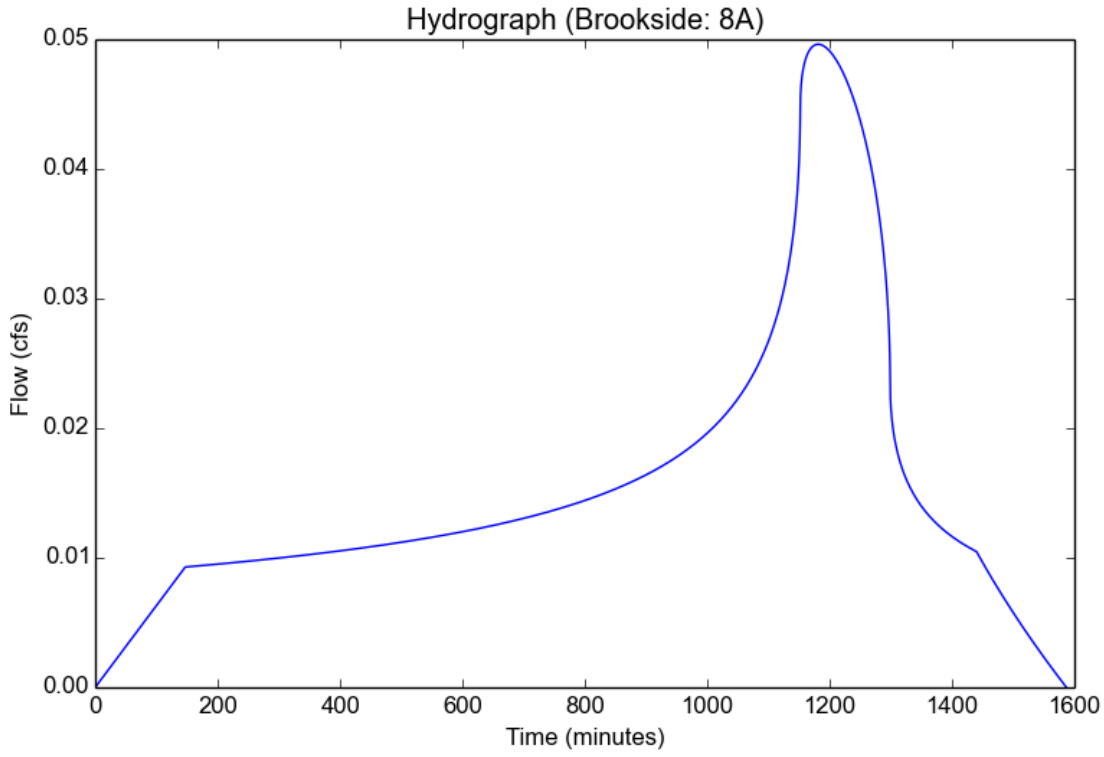
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.7-in Storm/Brookside - 8A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	8A
Area (ac)	5.39
Flow Path Length (ft)	1116.4
Flow Path Slope (vft/hft)	0.08151
85th Percentile Rainfall Depth (in)	0.7
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.7
Peak Intensity (in/hr)	0.0852
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	147.0
Clear Peak Flow Rate (cfs)	0.0496
Burned Peak Flow Rate (cfs)	0.0496
24-Hr Clear Runoff Volume (ac-ft)	0.0337
24-Hr Clear Runoff Volume (cu-ft)	1467.3802



Peak Flow Hydrologic Analysis

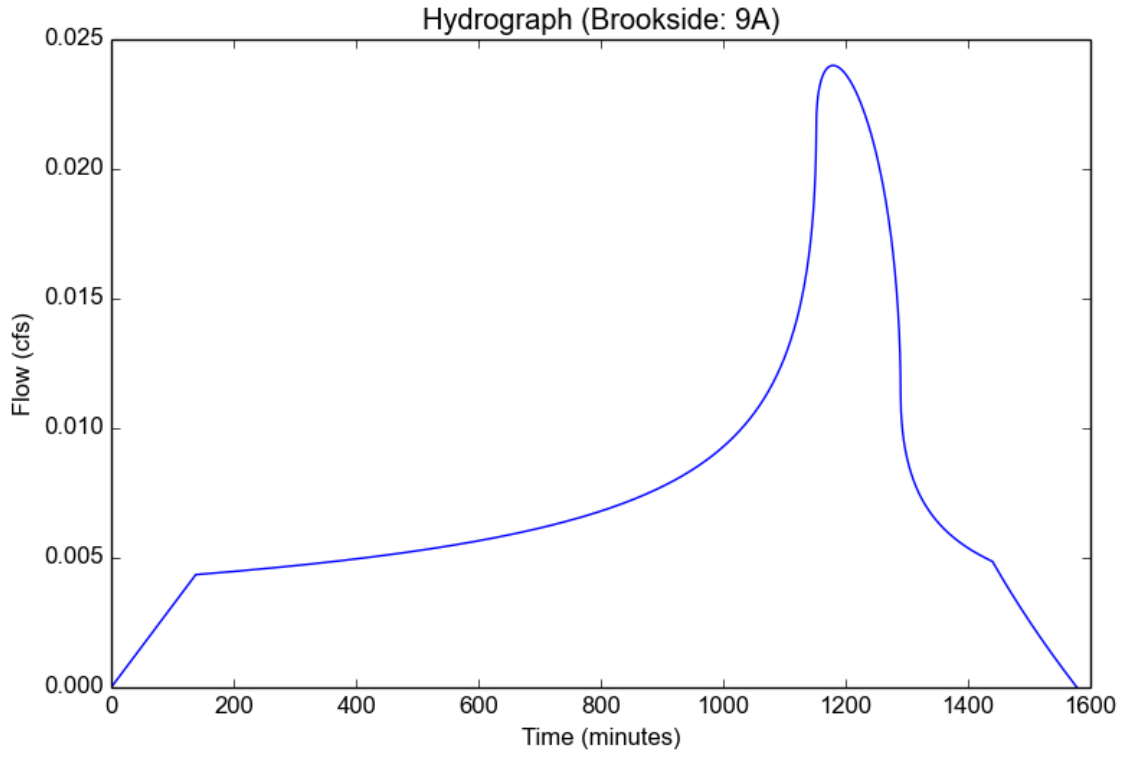
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.7-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	2.53
Flow Path Length (ft)	912.2
Flow Path Slope (vft/hft)	0.05591
85th Percentile Rainfall Depth (in)	0.7
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.7
Peak Intensity (in/hr)	0.0878
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	138.0
Clear Peak Flow Rate (cfs)	0.024
Burned Peak Flow Rate (cfs)	0.024
24-Hr Clear Runoff Volume (ac-ft)	0.0158
24-Hr Clear Runoff Volume (cu-ft)	688.7448



Peak Flow Hydrologic Analysis

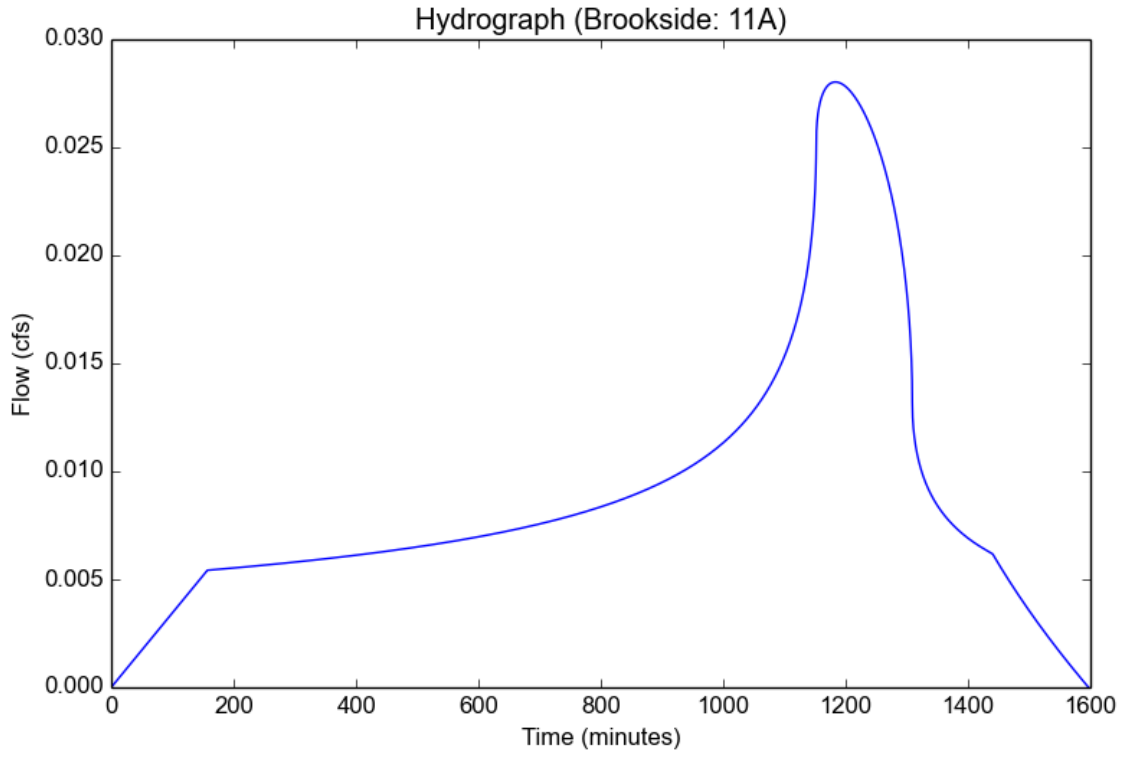
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.7-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	3.14
Flow Path Length (ft)	890.9
Flow Path Slope (vft/hft)	0.02469
85th Percentile Rainfall Depth (in)	0.7
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.7
Peak Intensity (in/hr)	0.0827
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	157.0
Clear Peak Flow Rate (cfs)	0.028
Burned Peak Flow Rate (cfs)	0.028
24-Hr Clear Runoff Volume (ac-ft)	0.0196
24-Hr Clear Runoff Volume (cu-ft)	854.8754



Peak Flow Hydrologic Analysis

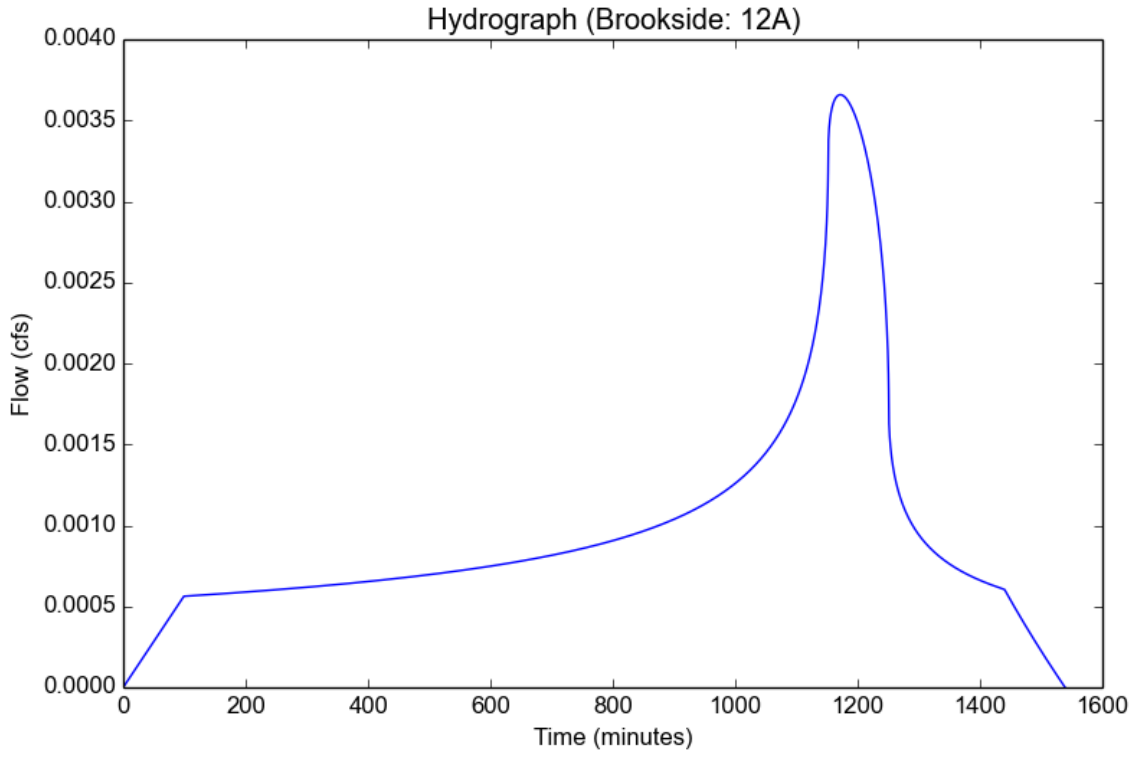
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.7-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.33
Flow Path Length (ft)	406.0
Flow Path Slope (vft/hft)	0.0197
85th Percentile Rainfall Depth (in)	0.7
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.7
Peak Intensity (in/hr)	0.1027
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	99.0
Clear Peak Flow Rate (cfs)	0.0037
Burned Peak Flow Rate (cfs)	0.0037
24-Hr Clear Runoff Volume (ac-ft)	0.0021
24-Hr Clear Runoff Volume (cu-ft)	89.8246



Peak Flow Hydrologic Analysis

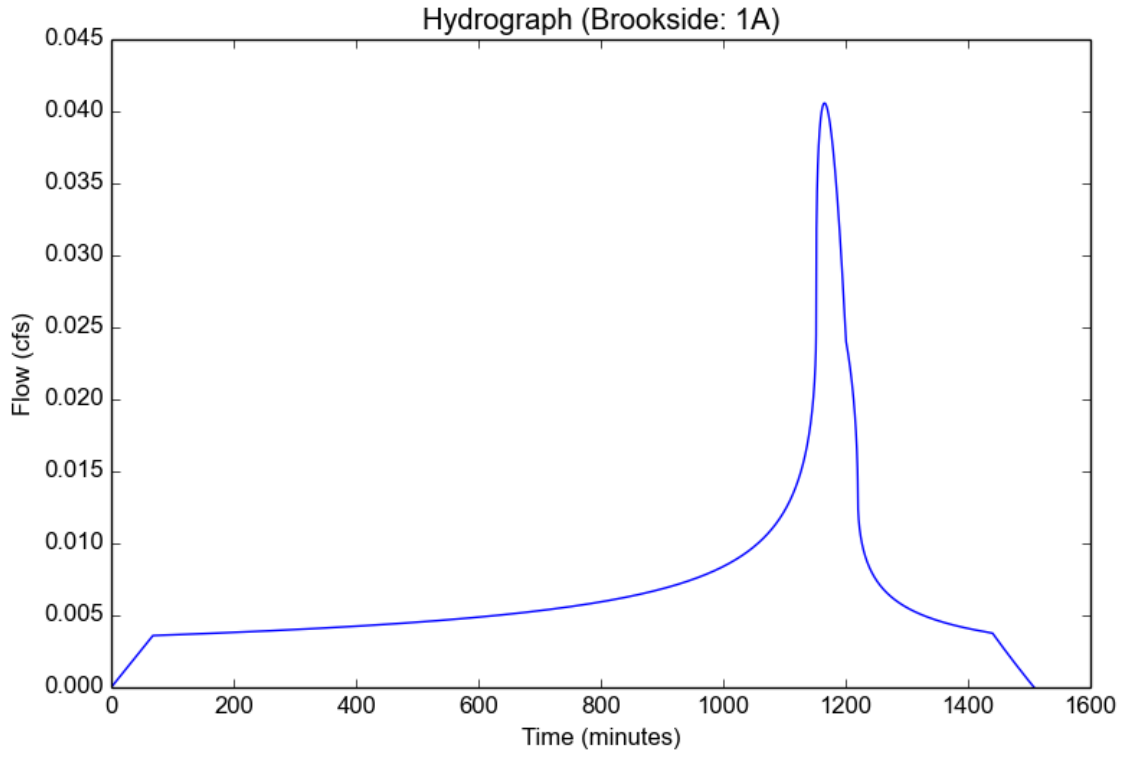
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.8-in Storm/Brookside - 1A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1A
Area (ac)	1.86
Flow Path Length (ft)	623.8
Flow Path Slope (vft/hft)	0.11061
85th Percentile Rainfall Depth (in)	0.8
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.8
Peak Intensity (in/hr)	0.14
Undeveloped Runoff Coefficient (Cu)	0.1483
Developed Runoff Coefficient (Cd)	0.1558
Time of Concentration (min)	68.0
Clear Peak Flow Rate (cfs)	0.0406
Burned Peak Flow Rate (cfs)	0.0406
24-Hr Clear Runoff Volume (ac-ft)	0.0139
24-Hr Clear Runoff Volume (cu-ft)	603.9134



Peak Flow Hydrologic Analysis

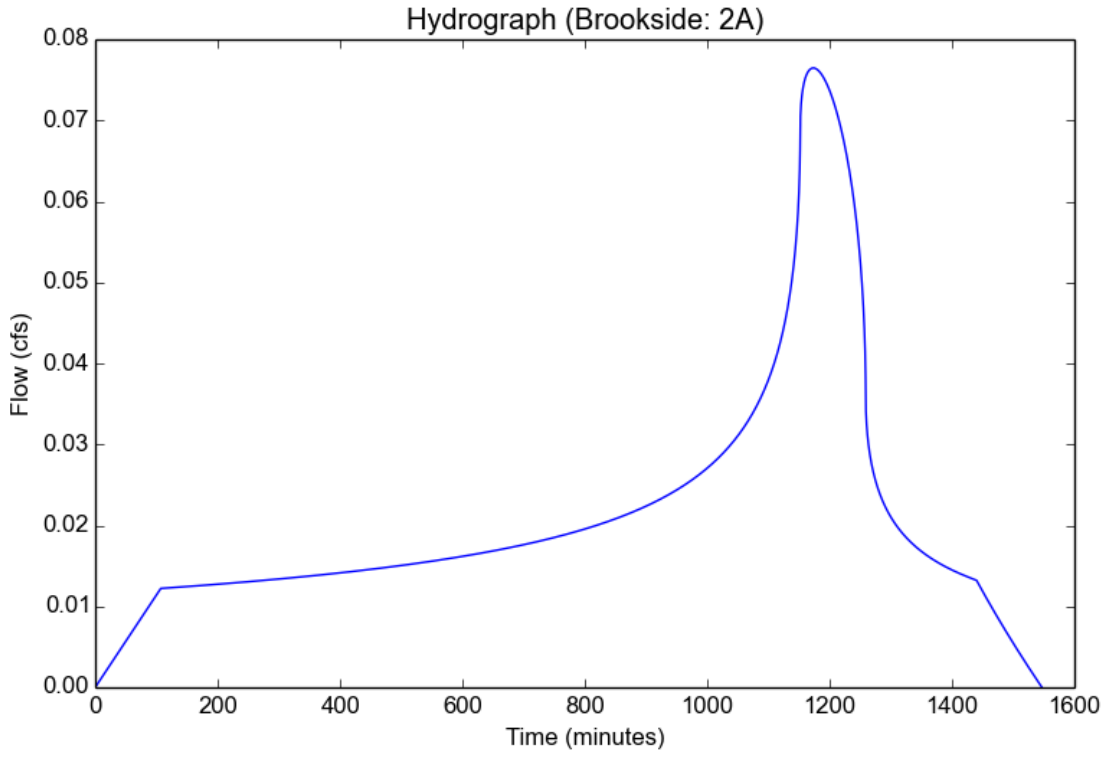
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.8-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	6.26
Flow Path Length (ft)	739.9
Flow Path Slope (vft/hft)	0.06623
85th Percentile Rainfall Depth (in)	0.8
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.8
Peak Intensity (in/hr)	0.1131
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	107.0
Clear Peak Flow Rate (cfs)	0.0765
Burned Peak Flow Rate (cfs)	0.0765
24-Hr Clear Runoff Volume (ac-ft)	0.0447
24-Hr Clear Runoff Volume (cu-ft)	1947.4098



Peak Flow Hydrologic Analysis

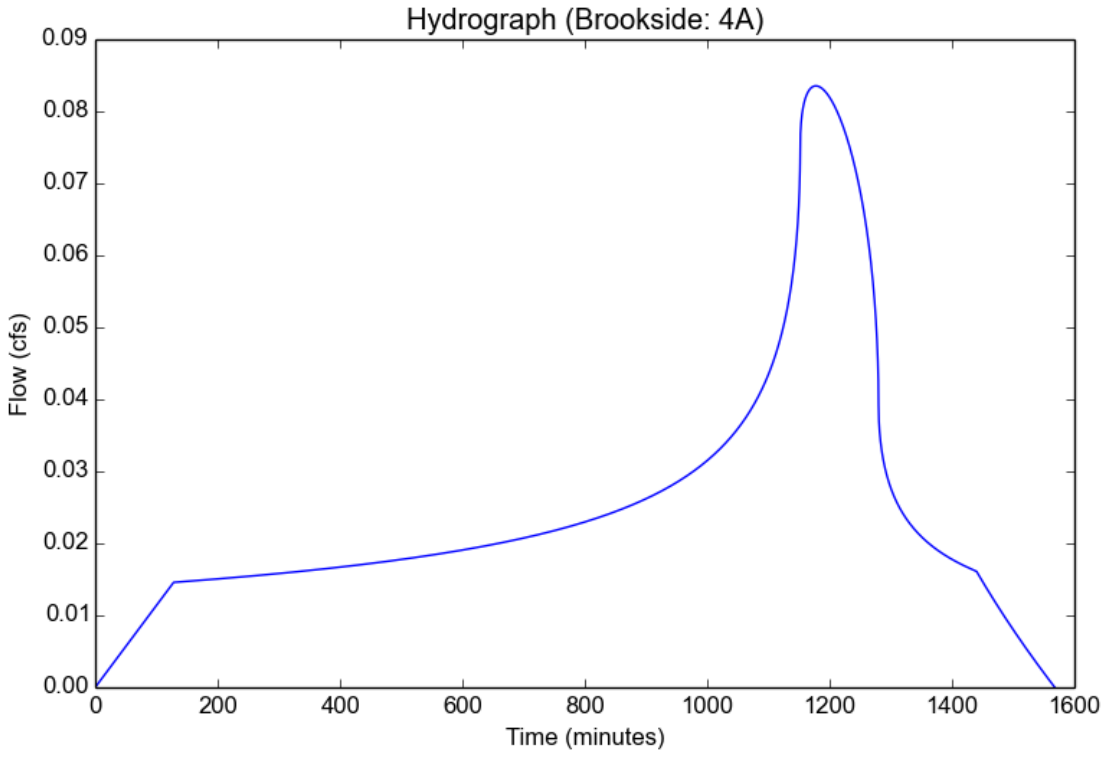
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.8-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	7.44
Flow Path Length (ft)	949.3
Flow Path Slope (vft/hft)	0.05794
85th Percentile Rainfall Depth (in)	0.8
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.8
Peak Intensity (in/hr)	0.104
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	128.0
Clear Peak Flow Rate (cfs)	0.0835
Burned Peak Flow Rate (cfs)	0.0835
24-Hr Clear Runoff Volume (ac-ft)	0.0531
24-Hr Clear Runoff Volume (cu-ft)	2314.6543



Peak Flow Hydrologic Analysis

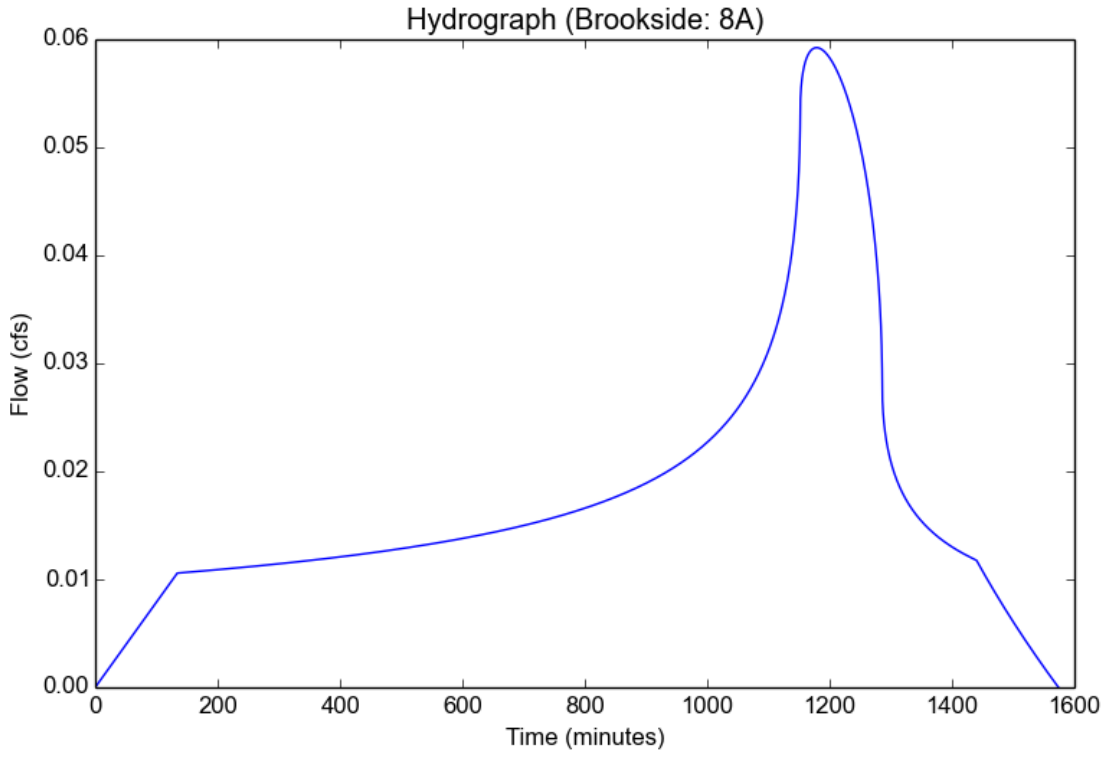
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.8-in Storm/Brookside - 8A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	8A
Area (ac)	5.39
Flow Path Length (ft)	1116.4
Flow Path Slope (vft/hft)	0.08151
85th Percentile Rainfall Depth (in)	0.8
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.8
Peak Intensity (in/hr)	0.1018
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	134.0
Clear Peak Flow Rate (cfs)	0.0592
Burned Peak Flow Rate (cfs)	0.0592
24-Hr Clear Runoff Volume (ac-ft)	0.0385
24-Hr Clear Runoff Volume (cu-ft)	1676.9176



Peak Flow Hydrologic Analysis

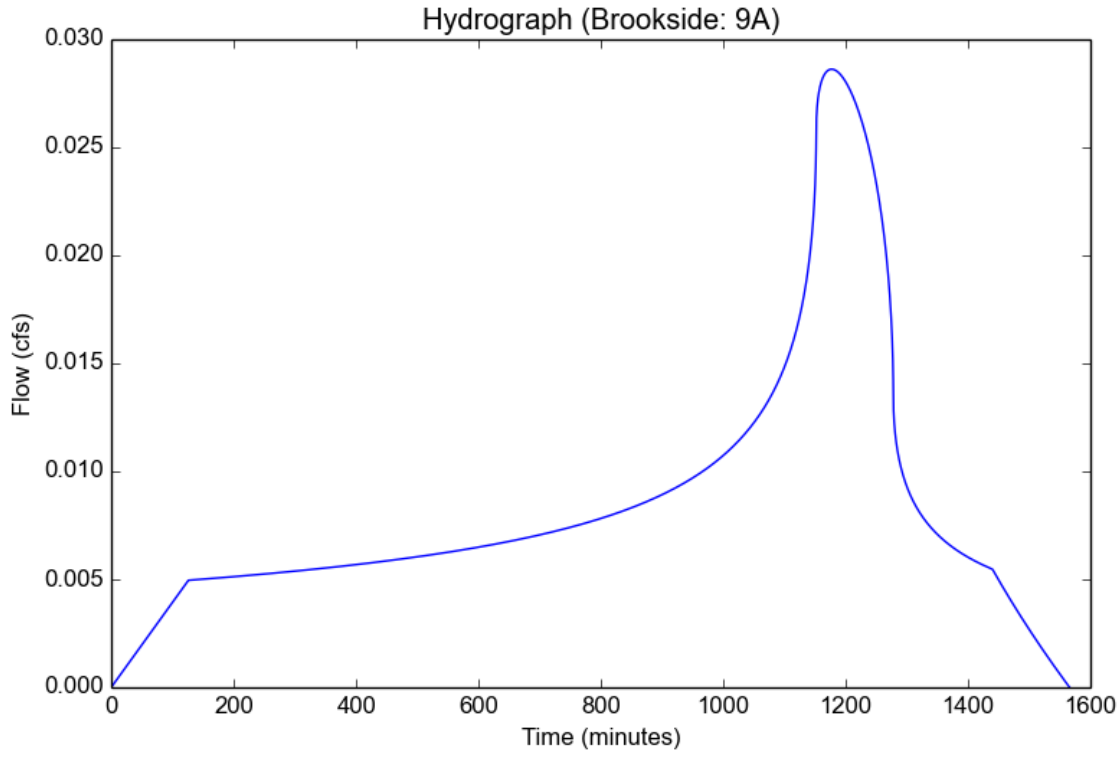
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.8-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	2.53
Flow Path Length (ft)	912.2
Flow Path Slope (vft/hft)	0.05591
85th Percentile Rainfall Depth (in)	0.8
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.8
Peak Intensity (in/hr)	0.1047
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	126.0
Clear Peak Flow Rate (cfs)	0.0286
Burned Peak Flow Rate (cfs)	0.0286
24-Hr Clear Runoff Volume (ac-ft)	0.0181
24-Hr Clear Runoff Volume (cu-ft)	787.1012



Peak Flow Hydrologic Analysis

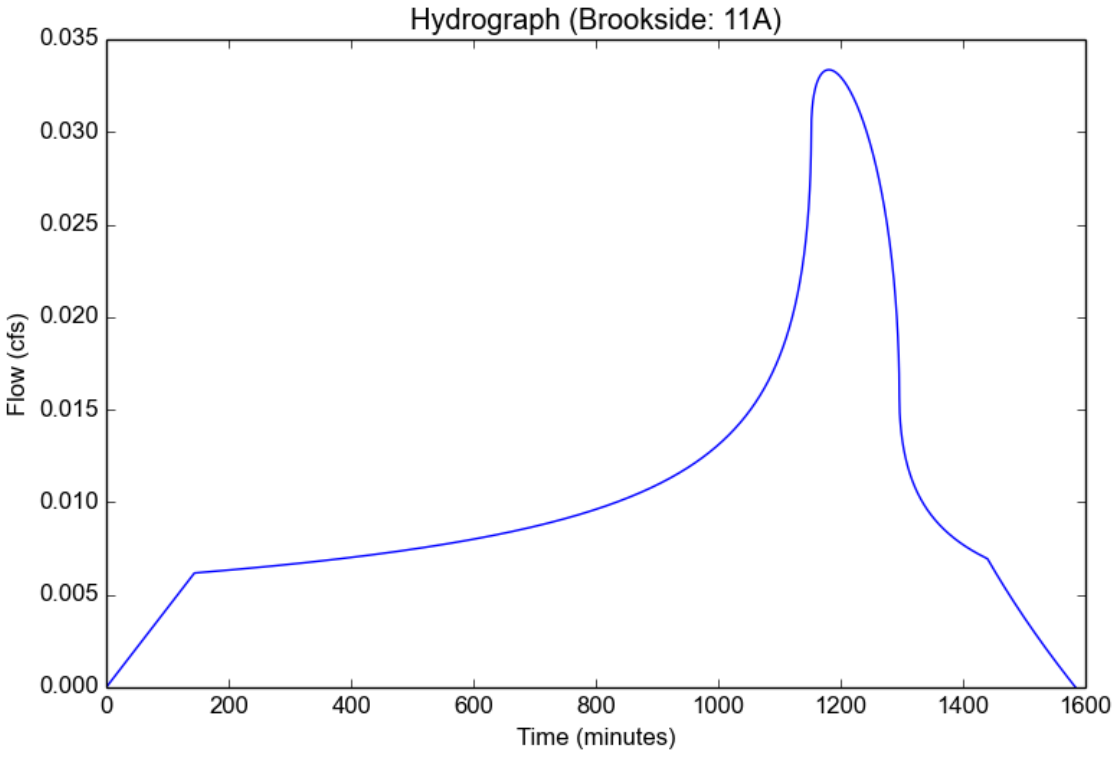
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.8-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	3.14
Flow Path Length (ft)	890.9
Flow Path Slope (vft/hft)	0.02469
85th Percentile Rainfall Depth (in)	0.8
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.8
Peak Intensity (in/hr)	0.0984
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	144.0
Clear Peak Flow Rate (cfs)	0.0334
Burned Peak Flow Rate (cfs)	0.0334
24-Hr Clear Runoff Volume (ac-ft)	0.0224
24-Hr Clear Runoff Volume (cu-ft)	976.9447



Peak Flow Hydrologic Analysis

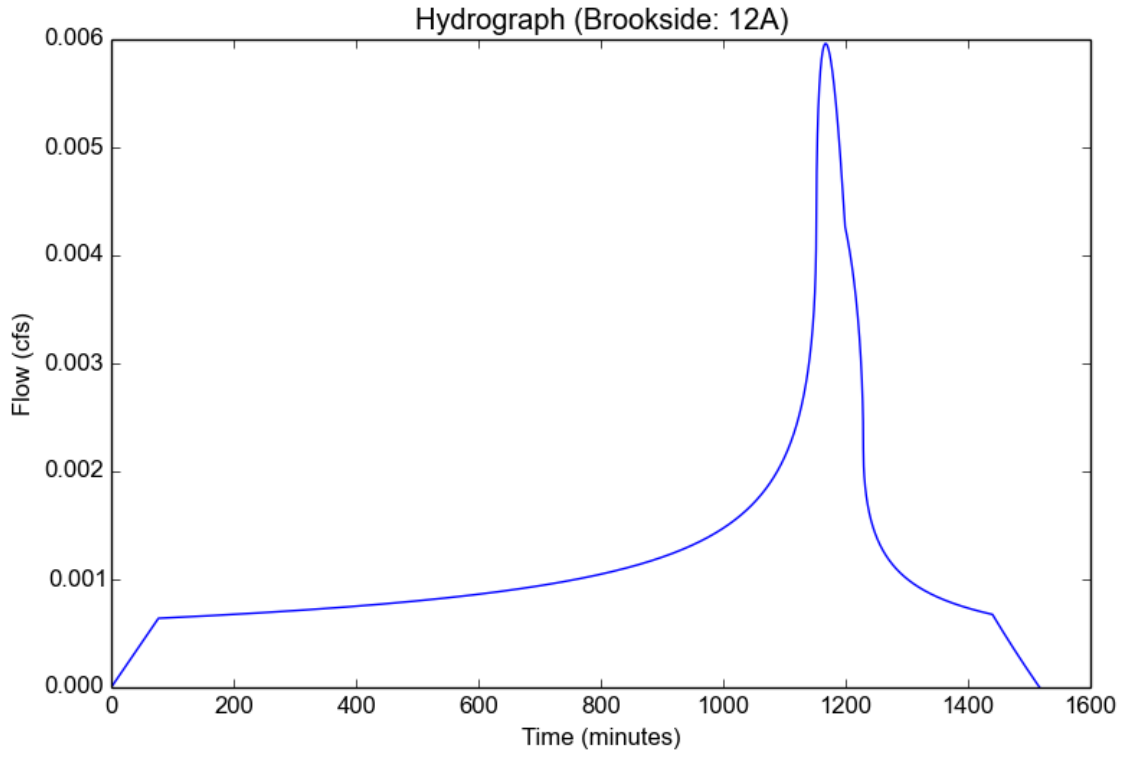
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.8-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.33
Flow Path Length (ft)	406.0
Flow Path Slope (vft/hft)	0.0197
85th Percentile Rainfall Depth (in)	0.8
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.8
Peak Intensity (in/hr)	0.132
Undeveloped Runoff Coefficient (Cu)	0.1291
Developed Runoff Coefficient (Cd)	0.1368
Time of Concentration (min)	77.0
Clear Peak Flow Rate (cfs)	0.006
Burned Peak Flow Rate (cfs)	0.006
24-Hr Clear Runoff Volume (ac-ft)	0.0024
24-Hr Clear Runoff Volume (cu-ft)	105.0765



Peak Flow Hydrologic Analysis

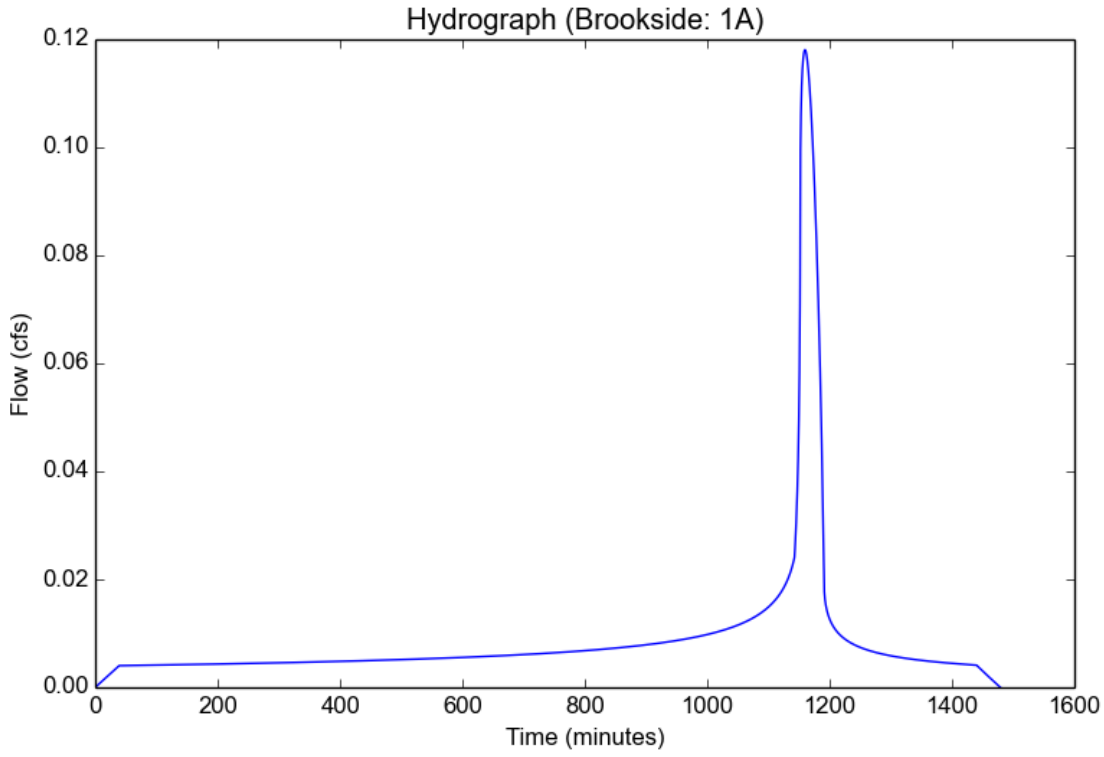
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.9-in Storm/Brookside - 1A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1A
Area (ac)	1.86
Flow Path Length (ft)	623.8
Flow Path Slope (vft/hft)	0.11061
85th Percentile Rainfall Depth (in)	0.9
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.9
Peak Intensity (in/hr)	0.2045
Undeveloped Runoff Coefficient (Cu)	0.3045
Developed Runoff Coefficient (Cd)	0.3104
Time of Concentration (min)	39.0
Clear Peak Flow Rate (cfs)	0.1181
Burned Peak Flow Rate (cfs)	0.1181
24-Hr Clear Runoff Volume (ac-ft)	0.018
24-Hr Clear Runoff Volume (cu-ft)	784.6298



Peak Flow Hydrologic Analysis

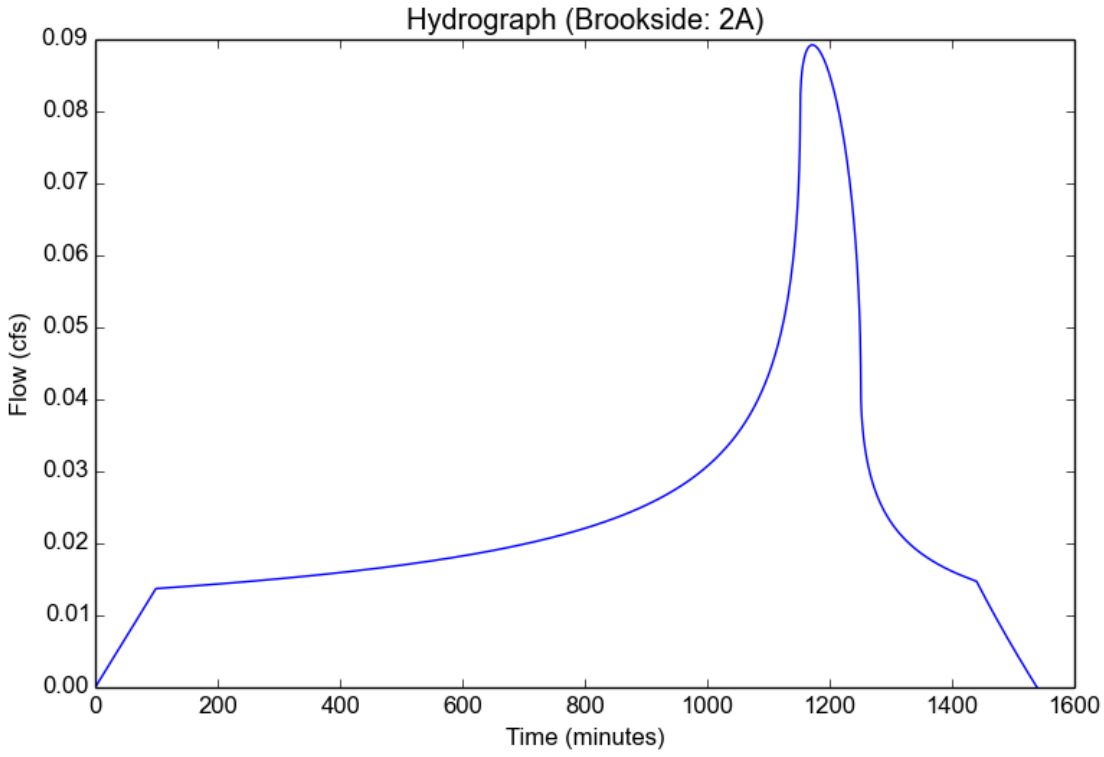
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.9-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	6.26
Flow Path Length (ft)	739.9
Flow Path Slope (vft/hft)	0.06623
85th Percentile Rainfall Depth (in)	0.9
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.9
Peak Intensity (in/hr)	0.132
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	99.0
Clear Peak Flow Rate (cfs)	0.0892
Burned Peak Flow Rate (cfs)	0.0892
24-Hr Clear Runoff Volume (ac-ft)	0.0503
24-Hr Clear Runoff Volume (cu-ft)	2190.786



Peak Flow Hydrologic Analysis

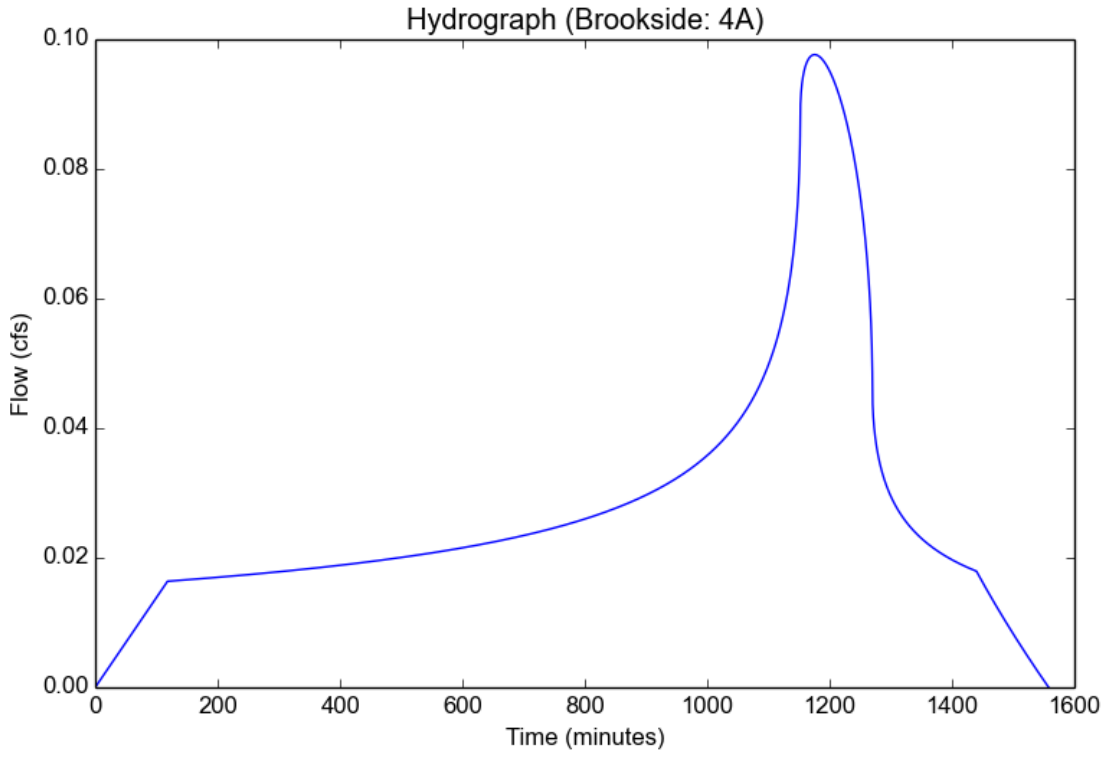
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.9-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	7.44
Flow Path Length (ft)	949.3
Flow Path Slope (vft/hft)	0.05794
85th Percentile Rainfall Depth (in)	0.9
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.9
Peak Intensity (in/hr)	0.1215
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	118.0
Clear Peak Flow Rate (cfs)	0.0977
Burned Peak Flow Rate (cfs)	0.0977
24-Hr Clear Runoff Volume (ac-ft)	0.0598
24-Hr Clear Runoff Volume (cu-ft)	2603.8954



Peak Flow Hydrologic Analysis

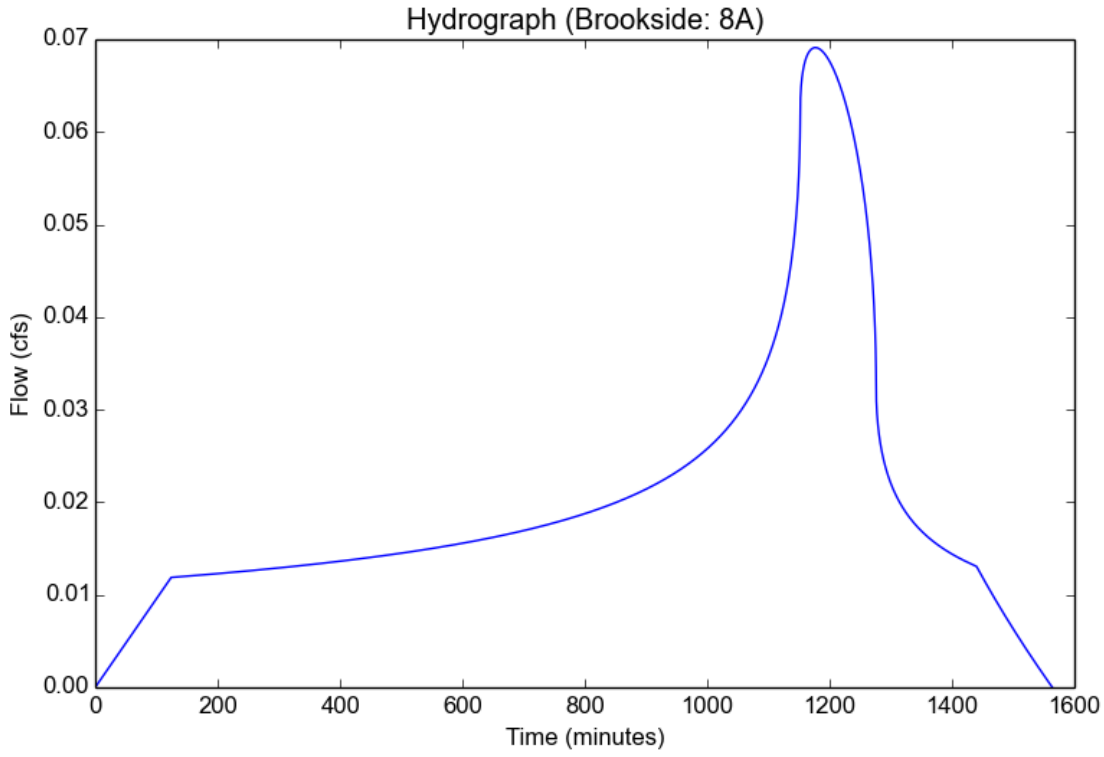
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.9-in Storm/Brookside - 8A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	8A
Area (ac)	5.39
Flow Path Length (ft)	1116.4
Flow Path Slope (vft/hft)	0.08151
85th Percentile Rainfall Depth (in)	0.9
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.9
Peak Intensity (in/hr)	0.1187
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	124.0
Clear Peak Flow Rate (cfs)	0.0691
Burned Peak Flow Rate (cfs)	0.0691
24-Hr Clear Runoff Volume (ac-ft)	0.0433
24-Hr Clear Runoff Volume (cu-ft)	1886.4629



Peak Flow Hydrologic Analysis

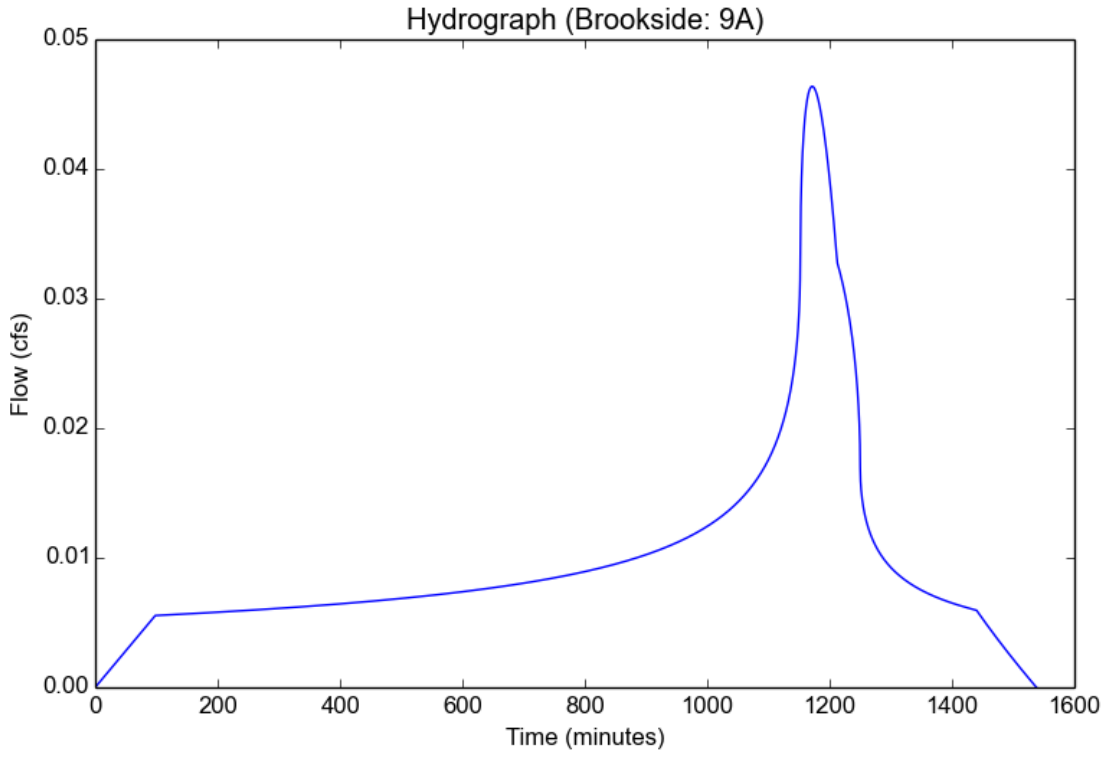
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.9-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	2.53
Flow Path Length (ft)	912.2
Flow Path Slope (vft/hft)	0.05591
85th Percentile Rainfall Depth (in)	0.9
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.9
Peak Intensity (in/hr)	0.1326
Undeveloped Runoff Coefficient (Cu)	0.1305
Developed Runoff Coefficient (Cd)	0.1382
Time of Concentration (min)	98.0
Clear Peak Flow Rate (cfs)	0.0464
Burned Peak Flow Rate (cfs)	0.0464
24-Hr Clear Runoff Volume (ac-ft)	0.0209
24-Hr Clear Runoff Volume (cu-ft)	910.7863



Peak Flow Hydrologic Analysis

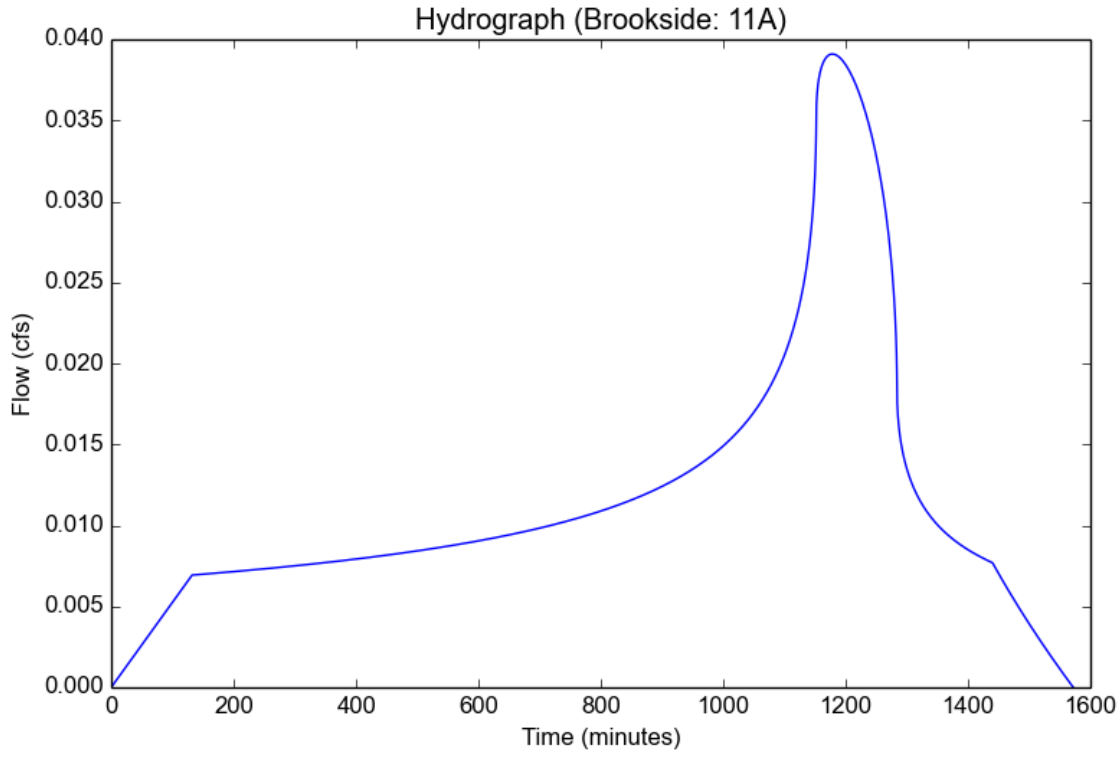
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.9-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	3.14
Flow Path Length (ft)	890.9
Flow Path Slope (vft/hft)	0.02469
85th Percentile Rainfall Depth (in)	0.9
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.9
Peak Intensity (in/hr)	0.1153
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	132.0
Clear Peak Flow Rate (cfs)	0.0391
Burned Peak Flow Rate (cfs)	0.0391
24-Hr Clear Runoff Volume (ac-ft)	0.0252
24-Hr Clear Runoff Volume (cu-ft)	1099.0104



Peak Flow Hydrologic Analysis

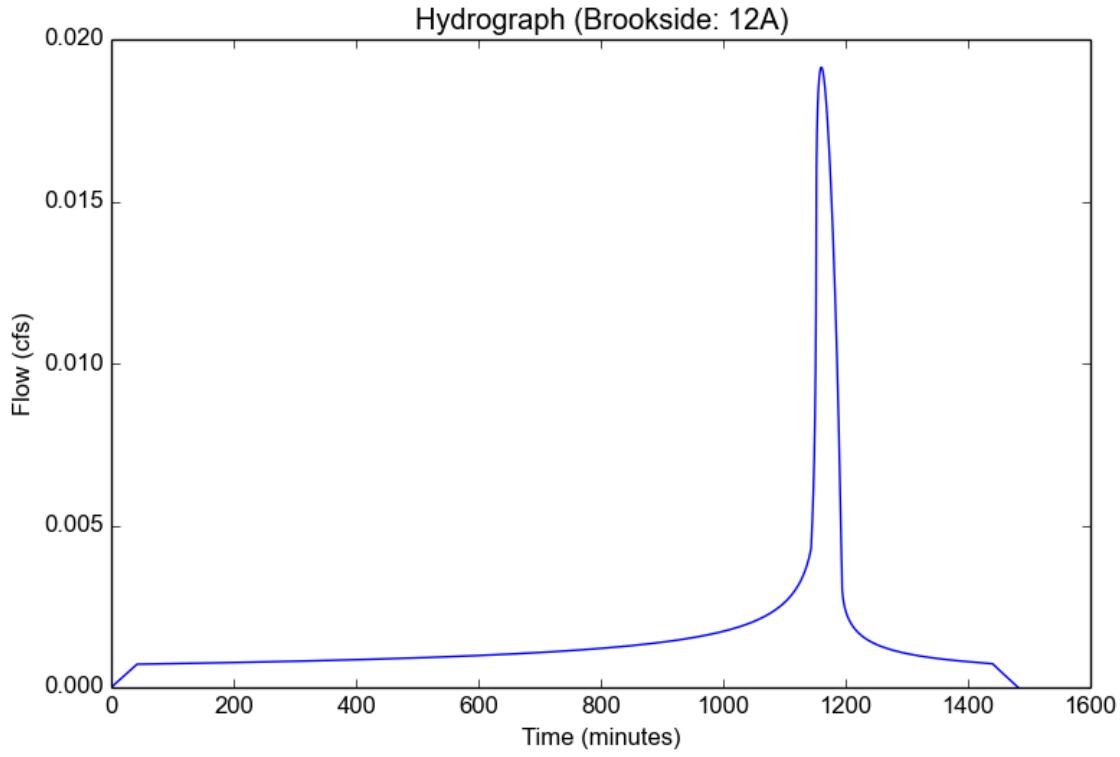
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/0.9-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.33
Flow Path Length (ft)	406.0
Flow Path Slope (vft/hft)	0.0197
85th Percentile Rainfall Depth (in)	0.9
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.9
Peak Intensity (in/hr)	0.1975
Undeveloped Runoff Coefficient (Cu)	0.2875
Developed Runoff Coefficient (Cd)	0.2937
Time of Concentration (min)	42.0
Clear Peak Flow Rate (cfs)	0.0191
Burned Peak Flow Rate (cfs)	0.0191
24-Hr Clear Runoff Volume (ac-ft)	0.0032
24-Hr Clear Runoff Volume (cu-ft)	137.6479



Peak Flow Hydrologic Analysis

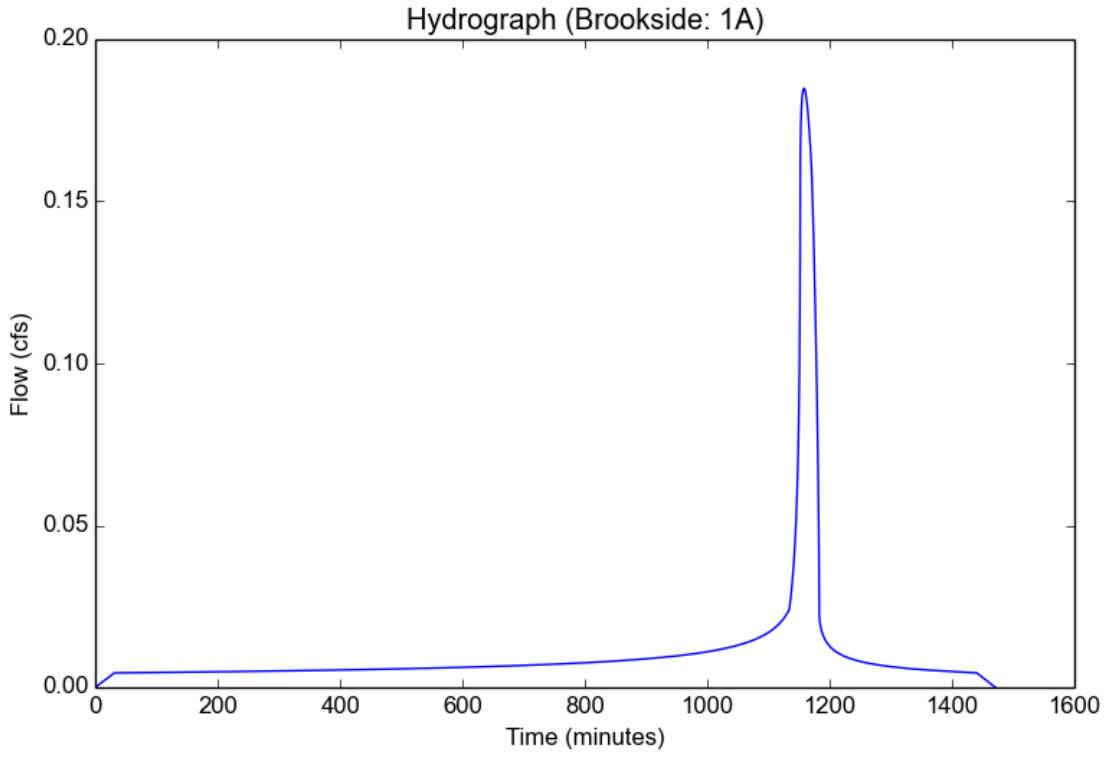
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/1.0-in Storm/Brookside - 1A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1A
Area (ac)	1.86
Flow Path Length (ft)	623.8
Flow Path Slope (vft/hft)	0.11061
85th Percentile Rainfall Depth (in)	1.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.0
Peak Intensity (in/hr)	0.2531
Undeveloped Runoff Coefficient (Cu)	0.3876
Developed Runoff Coefficient (Cd)	0.3927
Time of Concentration (min)	31.0
Clear Peak Flow Rate (cfs)	0.1849
Burned Peak Flow Rate (cfs)	0.1849
24-Hr Clear Runoff Volume (ac-ft)	0.0216
24-Hr Clear Runoff Volume (cu-ft)	941.3634



Peak Flow Hydrologic Analysis

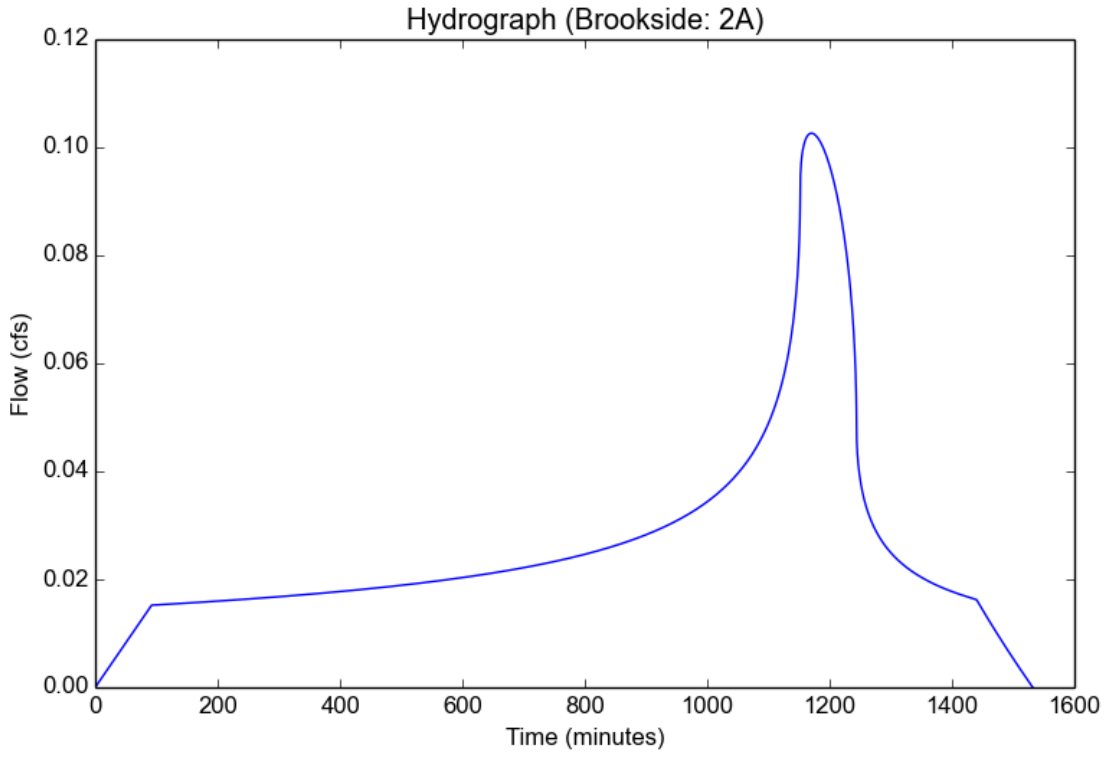
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/1.0-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	6.26
Flow Path Length (ft)	739.9
Flow Path Slope (vft/hft)	0.06623
85th Percentile Rainfall Depth (in)	1.0
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.0
Peak Intensity (in/hr)	0.1518
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	92.0
Clear Peak Flow Rate (cfs)	0.1026
Burned Peak Flow Rate (cfs)	0.1026
24-Hr Clear Runoff Volume (ac-ft)	0.0559
24-Hr Clear Runoff Volume (cu-ft)	2434.1619



Peak Flow Hydrologic Analysis

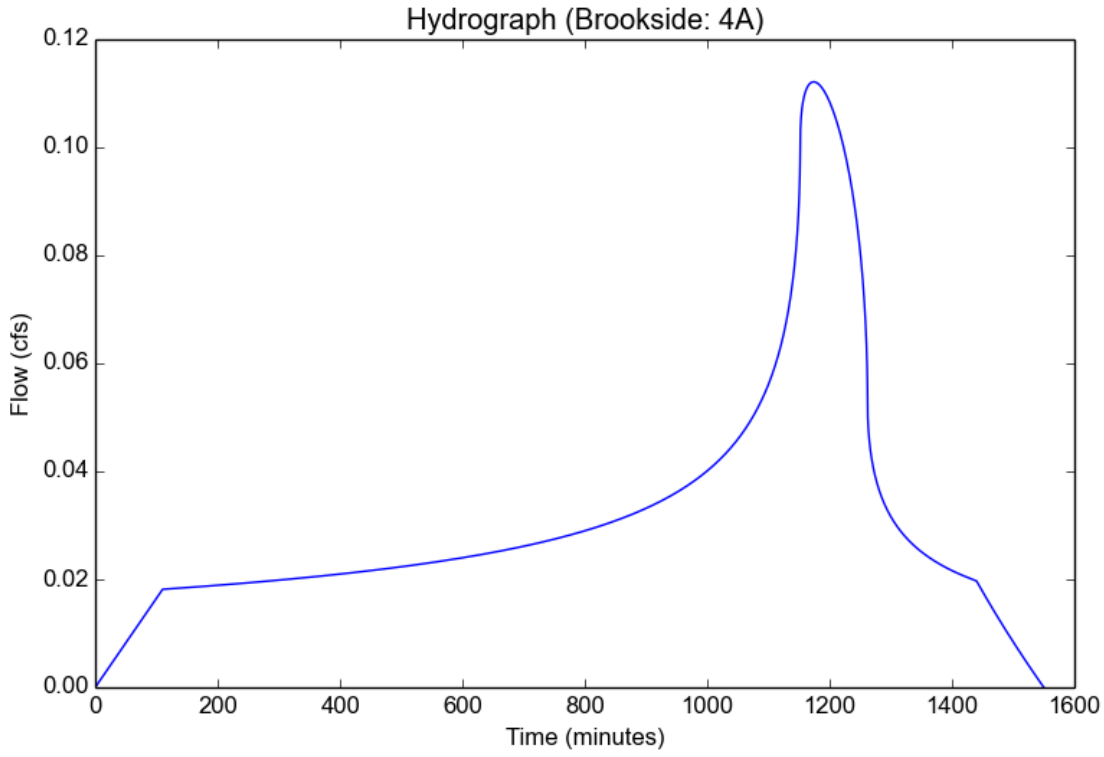
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/1.0-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	7.44
Flow Path Length (ft)	949.3
Flow Path Slope (vft/hft)	0.05794
85th Percentile Rainfall Depth (in)	1.0
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.0
Peak Intensity (in/hr)	0.1396
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	110.0
Clear Peak Flow Rate (cfs)	0.1121
Burned Peak Flow Rate (cfs)	0.1121
24-Hr Clear Runoff Volume (ac-ft)	0.0664
24-Hr Clear Runoff Volume (cu-ft)	2893.1431



Peak Flow Hydrologic Analysis

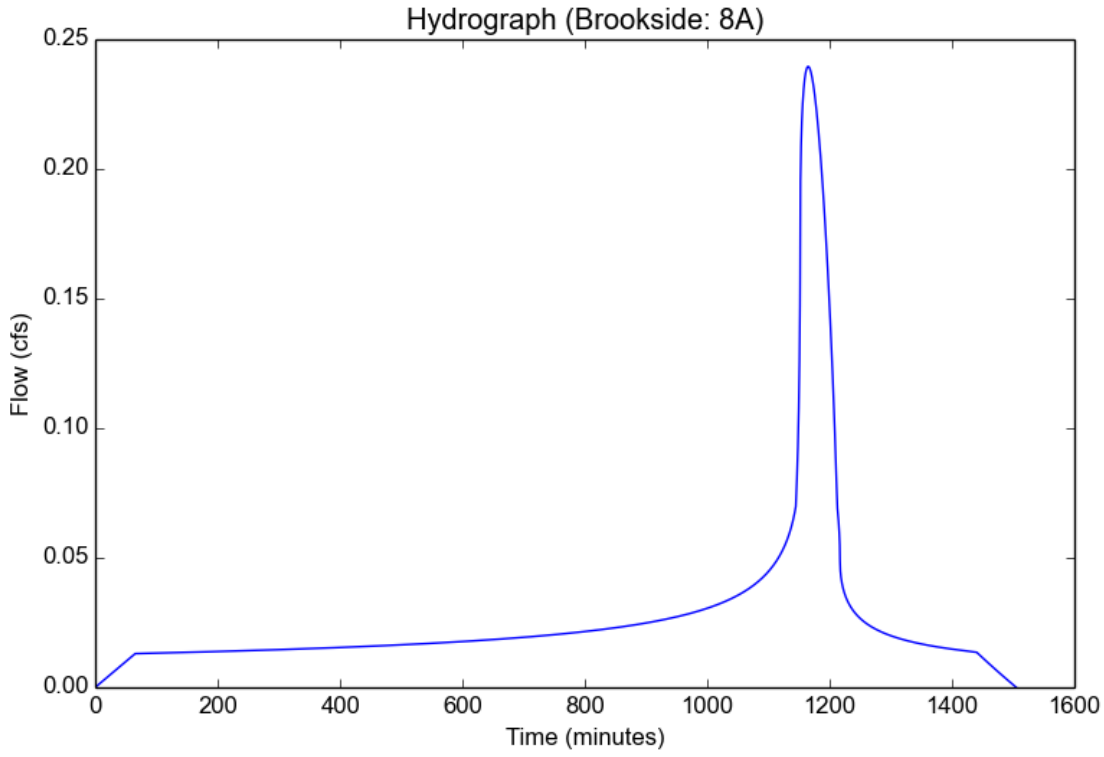
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/1.0-in Storm/Brookside - 8A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	8A
Area (ac)	5.39
Flow Path Length (ft)	1116.4
Flow Path Slope (vft/hft)	0.08151
85th Percentile Rainfall Depth (in)	1.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.0
Peak Intensity (in/hr)	0.1787
Undeveloped Runoff Coefficient (Cu)	0.2421
Developed Runoff Coefficient (Cd)	0.2487
Time of Concentration (min)	65.0
Clear Peak Flow Rate (cfs)	0.2395
Burned Peak Flow Rate (cfs)	0.2395
24-Hr Clear Runoff Volume (ac-ft)	0.0563
24-Hr Clear Runoff Volume (cu-ft)	2454.5088



Peak Flow Hydrologic Analysis

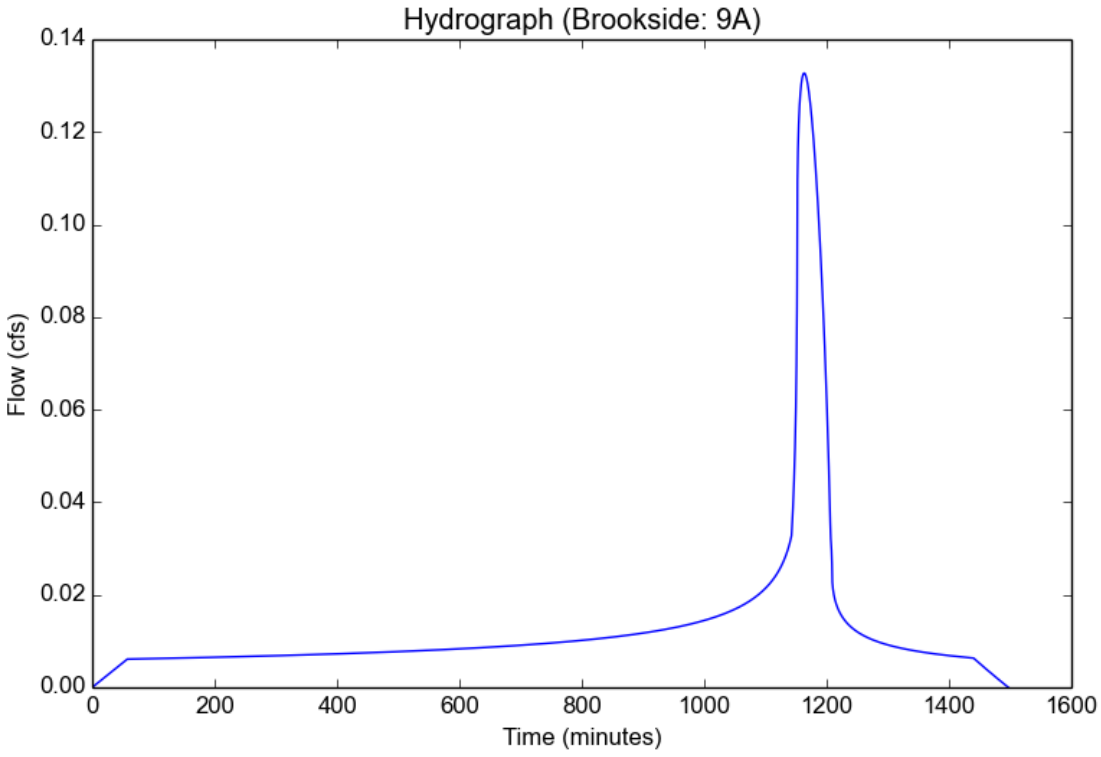
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/1.0-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	2.53
Flow Path Length (ft)	912.2
Flow Path Slope (vft/hft)	0.05591
85th Percentile Rainfall Depth (in)	1.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.0
Peak Intensity (in/hr)	0.1901
Undeveloped Runoff Coefficient (Cu)	0.2696
Developed Runoff Coefficient (Cd)	0.2759
Time of Concentration (min)	57.0
Clear Peak Flow Rate (cfs)	0.1327
Burned Peak Flow Rate (cfs)	0.1327
24-Hr Clear Runoff Volume (ac-ft)	0.0271
24-Hr Clear Runoff Volume (cu-ft)	1179.7039



Peak Flow Hydrologic Analysis

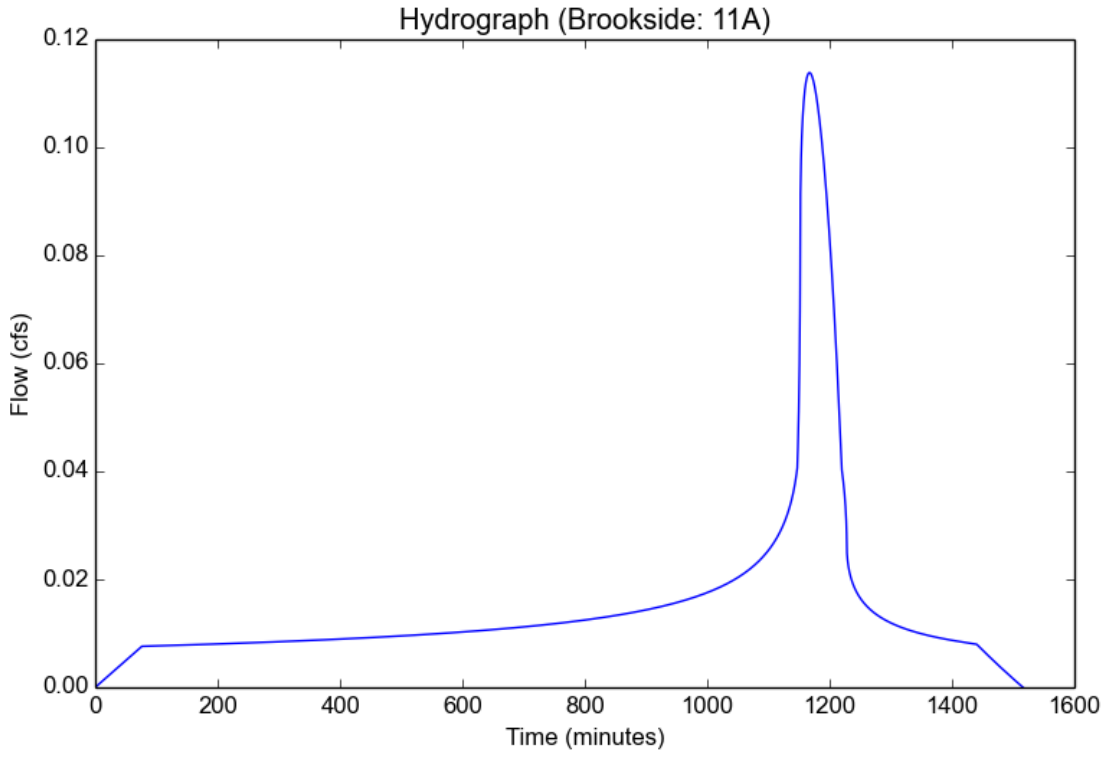
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/1.0-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	3.14
Flow Path Length (ft)	890.9
Flow Path Slope (vft/hft)	0.02469
85th Percentile Rainfall Depth (in)	1.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.0
Peak Intensity (in/hr)	0.166
Undeveloped Runoff Coefficient (Cu)	0.2115
Developed Runoff Coefficient (Cd)	0.2183
Time of Concentration (min)	76.0
Clear Peak Flow Rate (cfs)	0.1138
Burned Peak Flow Rate (cfs)	0.1138
24-Hr Clear Runoff Volume (ac-ft)	0.0319
24-Hr Clear Runoff Volume (cu-ft)	1388.1119



Peak Flow Hydrologic Analysis

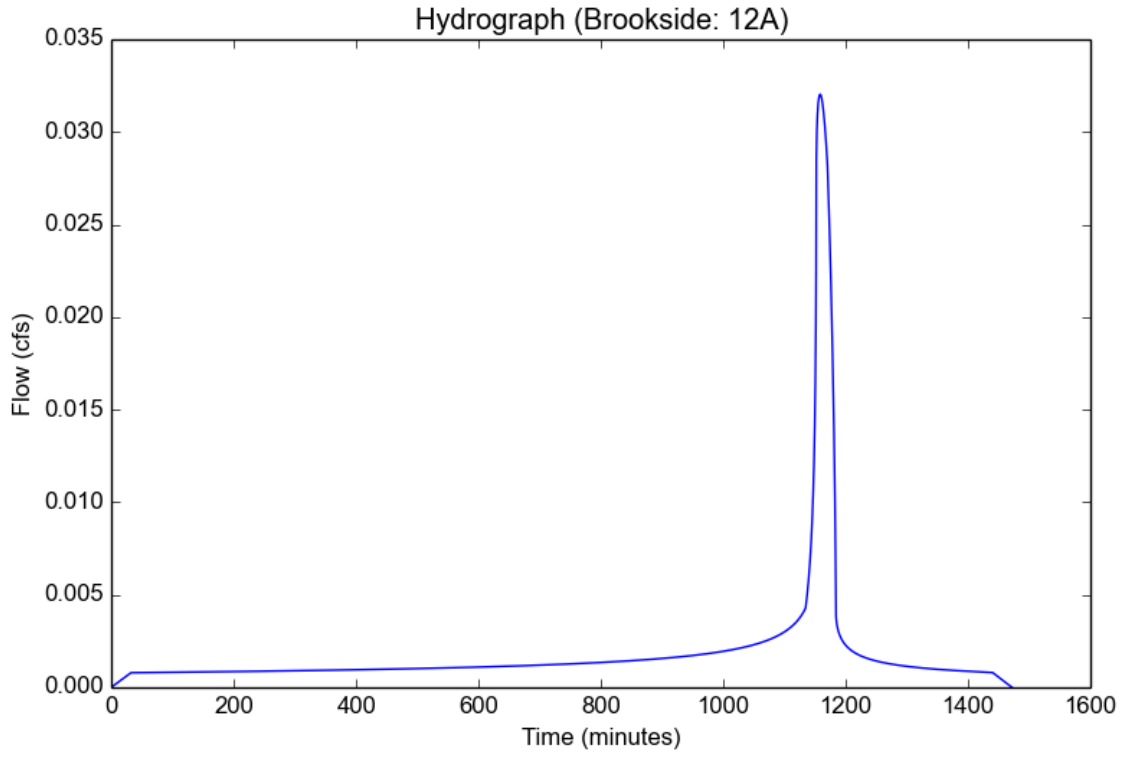
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/1.0-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.33
Flow Path Length (ft)	406.0
Flow Path Slope (vft/hft)	0.0197
85th Percentile Rainfall Depth (in)	1.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.0
Peak Intensity (in/hr)	0.2493
Undeveloped Runoff Coefficient (Cu)	0.3842
Developed Runoff Coefficient (Cd)	0.3893
Time of Concentration (min)	32.0
Clear Peak Flow Rate (cfs)	0.032
Burned Peak Flow Rate (cfs)	0.032
24-Hr Clear Runoff Volume (ac-ft)	0.0038
24-Hr Clear Runoff Volume (cu-ft)	166.7223



Peak Flow Hydrologic Analysis

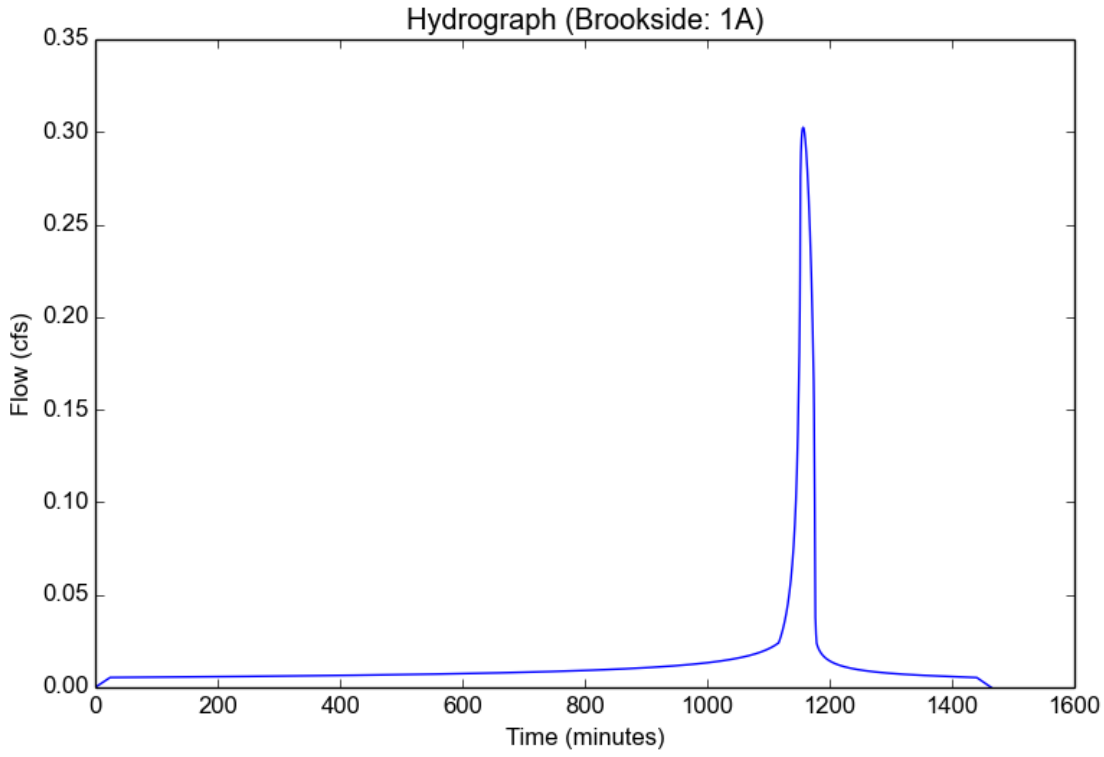
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/1.2-in Storm/Brookside - 1A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1A
Area (ac)	1.86
Flow Path Length (ft)	623.8
Flow Path Slope (vft/hft)	0.11061
85th Percentile Rainfall Depth (in)	1.2
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.2
Peak Intensity (in/hr)	0.3425
Undeveloped Runoff Coefficient (Cu)	0.4705
Developed Runoff Coefficient (Cd)	0.4748
Time of Concentration (min)	24.0
Clear Peak Flow Rate (cfs)	0.3025
Burned Peak Flow Rate (cfs)	0.3025
24-Hr Clear Runoff Volume (ac-ft)	0.0281
24-Hr Clear Runoff Volume (cu-ft)	1222.2493



Peak Flow Hydrologic Analysis

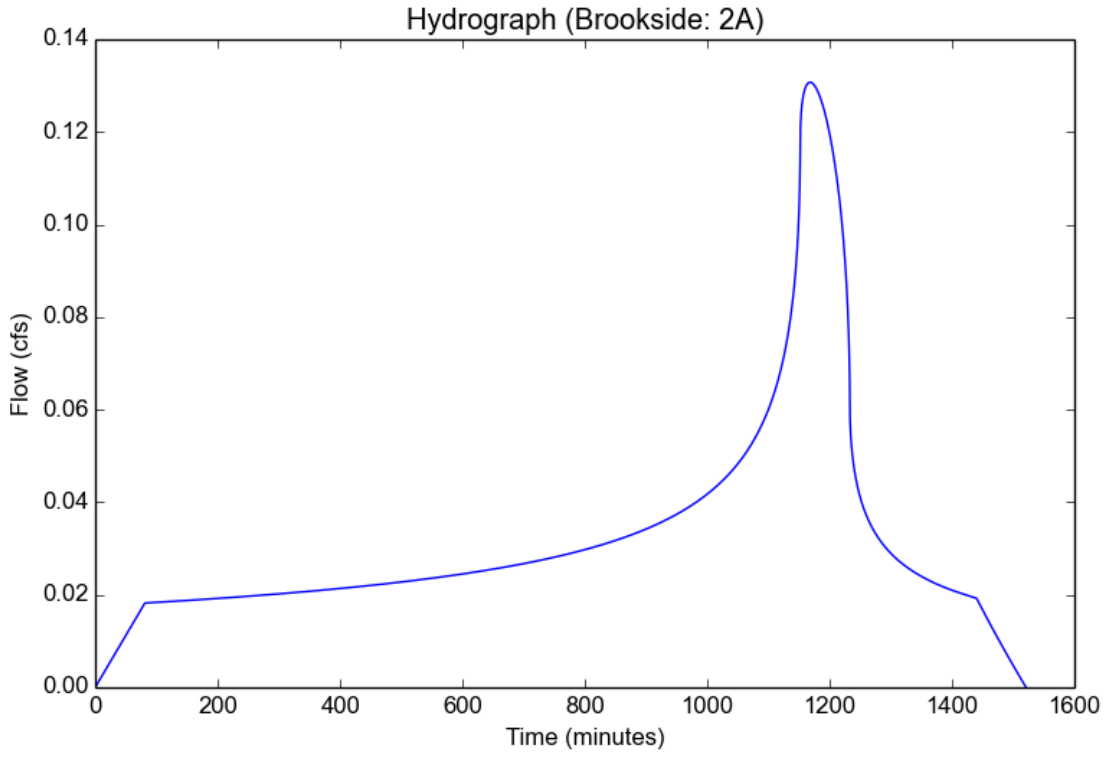
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/1.2-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	6.26
Flow Path Length (ft)	739.9
Flow Path Slope (vft/hft)	0.06623
85th Percentile Rainfall Depth (in)	1.2
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.2
Peak Intensity (in/hr)	0.1934
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	81.0
Clear Peak Flow Rate (cfs)	0.1307
Burned Peak Flow Rate (cfs)	0.1307
24-Hr Clear Runoff Volume (ac-ft)	0.0671
24-Hr Clear Runoff Volume (cu-ft)	2920.9185



Peak Flow Hydrologic Analysis

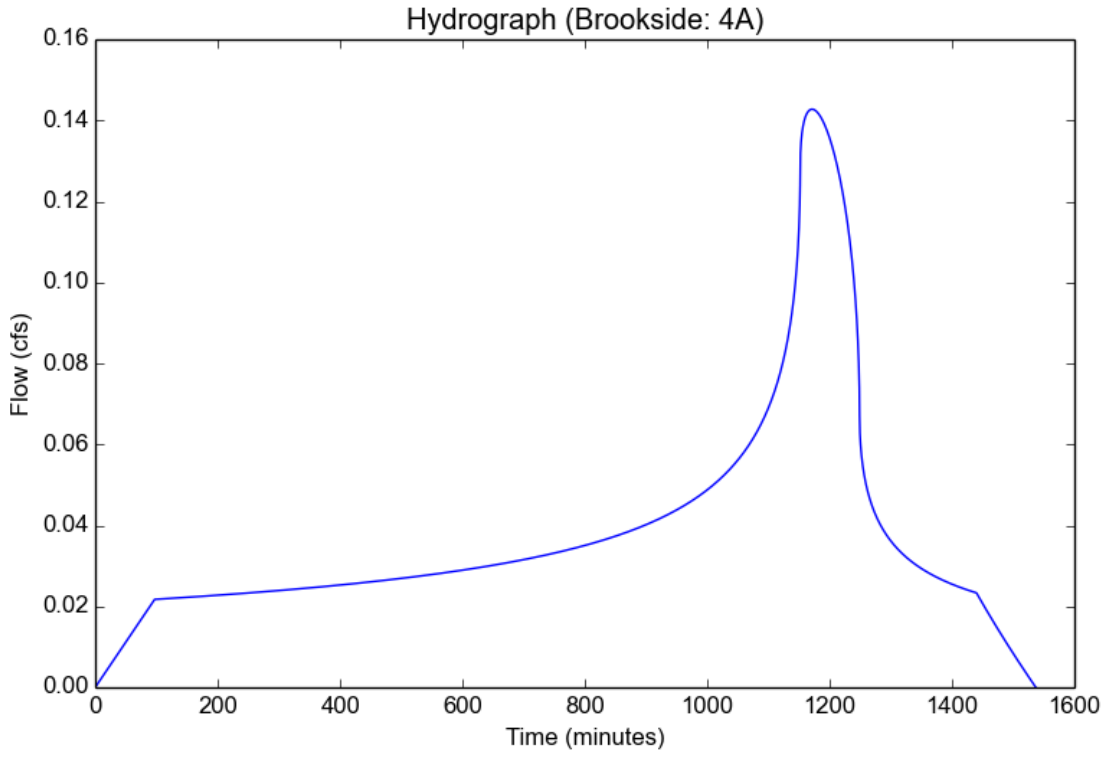
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/1.2-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	7.44
Flow Path Length (ft)	949.3
Flow Path Slope (vft/hft)	0.05794
85th Percentile Rainfall Depth (in)	1.2
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.2
Peak Intensity (in/hr)	0.1777
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	97.0
Clear Peak Flow Rate (cfs)	0.1428
Burned Peak Flow Rate (cfs)	0.1428
24-Hr Clear Runoff Volume (ac-ft)	0.0797
24-Hr Clear Runoff Volume (cu-ft)	3471.6421



Peak Flow Hydrologic Analysis

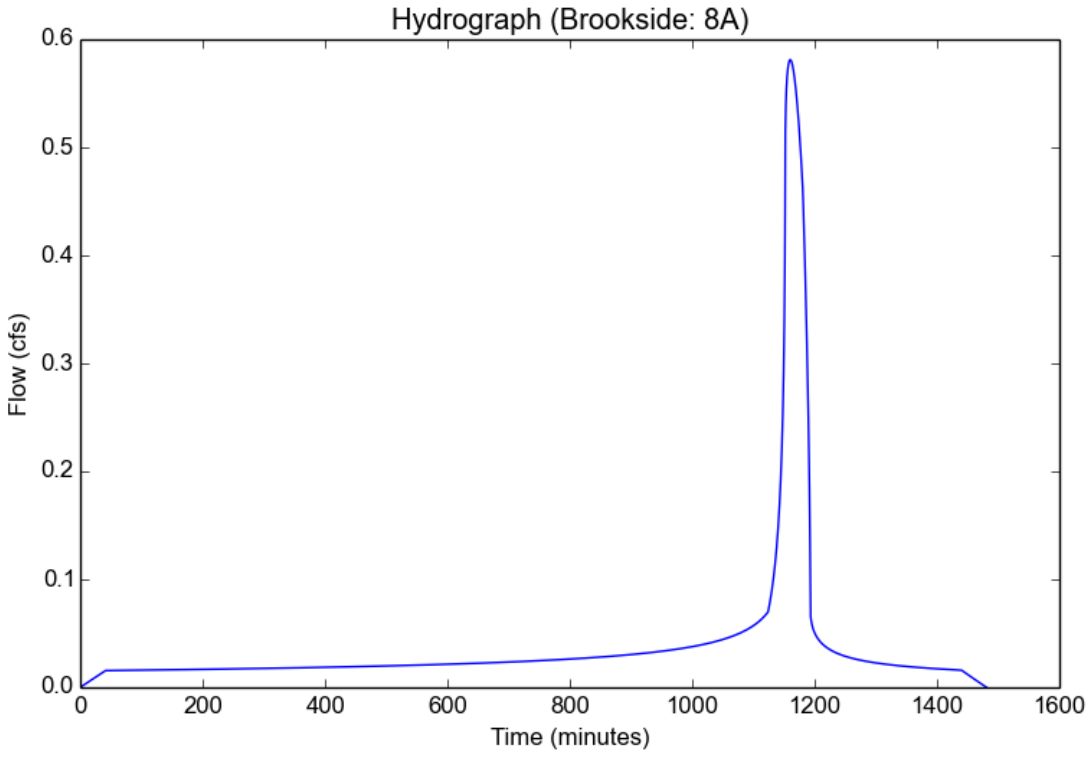
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/1.2-in Storm/Brookside - 8A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	8A
Area (ac)	5.39
Flow Path Length (ft)	1116.4
Flow Path Slope (vft/hft)	0.08151
85th Percentile Rainfall Depth (in)	1.2
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.2
Peak Intensity (in/hr)	0.2663
Undeveloped Runoff Coefficient (Cu)	0.3999
Developed Runoff Coefficient (Cd)	0.4049
Time of Concentration (min)	41.0
Clear Peak Flow Rate (cfs)	0.5812
Burned Peak Flow Rate (cfs)	0.5812
24-Hr Clear Runoff Volume (ac-ft)	0.0796
24-Hr Clear Runoff Volume (cu-ft)	3467.5245



Peak Flow Hydrologic Analysis

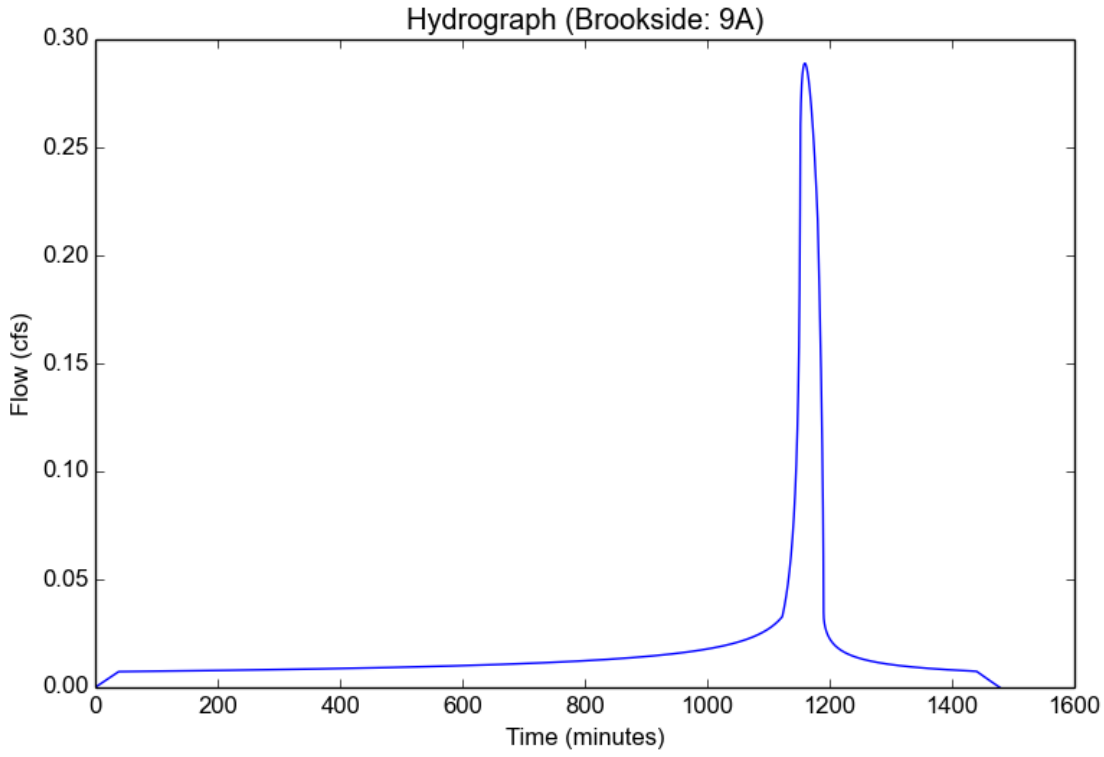
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/1.2-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	2.53
Flow Path Length (ft)	912.2
Flow Path Slope (vft/hft)	0.05591
85th Percentile Rainfall Depth (in)	1.2
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.2
Peak Intensity (in/hr)	0.276
Undeveloped Runoff Coefficient (Cu)	0.4088
Developed Runoff Coefficient (Cd)	0.4138
Time of Concentration (min)	38.0
Clear Peak Flow Rate (cfs)	0.2889
Burned Peak Flow Rate (cfs)	0.2889
24-Hr Clear Runoff Volume (ac-ft)	0.0375
24-Hr Clear Runoff Volume (cu-ft)	1633.4965



Peak Flow Hydrologic Analysis

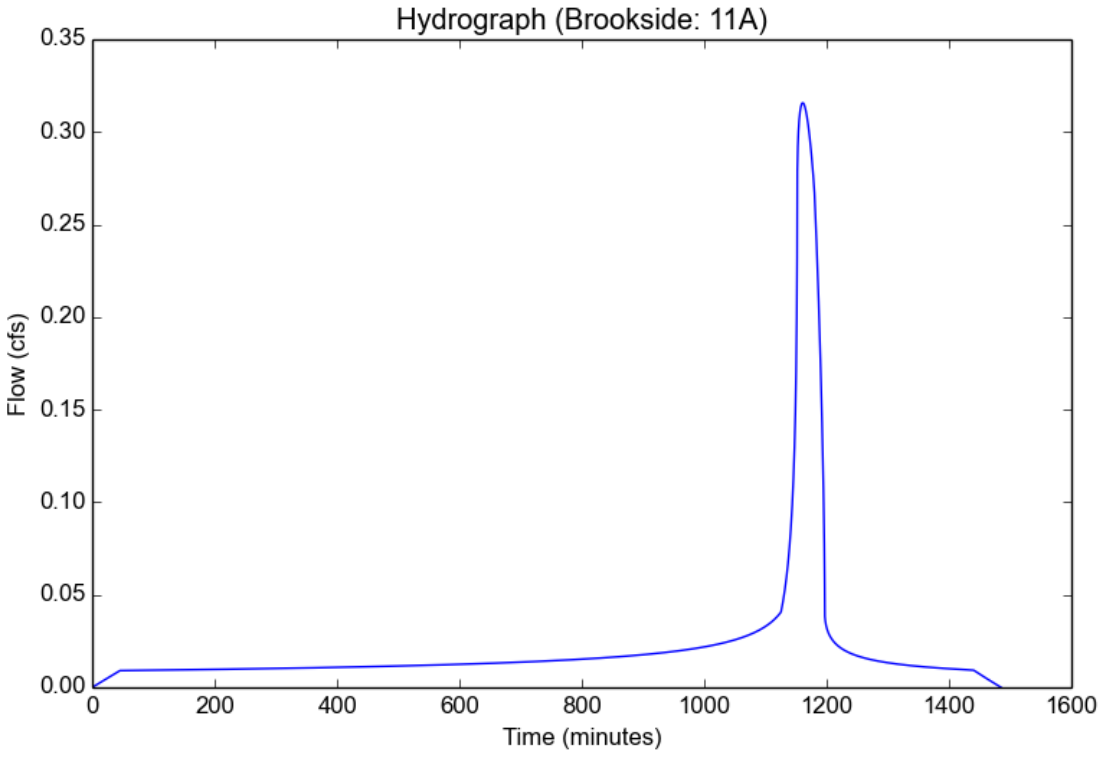
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/1.2-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	3.14
Flow Path Length (ft)	890.9
Flow Path Slope (vft/hft)	0.02469
85th Percentile Rainfall Depth (in)	1.2
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.2
Peak Intensity (in/hr)	0.2549
Undeveloped Runoff Coefficient (Cu)	0.3893
Developed Runoff Coefficient (Cd)	0.3944
Time of Concentration (min)	45.0
Clear Peak Flow Rate (cfs)	0.3157
Burned Peak Flow Rate (cfs)	0.3157
24-Hr Clear Runoff Volume (ac-ft)	0.0461
24-Hr Clear Runoff Volume (cu-ft)	2009.7914



Peak Flow Hydrologic Analysis

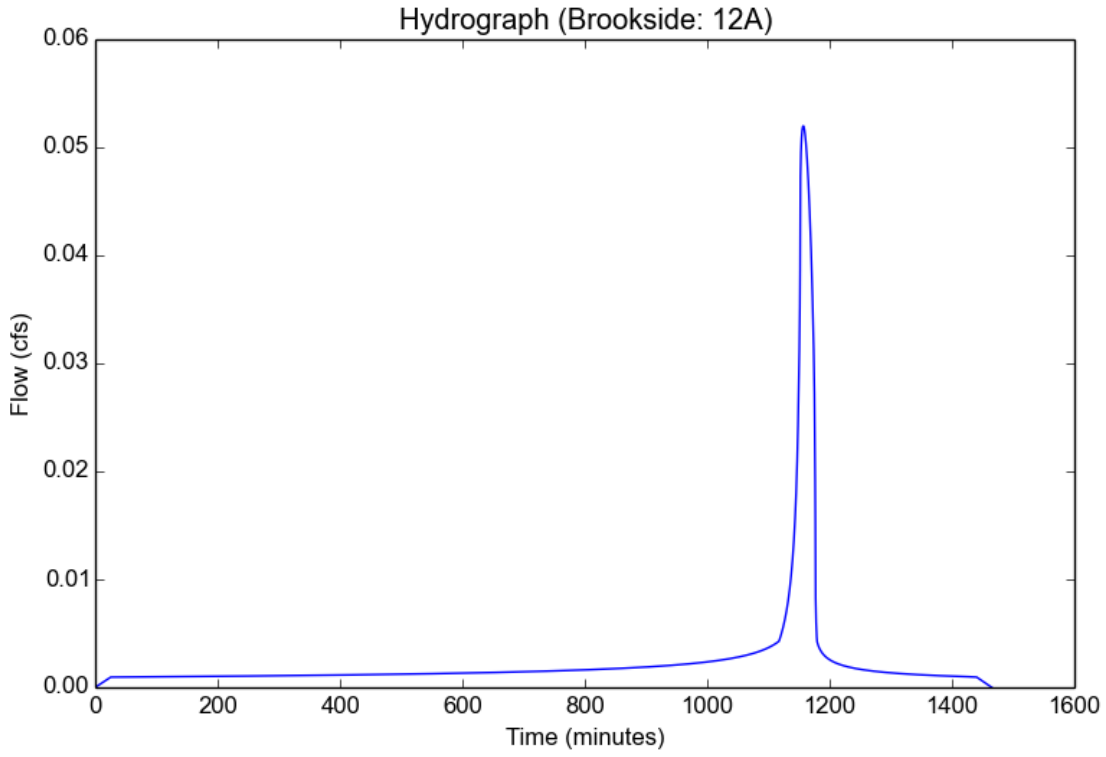
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/1.2-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.33
Flow Path Length (ft)	406.0
Flow Path Slope (vft/hft)	0.0197
85th Percentile Rainfall Depth (in)	1.2
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.2
Peak Intensity (in/hr)	0.336
Undeveloped Runoff Coefficient (Cu)	0.4644
Developed Runoff Coefficient (Cd)	0.4688
Time of Concentration (min)	25.0
Clear Peak Flow Rate (cfs)	0.052
Burned Peak Flow Rate (cfs)	0.052
24-Hr Clear Runoff Volume (ac-ft)	0.005
24-Hr Clear Runoff Volume (cu-ft)	216.5332



Peak Flow Hydrologic Analysis

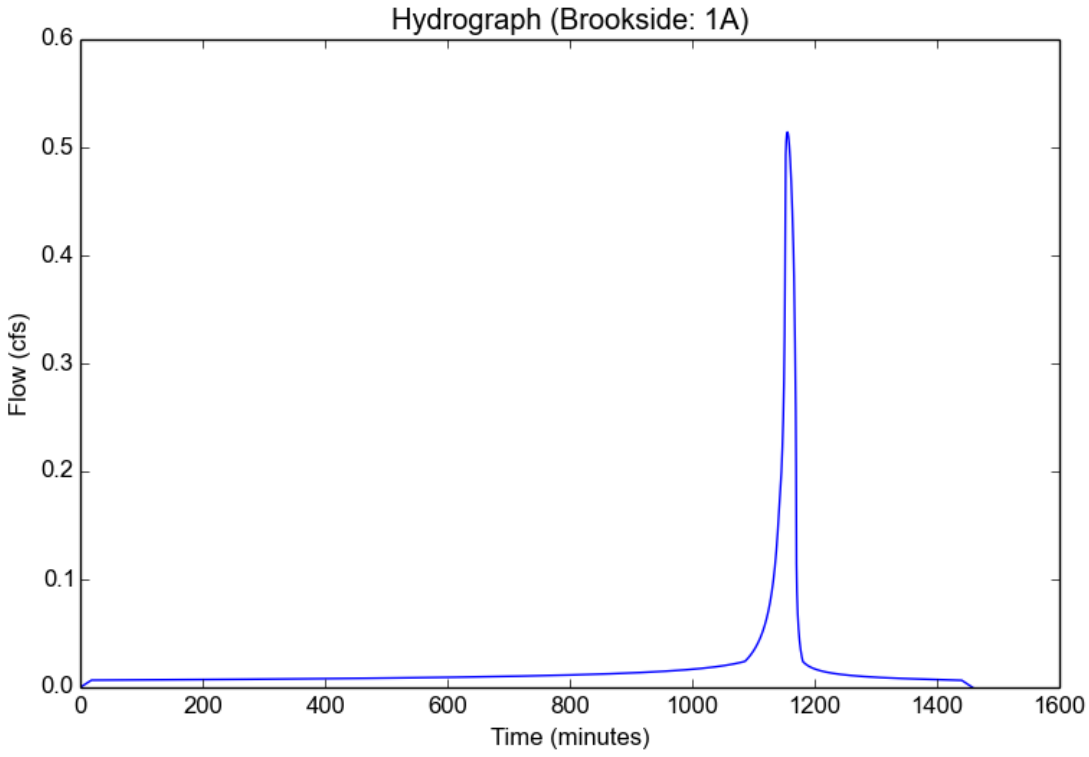
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/1.5-in Storm/Brookside - 1A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1A
Area (ac)	1.86
Flow Path Length (ft)	623.8
Flow Path Slope (vft/hft)	0.11061
85th Percentile Rainfall Depth (in)	1.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.5
Peak Intensity (in/hr)	0.4902
Undeveloped Runoff Coefficient (Cu)	0.5606
Developed Runoff Coefficient (Cd)	0.564
Time of Concentration (min)	18.0
Clear Peak Flow Rate (cfs)	0.5142
Burned Peak Flow Rate (cfs)	0.5142
24-Hr Clear Runoff Volume (ac-ft)	0.0388
24-Hr Clear Runoff Volume (cu-ft)	1688.7608



Peak Flow Hydrologic Analysis

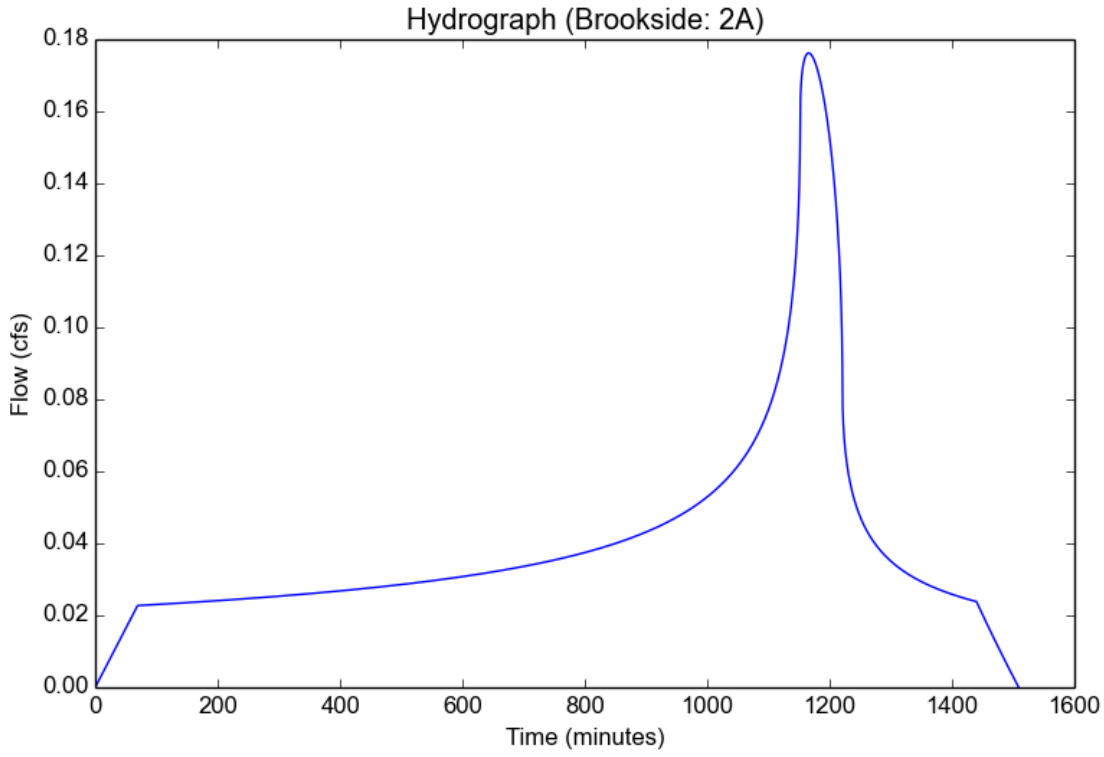
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/1.5-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	6.26
Flow Path Length (ft)	739.9
Flow Path Slope (vft/hft)	0.06623
85th Percentile Rainfall Depth (in)	1.5
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.5
Peak Intensity (in/hr)	0.2606
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	69.0
Clear Peak Flow Rate (cfs)	0.1762
Burned Peak Flow Rate (cfs)	0.1762
24-Hr Clear Runoff Volume (ac-ft)	0.0838
24-Hr Clear Runoff Volume (cu-ft)	3651.0595



Peak Flow Hydrologic Analysis

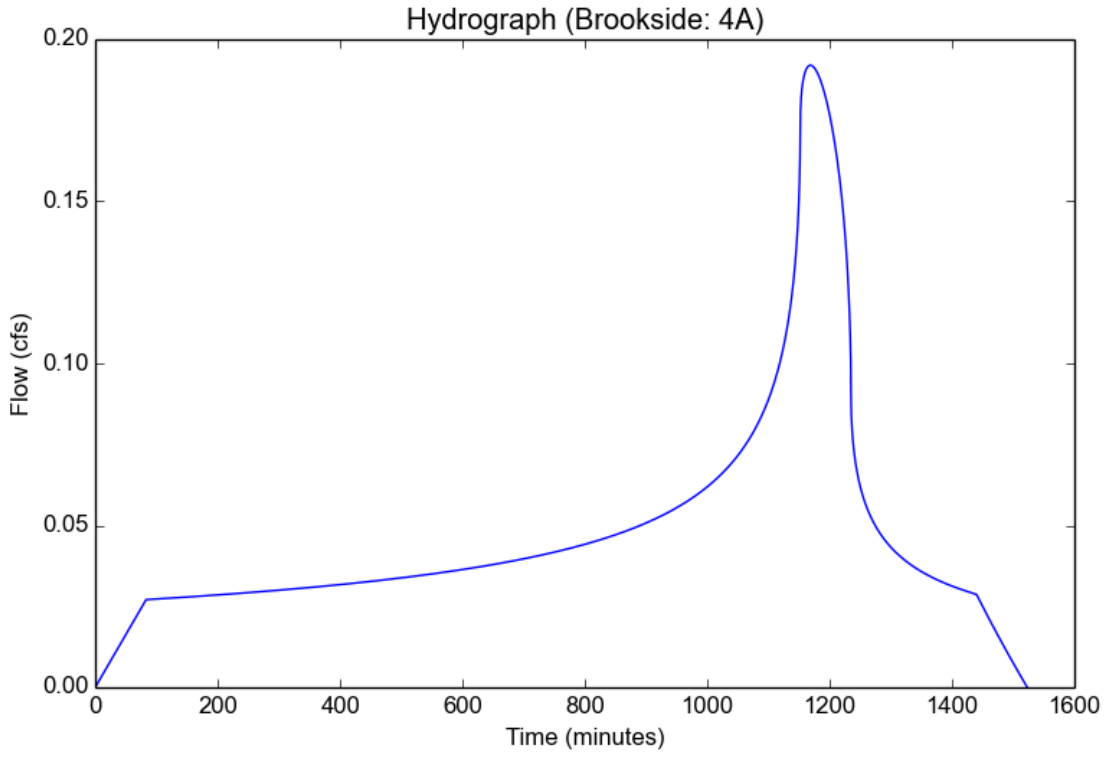
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/1.5-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	7.44
Flow Path Length (ft)	949.3
Flow Path Slope (vft/hft)	0.05794
85th Percentile Rainfall Depth (in)	1.5
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.5
Peak Intensity (in/hr)	0.239
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	83.0
Clear Peak Flow Rate (cfs)	0.192
Burned Peak Flow Rate (cfs)	0.192
24-Hr Clear Runoff Volume (ac-ft)	0.0996
24-Hr Clear Runoff Volume (cu-ft)	4339.403



Peak Flow Hydrologic Analysis

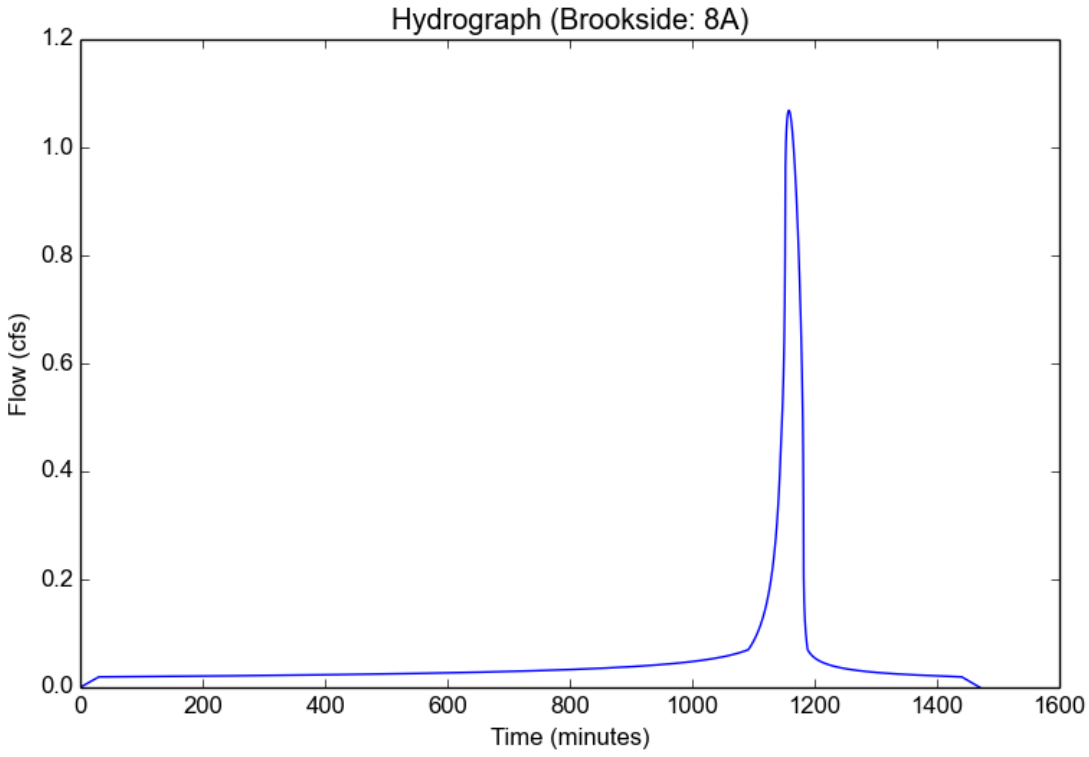
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/1.5-in Storm/Brookside - 8A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	8A
Area (ac)	5.39
Flow Path Length (ft)	1116.4
Flow Path Slope (vft/hft)	0.08151
85th Percentile Rainfall Depth (in)	1.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.5
Peak Intensity (in/hr)	0.3855
Undeveloped Runoff Coefficient (Cu)	0.5103
Developed Runoff Coefficient (Cd)	0.5142
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	1.0685
Burned Peak Flow Rate (cfs)	1.0685
24-Hr Clear Runoff Volume (ac-ft)	0.1113
24-Hr Clear Runoff Volume (cu-ft)	4847.3773



Peak Flow Hydrologic Analysis

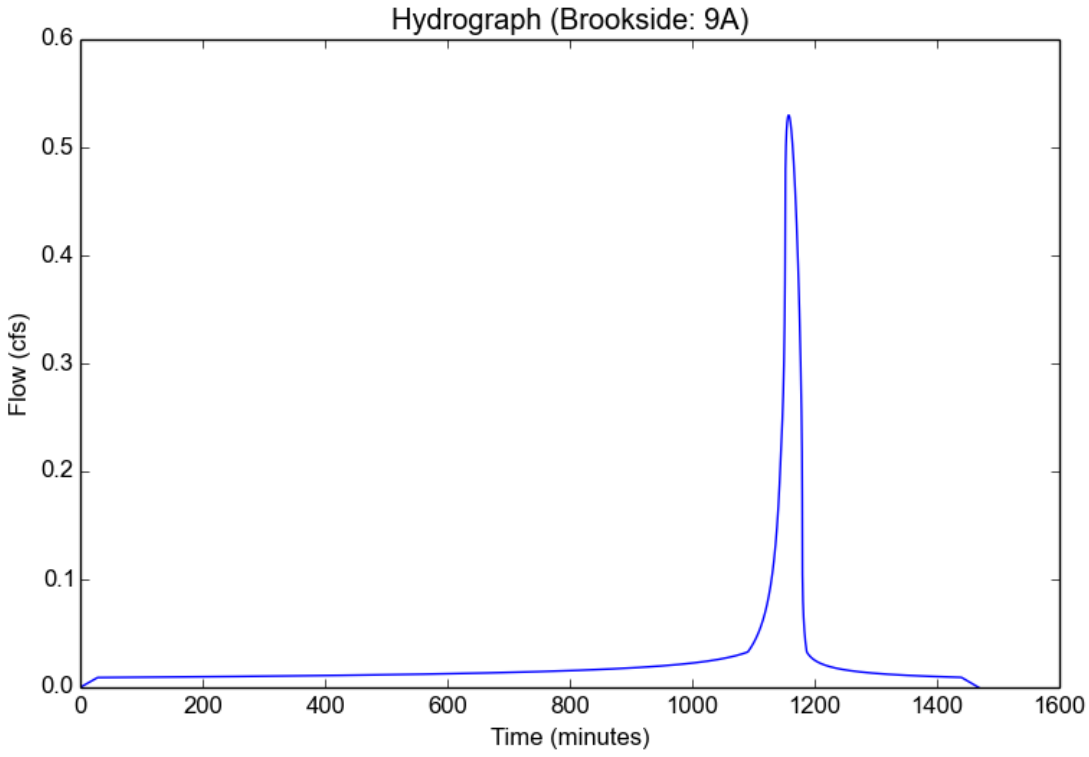
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/1.5-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	2.53
Flow Path Length (ft)	912.2
Flow Path Slope (vft/hft)	0.05591
85th Percentile Rainfall Depth (in)	1.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.5
Peak Intensity (in/hr)	0.3982
Undeveloped Runoff Coefficient (Cu)	0.5221
Developed Runoff Coefficient (Cd)	0.5258
Time of Concentration (min)	28.0
Clear Peak Flow Rate (cfs)	0.5298
Burned Peak Flow Rate (cfs)	0.5298
24-Hr Clear Runoff Volume (ac-ft)	0.0524
24-Hr Clear Runoff Volume (cu-ft)	2282.332



Peak Flow Hydrologic Analysis

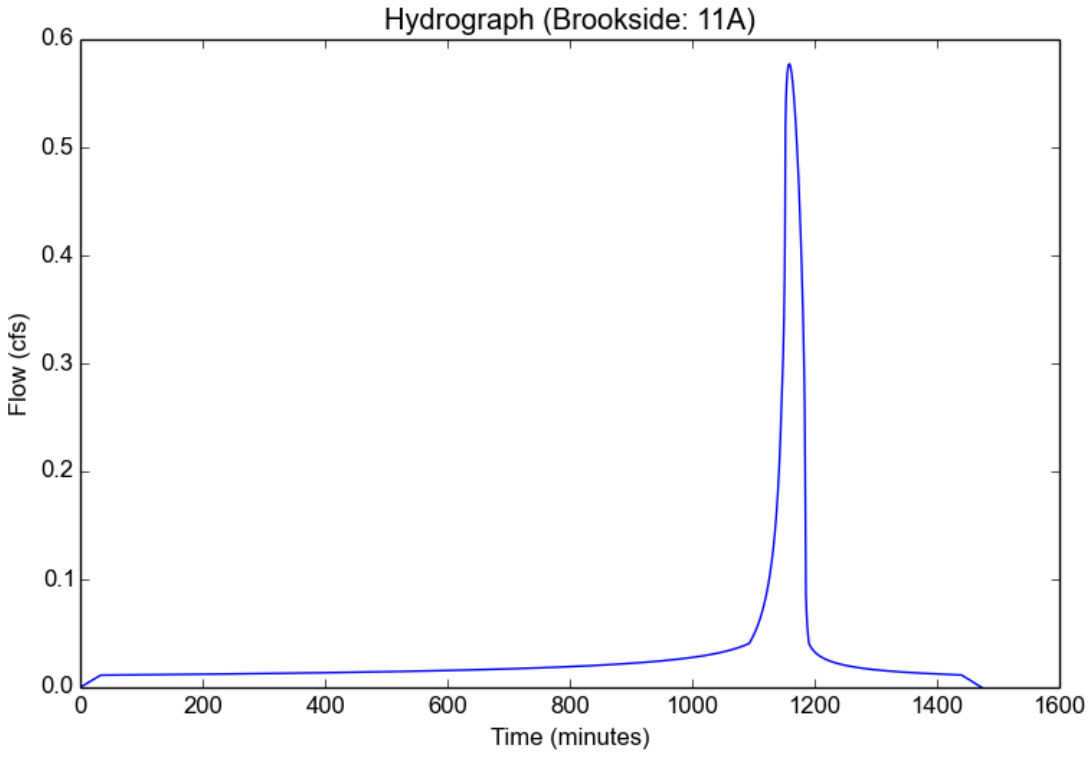
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/1.5-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	3.14
Flow Path Length (ft)	890.9
Flow Path Slope (vft/hft)	0.02469
85th Percentile Rainfall Depth (in)	1.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.5
Peak Intensity (in/hr)	0.3686
Undeveloped Runoff Coefficient (Cu)	0.4947
Developed Runoff Coefficient (Cd)	0.4987
Time of Concentration (min)	33.0
Clear Peak Flow Rate (cfs)	0.5773
Burned Peak Flow Rate (cfs)	0.5773
24-Hr Clear Runoff Volume (ac-ft)	0.0646
24-Hr Clear Runoff Volume (cu-ft)	2812.0859



Peak Flow Hydrologic Analysis

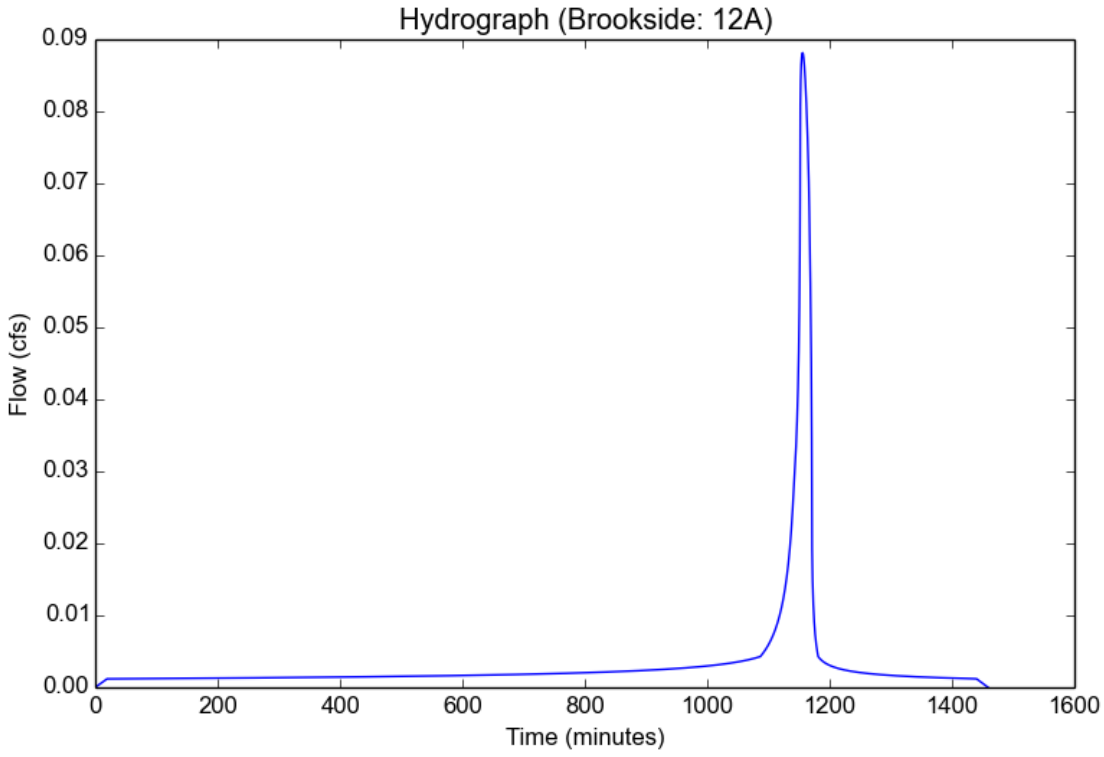
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/1.5-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.33
Flow Path Length (ft)	406.0
Flow Path Slope (vft/hft)	0.0197
85th Percentile Rainfall Depth (in)	1.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.5
Peak Intensity (in/hr)	0.4779
Undeveloped Runoff Coefficient (Cu)	0.5555
Developed Runoff Coefficient (Cd)	0.559
Time of Concentration (min)	19.0
Clear Peak Flow Rate (cfs)	0.0881
Burned Peak Flow Rate (cfs)	0.0881
24-Hr Clear Runoff Volume (ac-ft)	0.0069
24-Hr Clear Runoff Volume (cu-ft)	299.459



Peak Flow Hydrologic Analysis

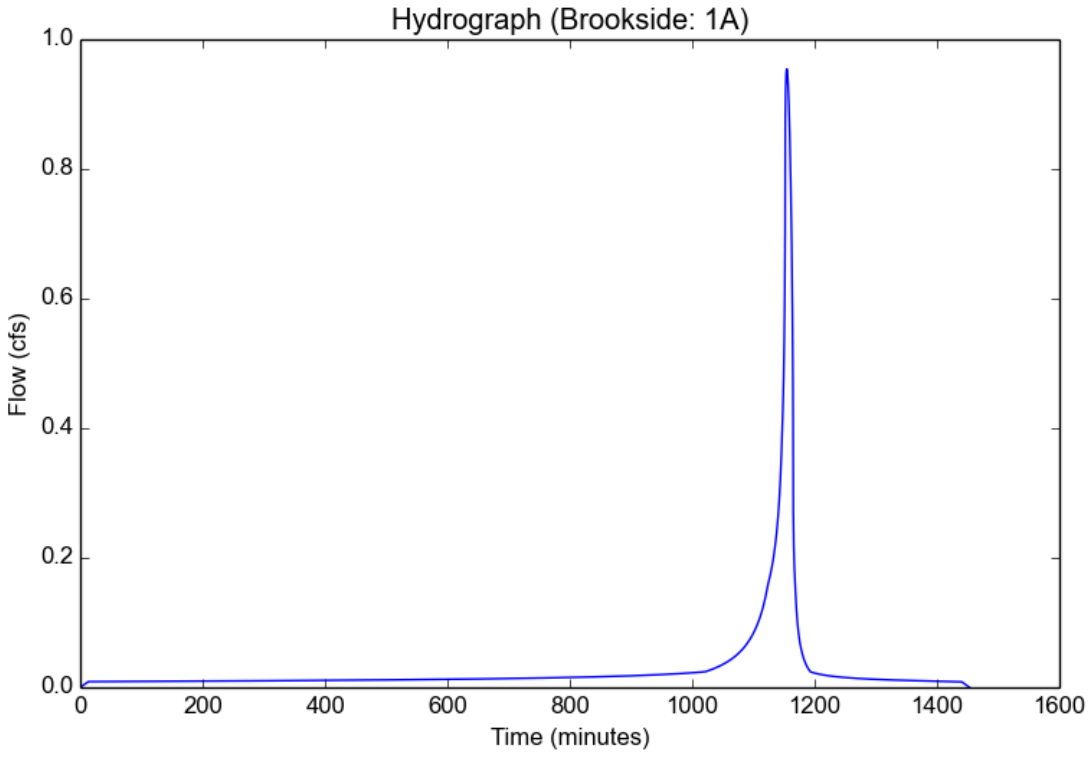
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/2.0-in Storm/Brookside - 1A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1A
Area (ac)	1.86
Flow Path Length (ft)	623.8
Flow Path Slope (vft/hft)	0.11061
85th Percentile Rainfall Depth (in)	2.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	2.0
Peak Intensity (in/hr)	0.7615
Undeveloped Runoff Coefficient (Cu)	0.6715
Developed Runoff Coefficient (Cd)	0.6738
Time of Concentration (min)	13.0
Clear Peak Flow Rate (cfs)	0.9544
Burned Peak Flow Rate (cfs)	0.9544
24-Hr Clear Runoff Volume (ac-ft)	0.0597
24-Hr Clear Runoff Volume (cu-ft)	2602.3987



Peak Flow Hydrologic Analysis

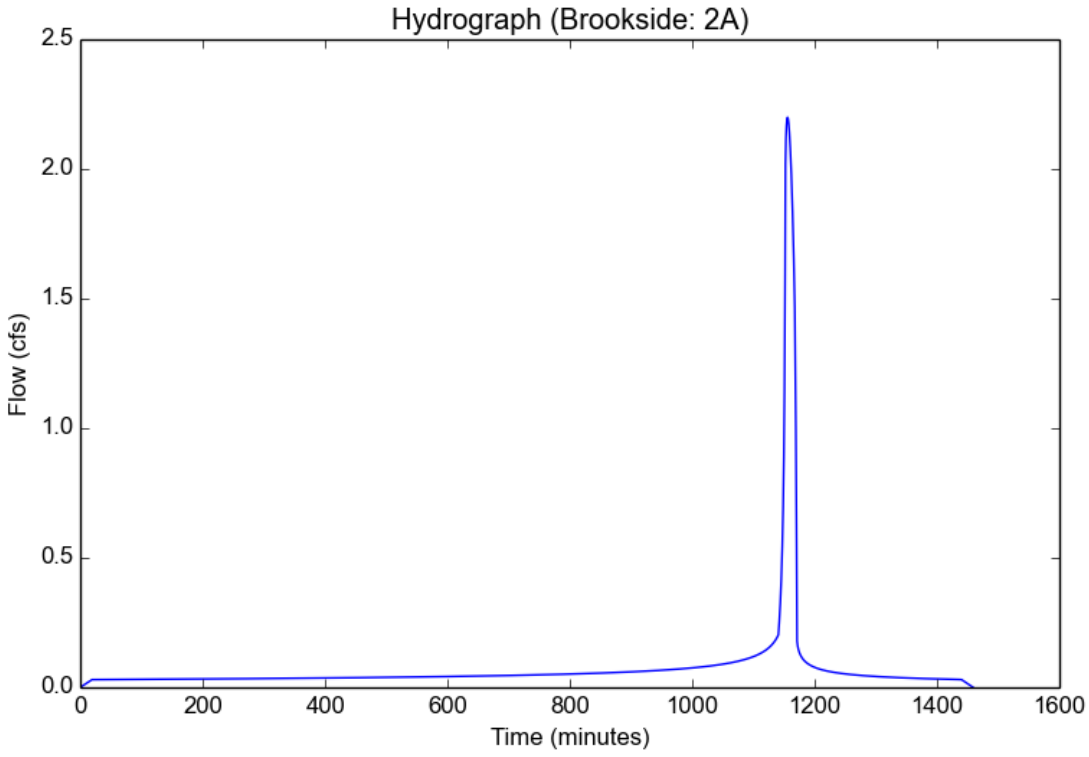
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/2.0-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	6.26
Flow Path Length (ft)	739.9
Flow Path Slope (vft/hft)	0.06623
85th Percentile Rainfall Depth (in)	2.0
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	2.0
Peak Intensity (in/hr)	0.6371
Undeveloped Runoff Coefficient (Cu)	0.5479
Developed Runoff Coefficient (Cd)	0.5514
Time of Concentration (min)	19.0
Clear Peak Flow Rate (cfs)	2.1993
Burned Peak Flow Rate (cfs)	2.1993
24-Hr Clear Runoff Volume (ac-ft)	0.1544
24-Hr Clear Runoff Volume (cu-ft)	6724.7394



Peak Flow Hydrologic Analysis

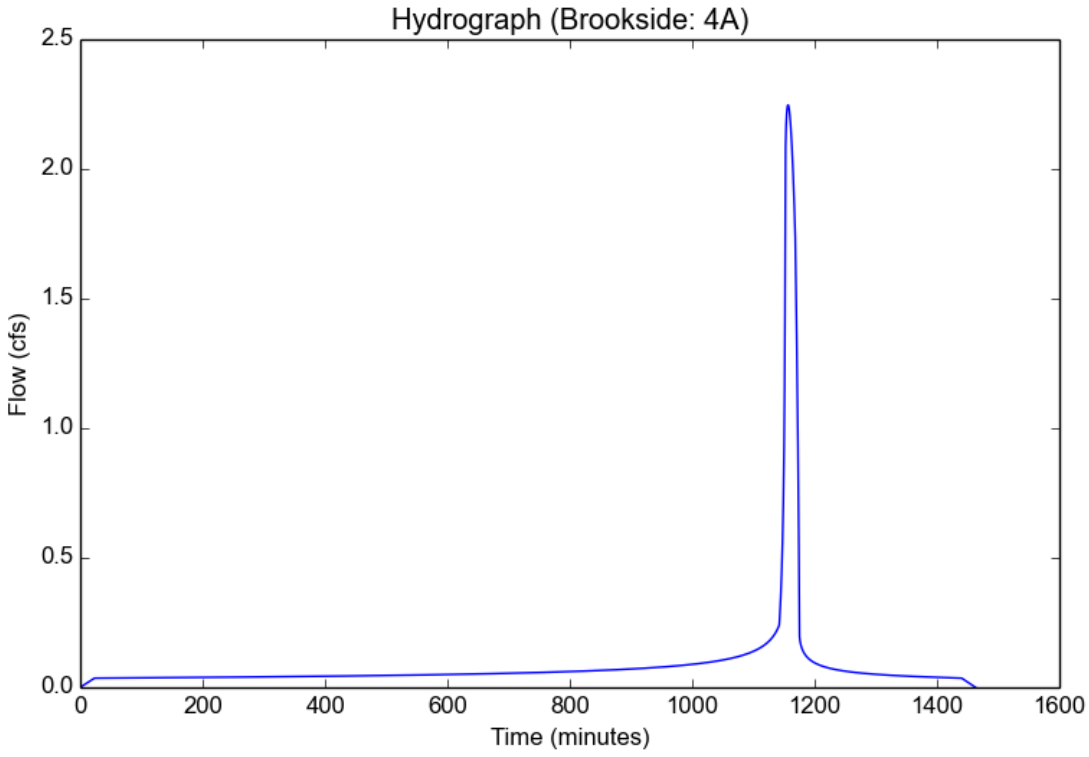
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/2.0-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	7.44
Flow Path Length (ft)	949.3
Flow Path Slope (vft/hft)	0.05794
85th Percentile Rainfall Depth (in)	2.0
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	2.0
Peak Intensity (in/hr)	0.5824
Undeveloped Runoff Coefficient (Cu)	0.5147
Developed Runoff Coefficient (Cd)	0.5185
Time of Concentration (min)	23.0
Clear Peak Flow Rate (cfs)	2.247
Burned Peak Flow Rate (cfs)	2.247
24-Hr Clear Runoff Volume (ac-ft)	0.1817
24-Hr Clear Runoff Volume (cu-ft)	7914.5625



Peak Flow Hydrologic Analysis

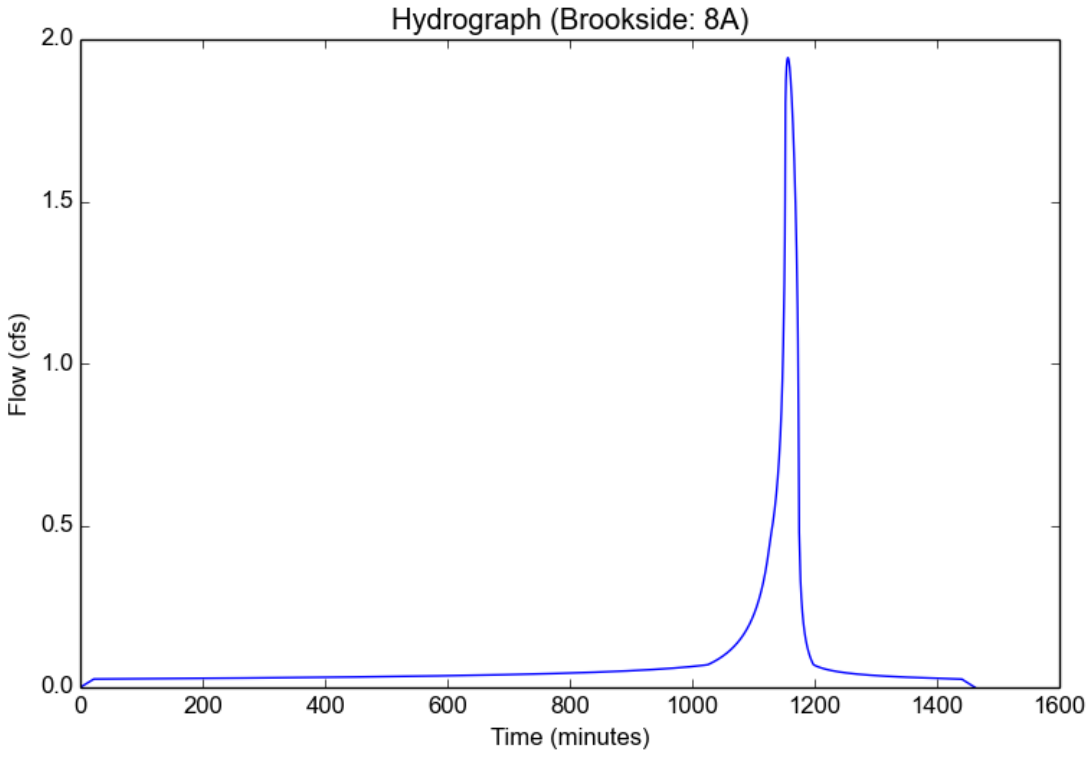
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/2.0-in Storm/Brookside - 8A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	8A
Area (ac)	5.39
Flow Path Length (ft)	1116.4
Flow Path Slope (vft/hft)	0.08151
85th Percentile Rainfall Depth (in)	2.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	2.0
Peak Intensity (in/hr)	0.5947
Undeveloped Runoff Coefficient (Cu)	0.6033
Developed Runoff Coefficient (Cd)	0.6063
Time of Concentration (min)	22.0
Clear Peak Flow Rate (cfs)	1.9435
Burned Peak Flow Rate (cfs)	1.9435
24-Hr Clear Runoff Volume (ac-ft)	0.1713
24-Hr Clear Runoff Volume (cu-ft)	7462.7221



Peak Flow Hydrologic Analysis

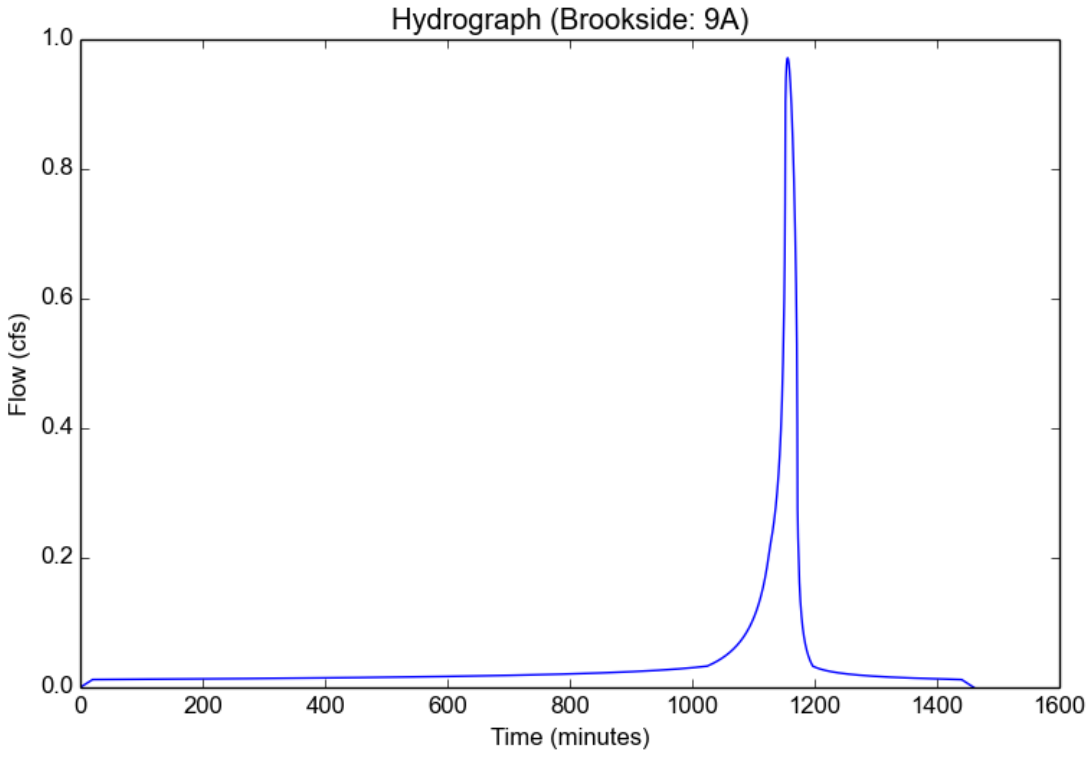
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/2.0-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	2.53
Flow Path Length (ft)	912.2
Flow Path Slope (vft/hft)	0.05591
85th Percentile Rainfall Depth (in)	2.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	2.0
Peak Intensity (in/hr)	0.622
Undeveloped Runoff Coefficient (Cu)	0.6145
Developed Runoff Coefficient (Cd)	0.6173
Time of Concentration (min)	20.0
Clear Peak Flow Rate (cfs)	0.9714
Burned Peak Flow Rate (cfs)	0.9714
24-Hr Clear Runoff Volume (ac-ft)	0.0805
24-Hr Clear Runoff Volume (cu-ft)	3508.7419



Peak Flow Hydrologic Analysis

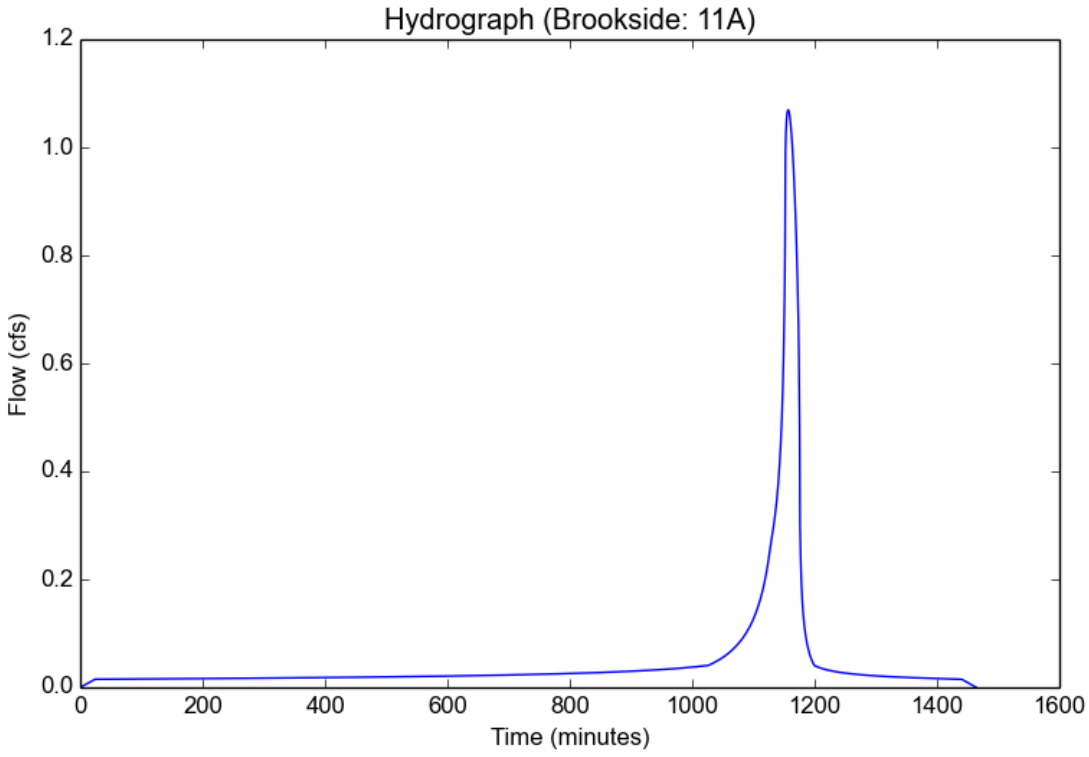
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/2.0-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	3.14
Flow Path Length (ft)	890.9
Flow Path Slope (vft/hft)	0.02469
85th Percentile Rainfall Depth (in)	2.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	2.0
Peak Intensity (in/hr)	0.5709
Undeveloped Runoff Coefficient (Cu)	0.5936
Developed Runoff Coefficient (Cd)	0.5966
Time of Concentration (min)	24.0
Clear Peak Flow Rate (cfs)	1.0695
Burned Peak Flow Rate (cfs)	1.0695
24-Hr Clear Runoff Volume (ac-ft)	0.0997
24-Hr Clear Runoff Volume (cu-ft)	4341.3313



Peak Flow Hydrologic Analysis

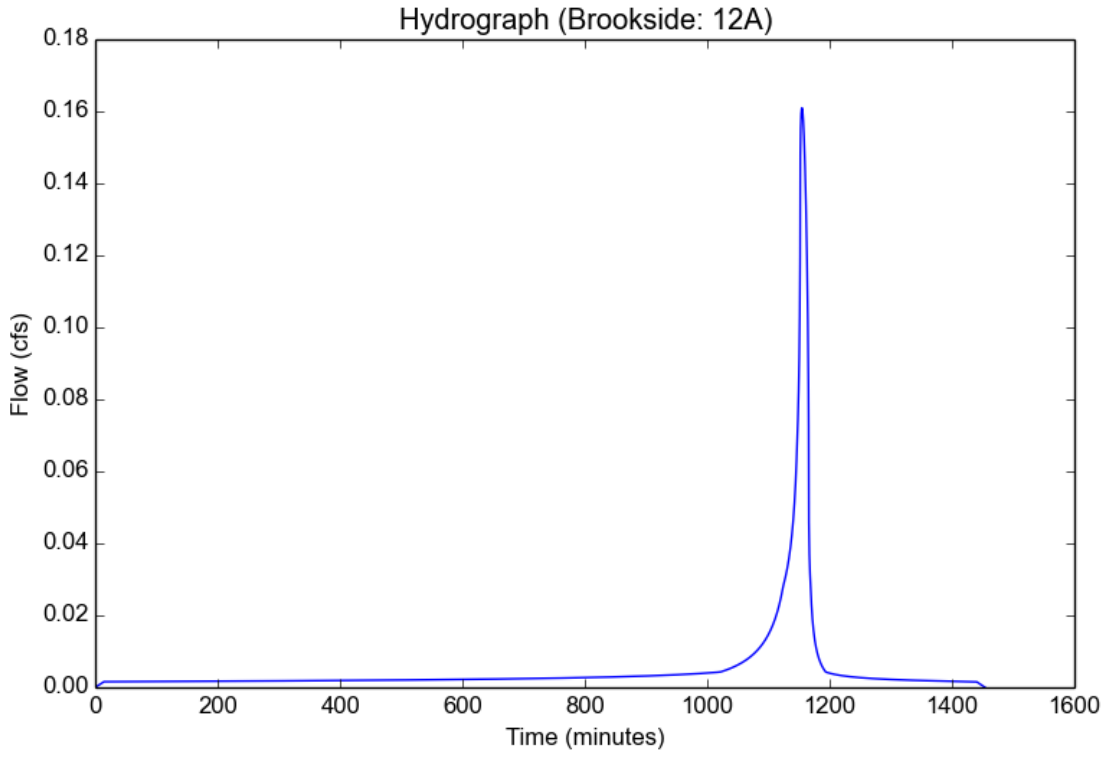
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/2.0-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.33
Flow Path Length (ft)	406.0
Flow Path Slope (vft/hft)	0.0197
85th Percentile Rainfall Depth (in)	2.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	2.0
Peak Intensity (in/hr)	0.7355
Undeveloped Runoff Coefficient (Cu)	0.6609
Developed Runoff Coefficient (Cd)	0.6633
Time of Concentration (min)	14.0
Clear Peak Flow Rate (cfs)	0.161
Burned Peak Flow Rate (cfs)	0.161
24-Hr Clear Runoff Volume (ac-ft)	0.0106
24-Hr Clear Runoff Volume (cu-ft)	460.9541



Peak Flow Hydrologic Analysis

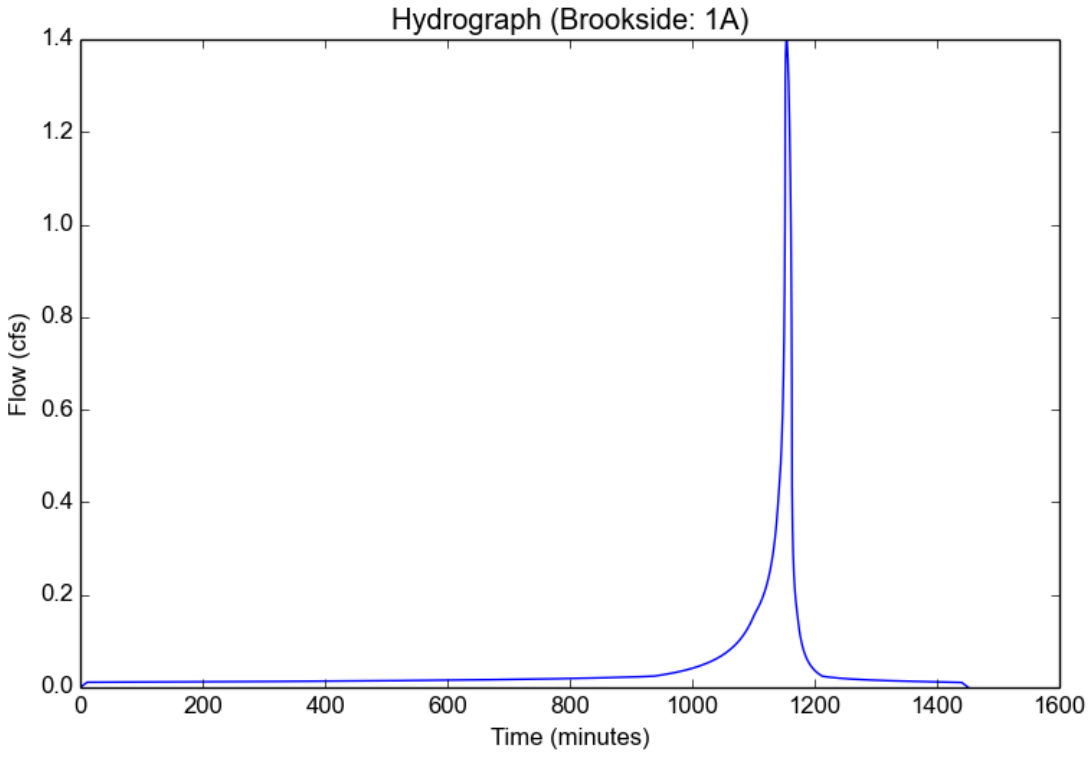
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/2.5-in Storm/Brookside - 1A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1A
Area (ac)	1.86
Flow Path Length (ft)	623.8
Flow Path Slope (vft/hft)	0.11061
85th Percentile Rainfall Depth (in)	2.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	2.5
Peak Intensity (in/hr)	1.0297
Undeveloped Runoff Coefficient (Cu)	0.7287
Developed Runoff Coefficient (Cd)	0.7304
Time of Concentration (min)	11.0
Clear Peak Flow Rate (cfs)	1.3988
Burned Peak Flow Rate (cfs)	1.3988
24-Hr Clear Runoff Volume (ac-ft)	0.0848
24-Hr Clear Runoff Volume (cu-ft)	3694.8569



Peak Flow Hydrologic Analysis

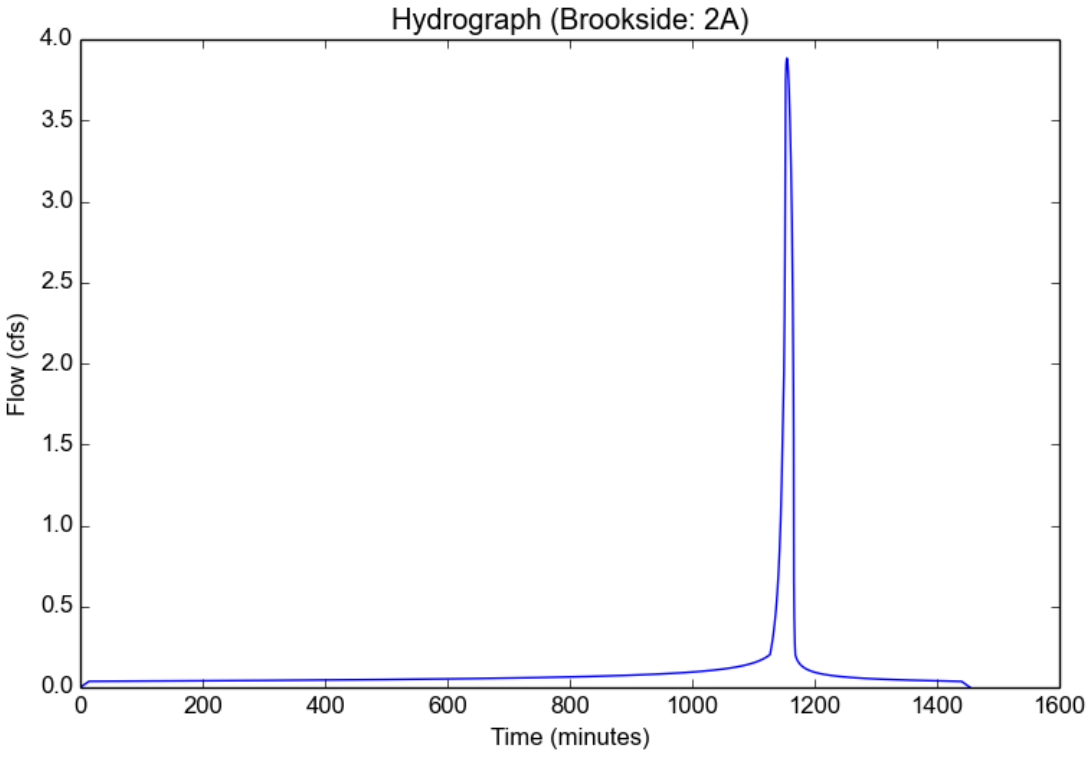
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/2.5-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	6.26
Flow Path Length (ft)	739.9
Flow Path Slope (vft/hft)	0.06623
85th Percentile Rainfall Depth (in)	2.5
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	2.5
Peak Intensity (in/hr)	0.9193
Undeveloped Runoff Coefficient (Cu)	0.6726
Developed Runoff Coefficient (Cd)	0.6749
Time of Concentration (min)	14.0
Clear Peak Flow Rate (cfs)	3.8842
Burned Peak Flow Rate (cfs)	3.8842
24-Hr Clear Runoff Volume (ac-ft)	0.213
24-Hr Clear Runoff Volume (cu-ft)	9280.1868



Peak Flow Hydrologic Analysis

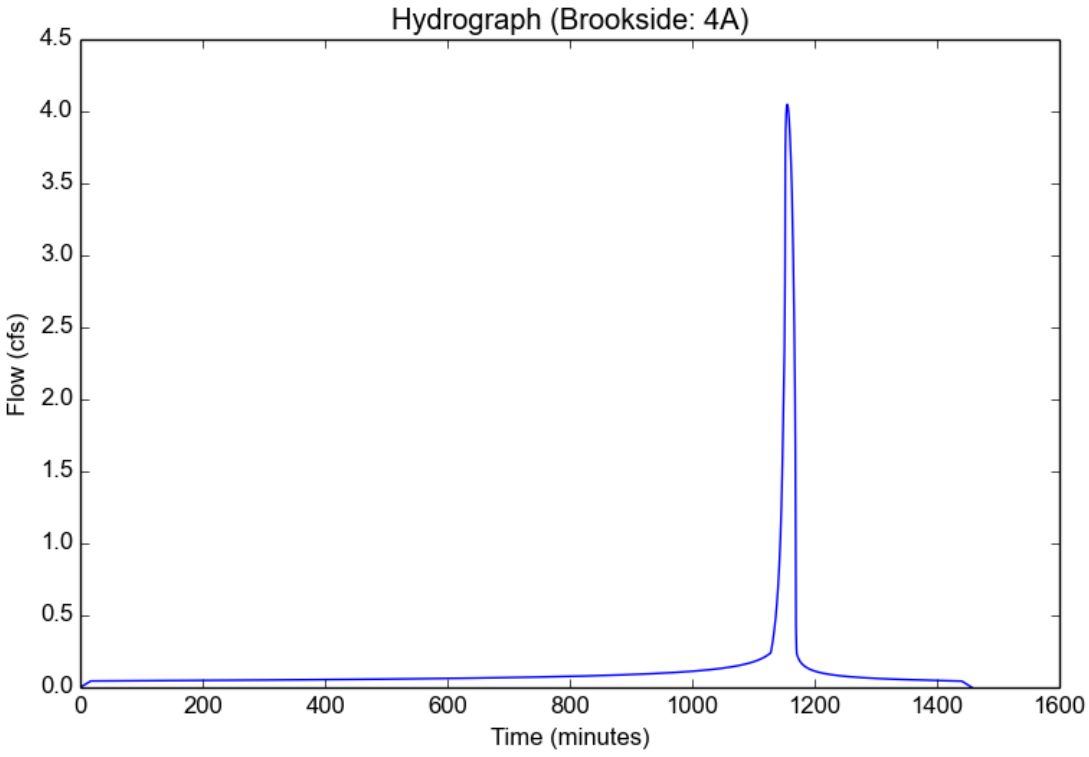
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/2.5-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	7.44
Flow Path Length (ft)	949.3
Flow Path Slope (vft/hft)	0.05794
85th Percentile Rainfall Depth (in)	2.5
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	2.5
Peak Intensity (in/hr)	0.8392
Undeveloped Runoff Coefficient (Cu)	0.646
Developed Runoff Coefficient (Cd)	0.6485
Time of Concentration (min)	17.0
Clear Peak Flow Rate (cfs)	4.049
Burned Peak Flow Rate (cfs)	4.049
24-Hr Clear Runoff Volume (ac-ft)	0.2527
24-Hr Clear Runoff Volume (cu-ft)	11006.1054



Peak Flow Hydrologic Analysis

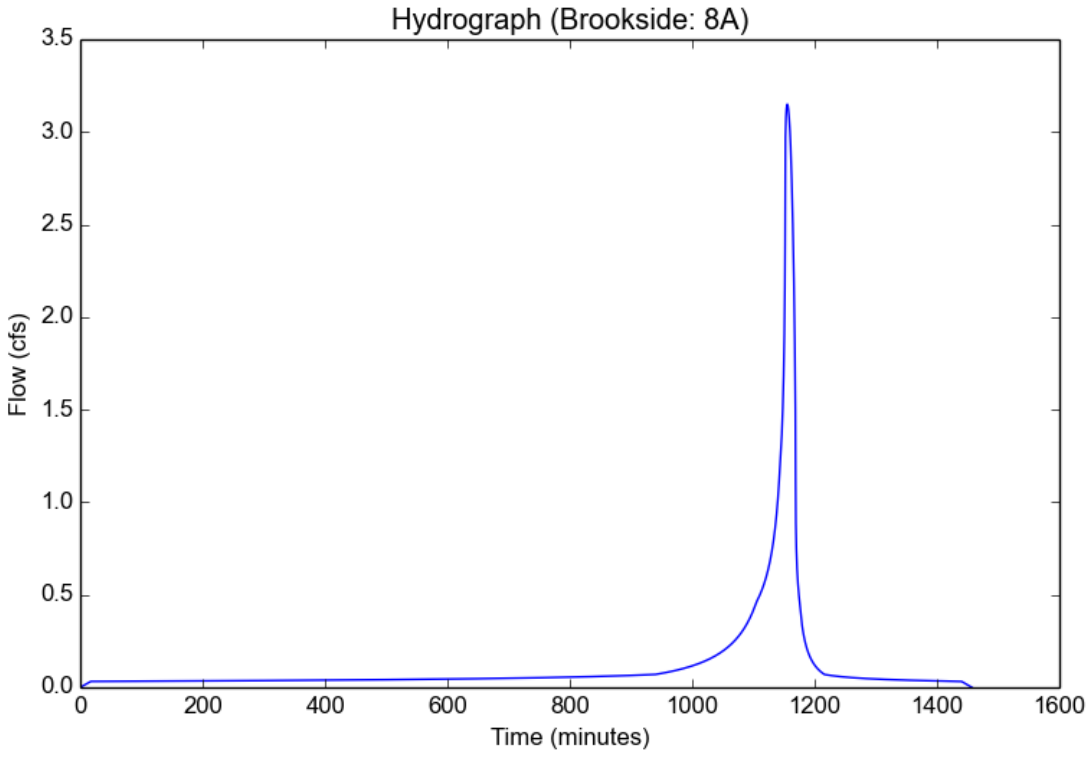
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/2.5-in Storm/Brookside - 8A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	8A
Area (ac)	5.39
Flow Path Length (ft)	1116.4
Flow Path Slope (vft/hft)	0.08151
85th Percentile Rainfall Depth (in)	2.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	2.5
Peak Intensity (in/hr)	0.8392
Undeveloped Runoff Coefficient (Cu)	0.6943
Developed Runoff Coefficient (Cd)	0.6964
Time of Concentration (min)	17.0
Clear Peak Flow Rate (cfs)	3.1498
Burned Peak Flow Rate (cfs)	3.1498
24-Hr Clear Runoff Volume (ac-ft)	0.245
24-Hr Clear Runoff Volume (cu-ft)	10671.2584



Peak Flow Hydrologic Analysis

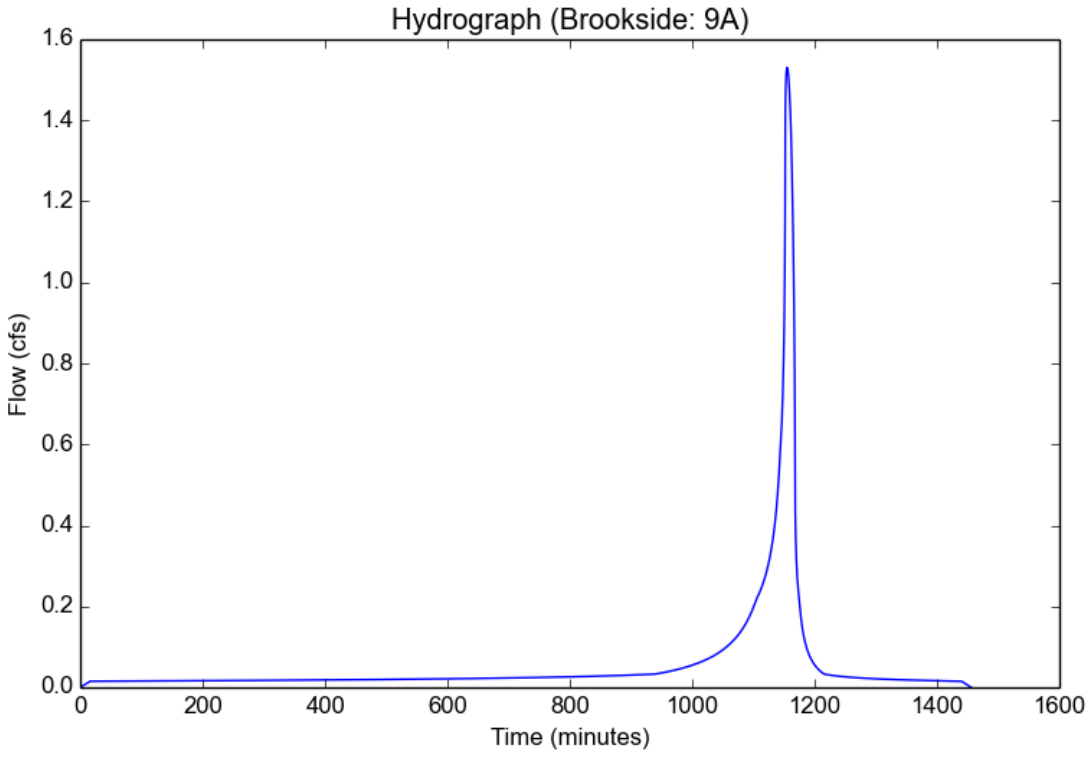
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/2.5-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	2.53
Flow Path Length (ft)	912.2
Flow Path Slope (vft/hft)	0.05591
85th Percentile Rainfall Depth (in)	2.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	2.5
Peak Intensity (in/hr)	0.8634
Undeveloped Runoff Coefficient (Cu)	0.6987
Developed Runoff Coefficient (Cd)	0.7007
Time of Concentration (min)	16.0
Clear Peak Flow Rate (cfs)	1.5306
Burned Peak Flow Rate (cfs)	1.5306
24-Hr Clear Runoff Volume (ac-ft)	0.1151
24-Hr Clear Runoff Volume (cu-ft)	5011.957



Peak Flow Hydrologic Analysis

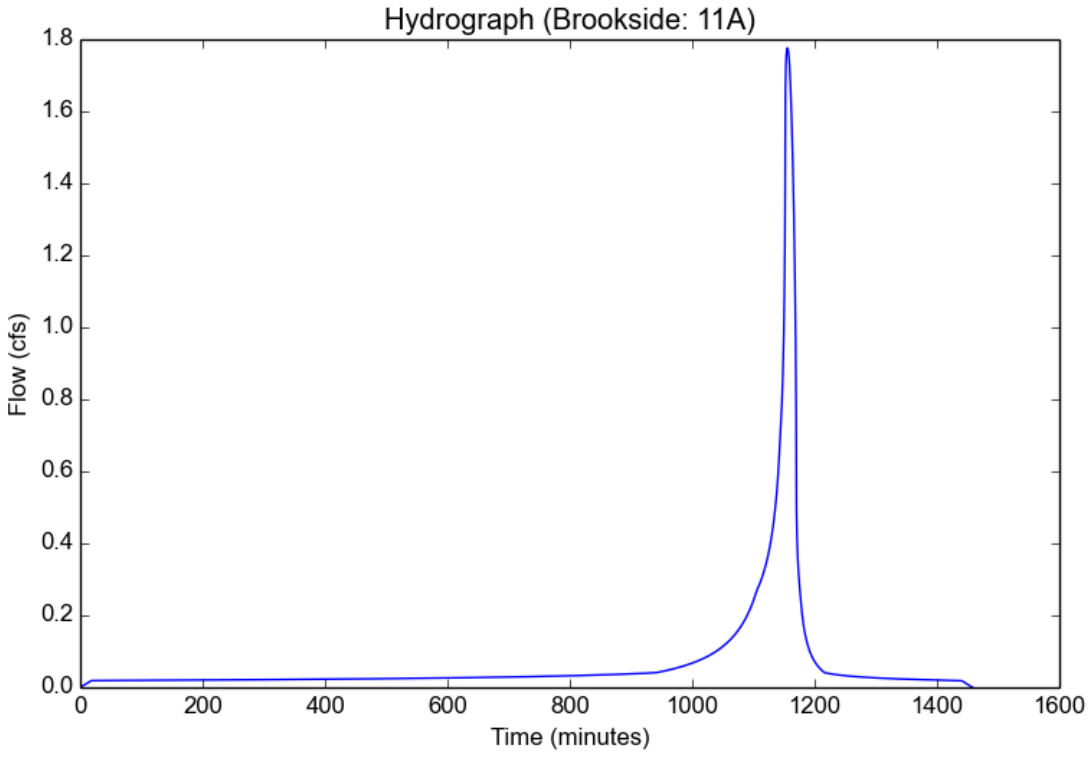
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/2.5-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	3.14
Flow Path Length (ft)	890.9
Flow Path Slope (vft/hft)	0.02469
85th Percentile Rainfall Depth (in)	2.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	2.5
Peak Intensity (in/hr)	0.8169
Undeveloped Runoff Coefficient (Cu)	0.6903
Developed Runoff Coefficient (Cd)	0.6924
Time of Concentration (min)	18.0
Clear Peak Flow Rate (cfs)	1.7761
Burned Peak Flow Rate (cfs)	1.7761
24-Hr Clear Runoff Volume (ac-ft)	0.1426
24-Hr Clear Runoff Volume (cu-ft)	6212.02



Peak Flow Hydrologic Analysis

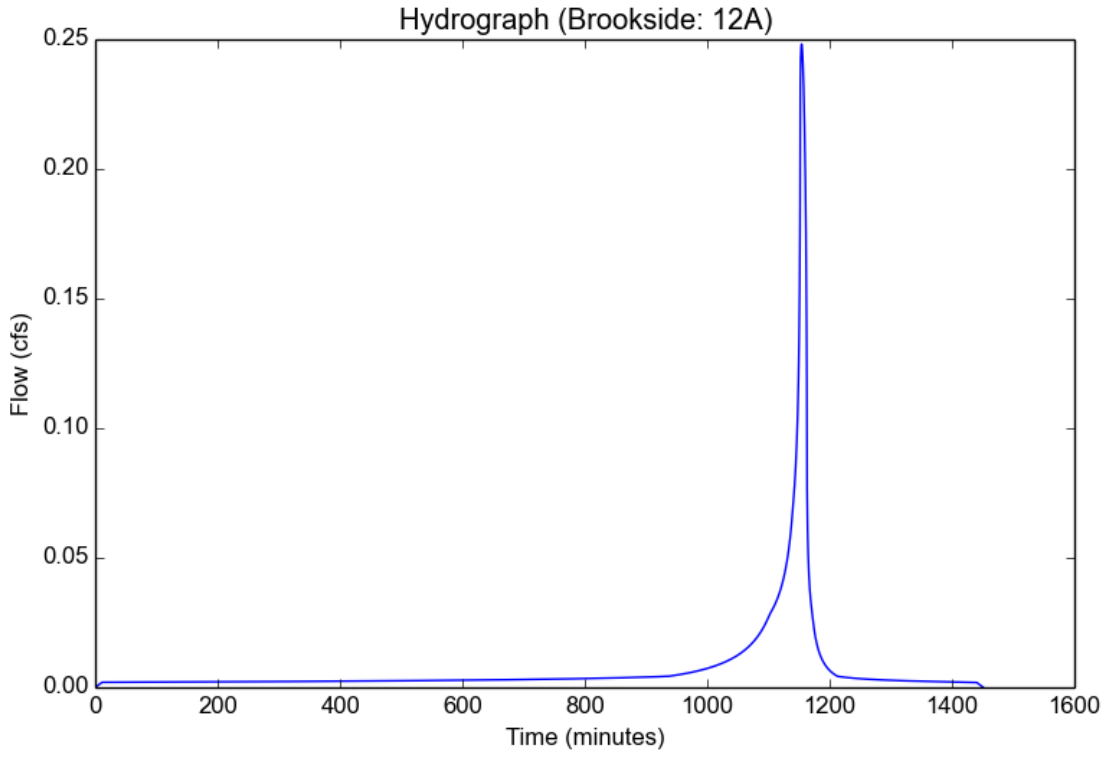
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/2.5-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.33
Flow Path Length (ft)	406.0
Flow Path Slope (vft/hft)	0.0197
85th Percentile Rainfall Depth (in)	2.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	2.5
Peak Intensity (in/hr)	1.0297
Undeveloped Runoff Coefficient (Cu)	0.7287
Developed Runoff Coefficient (Cd)	0.7304
Time of Concentration (min)	11.0
Clear Peak Flow Rate (cfs)	0.2482
Burned Peak Flow Rate (cfs)	0.2482
24-Hr Clear Runoff Volume (ac-ft)	0.015
24-Hr Clear Runoff Volume (cu-ft)	655.5391



Peak Flow Hydrologic Analysis

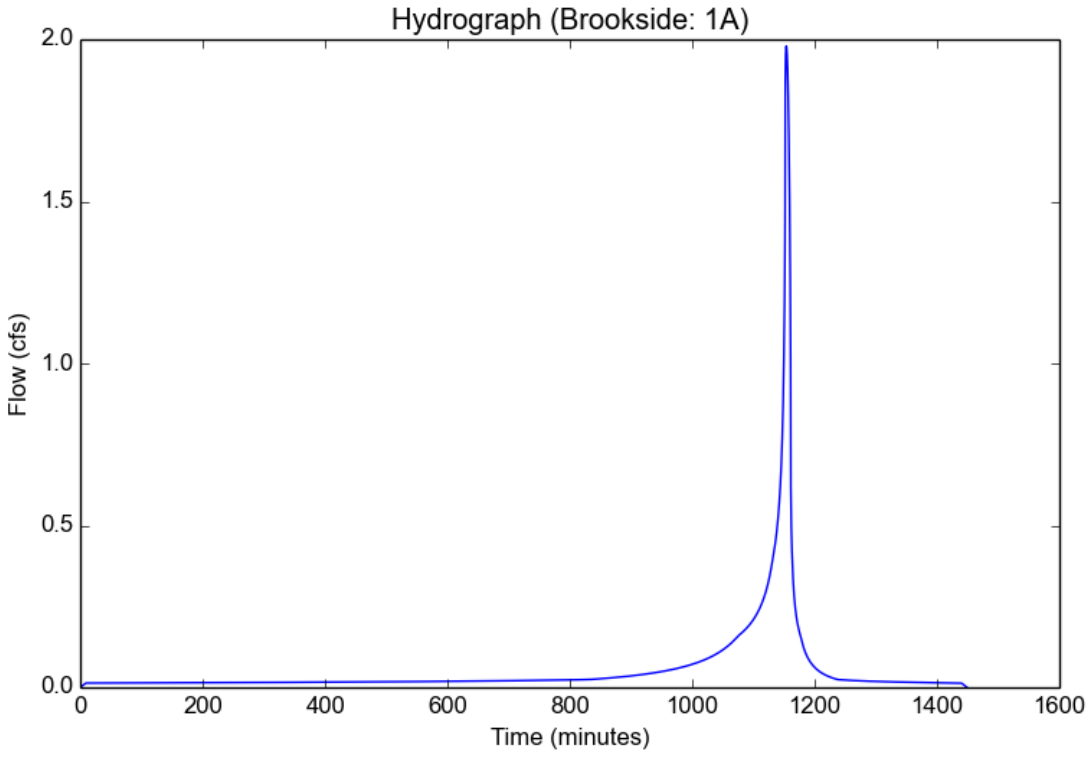
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/3.0-in Storm/Brookside - 1A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1A
Area (ac)	1.86
Flow Path Length (ft)	623.8
Flow Path Slope (vft/hft)	0.11061
85th Percentile Rainfall Depth (in)	3.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	3.0
Peak Intensity (in/hr)	1.3578
Undeveloped Runoff Coefficient (Cu)	0.7825
Developed Runoff Coefficient (Cd)	0.7837
Time of Concentration (min)	9.0
Clear Peak Flow Rate (cfs)	1.9792
Burned Peak Flow Rate (cfs)	1.9792
24-Hr Clear Runoff Volume (ac-ft)	0.1142
24-Hr Clear Runoff Volume (cu-ft)	4975.203



Peak Flow Hydrologic Analysis

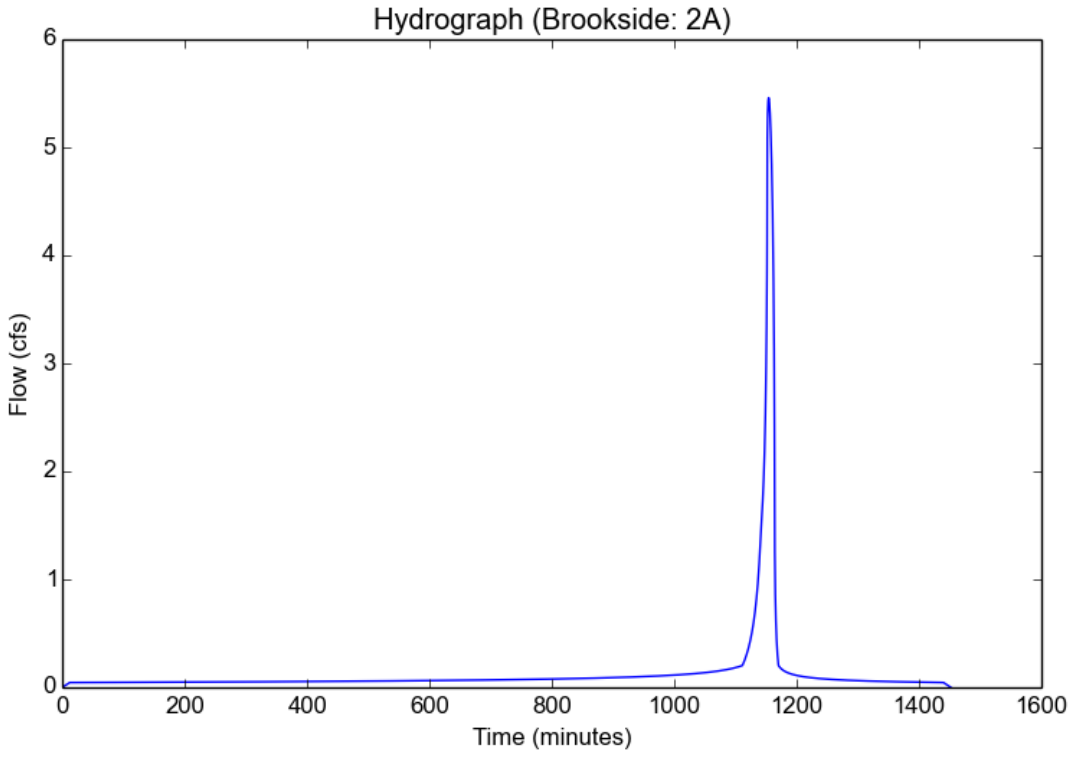
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/3.0-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	6.26
Flow Path Length (ft)	739.9
Flow Path Slope (vft/hft)	0.06623
85th Percentile Rainfall Depth (in)	3.0
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	3.0
Peak Intensity (in/hr)	1.1861
Undeveloped Runoff Coefficient (Cu)	0.7336
Developed Runoff Coefficient (Cd)	0.7353
Time of Concentration (min)	12.0
Clear Peak Flow Rate (cfs)	5.4593
Burned Peak Flow Rate (cfs)	5.4593
24-Hr Clear Runoff Volume (ac-ft)	0.2768
24-Hr Clear Runoff Volume (cu-ft)	12057.8858



Peak Flow Hydrologic Analysis

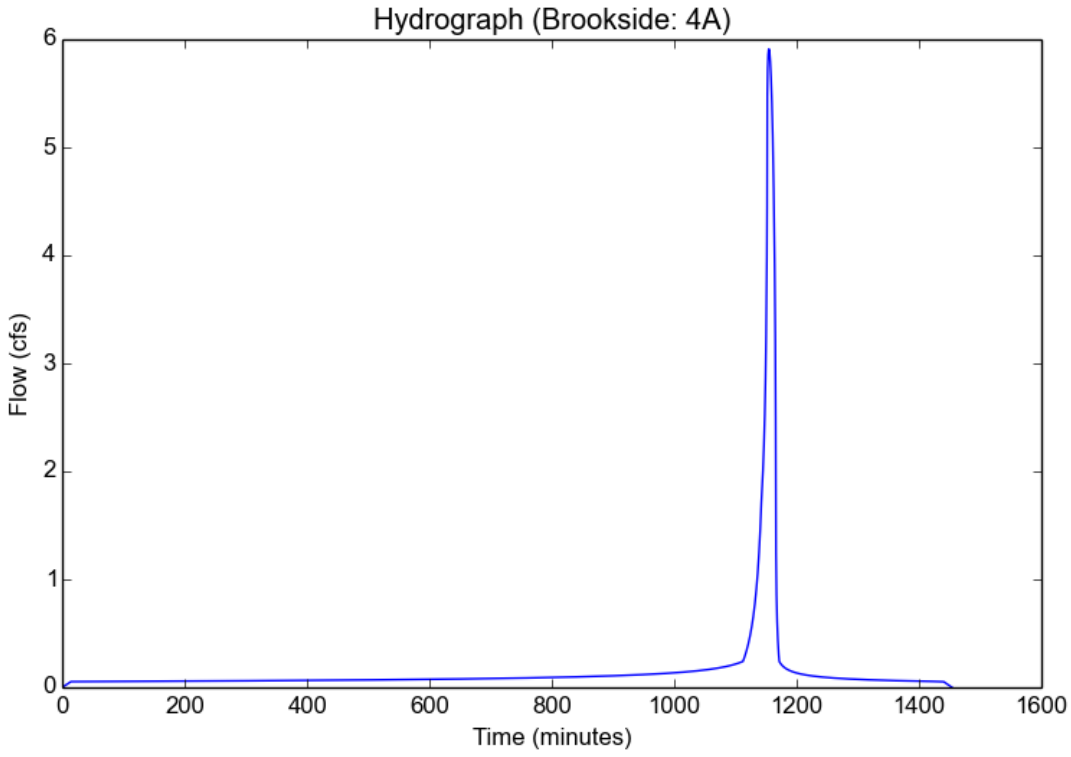
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/3.0-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	7.44
Flow Path Length (ft)	949.3
Flow Path Slope (vft/hft)	0.05794
85th Percentile Rainfall Depth (in)	3.0
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	3.0
Peak Intensity (in/hr)	1.1032
Undeveloped Runoff Coefficient (Cu)	0.7184
Developed Runoff Coefficient (Cd)	0.7202
Time of Concentration (min)	14.0
Clear Peak Flow Rate (cfs)	5.9114
Burned Peak Flow Rate (cfs)	5.9114
24-Hr Clear Runoff Volume (ac-ft)	0.3289
24-Hr Clear Runoff Volume (cu-ft)	14325.9419



Peak Flow Hydrologic Analysis

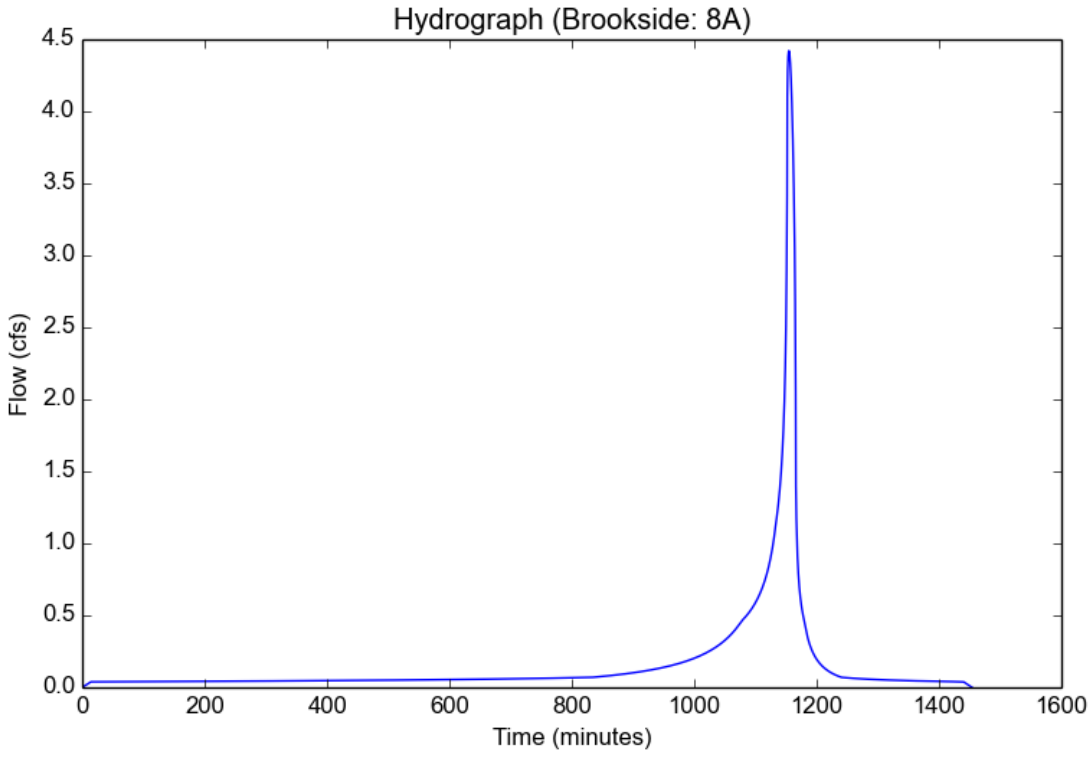
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/3.0-in Storm/Brookside - 8A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	8A
Area (ac)	5.39
Flow Path Length (ft)	1116.4
Flow Path Slope (vft/hft)	0.08151
85th Percentile Rainfall Depth (in)	3.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	3.0
Peak Intensity (in/hr)	1.1032
Undeveloped Runoff Coefficient (Cu)	0.7419
Developed Runoff Coefficient (Cd)	0.7435
Time of Concentration (min)	14.0
Clear Peak Flow Rate (cfs)	4.421
Burned Peak Flow Rate (cfs)	4.421
24-Hr Clear Runoff Volume (ac-ft)	0.3297
24-Hr Clear Runoff Volume (cu-ft)	14363.5212



Peak Flow Hydrologic Analysis

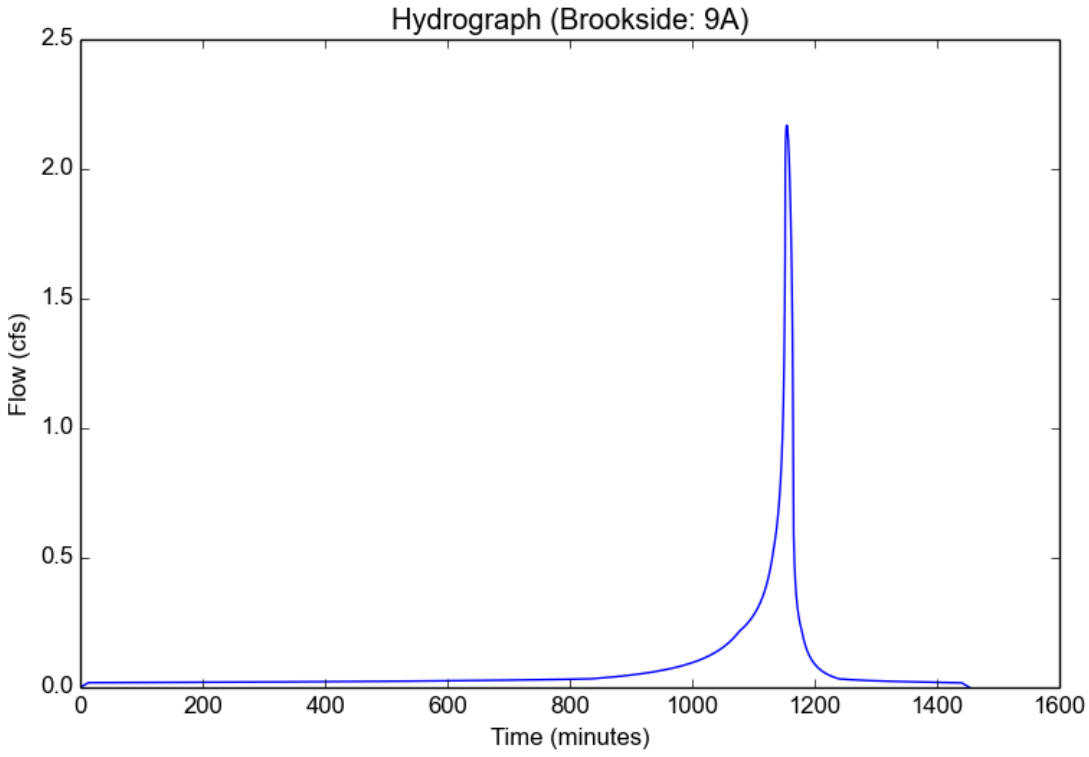
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/3.0-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	2.53
Flow Path Length (ft)	912.2
Flow Path Slope (vft/hft)	0.05591
85th Percentile Rainfall Depth (in)	3.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	3.0
Peak Intensity (in/hr)	1.1423
Undeveloped Runoff Coefficient (Cu)	0.7489
Developed Runoff Coefficient (Cd)	0.7505
Time of Concentration (min)	13.0
Clear Peak Flow Rate (cfs)	2.1689
Burned Peak Flow Rate (cfs)	2.1689
24-Hr Clear Runoff Volume (ac-ft)	0.1549
24-Hr Clear Runoff Volume (cu-ft)	6746.3434



Peak Flow Hydrologic Analysis

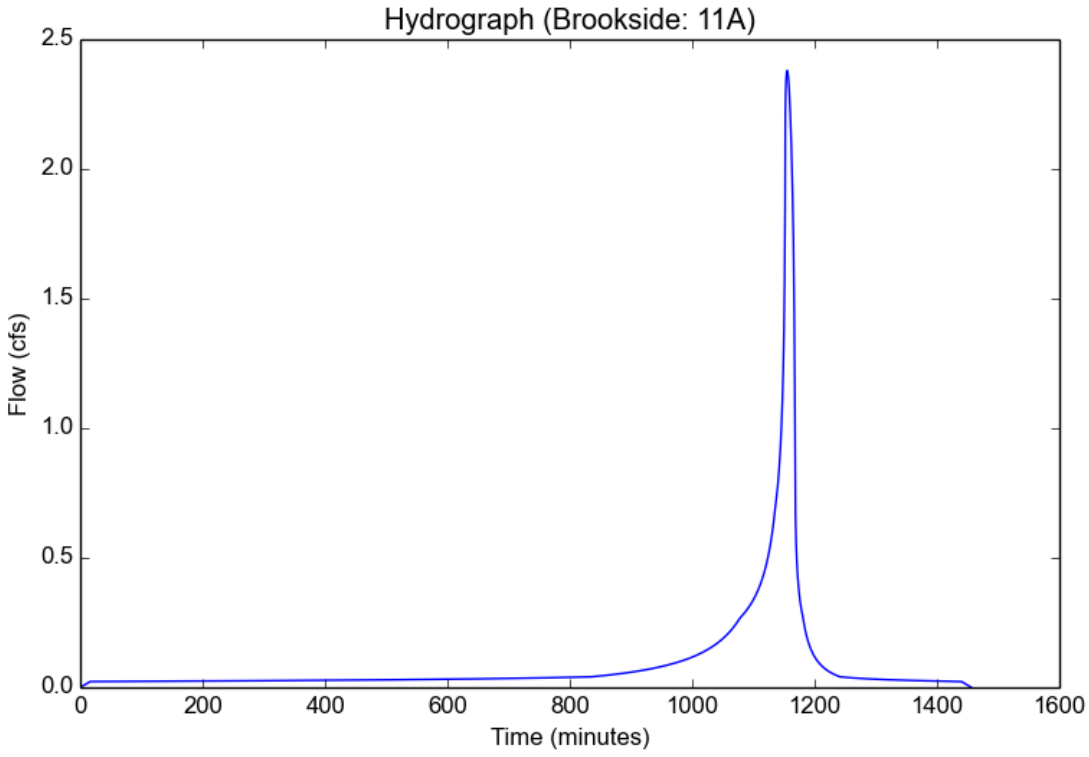
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/3.0-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	3.14
Flow Path Length (ft)	890.9
Flow Path Slope (vft/hft)	0.02469
85th Percentile Rainfall Depth (in)	3.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	3.0
Peak Intensity (in/hr)	1.0361
Undeveloped Runoff Coefficient (Cu)	0.7298
Developed Runoff Coefficient (Cd)	0.7315
Time of Concentration (min)	16.0
Clear Peak Flow Rate (cfs)	2.3799
Burned Peak Flow Rate (cfs)	2.3799
24-Hr Clear Runoff Volume (ac-ft)	0.1919
24-Hr Clear Runoff Volume (cu-ft)	8358.4911



Peak Flow Hydrologic Analysis

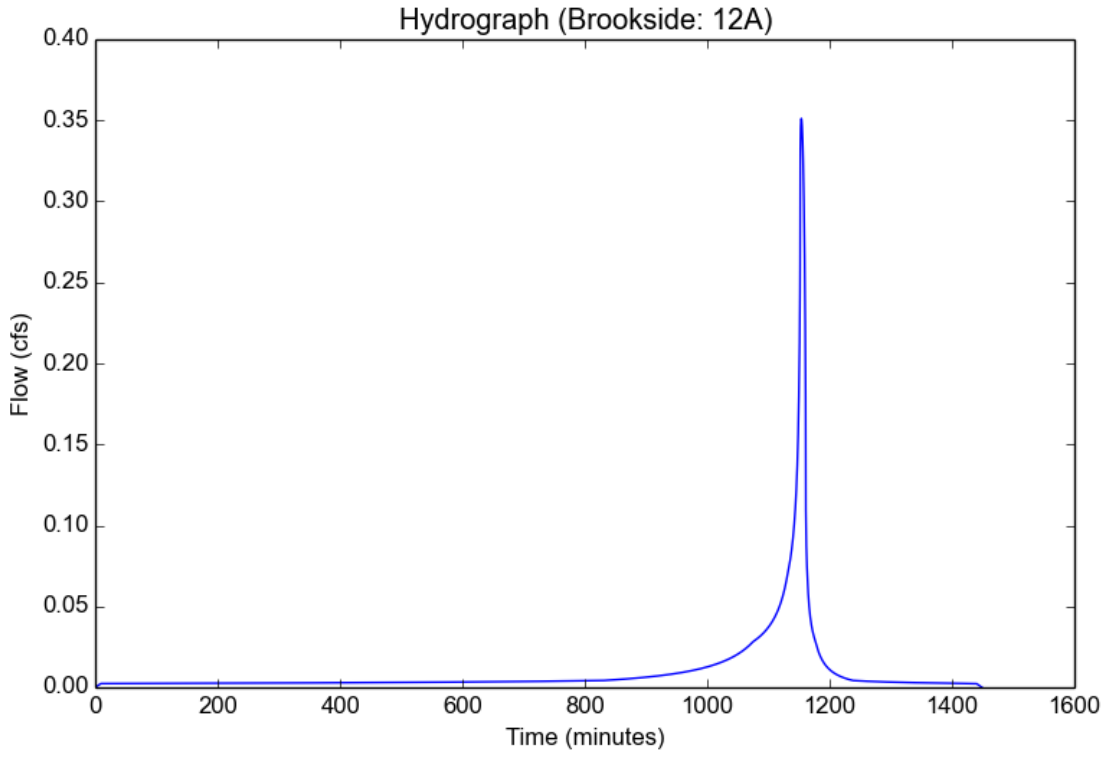
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/3.0-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.33
Flow Path Length (ft)	406.0
Flow Path Slope (vft/hft)	0.0197
85th Percentile Rainfall Depth (in)	3.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	3.0
Peak Intensity (in/hr)	1.3578
Undeveloped Runoff Coefficient (Cu)	0.7825
Developed Runoff Coefficient (Cd)	0.7837
Time of Concentration (min)	9.0
Clear Peak Flow Rate (cfs)	0.3512
Burned Peak Flow Rate (cfs)	0.3512
24-Hr Clear Runoff Volume (ac-ft)	0.0203
24-Hr Clear Runoff Volume (cu-ft)	882.6973



Peak Flow Hydrologic Analysis

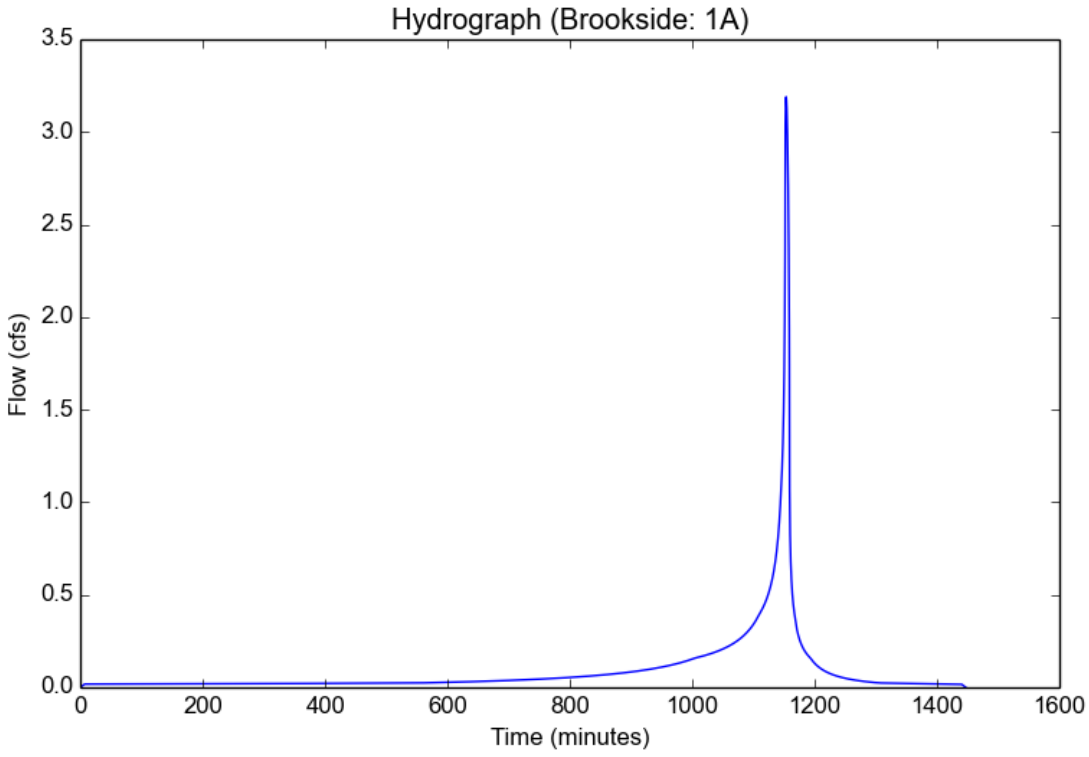
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/4-in Storm/Brookside - 1A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1A
Area (ac)	1.86
Flow Path Length (ft)	623.8
Flow Path Slope (vft/hft)	0.11061
85th Percentile Rainfall Depth (in)	4.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	4.0
Peak Intensity (in/hr)	2.0374
Undeveloped Runoff Coefficient (Cu)	0.8411
Developed Runoff Coefficient (Cd)	0.8417
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	3.1897
Burned Peak Flow Rate (cfs)	3.1897
24-Hr Clear Runoff Volume (ac-ft)	0.1858
24-Hr Clear Runoff Volume (cu-ft)	8092.1006



Peak Flow Hydrologic Analysis

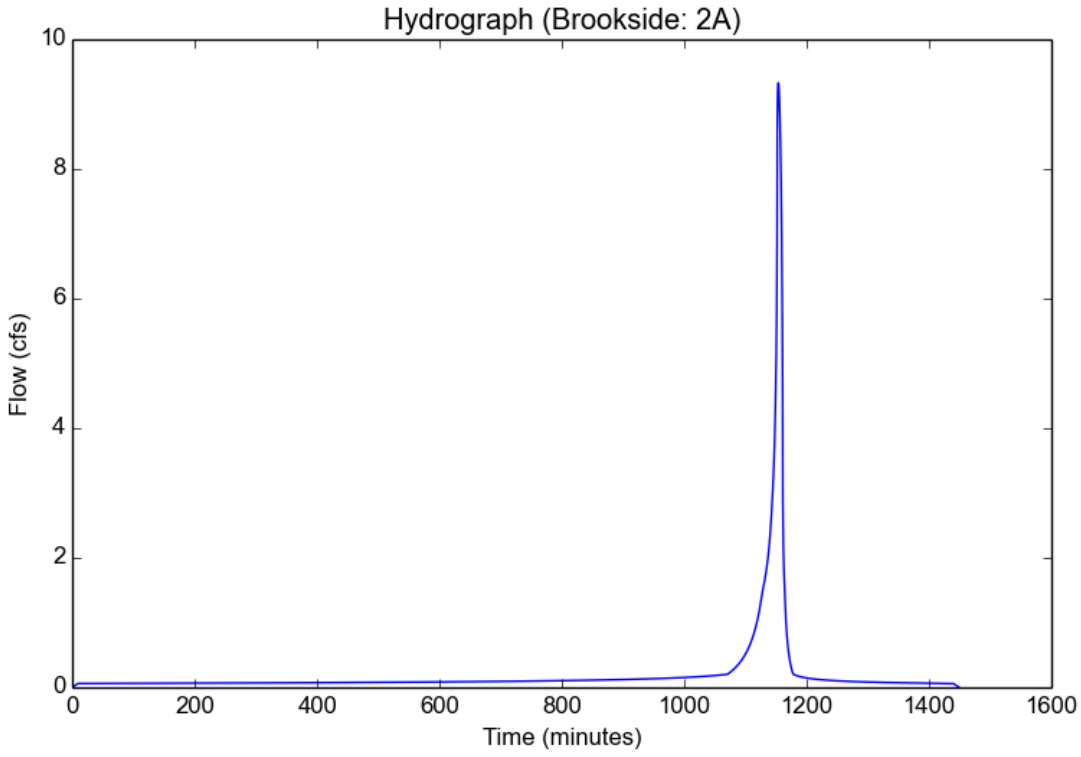
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/4-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	6.26
Flow Path Length (ft)	739.9
Flow Path Slope (vft/hft)	0.06623
85th Percentile Rainfall Depth (in)	4.0
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	4.0
Peak Intensity (in/hr)	1.8104
Undeveloped Runoff Coefficient (Cu)	0.8224
Developed Runoff Coefficient (Cd)	0.8232
Time of Concentration (min)	9.0
Clear Peak Flow Rate (cfs)	9.3293
Burned Peak Flow Rate (cfs)	9.3293
24-Hr Clear Runoff Volume (ac-ft)	0.4273
24-Hr Clear Runoff Volume (cu-ft)	18611.2135



Peak Flow Hydrologic Analysis

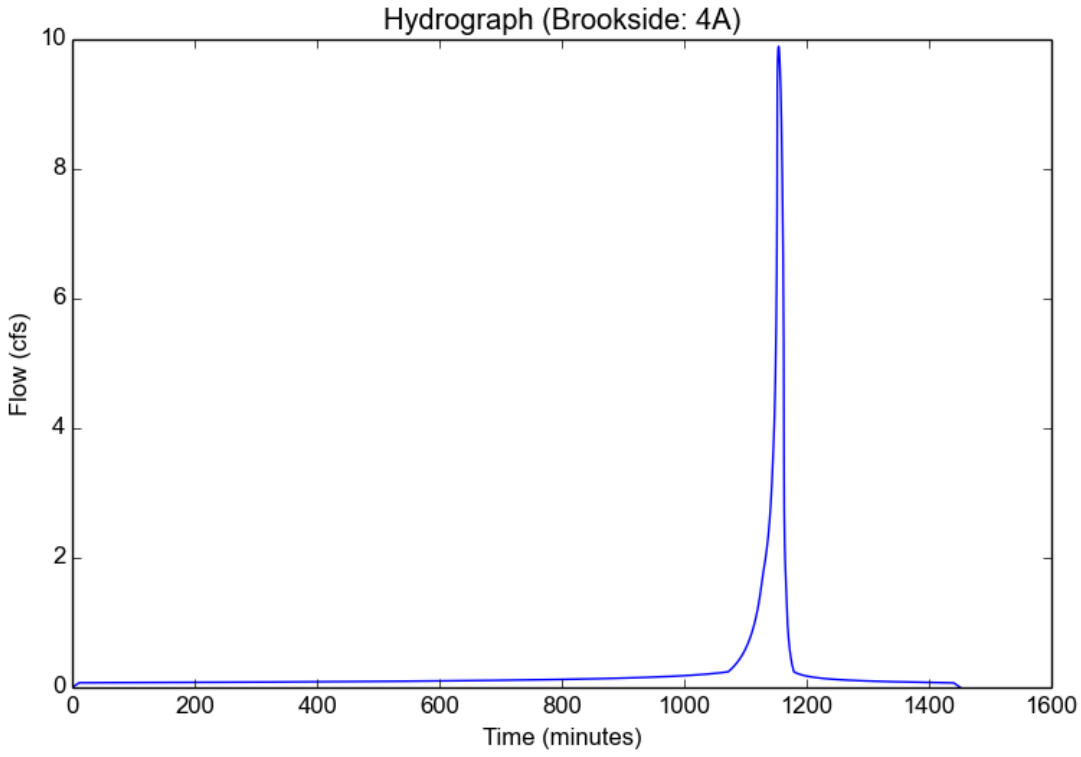
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/4-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	7.44
Flow Path Length (ft)	949.3
Flow Path Slope (vft/hft)	0.05794
85th Percentile Rainfall Depth (in)	4.0
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	4.0
Peak Intensity (in/hr)	1.6475
Undeveloped Runoff Coefficient (Cu)	0.806
Developed Runoff Coefficient (Cd)	0.807
Time of Concentration (min)	11.0
Clear Peak Flow Rate (cfs)	9.8911
Burned Peak Flow Rate (cfs)	9.8911
24-Hr Clear Runoff Volume (ac-ft)	0.5075
24-Hr Clear Runoff Volume (cu-ft)	22105.0184



Peak Flow Hydrologic Analysis

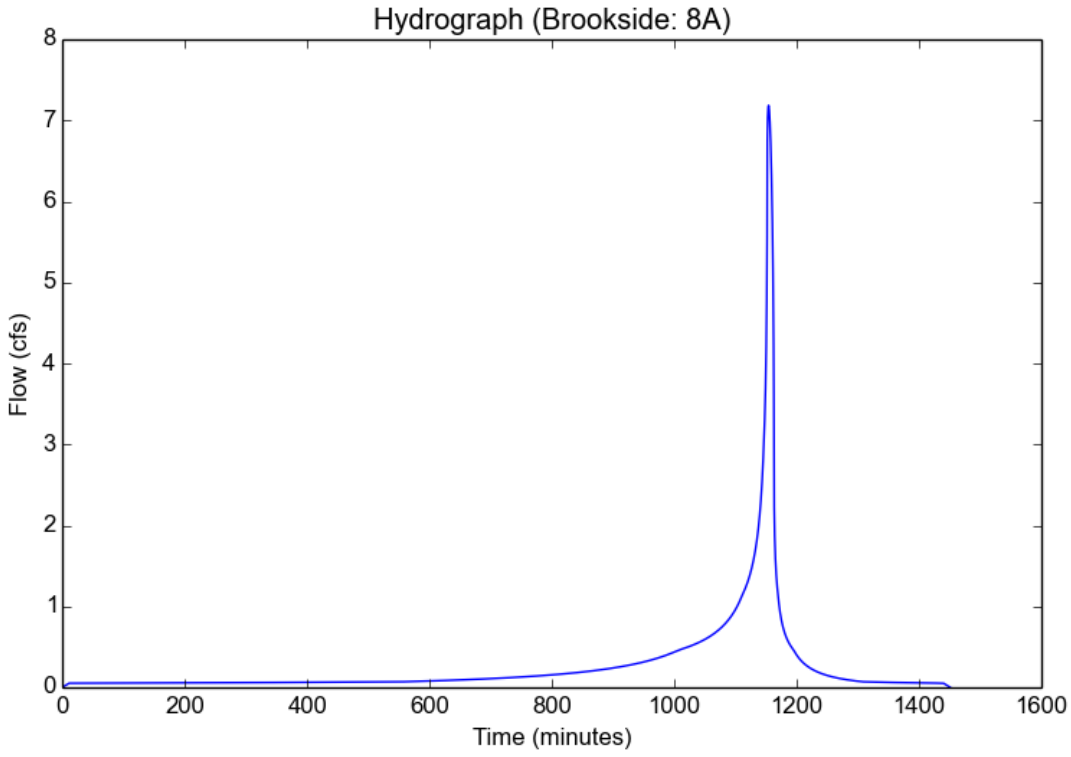
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/4-in Storm/Brookside - 8A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	8A
Area (ac)	5.39
Flow Path Length (ft)	1116.4
Flow Path Slope (vft/hft)	0.08151
85th Percentile Rainfall Depth (in)	4.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	4.0
Peak Intensity (in/hr)	1.6475
Undeveloped Runoff Coefficient (Cu)	0.8082
Developed Runoff Coefficient (Cd)	0.8091
Time of Concentration (min)	11.0
Clear Peak Flow Rate (cfs)	7.1848
Burned Peak Flow Rate (cfs)	7.1848
24-Hr Clear Runoff Volume (ac-ft)	0.5374
24-Hr Clear Runoff Volume (cu-ft)	23407.4271



Peak Flow Hydrologic Analysis

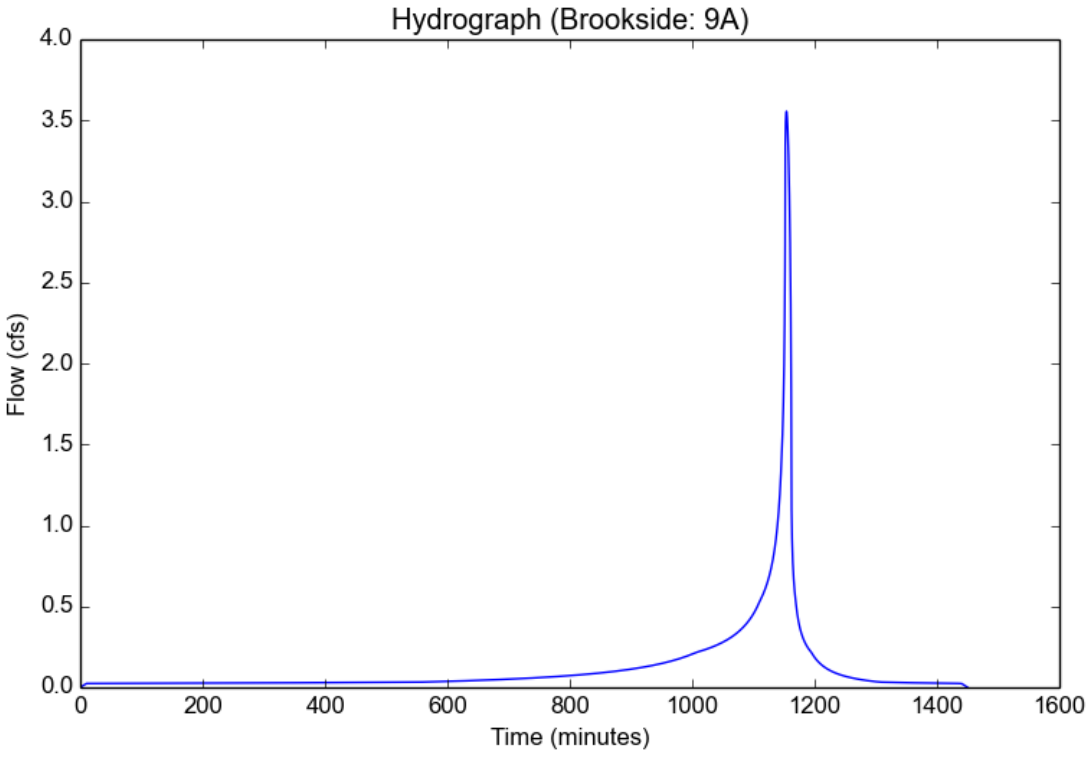
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/4-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	2.53
Flow Path Length (ft)	912.2
Flow Path Slope (vft/hft)	0.05591
85th Percentile Rainfall Depth (in)	4.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	4.0
Peak Intensity (in/hr)	1.723
Undeveloped Runoff Coefficient (Cu)	0.8149
Developed Runoff Coefficient (Cd)	0.8157
Time of Concentration (min)	10.0
Clear Peak Flow Rate (cfs)	3.5559
Burned Peak Flow Rate (cfs)	3.5559
24-Hr Clear Runoff Volume (ac-ft)	0.2523
24-Hr Clear Runoff Volume (cu-ft)	10990.8422



Peak Flow Hydrologic Analysis

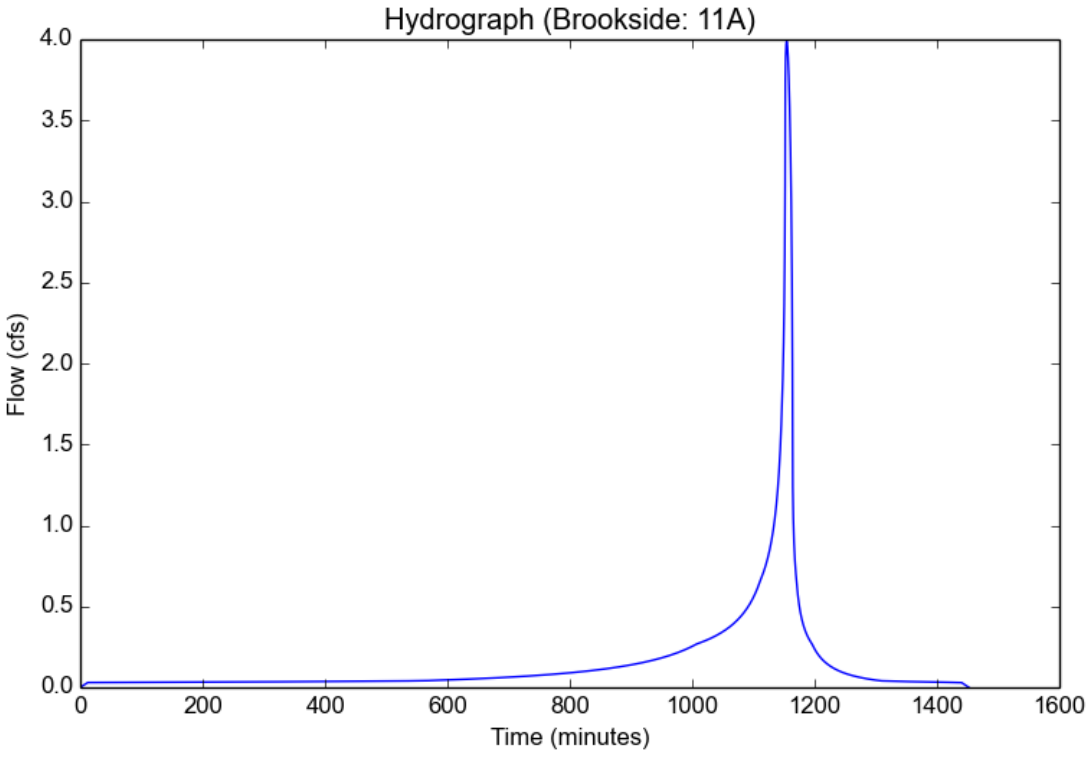
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/4-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	3.14
Flow Path Length (ft)	890.9
Flow Path Slope (vft/hft)	0.02469
85th Percentile Rainfall Depth (in)	4.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	4.0
Peak Intensity (in/hr)	1.5815
Undeveloped Runoff Coefficient (Cu)	0.8023
Developed Runoff Coefficient (Cd)	0.8033
Time of Concentration (min)	12.0
Clear Peak Flow Rate (cfs)	3.9891
Burned Peak Flow Rate (cfs)	3.9891
24-Hr Clear Runoff Volume (ac-ft)	0.313
24-Hr Clear Runoff Volume (cu-ft)	13632.4346



Peak Flow Hydrologic Analysis

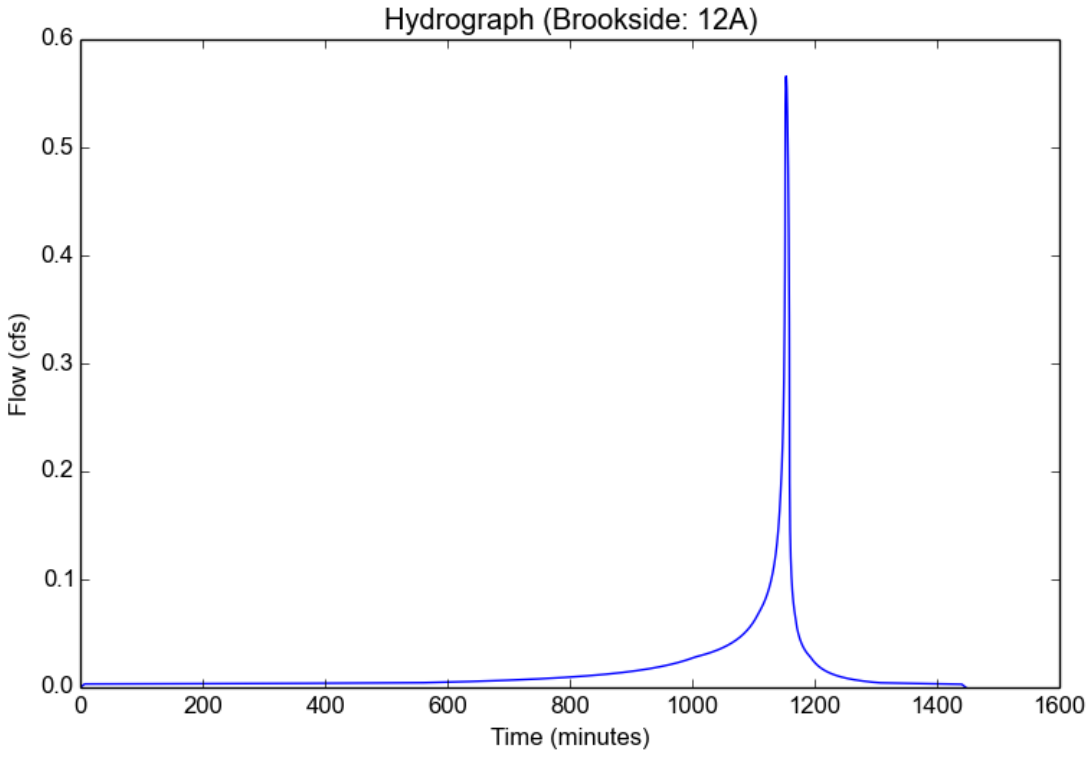
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/4-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.33
Flow Path Length (ft)	406.0
Flow Path Slope (vft/hft)	0.0197
85th Percentile Rainfall Depth (in)	4.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	4.0
Peak Intensity (in/hr)	2.0374
Undeveloped Runoff Coefficient (Cu)	0.8411
Developed Runoff Coefficient (Cd)	0.8417
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	0.5659
Burned Peak Flow Rate (cfs)	0.5659
24-Hr Clear Runoff Volume (ac-ft)	0.033
24-Hr Clear Runoff Volume (cu-ft)	1435.6953



Peak Flow Hydrologic Analysis

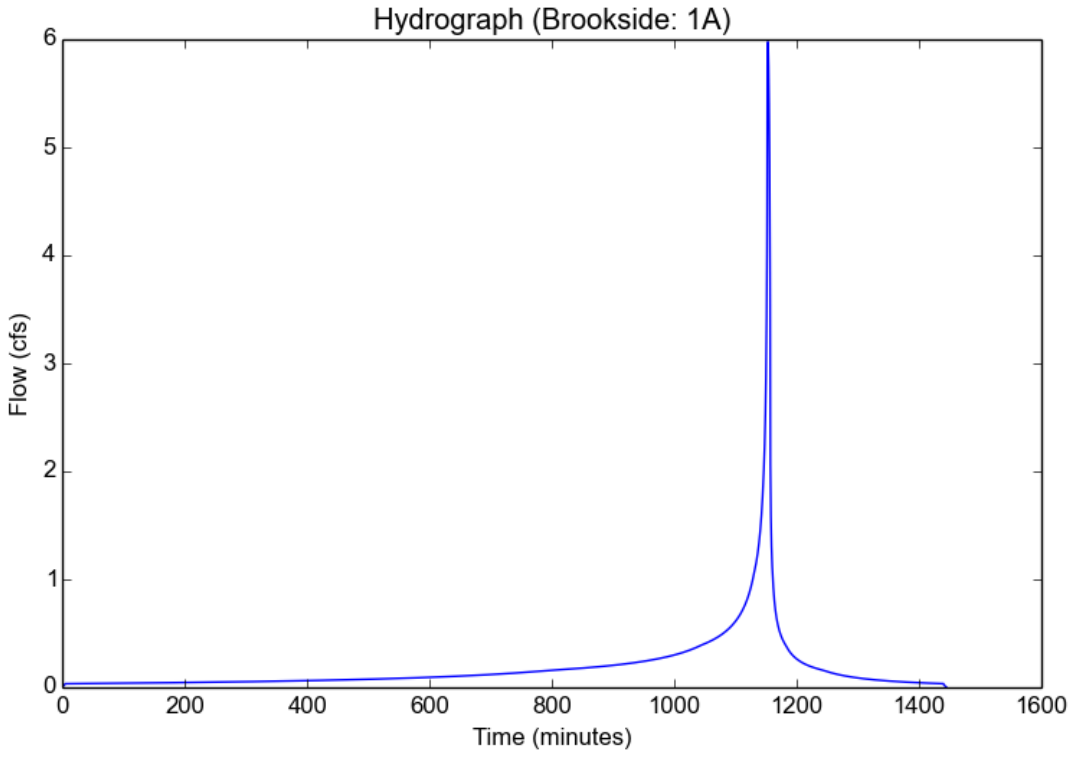
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/6-in Storm/Brookside - 1A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1A
Area (ac)	1.86
Flow Path Length (ft)	623.8
Flow Path Slope (vft/hft)	0.11061
85th Percentile Rainfall Depth (in)	6.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	6.0
Peak Intensity (in/hr)	3.5798
Undeveloped Runoff Coefficient (Cu)	0.8977
Developed Runoff Coefficient (Cd)	0.8977
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	5.9772
Burned Peak Flow Rate (cfs)	5.9772
24-Hr Clear Runoff Volume (ac-ft)	0.3815
24-Hr Clear Runoff Volume (cu-ft)	16618.2454



Peak Flow Hydrologic Analysis

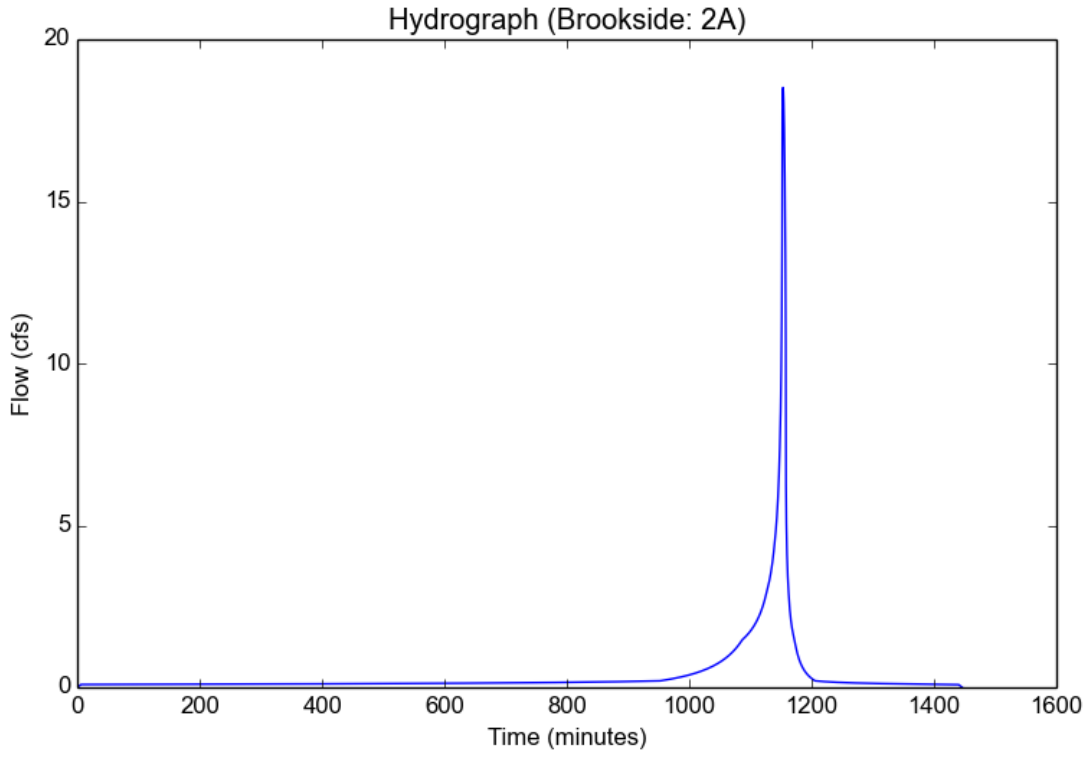
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/6-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	6.26
Flow Path Length (ft)	739.9
Flow Path Slope (vft/hft)	0.06623
85th Percentile Rainfall Depth (in)	6.0
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	6.0
Peak Intensity (in/hr)	3.2858
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	18.5121
Burned Peak Flow Rate (cfs)	18.5121
24-Hr Clear Runoff Volume (ac-ft)	0.8206
24-Hr Clear Runoff Volume (cu-ft)	35744.8556



Peak Flow Hydrologic Analysis

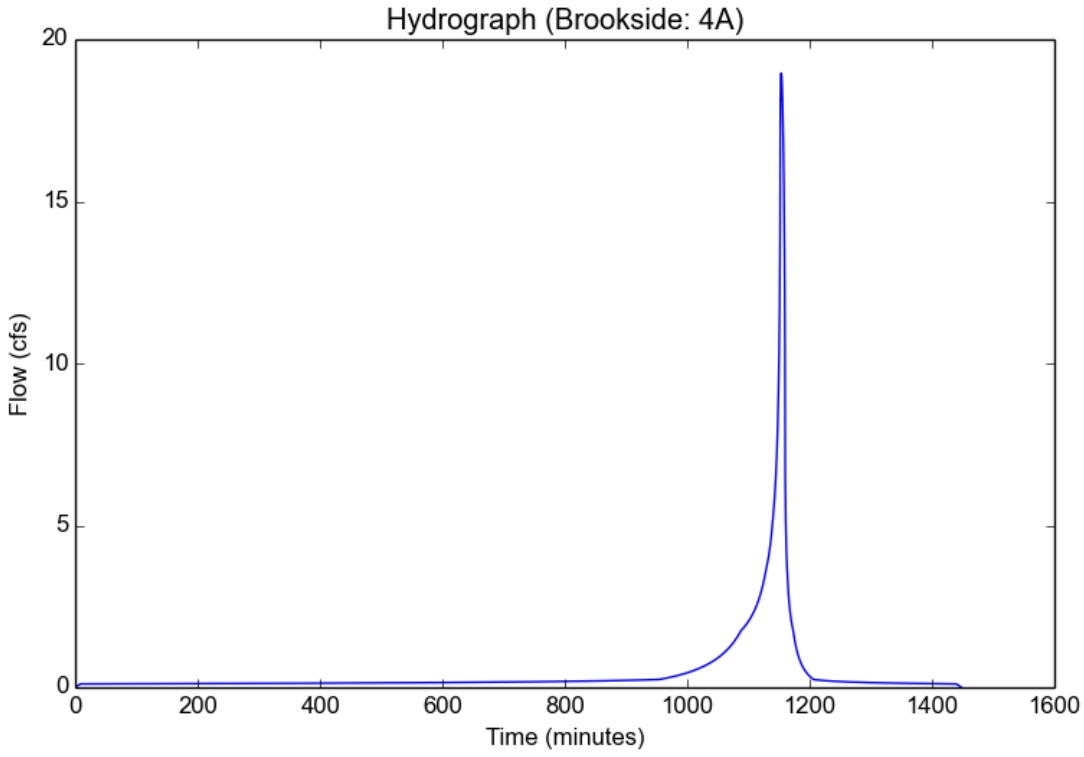
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/6-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	7.44
Flow Path Length (ft)	949.3
Flow Path Slope (vft/hft)	0.05794
85th Percentile Rainfall Depth (in)	6.0
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	6.0
Peak Intensity (in/hr)	2.8702
Undeveloped Runoff Coefficient (Cu)	0.8876
Developed Runoff Coefficient (Cd)	0.8877
Time of Concentration (min)	8.0
Clear Peak Flow Rate (cfs)	18.9562
Burned Peak Flow Rate (cfs)	18.9562
24-Hr Clear Runoff Volume (ac-ft)	0.9751
24-Hr Clear Runoff Volume (cu-ft)	42474.789



Peak Flow Hydrologic Analysis

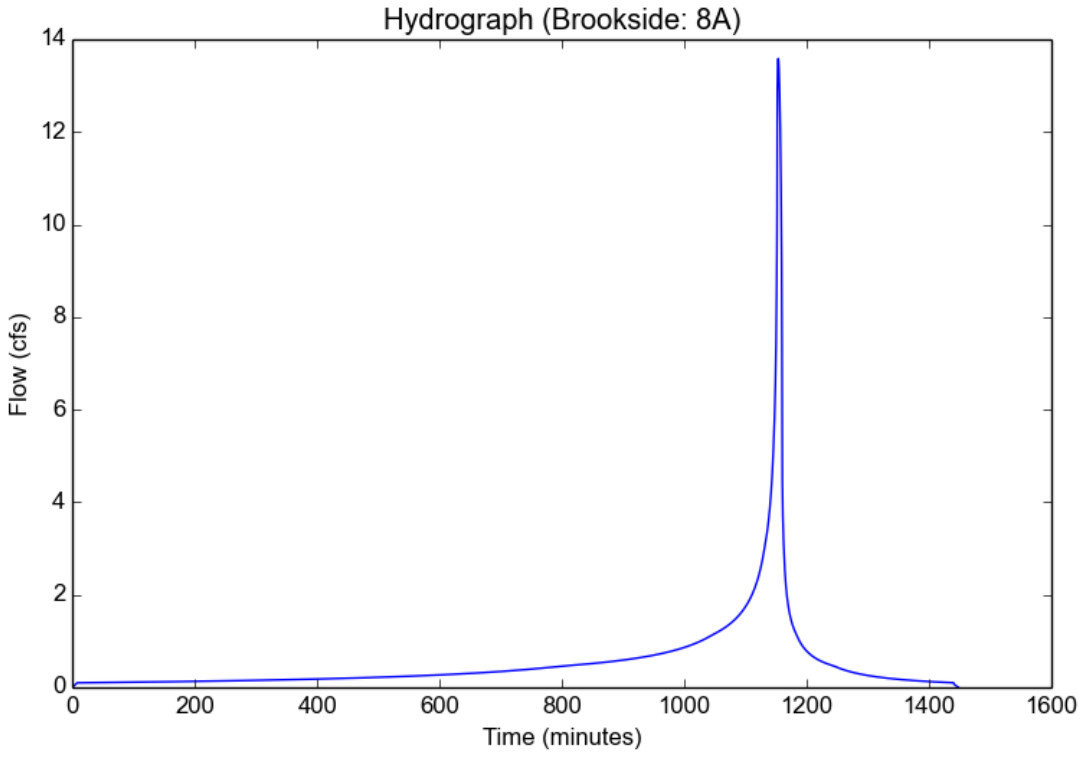
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/6-in Storm/Brookside - 8A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	8A
Area (ac)	5.39
Flow Path Length (ft)	1116.4
Flow Path Slope (vft/hft)	0.08151
85th Percentile Rainfall Depth (in)	6.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	6.0
Peak Intensity (in/hr)	2.8702
Undeveloped Runoff Coefficient (Cu)	0.8779
Developed Runoff Coefficient (Cd)	0.8782
Time of Concentration (min)	8.0
Clear Peak Flow Rate (cfs)	13.5855
Burned Peak Flow Rate (cfs)	13.5855
24-Hr Clear Runoff Volume (ac-ft)	1.1049
24-Hr Clear Runoff Volume (cu-ft)	48129.6667



Peak Flow Hydrologic Analysis

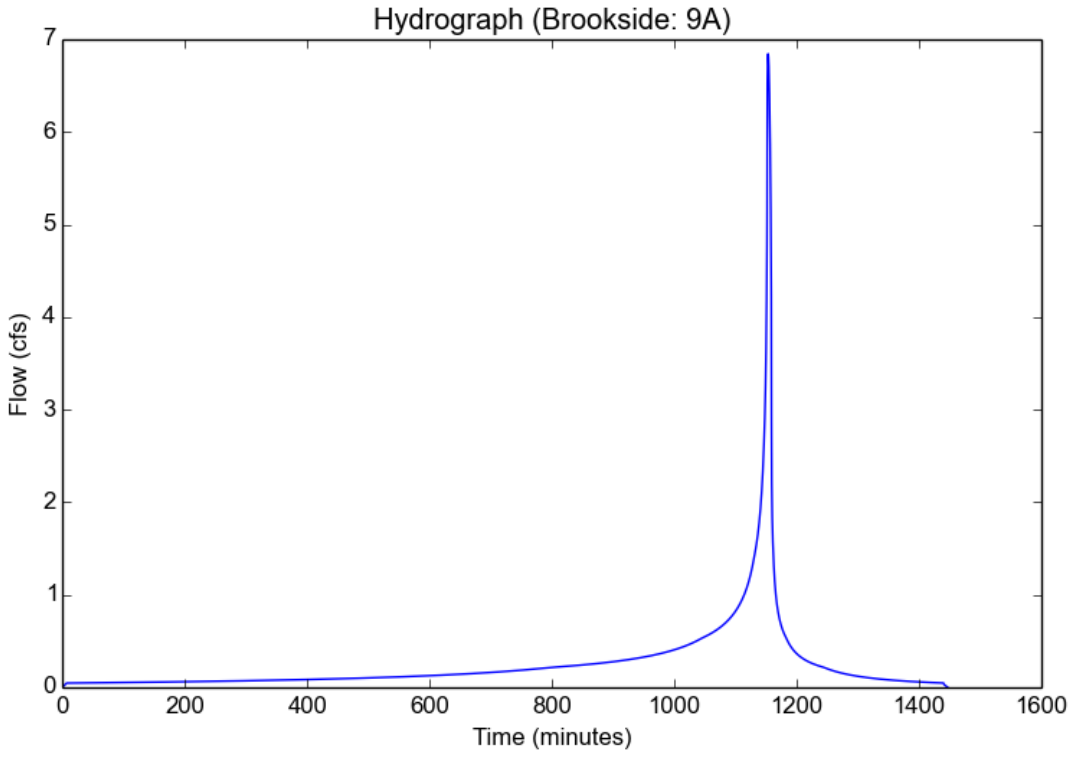
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/6-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	2.53
Flow Path Length (ft)	912.2
Flow Path Slope (vft/hft)	0.05591
85th Percentile Rainfall Depth (in)	6.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	6.0
Peak Intensity (in/hr)	3.0561
Undeveloped Runoff Coefficient (Cu)	0.885
Developed Runoff Coefficient (Cd)	0.8852
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	6.8442
Burned Peak Flow Rate (cfs)	6.8442
24-Hr Clear Runoff Volume (ac-ft)	0.5188
24-Hr Clear Runoff Volume (cu-ft)	22598.0983



Peak Flow Hydrologic Analysis

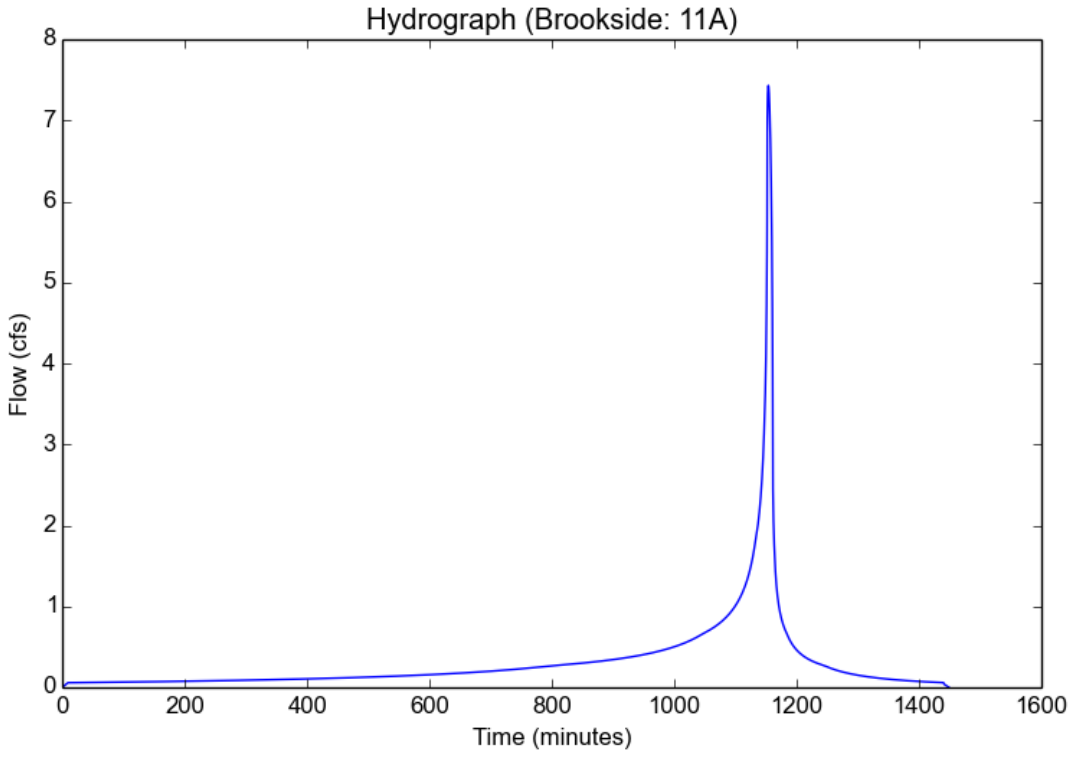
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/6-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	3.14
Flow Path Length (ft)	890.9
Flow Path Slope (vft/hft)	0.02469
85th Percentile Rainfall Depth (in)	6.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	6.0
Peak Intensity (in/hr)	2.7157
Undeveloped Runoff Coefficient (Cu)	0.8711
Developed Runoff Coefficient (Cd)	0.8714
Time of Concentration (min)	9.0
Clear Peak Flow Rate (cfs)	7.4305
Burned Peak Flow Rate (cfs)	7.4305
24-Hr Clear Runoff Volume (ac-ft)	0.6435
24-Hr Clear Runoff Volume (cu-ft)	28031.3441



Peak Flow Hydrologic Analysis

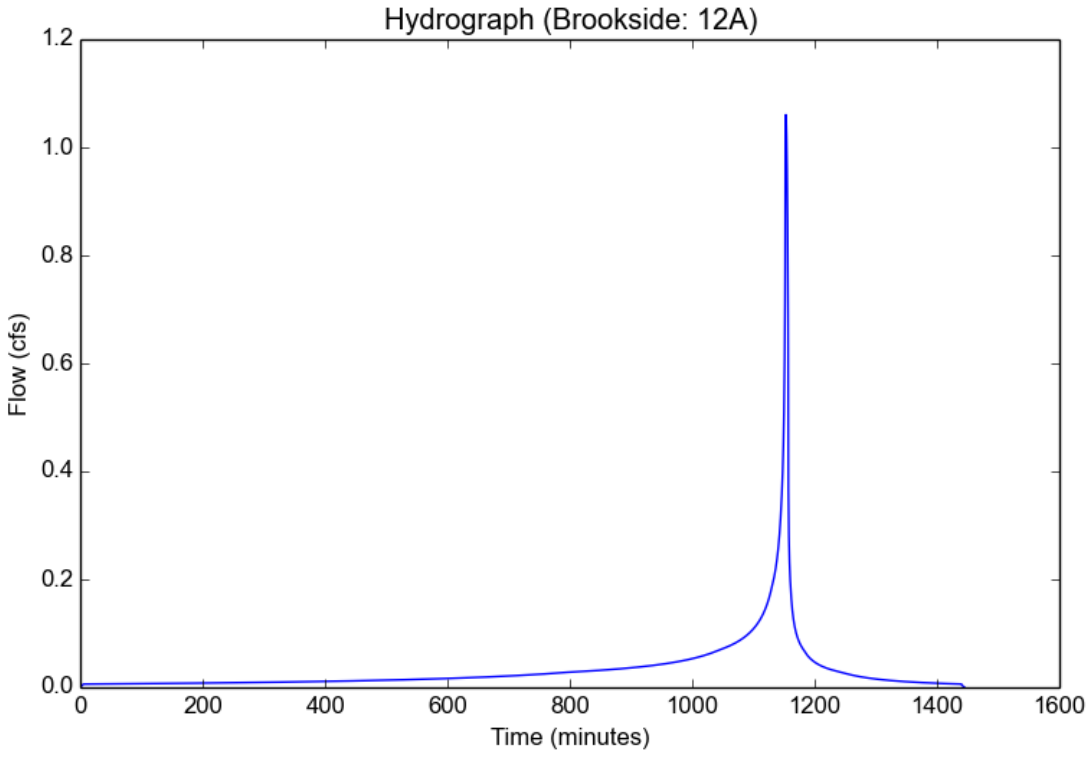
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/6-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.33
Flow Path Length (ft)	406.0
Flow Path Slope (vft/hft)	0.0197
85th Percentile Rainfall Depth (in)	6.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	6.0
Peak Intensity (in/hr)	3.5798
Undeveloped Runoff Coefficient (Cu)	0.8977
Developed Runoff Coefficient (Cd)	0.8977
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.0605
Burned Peak Flow Rate (cfs)	1.0605
24-Hr Clear Runoff Volume (ac-ft)	0.0677
24-Hr Clear Runoff Volume (cu-ft)	2948.3984



Peak Flow Hydrologic Analysis

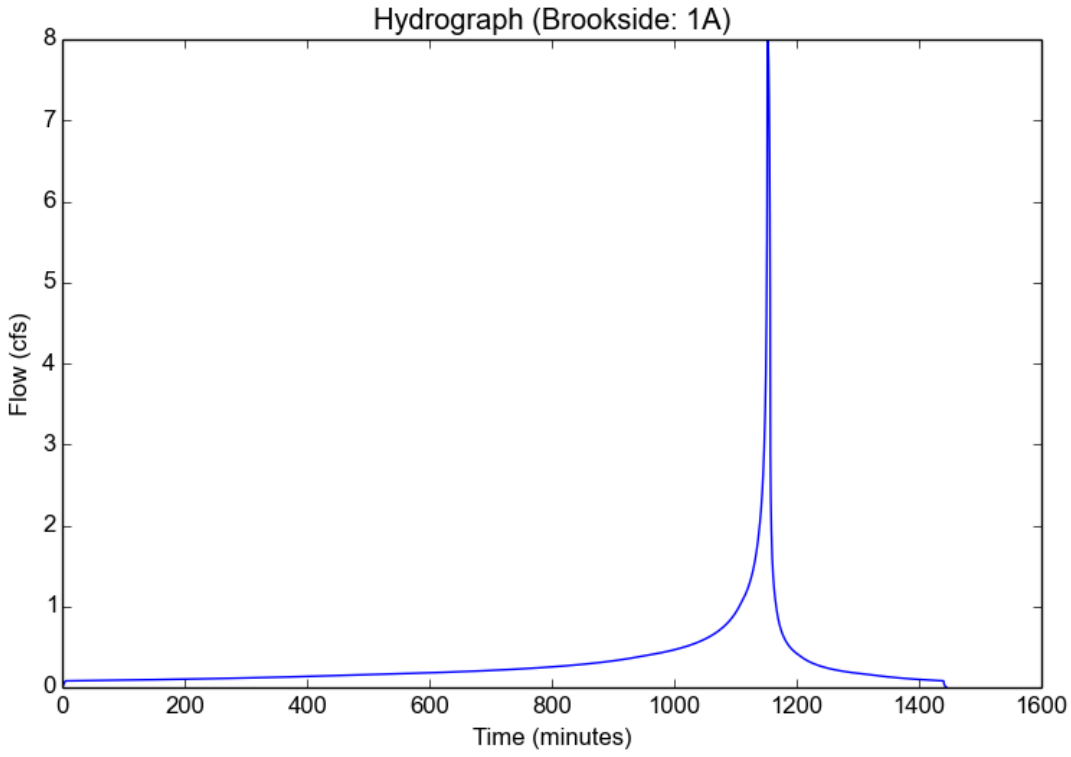
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/8-in Storm/Brookside - 1A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1A
Area (ac)	1.86
Flow Path Length (ft)	623.8
Flow Path Slope (vft/hft)	0.11061
85th Percentile Rainfall Depth (in)	8.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	8.0
Peak Intensity (in/hr)	4.773
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	7.99
Burned Peak Flow Rate (cfs)	7.99
24-Hr Clear Runoff Volume (ac-ft)	0.6156
24-Hr Clear Runoff Volume (cu-ft)	26817.2994



Peak Flow Hydrologic Analysis

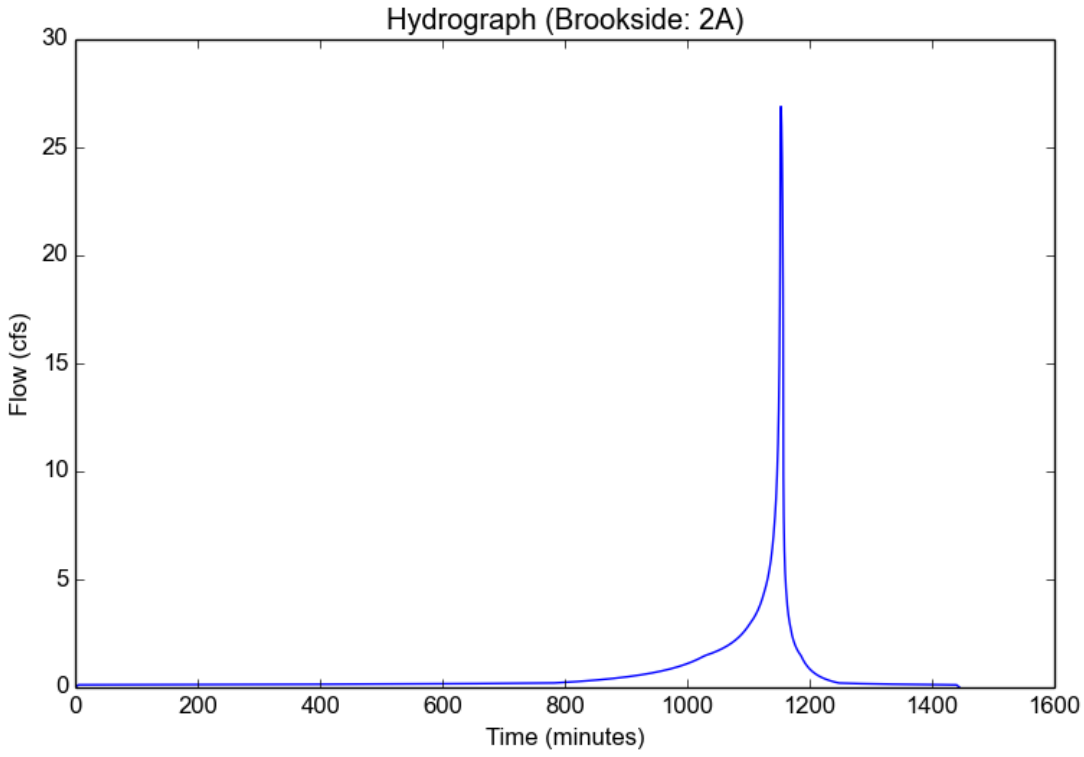
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/8-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	6.26
Flow Path Length (ft)	739.9
Flow Path Slope (vft/hft)	0.06623
85th Percentile Rainfall Depth (in)	8.0
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	8.0
Peak Intensity (in/hr)	4.773
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	26.8912
Burned Peak Flow Rate (cfs)	26.8912
24-Hr Clear Runoff Volume (ac-ft)	1.3379
24-Hr Clear Runoff Volume (cu-ft)	58277.7268



Peak Flow Hydrologic Analysis

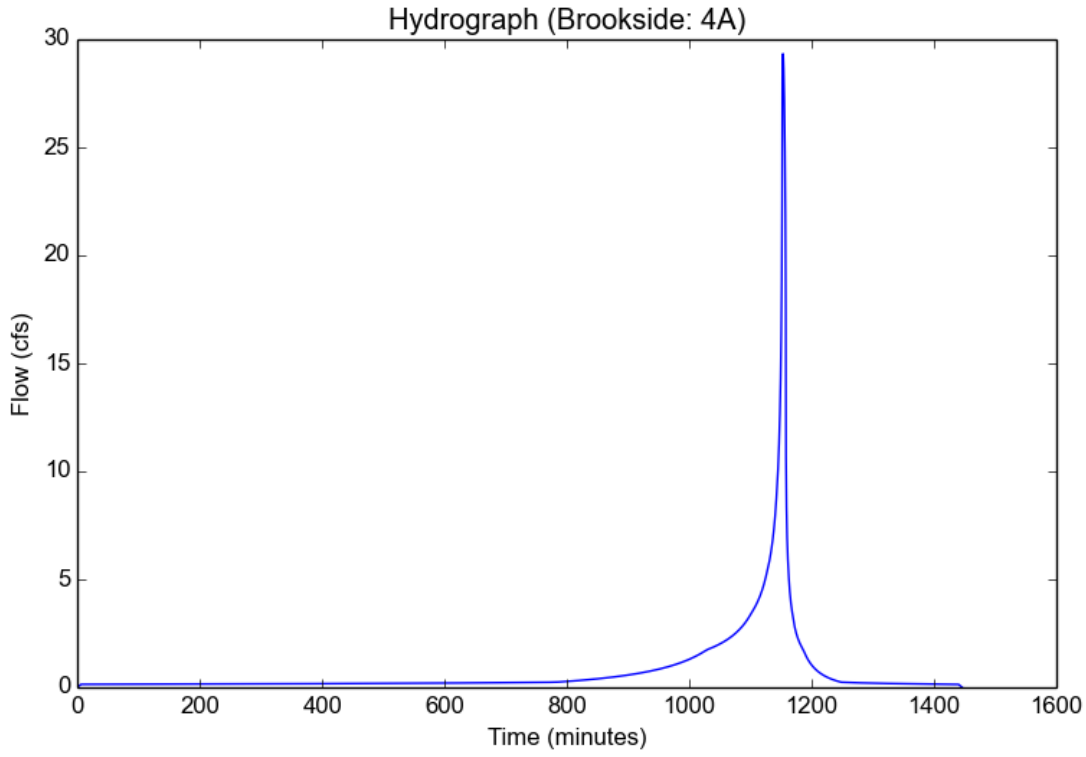
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/8-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	7.44
Flow Path Length (ft)	949.3
Flow Path Slope (vft/hft)	0.05794
85th Percentile Rainfall Depth (in)	8.0
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	8.0
Peak Intensity (in/hr)	4.381
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	29.3355
Burned Peak Flow Rate (cfs)	29.3355
24-Hr Clear Runoff Volume (ac-ft)	1.591
24-Hr Clear Runoff Volume (cu-ft)	69304.3009



Peak Flow Hydrologic Analysis

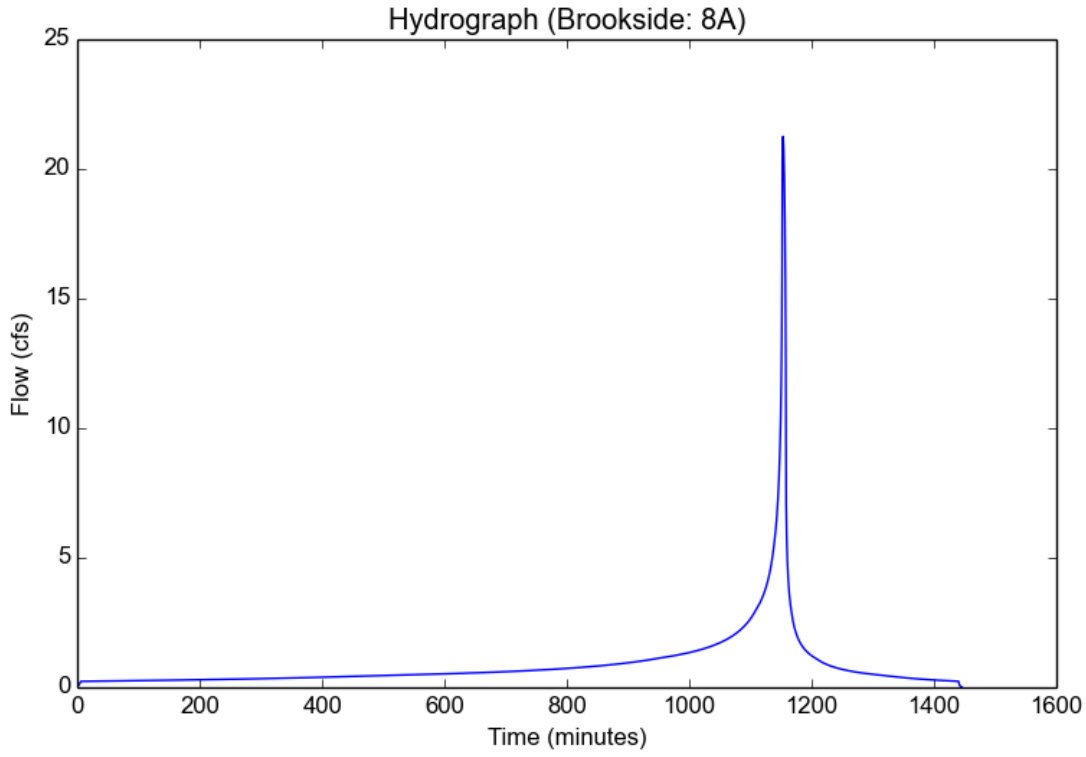
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/8-in Storm/Brookside - 8A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	8A
Area (ac)	5.39
Flow Path Length (ft)	1116.4
Flow Path Slope (vft/hft)	0.08151
85th Percentile Rainfall Depth (in)	8.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	8.0
Peak Intensity (in/hr)	4.381
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	21.2525
Burned Peak Flow Rate (cfs)	21.2525
24-Hr Clear Runoff Volume (ac-ft)	1.7845
24-Hr Clear Runoff Volume (cu-ft)	77733.6049



Peak Flow Hydrologic Analysis

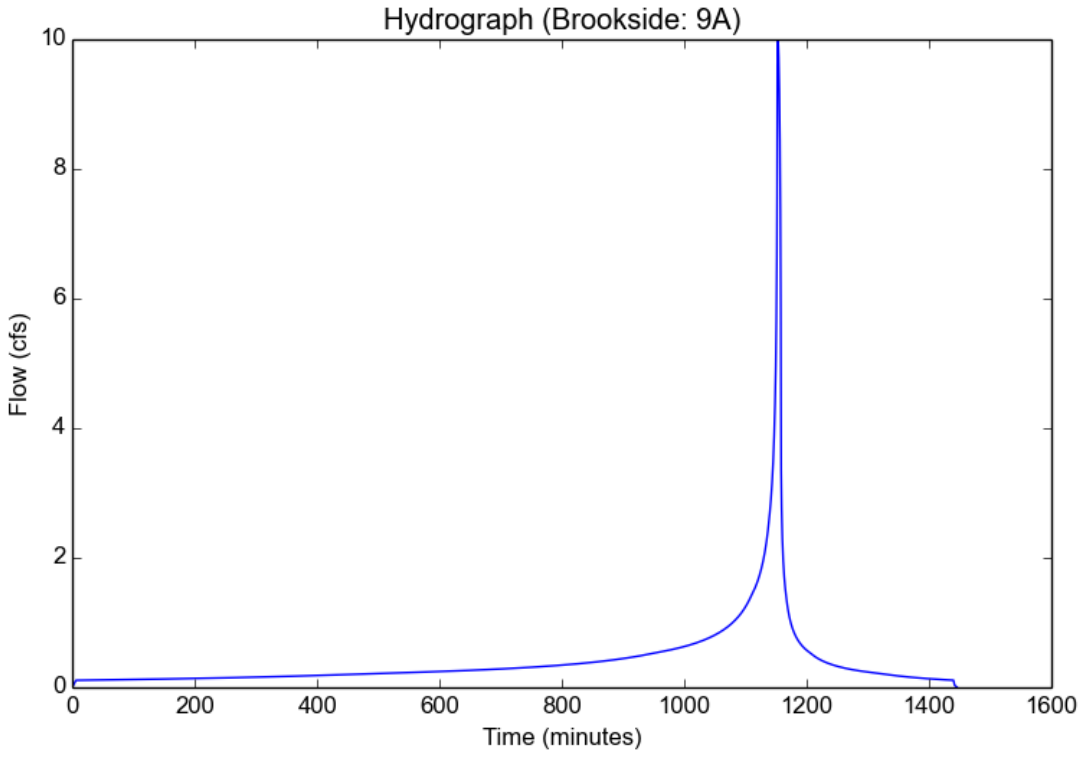
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/8-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	2.53
Flow Path Length (ft)	912.2
Flow Path Slope (vft/hft)	0.05591
85th Percentile Rainfall Depth (in)	8.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	8.0
Peak Intensity (in/hr)	4.381
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	9.9756
Burned Peak Flow Rate (cfs)	9.9756
24-Hr Clear Runoff Volume (ac-ft)	0.8376
24-Hr Clear Runoff Volume (cu-ft)	36487.2023



Peak Flow Hydrologic Analysis

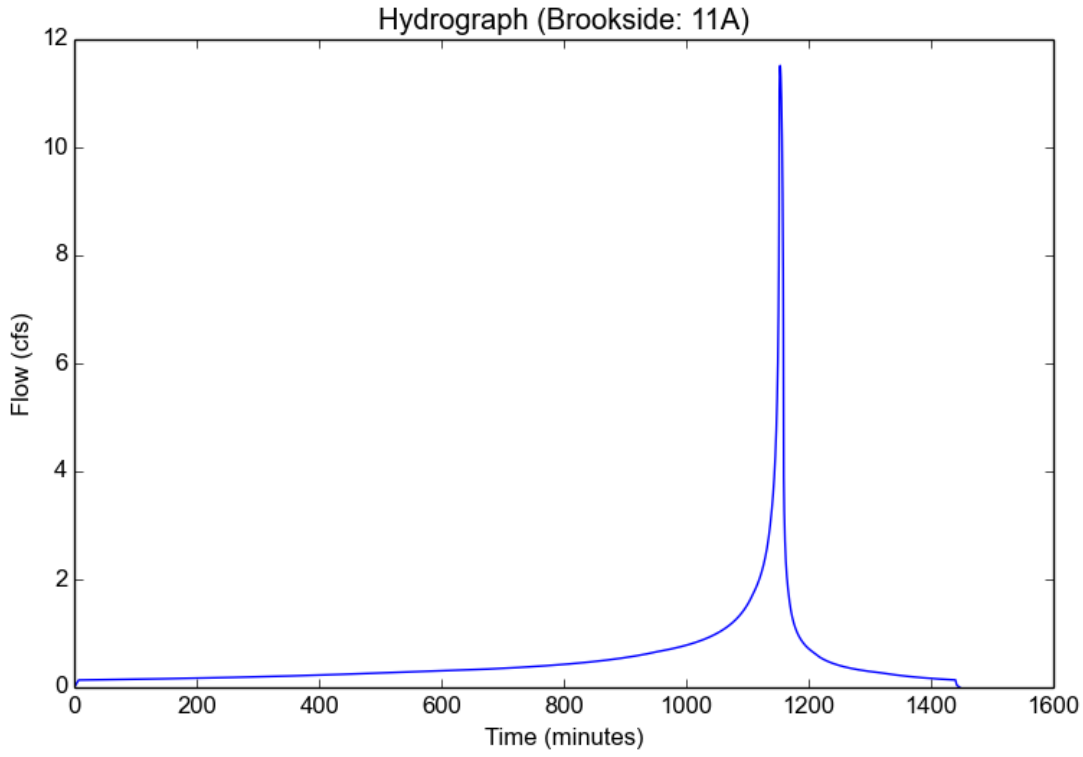
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/8-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	3.14
Flow Path Length (ft)	890.9
Flow Path Slope (vft/hft)	0.02469
85th Percentile Rainfall Depth (in)	8.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	8.0
Peak Intensity (in/hr)	4.0749
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	11.5156
Burned Peak Flow Rate (cfs)	11.5156
24-Hr Clear Runoff Volume (ac-ft)	1.0398
24-Hr Clear Runoff Volume (cu-ft)	45295.37



Peak Flow Hydrologic Analysis

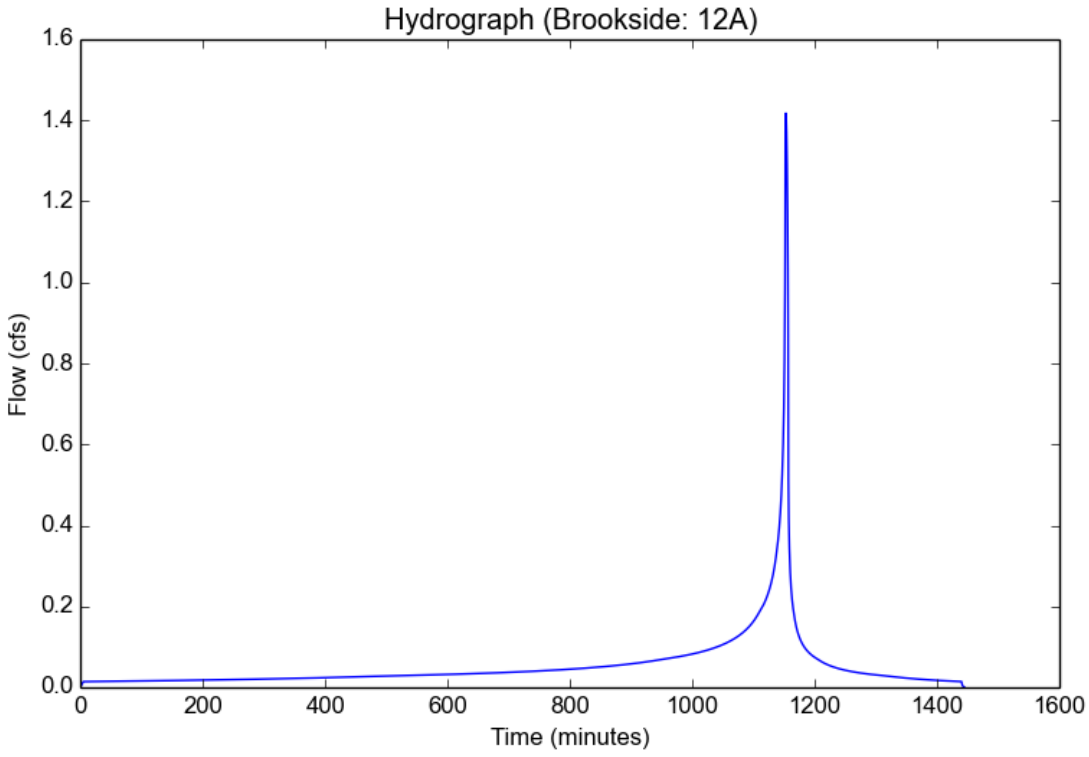
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/8-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.33
Flow Path Length (ft)	406.0
Flow Path Slope (vft/hft)	0.0197
85th Percentile Rainfall Depth (in)	8.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	8.0
Peak Intensity (in/hr)	4.773
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.4176
Burned Peak Flow Rate (cfs)	1.4176
24-Hr Clear Runoff Volume (ac-ft)	0.1092
24-Hr Clear Runoff Volume (cu-ft)	4757.908



Peak Flow Hydrologic Analysis

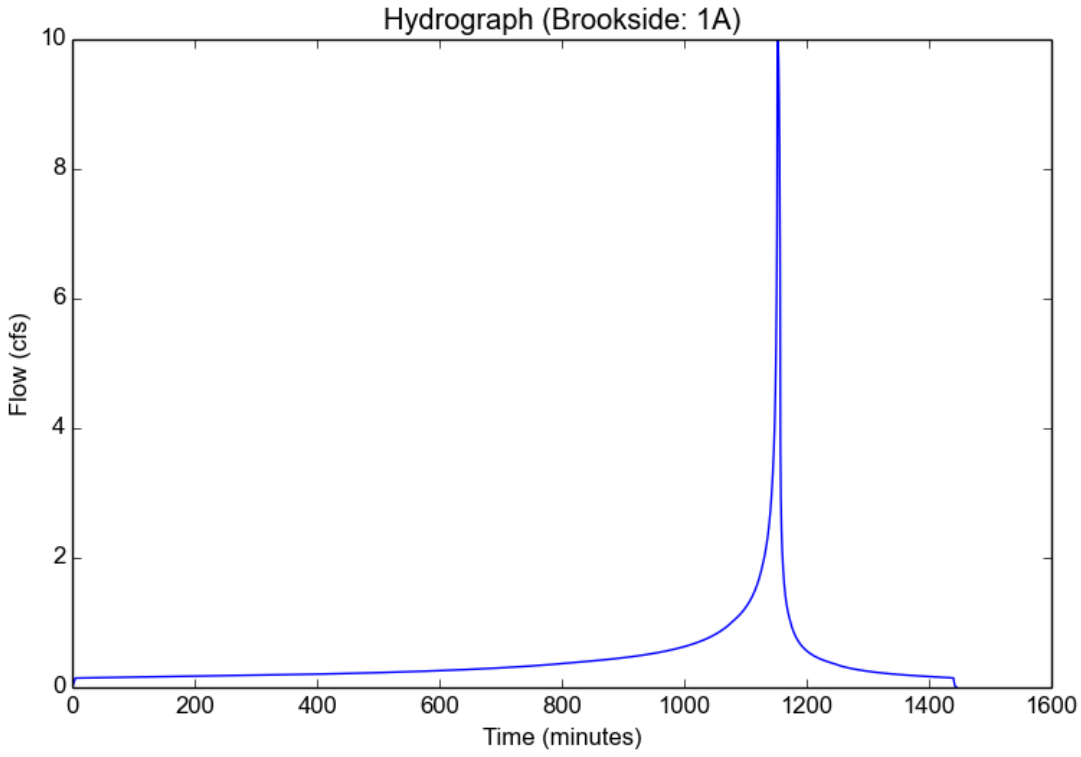
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/10-in Storm/Brookside - 1A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1A
Area (ac)	1.86
Flow Path Length (ft)	623.8
Flow Path Slope (vft/hft)	0.11061
85th Percentile Rainfall Depth (in)	10.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	10.0
Peak Intensity (in/hr)	5.9663
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	9.9875
Burned Peak Flow Rate (cfs)	9.9875
24-Hr Clear Runoff Volume (ac-ft)	0.8605
24-Hr Clear Runoff Volume (cu-ft)	37481.2629



Peak Flow Hydrologic Analysis

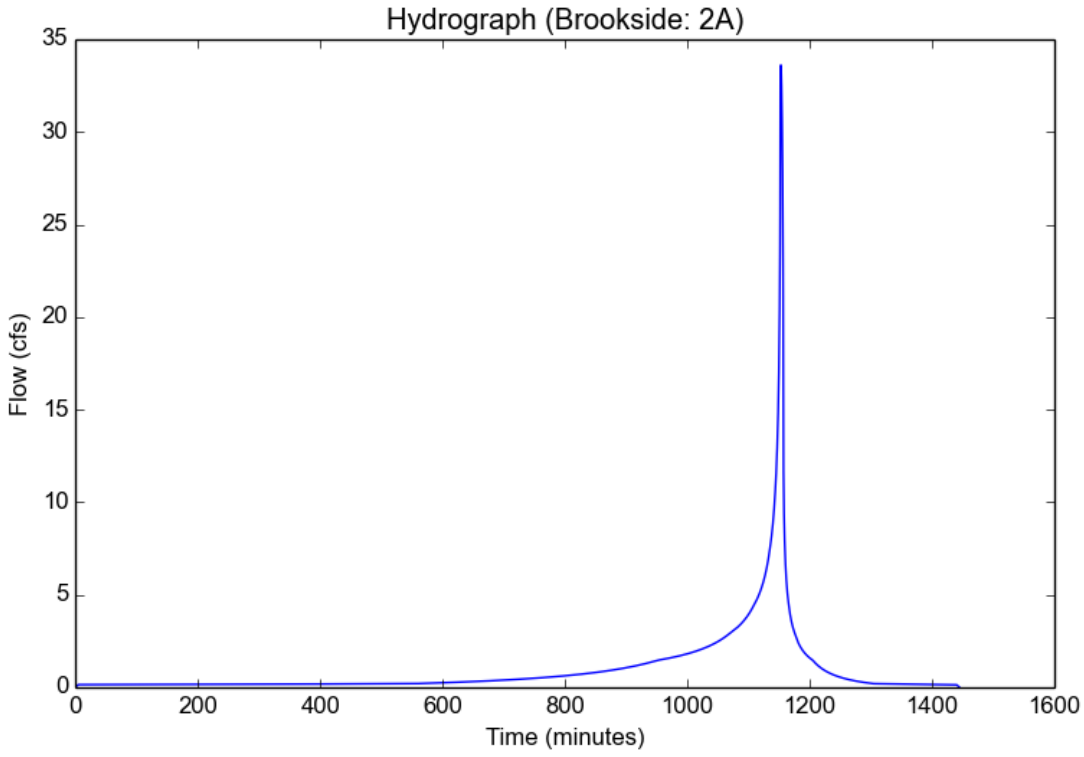
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/10-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	6.26
Flow Path Length (ft)	739.9
Flow Path Slope (vft/hft)	0.06623
85th Percentile Rainfall Depth (in)	10.0
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	10.0
Peak Intensity (in/hr)	5.9663
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	33.614
Burned Peak Flow Rate (cfs)	33.614
24-Hr Clear Runoff Volume (ac-ft)	1.9888
24-Hr Clear Runoff Volume (cu-ft)	86630.7083



Peak Flow Hydrologic Analysis

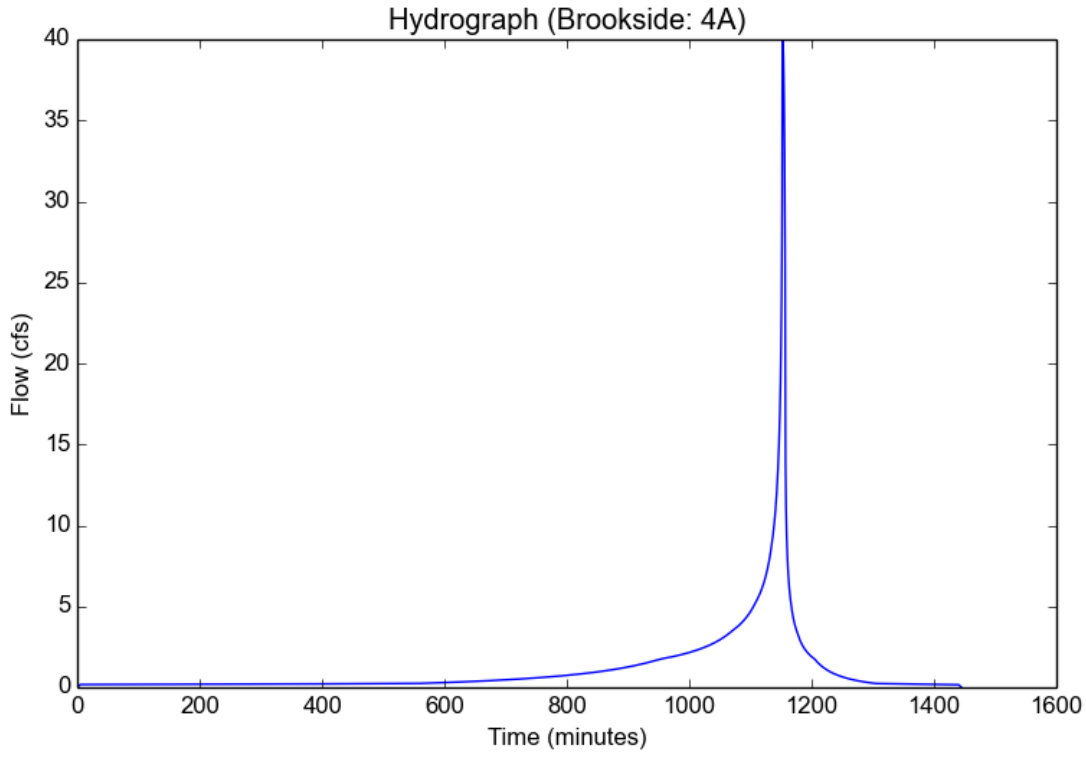
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/10-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	7.44
Flow Path Length (ft)	949.3
Flow Path Slope (vft/hft)	0.05794
85th Percentile Rainfall Depth (in)	10.0
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	10.0
Peak Intensity (in/hr)	5.9663
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	39.9502
Burned Peak Flow Rate (cfs)	39.9502
24-Hr Clear Runoff Volume (ac-ft)	2.3636
24-Hr Clear Runoff Volume (cu-ft)	102960.4584



Peak Flow Hydrologic Analysis

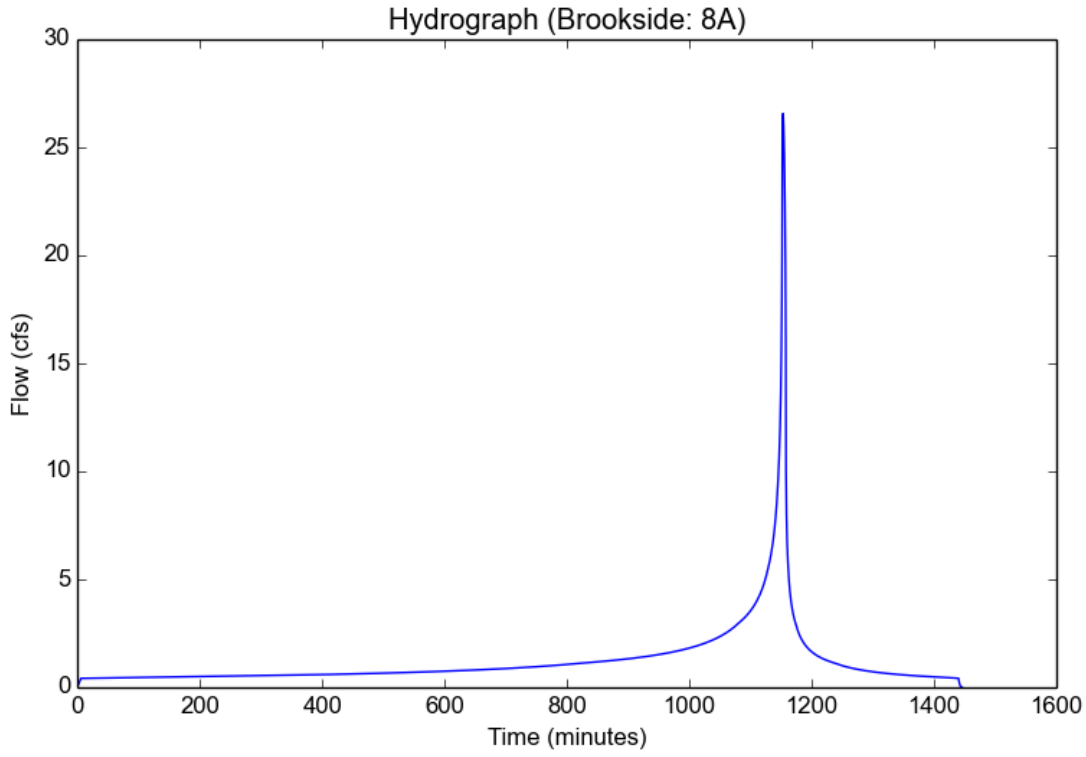
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/10-in Storm/Brookside - 8A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	8A
Area (ac)	5.39
Flow Path Length (ft)	1116.4
Flow Path Slope (vft/hft)	0.08151
85th Percentile Rainfall Depth (in)	10.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	10.0
Peak Intensity (in/hr)	5.4763
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	26.5656
Burned Peak Flow Rate (cfs)	26.5656
24-Hr Clear Runoff Volume (ac-ft)	2.4939
24-Hr Clear Runoff Volume (cu-ft)	108634.0813



Peak Flow Hydrologic Analysis

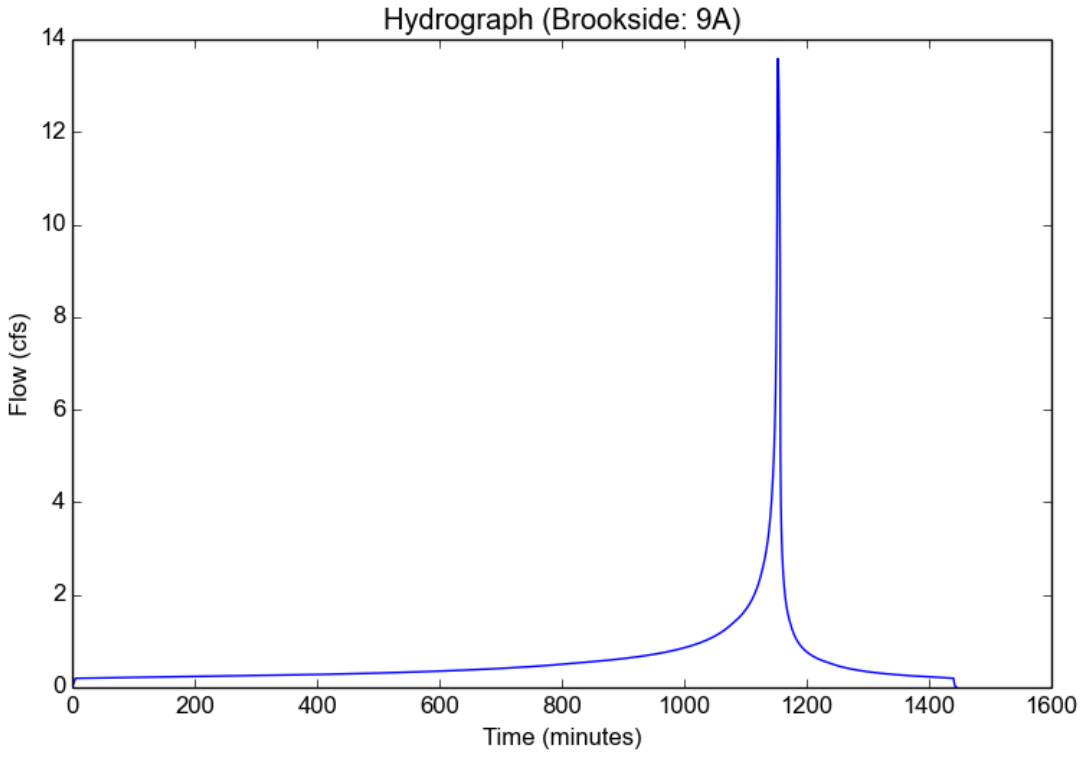
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/10-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	2.53
Flow Path Length (ft)	912.2
Flow Path Slope (vft/hft)	0.05591
85th Percentile Rainfall Depth (in)	10.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	10.0
Peak Intensity (in/hr)	5.9663
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	13.5852
Burned Peak Flow Rate (cfs)	13.5852
24-Hr Clear Runoff Volume (ac-ft)	1.1704
24-Hr Clear Runoff Volume (cu-ft)	50982.578



Peak Flow Hydrologic Analysis

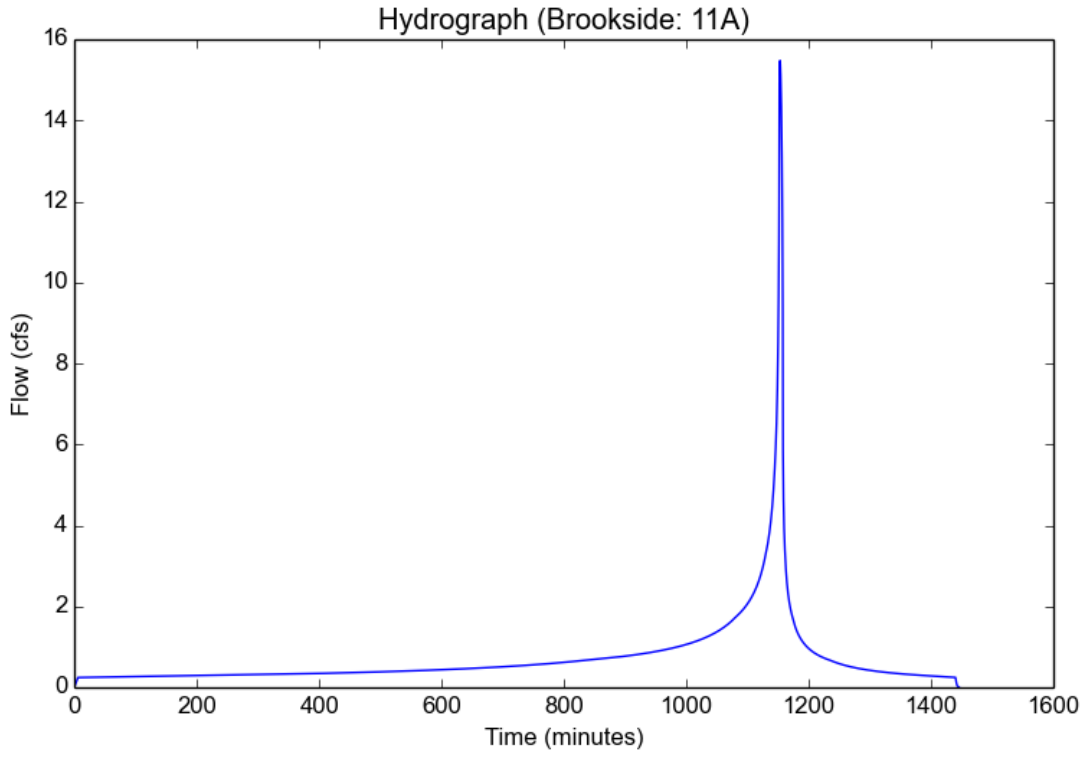
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/10-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	3.14
Flow Path Length (ft)	890.9
Flow Path Slope (vft/hft)	0.02469
85th Percentile Rainfall Depth (in)	10.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	10.0
Peak Intensity (in/hr)	5.4763
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	15.4761
Burned Peak Flow Rate (cfs)	15.4761
24-Hr Clear Runoff Volume (ac-ft)	1.4528
24-Hr Clear Runoff Volume (cu-ft)	63285.9027



Peak Flow Hydrologic Analysis

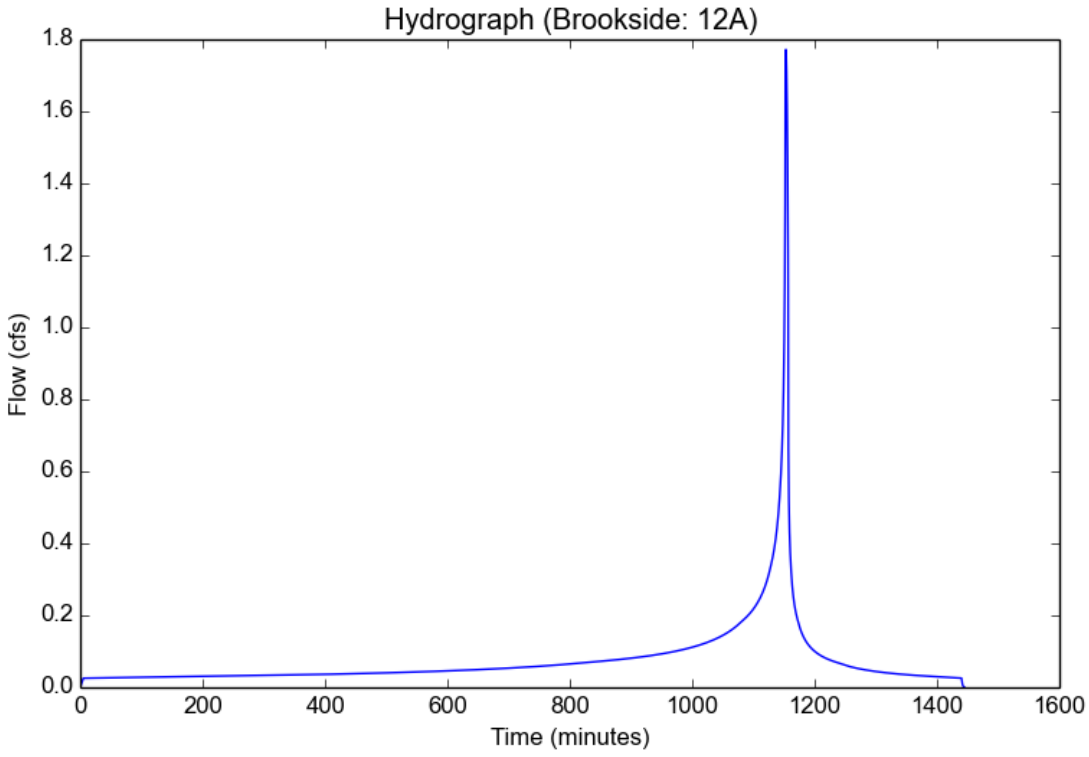
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/10-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.33
Flow Path Length (ft)	406.0
Flow Path Slope (vft/hft)	0.0197
85th Percentile Rainfall Depth (in)	10.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	10.0
Peak Intensity (in/hr)	5.9663
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.772
Burned Peak Flow Rate (cfs)	1.772
24-Hr Clear Runoff Volume (ac-ft)	0.1527
24-Hr Clear Runoff Volume (cu-ft)	6649.9015



Peak Flow Hydrologic Analysis

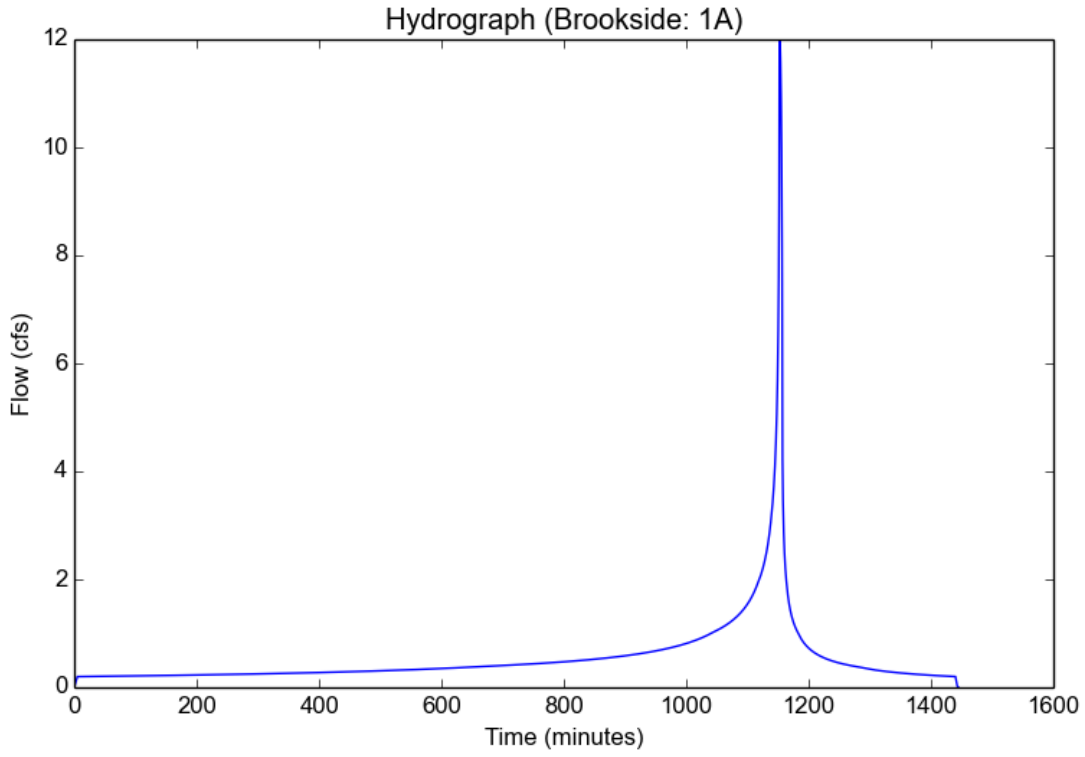
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/12-in Storm/Brookside - 1A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1A
Area (ac)	1.86
Flow Path Length (ft)	623.8
Flow Path Slope (vft/hft)	0.11061
85th Percentile Rainfall Depth (in)	12.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	12.0
Peak Intensity (in/hr)	7.1595
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	11.9851
Burned Peak Flow Rate (cfs)	11.9851
24-Hr Clear Runoff Volume (ac-ft)	1.1077
24-Hr Clear Runoff Volume (cu-ft)	48250.8995



Peak Flow Hydrologic Analysis

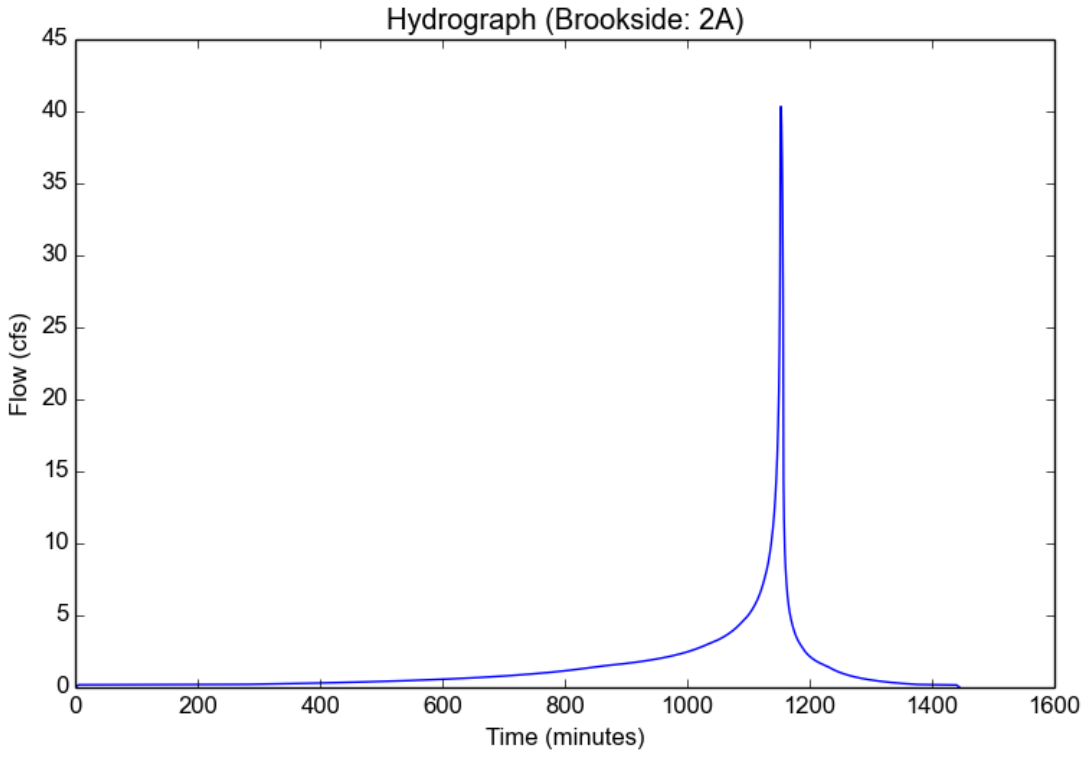
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/12-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	6.26
Flow Path Length (ft)	739.9
Flow Path Slope (vft/hft)	0.06623
85th Percentile Rainfall Depth (in)	12.0
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	12.0
Peak Intensity (in/hr)	7.1595
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	40.3368
Burned Peak Flow Rate (cfs)	40.3368
24-Hr Clear Runoff Volume (ac-ft)	2.7769
24-Hr Clear Runoff Volume (cu-ft)	120963.3454



Peak Flow Hydrologic Analysis

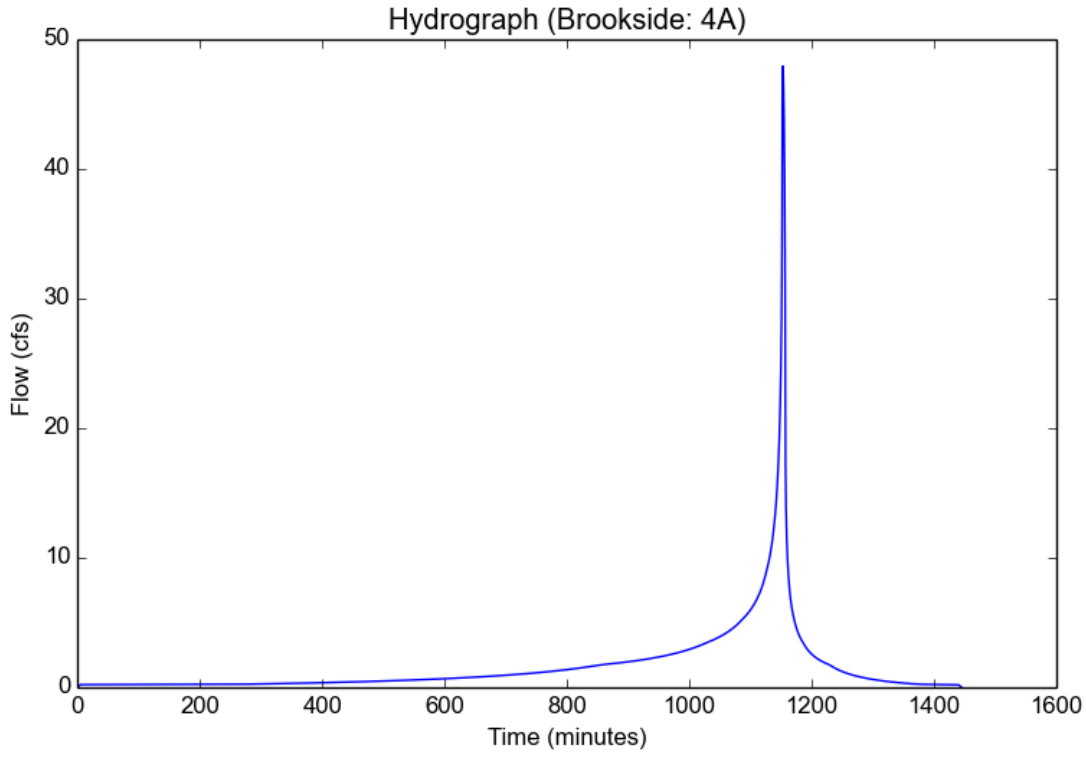
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/12-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	7.44
Flow Path Length (ft)	949.3
Flow Path Slope (vft/hft)	0.05794
85th Percentile Rainfall Depth (in)	12.0
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	12.0
Peak Intensity (in/hr)	7.1595
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	47.9402
Burned Peak Flow Rate (cfs)	47.9402
24-Hr Clear Runoff Volume (ac-ft)	3.3004
24-Hr Clear Runoff Volume (cu-ft)	143764.7427



Peak Flow Hydrologic Analysis

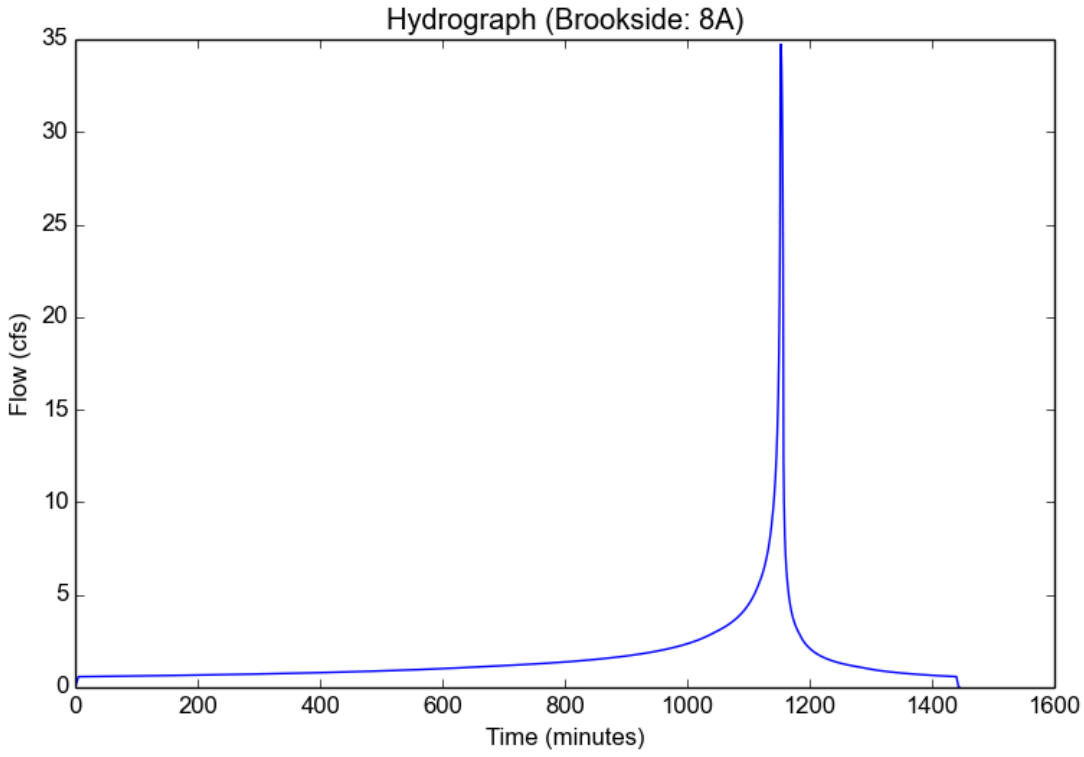
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/12-in Storm/Brookside - 8A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	8A
Area (ac)	5.39
Flow Path Length (ft)	1116.4
Flow Path Slope (vft/hft)	0.08151
85th Percentile Rainfall Depth (in)	12.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	12.0
Peak Intensity (in/hr)	7.1595
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	34.7309
Burned Peak Flow Rate (cfs)	34.7309
24-Hr Clear Runoff Volume (ac-ft)	3.2099
24-Hr Clear Runoff Volume (cu-ft)	139823.8433



Peak Flow Hydrologic Analysis

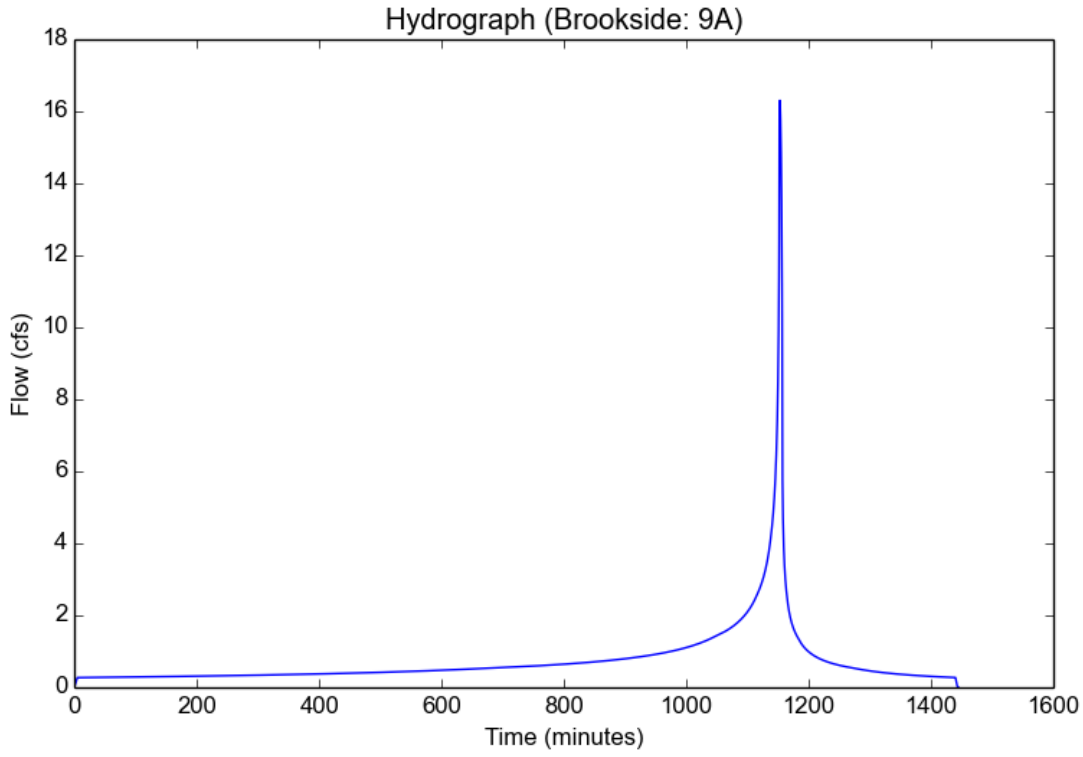
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/12-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	2.53
Flow Path Length (ft)	912.2
Flow Path Slope (vft/hft)	0.05591
85th Percentile Rainfall Depth (in)	12.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	12.0
Peak Intensity (in/hr)	7.1595
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	16.3022
Burned Peak Flow Rate (cfs)	16.3022
24-Hr Clear Runoff Volume (ac-ft)	1.5067
24-Hr Clear Runoff Volume (cu-ft)	65631.5999



Peak Flow Hydrologic Analysis

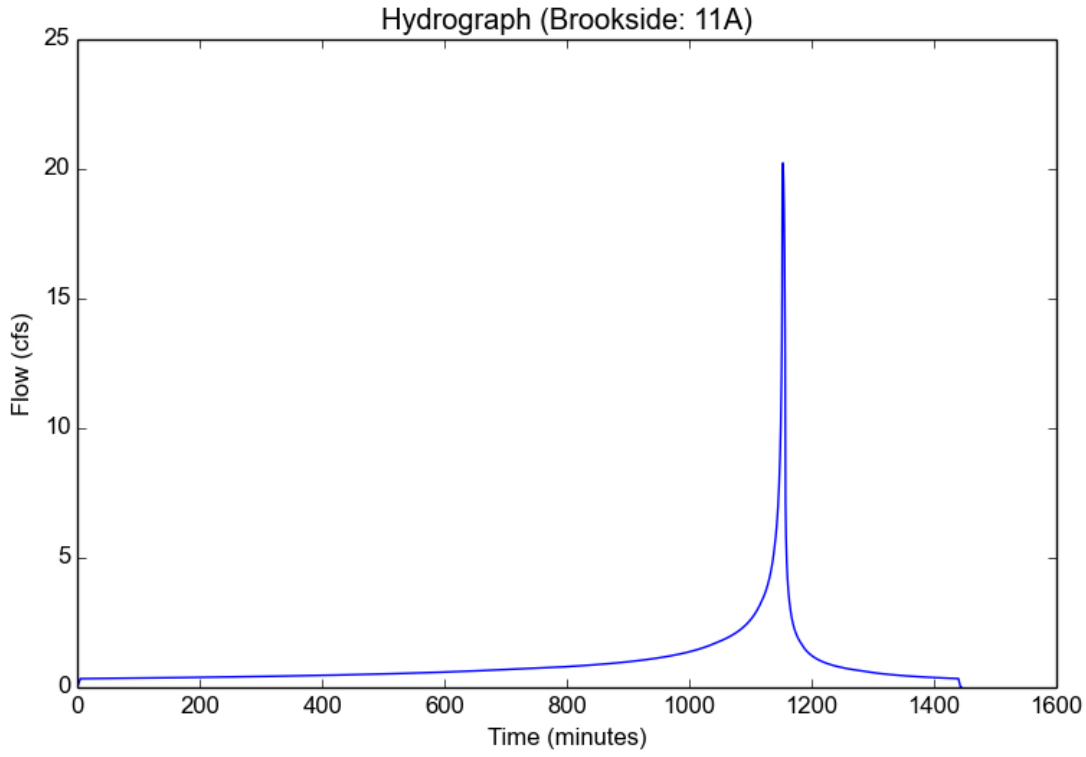
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/12-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	3.14
Flow Path Length (ft)	890.9
Flow Path Slope (vft/hft)	0.02469
85th Percentile Rainfall Depth (in)	12.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	12.0
Peak Intensity (in/hr)	7.1595
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	20.2328
Burned Peak Flow Rate (cfs)	20.2328
24-Hr Clear Runoff Volume (ac-ft)	1.87
24-Hr Clear Runoff Volume (cu-ft)	81455.8196



Peak Flow Hydrologic Analysis

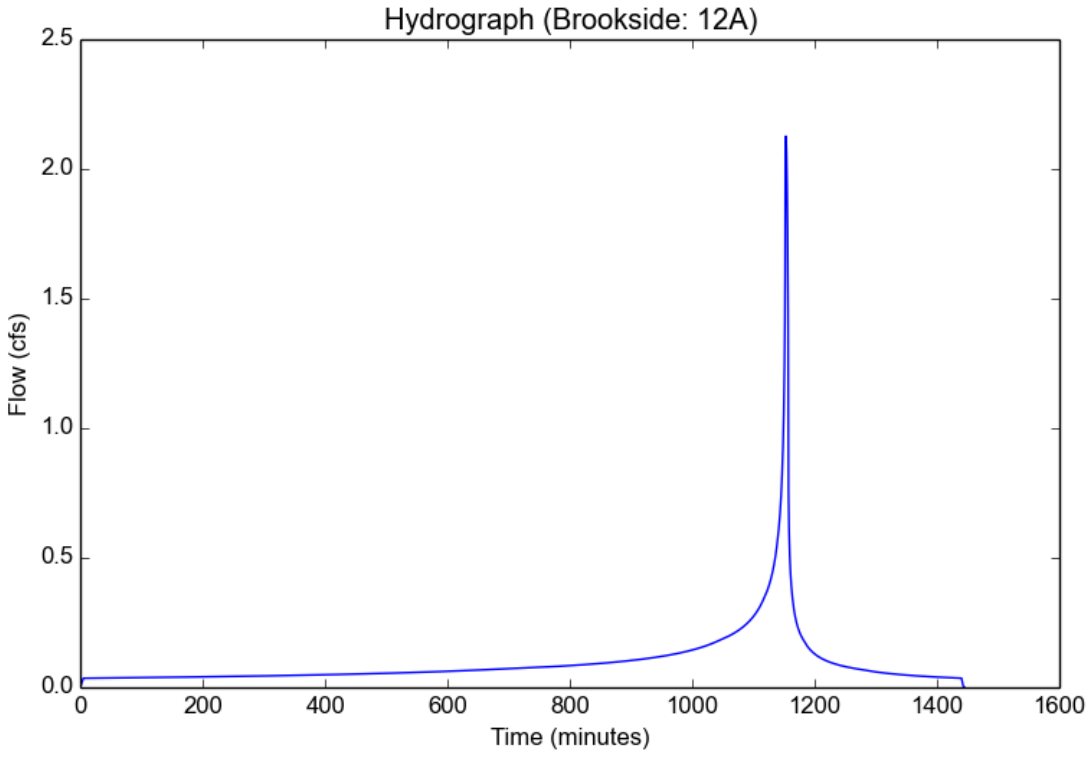
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/12-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.33
Flow Path Length (ft)	406.0
Flow Path Slope (vft/hft)	0.0197
85th Percentile Rainfall Depth (in)	12.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	12.0
Peak Intensity (in/hr)	7.1595
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	2.1264
Burned Peak Flow Rate (cfs)	2.1264
24-Hr Clear Runoff Volume (ac-ft)	0.1965
24-Hr Clear Runoff Volume (cu-ft)	8560.6435



Peak Flow Hydrologic Analysis

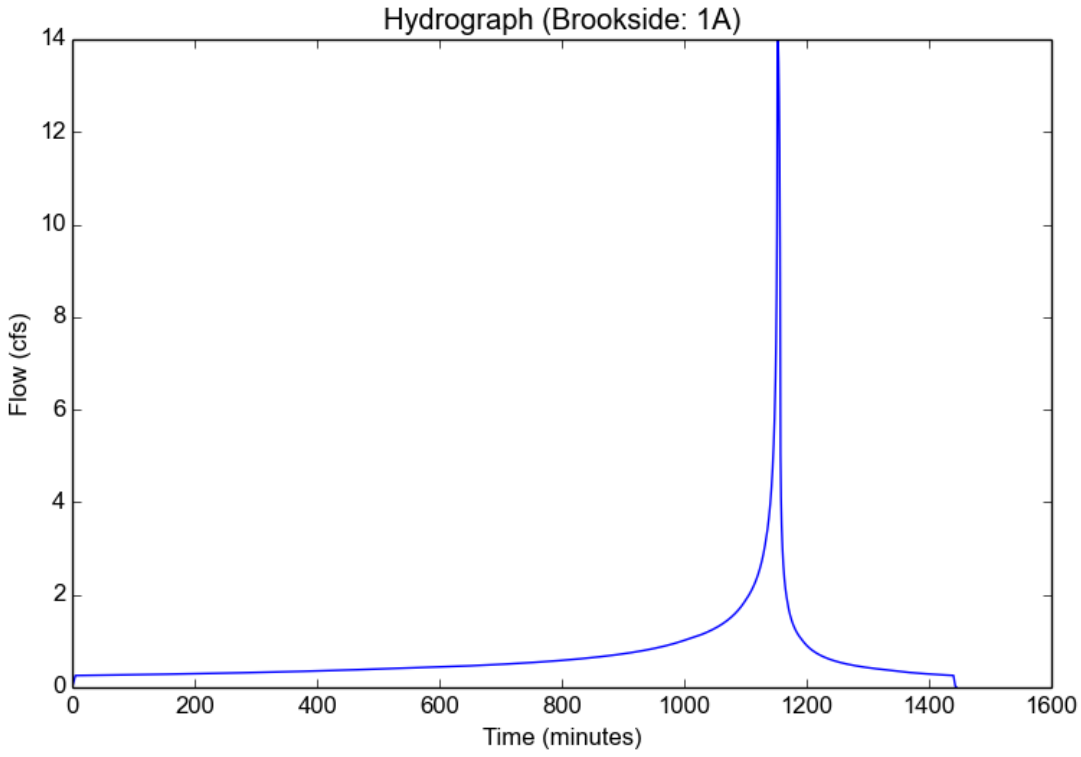
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/14-in Storm/Brookside - 1A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1A
Area (ac)	1.86
Flow Path Length (ft)	623.8
Flow Path Slope (vft/hft)	0.11061
85th Percentile Rainfall Depth (in)	14.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	14.0
Peak Intensity (in/hr)	8.3528
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	13.9826
Burned Peak Flow Rate (cfs)	13.9826
24-Hr Clear Runoff Volume (ac-ft)	1.3647
24-Hr Clear Runoff Volume (cu-ft)	59446.6319



Peak Flow Hydrologic Analysis

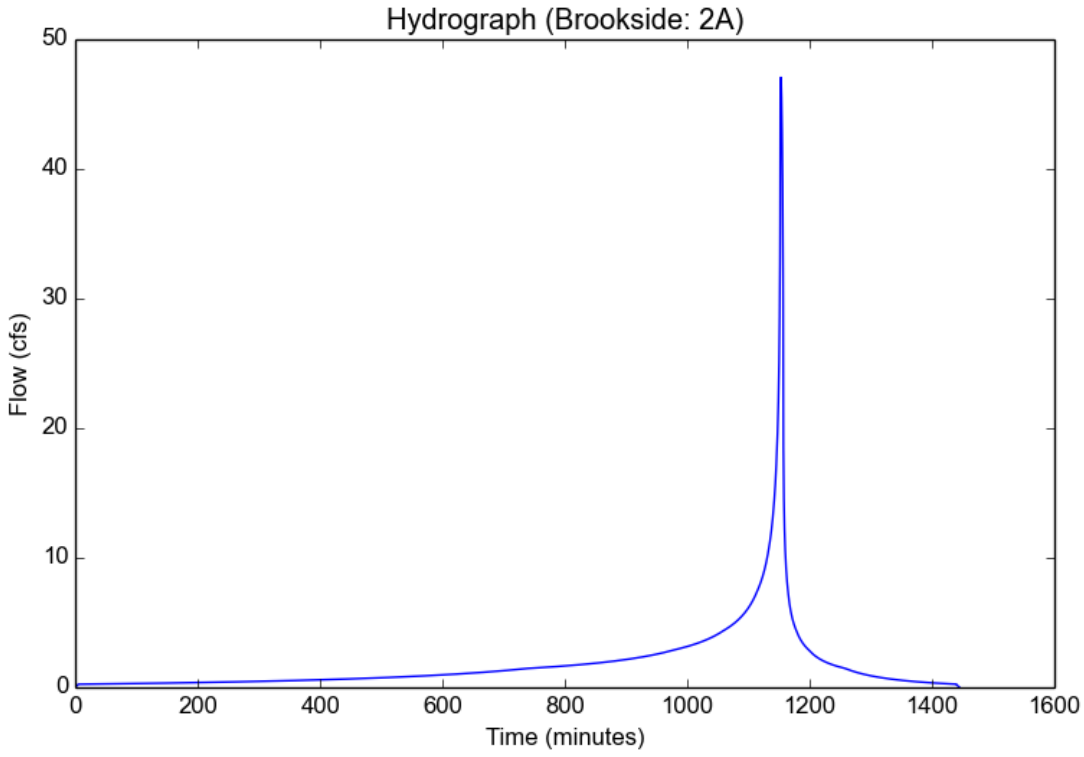
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/14-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	6.26
Flow Path Length (ft)	739.9
Flow Path Slope (vft/hft)	0.06623
85th Percentile Rainfall Depth (in)	14.0
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	14.0
Peak Intensity (in/hr)	8.3528
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	47.0596
Burned Peak Flow Rate (cfs)	47.0596
24-Hr Clear Runoff Volume (ac-ft)	3.7034
24-Hr Clear Runoff Volume (cu-ft)	161320.0309



Peak Flow Hydrologic Analysis

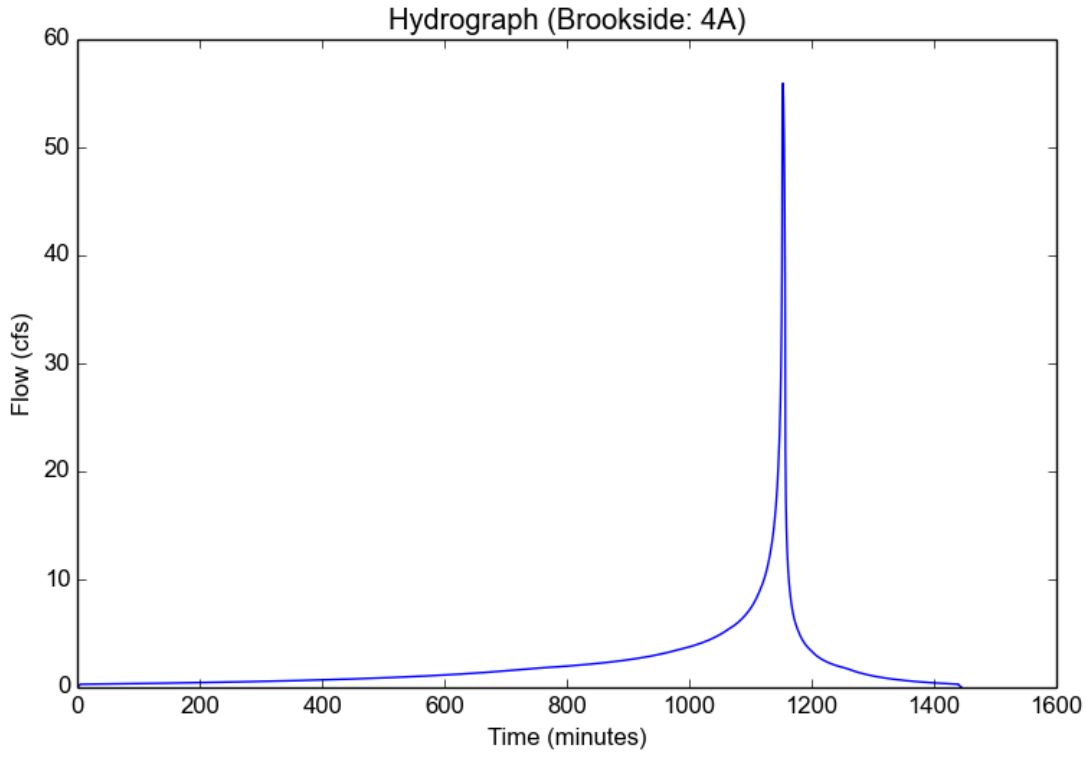
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/14-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	7.44
Flow Path Length (ft)	949.3
Flow Path Slope (vft/hft)	0.05794
85th Percentile Rainfall Depth (in)	14.0
Percent Impervious	0.01
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	14.0
Peak Intensity (in/hr)	8.3528
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	55.9302
Burned Peak Flow Rate (cfs)	55.9302
24-Hr Clear Runoff Volume (ac-ft)	4.4015
24-Hr Clear Runoff Volume (cu-ft)	191728.599



Peak Flow Hydrologic Analysis

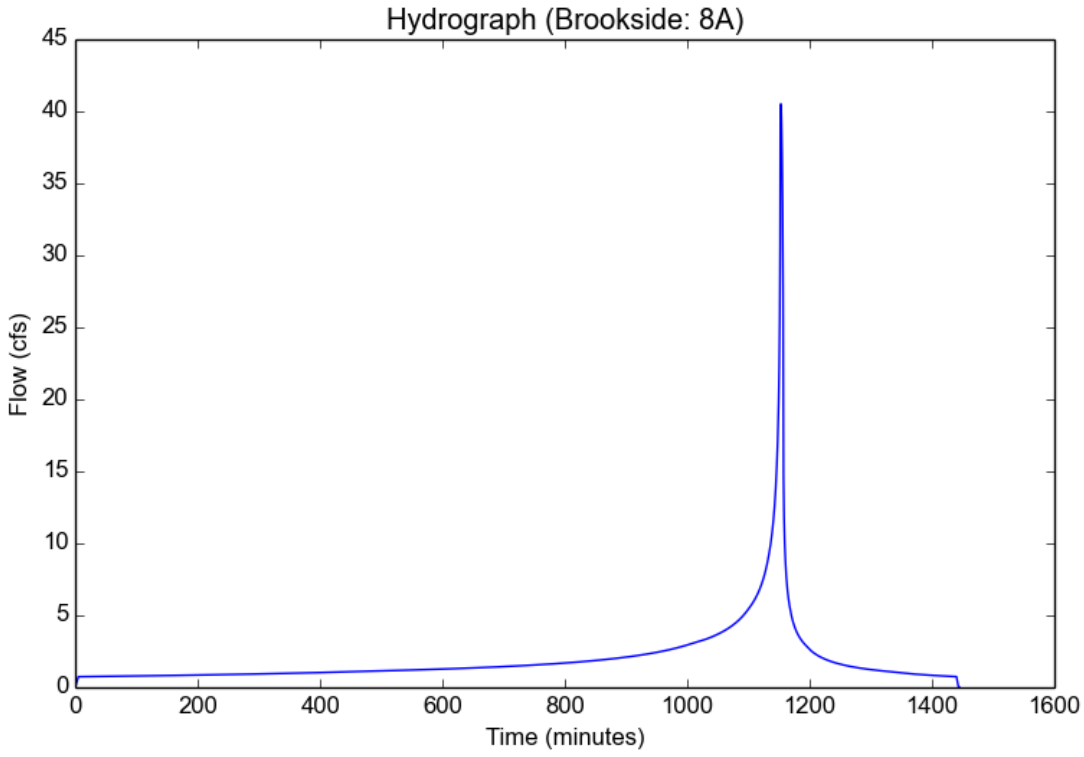
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/14-in Storm/Brookside - 8A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	8A
Area (ac)	5.39
Flow Path Length (ft)	1116.4
Flow Path Slope (vft/hft)	0.08151
85th Percentile Rainfall Depth (in)	14.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	14.0
Peak Intensity (in/hr)	8.3528
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	40.5194
Burned Peak Flow Rate (cfs)	40.5194
24-Hr Clear Runoff Volume (ac-ft)	3.9547
24-Hr Clear Runoff Volume (cu-ft)	172267.3902



Peak Flow Hydrologic Analysis

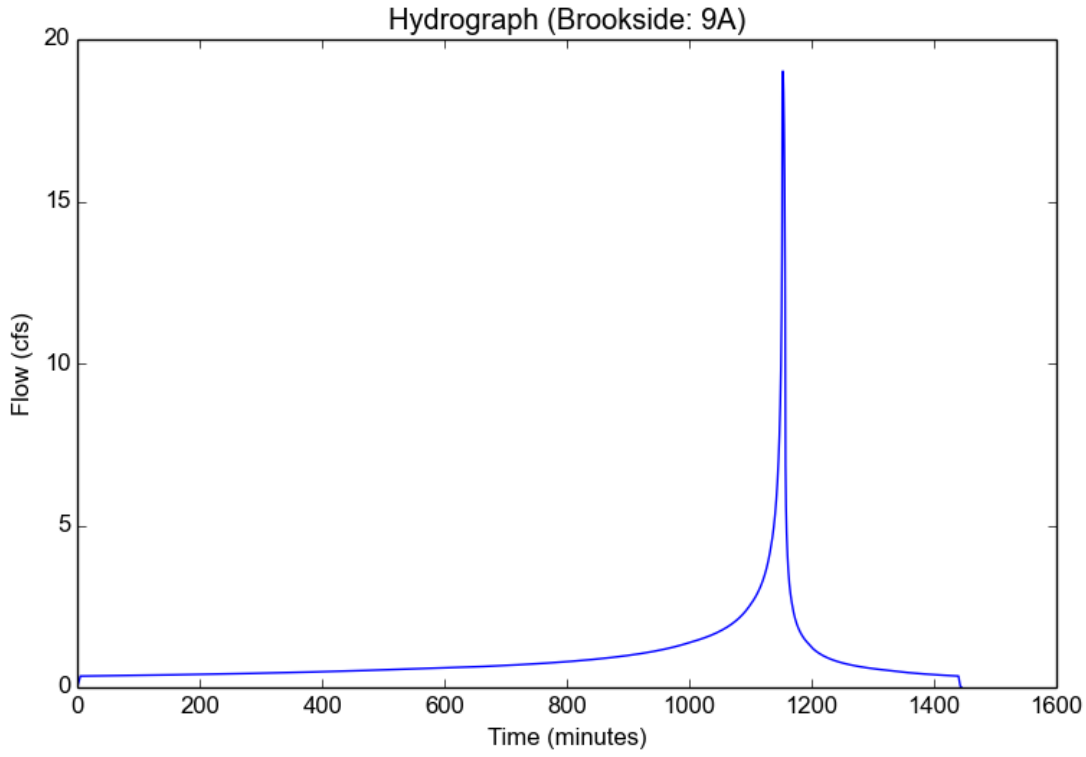
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/14-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	2.53
Flow Path Length (ft)	912.2
Flow Path Slope (vft/hft)	0.05591
85th Percentile Rainfall Depth (in)	14.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	14.0
Peak Intensity (in/hr)	8.3528
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	19.0193
Burned Peak Flow Rate (cfs)	19.0193
24-Hr Clear Runoff Volume (ac-ft)	1.8563
24-Hr Clear Runoff Volume (cu-ft)	80860.2036



Peak Flow Hydrologic Analysis

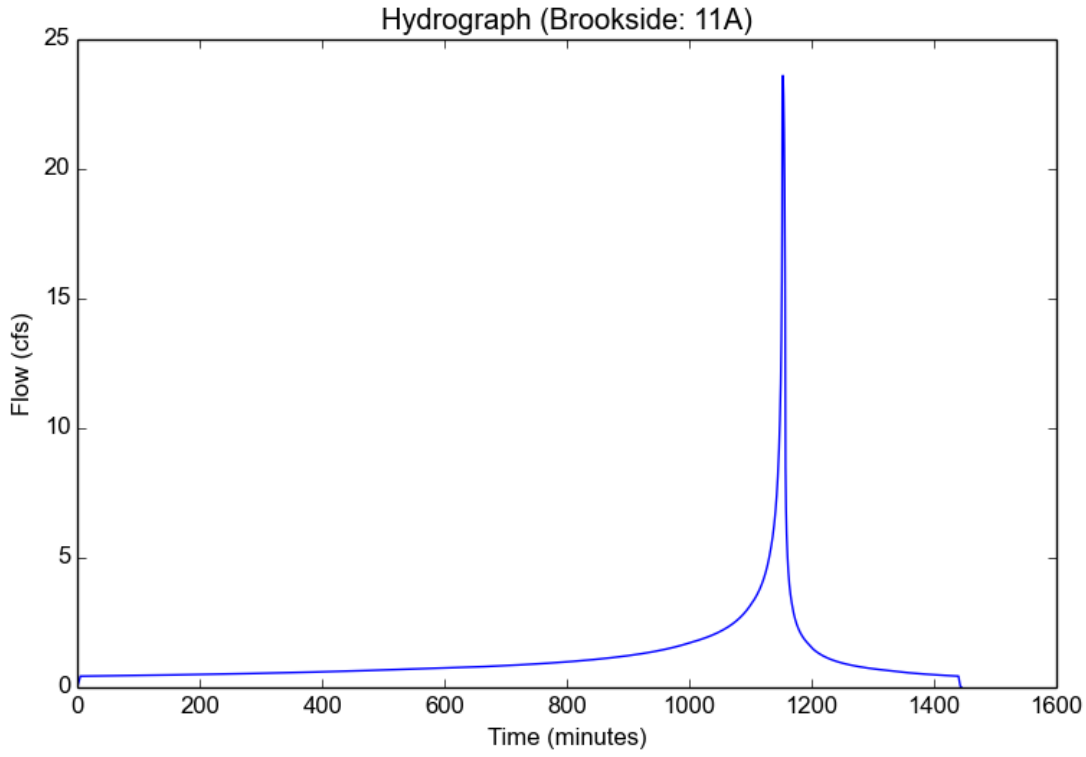
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/14-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	3.14
Flow Path Length (ft)	890.9
Flow Path Slope (vft/hft)	0.02469
85th Percentile Rainfall Depth (in)	14.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	14.0
Peak Intensity (in/hr)	8.3528
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	23.605
Burned Peak Flow Rate (cfs)	23.605
24-Hr Clear Runoff Volume (ac-ft)	2.3039
24-Hr Clear Runoff Volume (cu-ft)	100356.142



Peak Flow Hydrologic Analysis

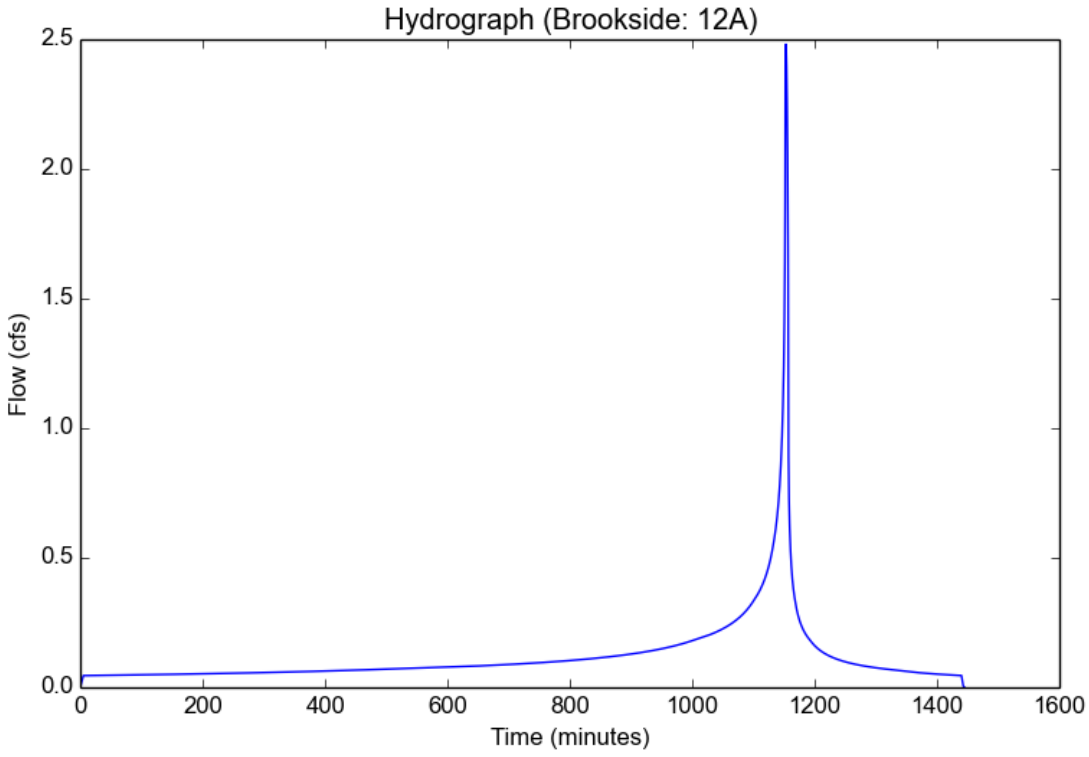
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/EX/14-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.33
Flow Path Length (ft)	406.0
Flow Path Slope (vft/hft)	0.0197
85th Percentile Rainfall Depth (in)	14.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	14.0
Peak Intensity (in/hr)	8.3528
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	2.4808
Burned Peak Flow Rate (cfs)	2.4808
24-Hr Clear Runoff Volume (ac-ft)	0.2421
24-Hr Clear Runoff Volume (cu-ft)	10546.9831



Peak Flow Hydrologic Analysis

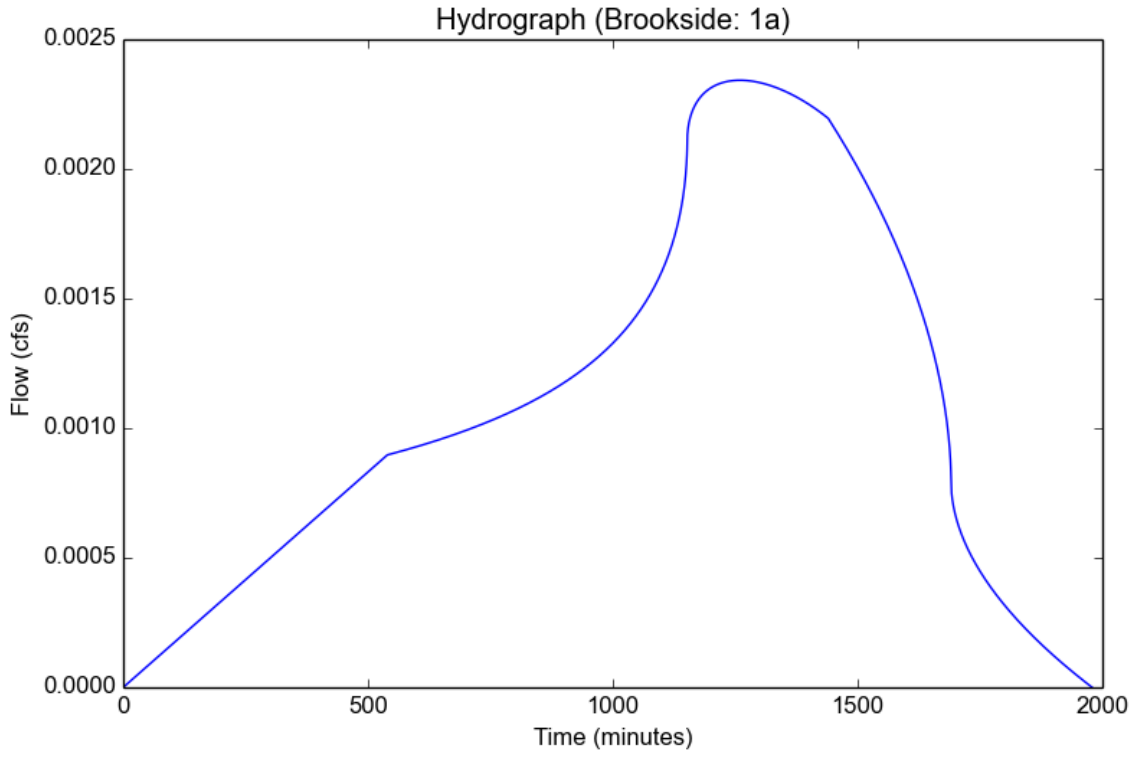
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.1-in Storm/Brookside - 1a.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1a
Area (ac)	3.28
Flow Path Length (ft)	866.7
Flow Path Slope (vft/hft)	0.04038
85th Percentile Rainfall Depth (in)	0.1
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.1
Peak Intensity (in/hr)	0.0066
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	539.0
Clear Peak Flow Rate (cfs)	0.0023
Burned Peak Flow Rate (cfs)	0.0023
24-Hr Clear Runoff Volume (ac-ft)	0.0029
24-Hr Clear Runoff Volume (cu-ft)	128.2369



Peak Flow Hydrologic Analysis

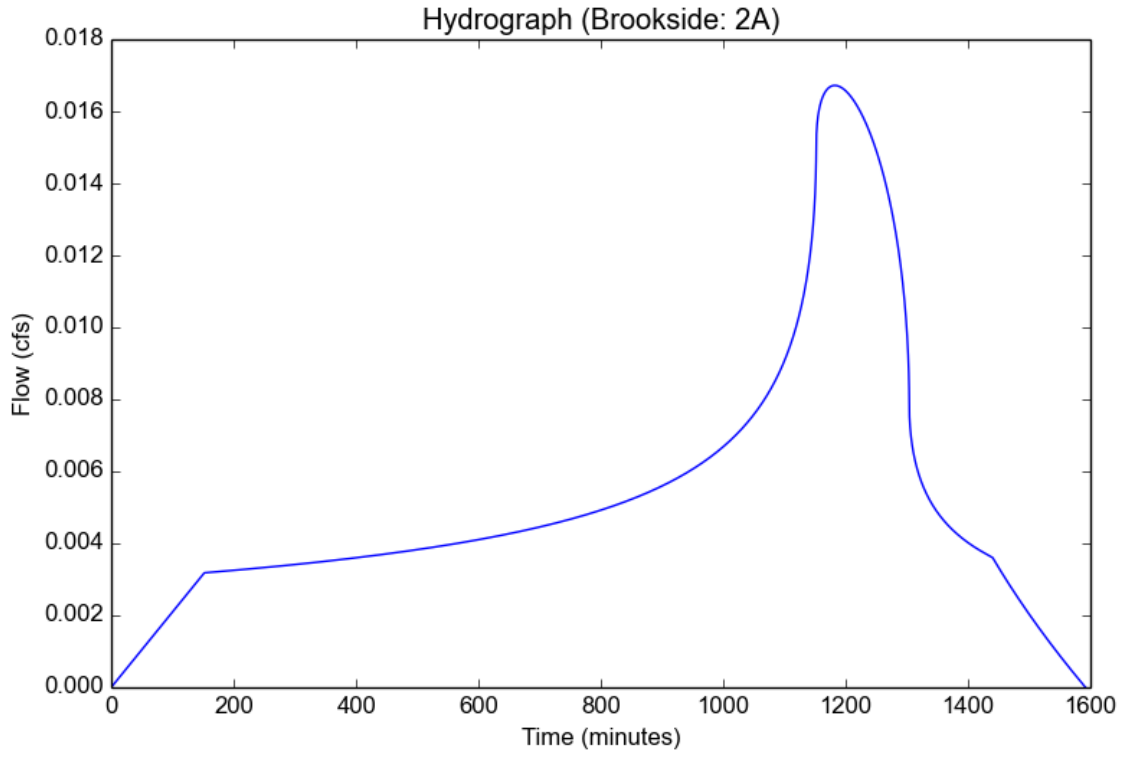
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.1-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	2.75
Flow Path Length (ft)	652.4
Flow Path Slope (vft/hft)	0.04599
85th Percentile Rainfall Depth (in)	0.1
Percent Impervious	0.509
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.1
Peak Intensity (in/hr)	0.012
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.5072
Time of Concentration (min)	152.0
Clear Peak Flow Rate (cfs)	0.0167
Burned Peak Flow Rate (cfs)	0.0167
24-Hr Clear Runoff Volume (ac-ft)	0.0115
24-Hr Clear Runoff Volume (cu-ft)	502.2888



Peak Flow Hydrologic Analysis

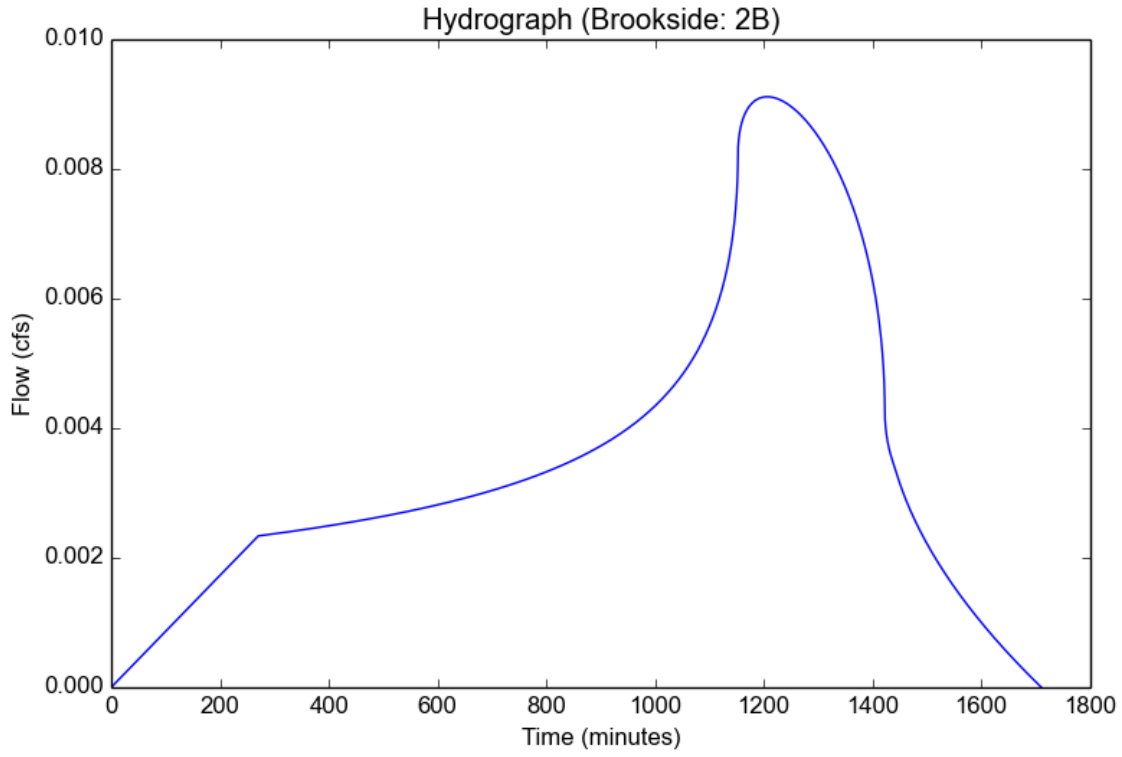
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.1-in Storm/Brookside - 2B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2B
Area (ac)	3.32
Flow Path Length (ft)	861.6
Flow Path Slope (vft/hft)	0.03714
85th Percentile Rainfall Depth (in)	0.1
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.1
Peak Intensity (in/hr)	0.0092
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	270.0
Clear Peak Flow Rate (cfs)	0.0091
Burned Peak Flow Rate (cfs)	0.0091
24-Hr Clear Runoff Volume (ac-ft)	0.0082
24-Hr Clear Runoff Volume (cu-ft)	358.9554



Peak Flow Hydrologic Analysis

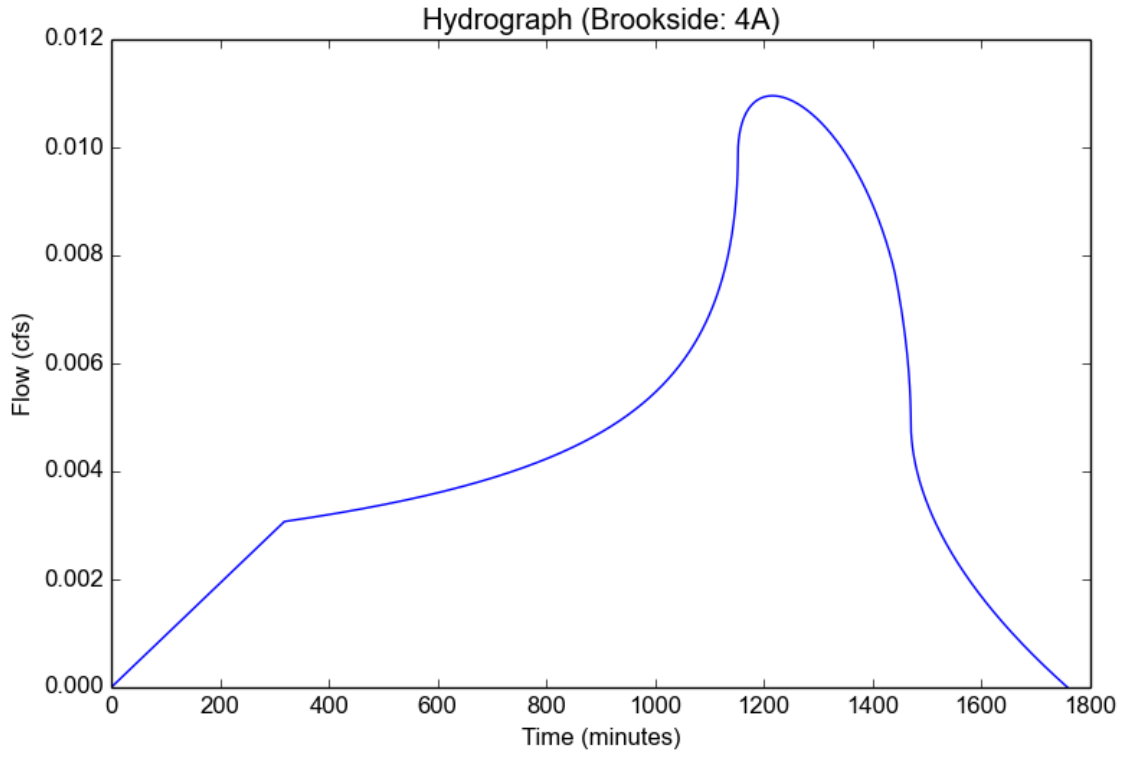
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.1-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	4.31
Flow Path Length (ft)	796.6
Flow Path Slope (vft/hft)	0.0113
85th Percentile Rainfall Depth (in)	0.1
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.1
Peak Intensity (in/hr)	0.0085
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	318.0
Clear Peak Flow Rate (cfs)	0.011
Burned Peak Flow Rate (cfs)	0.011
24-Hr Clear Runoff Volume (ac-ft)	0.0107
24-Hr Clear Runoff Volume (cu-ft)	466.2197



Peak Flow Hydrologic Analysis

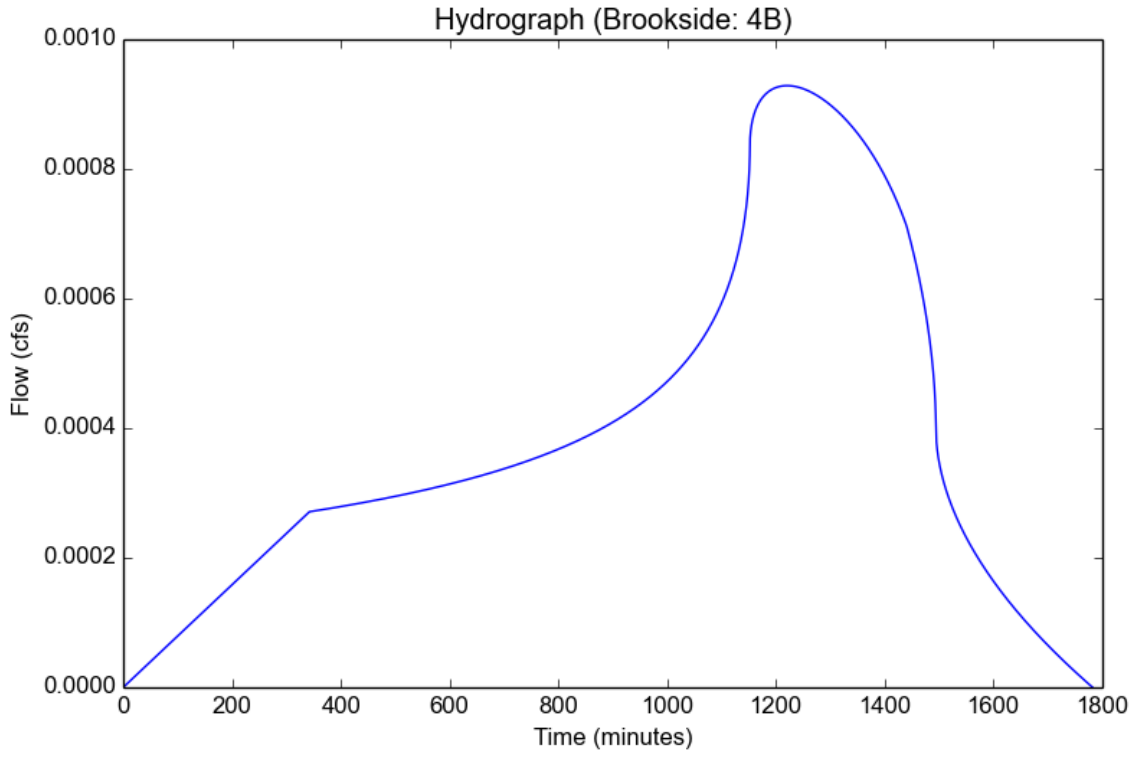
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.1-in Storm/Brookside - 4B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4B
Area (ac)	1.05
Flow Path Length (ft)	377.9
Flow Path Slope (vft/hft)	0.02646
85th Percentile Rainfall Depth (in)	0.1
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.1
Peak Intensity (in/hr)	0.0082
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	342.0
Clear Peak Flow Rate (cfs)	0.0009
Burned Peak Flow Rate (cfs)	0.0009
24-Hr Clear Runoff Volume (ac-ft)	0.0009
24-Hr Clear Runoff Volume (cu-ft)	40.9005



Peak Flow Hydrologic Analysis

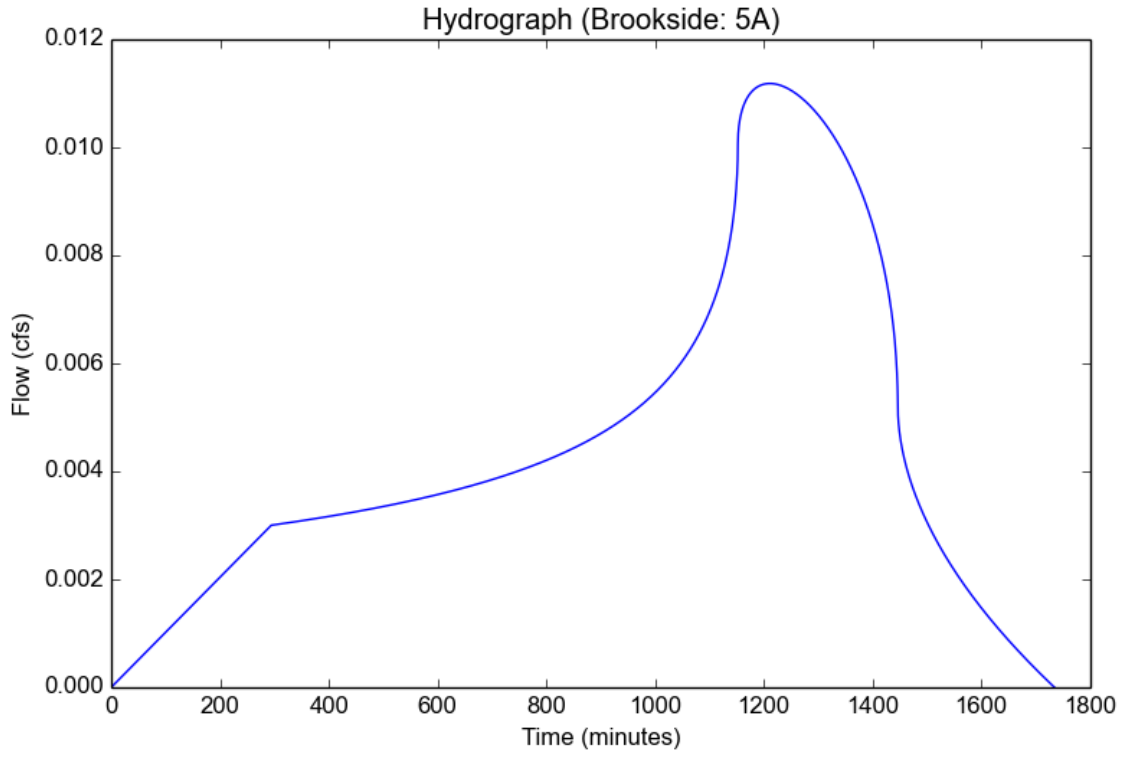
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.1-in Storm/Brookside - 5A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5A
Area (ac)	4.24
Flow Path Length (ft)	954.1
Flow Path Slope (vft/hft)	0.03354
85th Percentile Rainfall Depth (in)	0.1
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.1
Peak Intensity (in/hr)	0.0088
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	294.0
Clear Peak Flow Rate (cfs)	0.0112
Burned Peak Flow Rate (cfs)	0.0112
24-Hr Clear Runoff Volume (ac-ft)	0.0105
24-Hr Clear Runoff Volume (cu-ft)	458.5301



Peak Flow Hydrologic Analysis

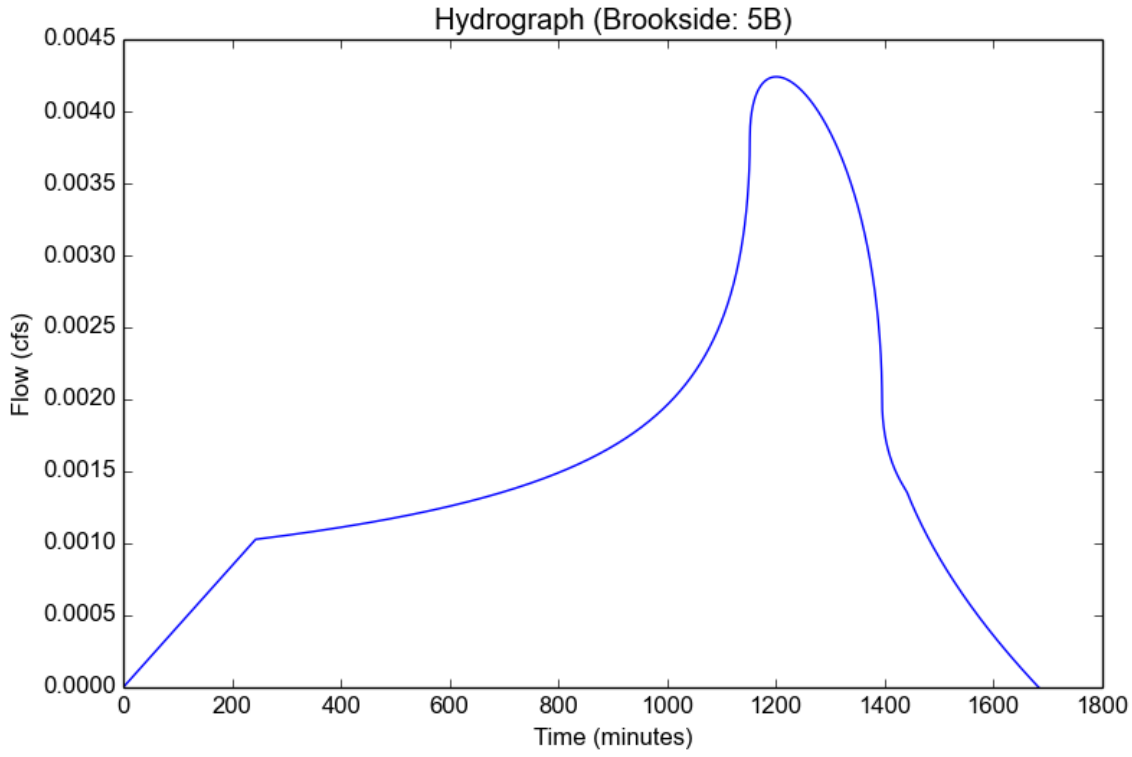
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.1-in Storm/Brookside - 5B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5B
Area (ac)	1.47
Flow Path Length (ft)	542.7
Flow Path Slope (vft/hft)	0.0129
85th Percentile Rainfall Depth (in)	0.1
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.1
Peak Intensity (in/hr)	0.0096
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	243.0
Clear Peak Flow Rate (cfs)	0.0042
Burned Peak Flow Rate (cfs)	0.0042
24-Hr Clear Runoff Volume (ac-ft)	0.0036
24-Hr Clear Runoff Volume (cu-ft)	158.8989



Peak Flow Hydrologic Analysis

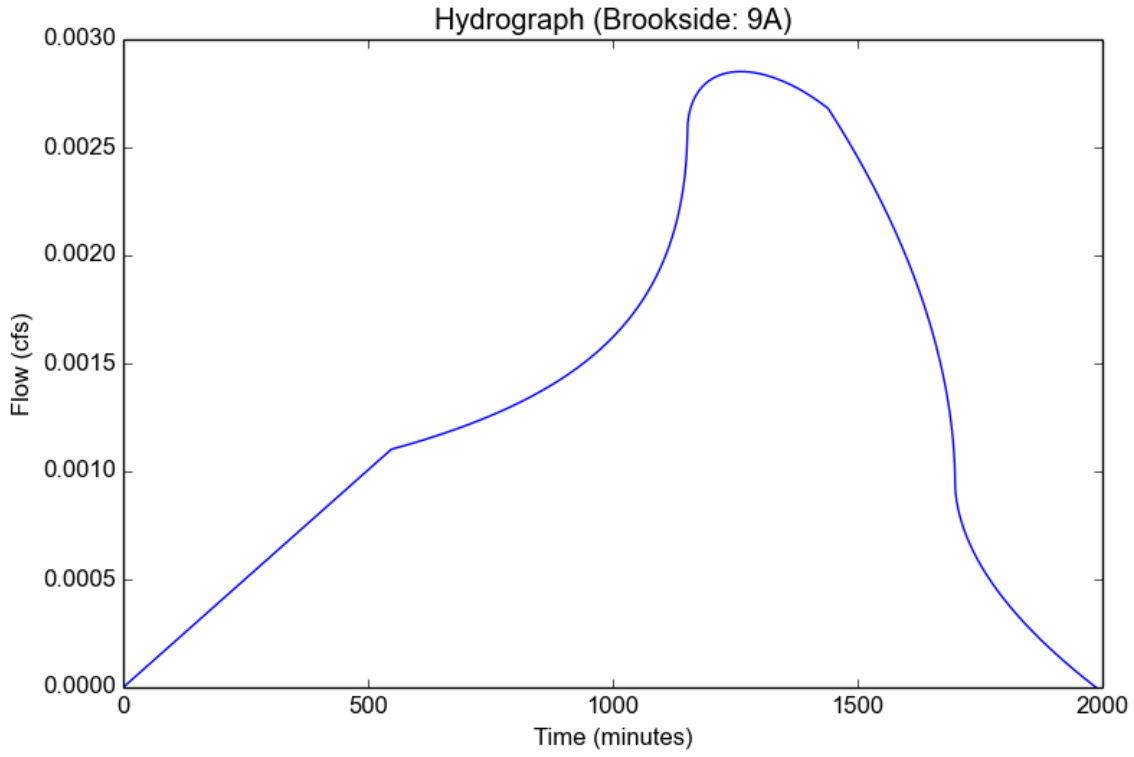
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.1-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	4.02
Flow Path Length (ft)	958.0
Flow Path Slope (vft/hft)	0.05323
85th Percentile Rainfall Depth (in)	0.1
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.1
Peak Intensity (in/hr)	0.0066
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	547.0
Clear Peak Flow Rate (cfs)	0.0029
Burned Peak Flow Rate (cfs)	0.0029
24-Hr Clear Runoff Volume (ac-ft)	0.0036
24-Hr Clear Runoff Volume (cu-ft)	157.2017



Peak Flow Hydrologic Analysis

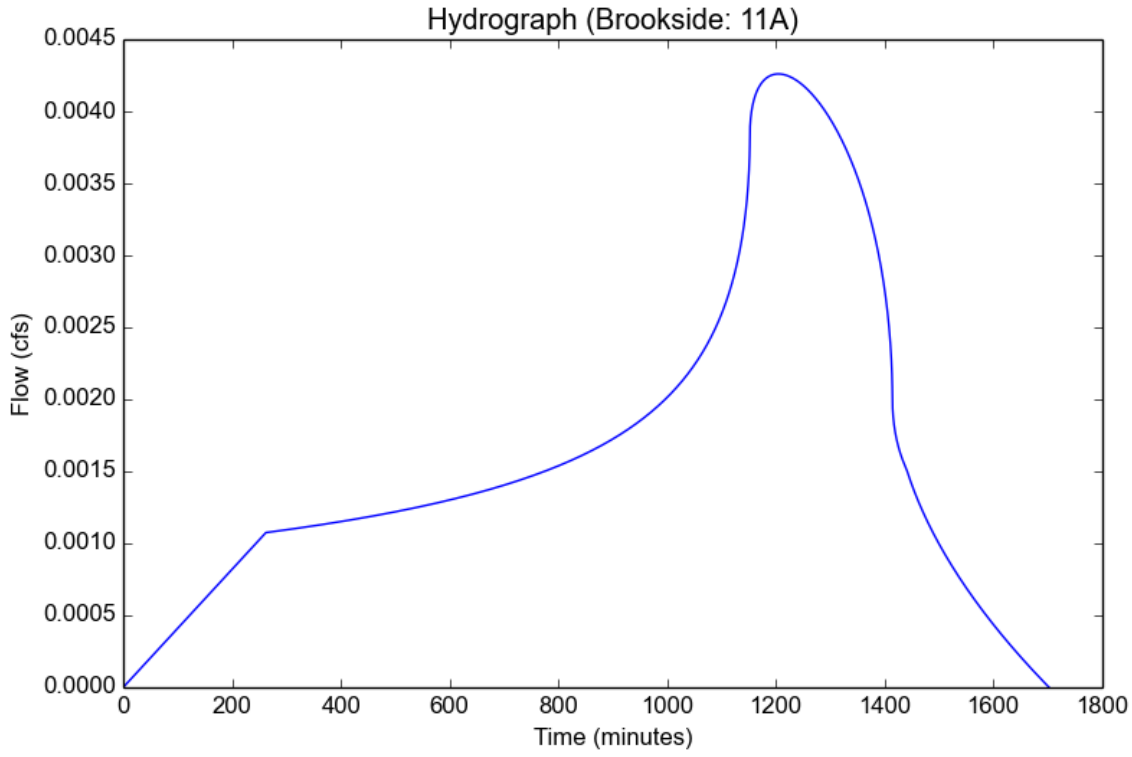
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.1-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	1.53
Flow Path Length (ft)	494.1
Flow Path Slope (vft/hft)	0.00607
85th Percentile Rainfall Depth (in)	0.1
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.1
Peak Intensity (in/hr)	0.0093
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	262.0
Clear Peak Flow Rate (cfs)	0.0043
Burned Peak Flow Rate (cfs)	0.0043
24-Hr Clear Runoff Volume (ac-ft)	0.0038
24-Hr Clear Runoff Volume (cu-ft)	165.4105



Peak Flow Hydrologic Analysis

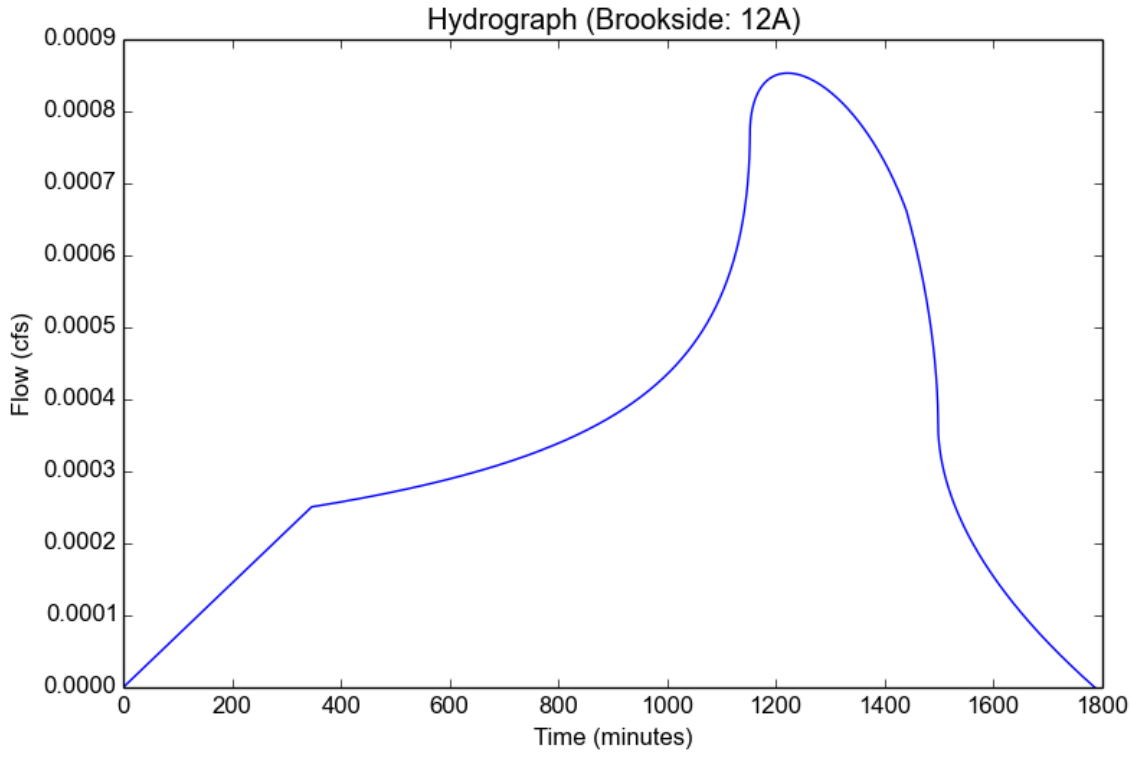
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.1-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.97
Flow Path Length (ft)	512.5
Flow Path Slope (vft/hft)	0.07414
85th Percentile Rainfall Depth (in)	0.1
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.1
Peak Intensity (in/hr)	0.0081
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	346.0
Clear Peak Flow Rate (cfs)	0.0009
Burned Peak Flow Rate (cfs)	0.0009
24-Hr Clear Runoff Volume (ac-ft)	0.0009
24-Hr Clear Runoff Volume (cu-ft)	37.7862



Peak Flow Hydrologic Analysis

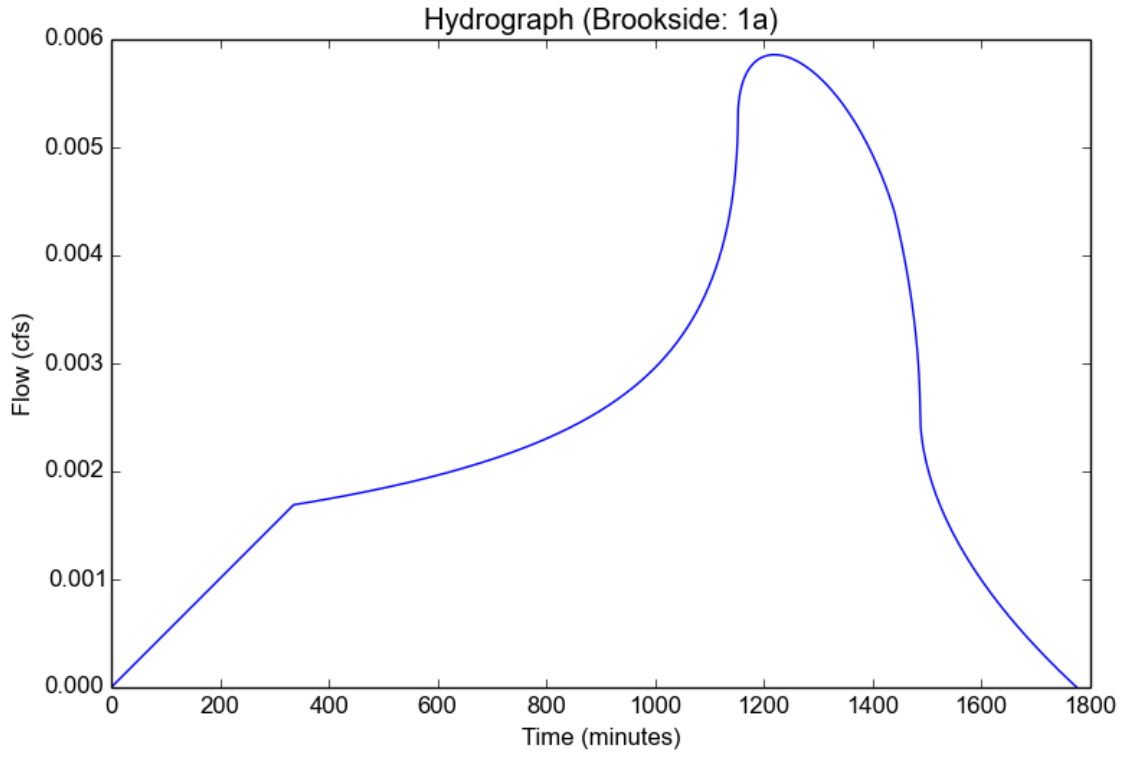
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.2-in Storm/Brookside - 1a.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1a
Area (ac)	3.28
Flow Path Length (ft)	866.7
Flow Path Slope (vft/hft)	0.04038
85th Percentile Rainfall Depth (in)	0.2
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.2
Peak Intensity (in/hr)	0.0165
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	335.0
Clear Peak Flow Rate (cfs)	0.0059
Burned Peak Flow Rate (cfs)	0.0059
24-Hr Clear Runoff Volume (ac-ft)	0.0059
24-Hr Clear Runoff Volume (cu-ft)	255.5089



Peak Flow Hydrologic Analysis

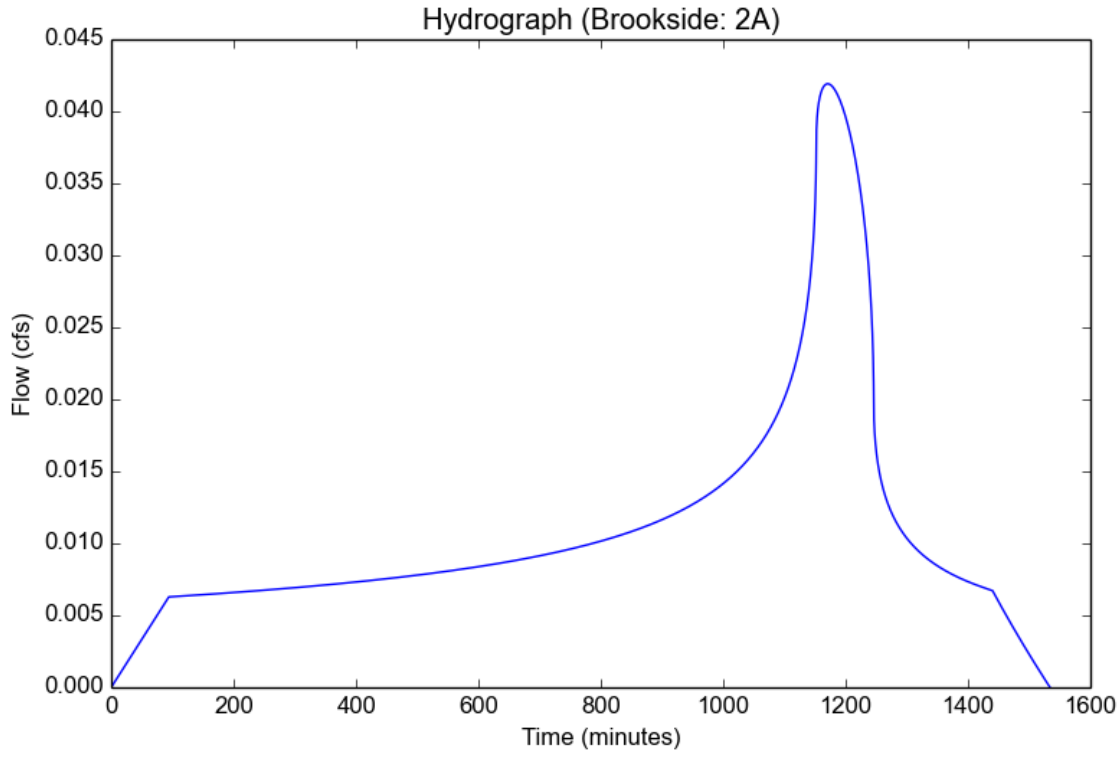
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.2-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	2.75
Flow Path Length (ft)	652.4
Flow Path Slope (vft/hft)	0.04599
85th Percentile Rainfall Depth (in)	0.2
Percent Impervious	0.509
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.2
Peak Intensity (in/hr)	0.0301
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.5072
Time of Concentration (min)	94.0
Clear Peak Flow Rate (cfs)	0.0419
Burned Peak Flow Rate (cfs)	0.0419
24-Hr Clear Runoff Volume (ac-ft)	0.0231
24-Hr Clear Runoff Volume (cu-ft)	1004.3741



Peak Flow Hydrologic Analysis

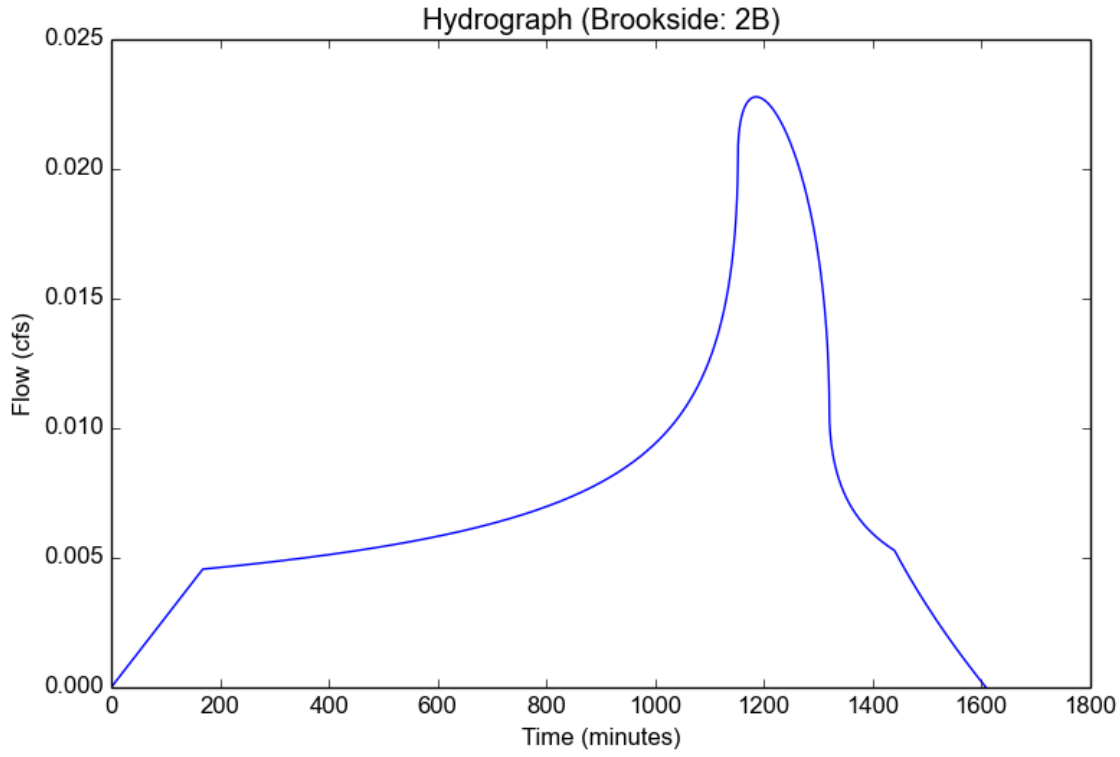
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.2-in Storm/Brookside - 2B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2B
Area (ac)	3.32
Flow Path Length (ft)	861.6
Flow Path Slope (vft/hft)	0.03714
85th Percentile Rainfall Depth (in)	0.2
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.2
Peak Intensity (in/hr)	0.0229
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	168.0
Clear Peak Flow Rate (cfs)	0.0228
Burned Peak Flow Rate (cfs)	0.0228
24-Hr Clear Runoff Volume (ac-ft)	0.0165
24-Hr Clear Runoff Volume (cu-ft)	717.4037



Peak Flow Hydrologic Analysis

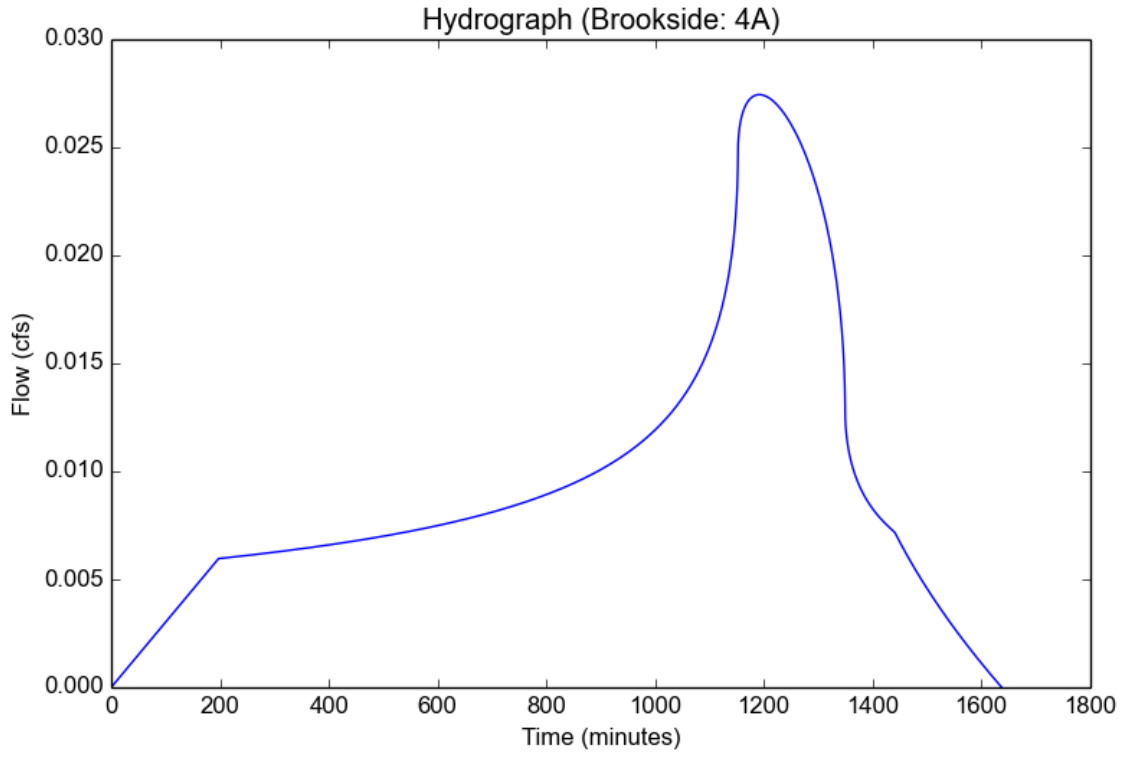
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.2-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	4.31
Flow Path Length (ft)	796.6
Flow Path Slope (vft/hft)	0.0113
85th Percentile Rainfall Depth (in)	0.2
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.2
Peak Intensity (in/hr)	0.0212
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	197.0
Clear Peak Flow Rate (cfs)	0.0274
Burned Peak Flow Rate (cfs)	0.0274
24-Hr Clear Runoff Volume (ac-ft)	0.0214
24-Hr Clear Runoff Volume (cu-ft)	931.4772



Peak Flow Hydrologic Analysis

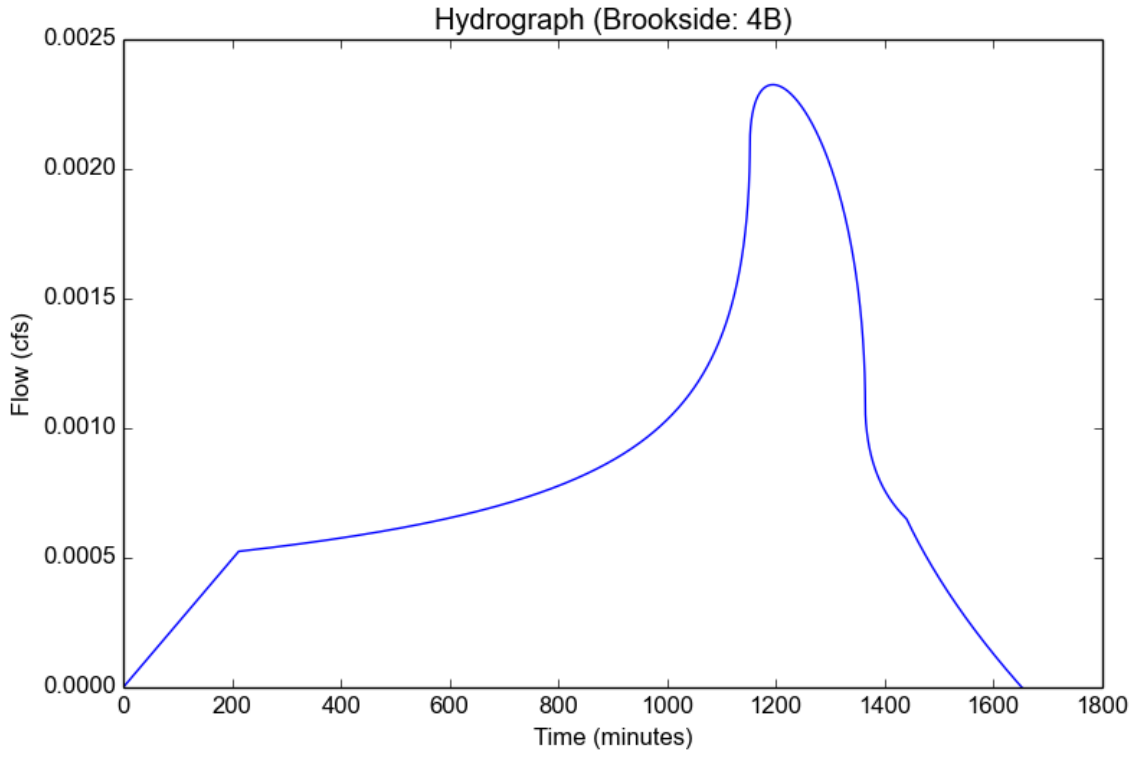
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.2-in Storm/Brookside - 4B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4B
Area (ac)	1.05
Flow Path Length (ft)	377.9
Flow Path Slope (vft/hft)	0.02646
85th Percentile Rainfall Depth (in)	0.2
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.2
Peak Intensity (in/hr)	0.0205
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	212.0
Clear Peak Flow Rate (cfs)	0.0023
Burned Peak Flow Rate (cfs)	0.0023
24-Hr Clear Runoff Volume (ac-ft)	0.0019
24-Hr Clear Runoff Volume (cu-ft)	81.7011



Peak Flow Hydrologic Analysis

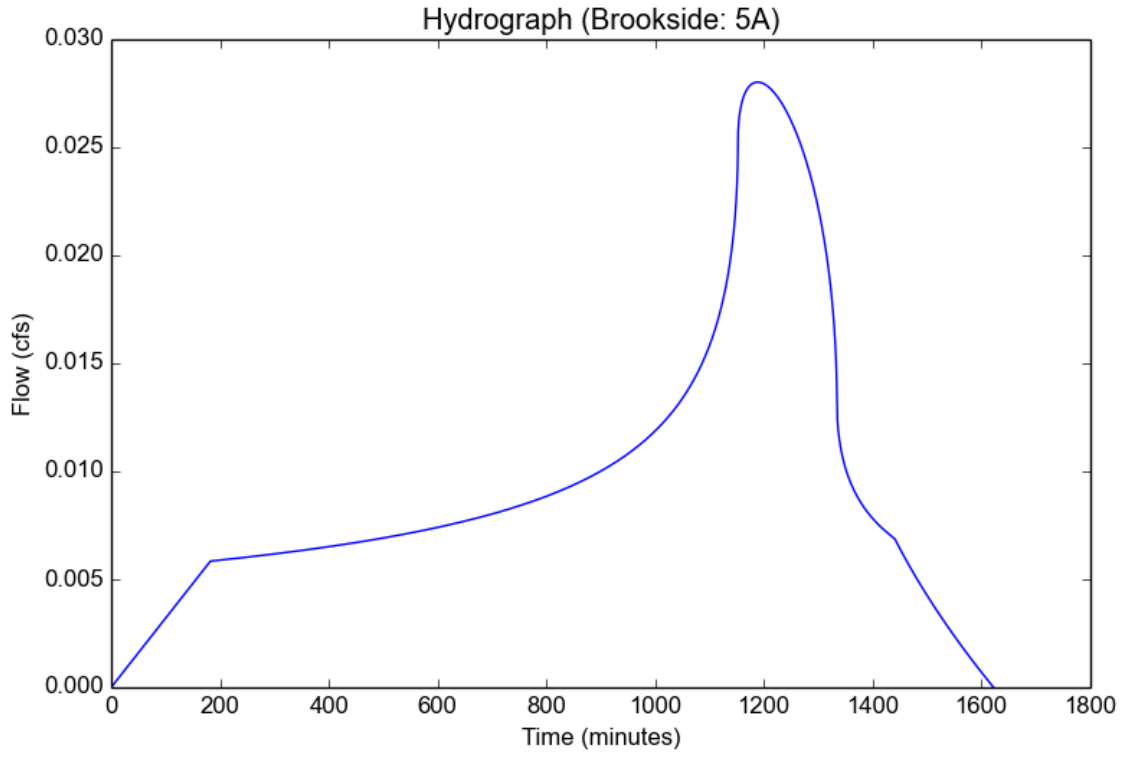
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.2-in Storm/Brookside - 5A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5A
Area (ac)	4.24
Flow Path Length (ft)	954.1
Flow Path Slope (vft/hft)	0.03354
85th Percentile Rainfall Depth (in)	0.2
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.2
Peak Intensity (in/hr)	0.022
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	182.0
Clear Peak Flow Rate (cfs)	0.028
Burned Peak Flow Rate (cfs)	0.028
24-Hr Clear Runoff Volume (ac-ft)	0.021
24-Hr Clear Runoff Volume (cu-ft)	916.2696



Peak Flow Hydrologic Analysis

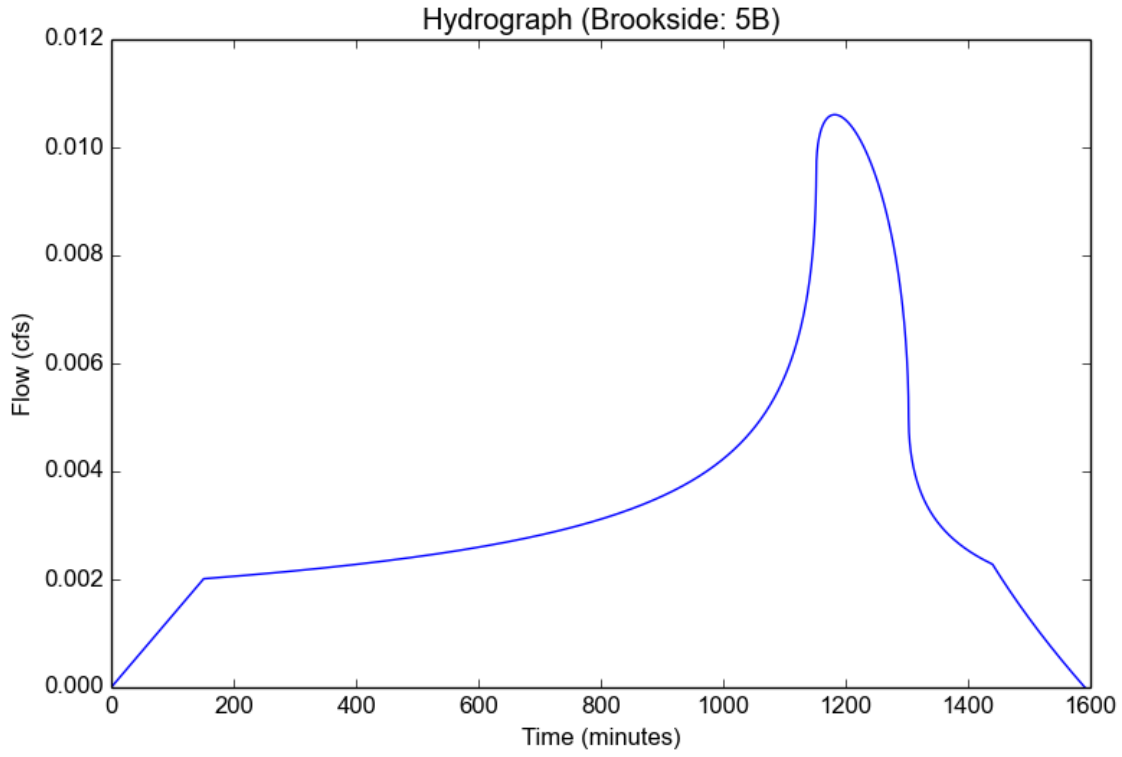
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.2-in Storm/Brookside - 5B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5B
Area (ac)	1.47
Flow Path Length (ft)	542.7
Flow Path Slope (vft/hft)	0.0129
85th Percentile Rainfall Depth (in)	0.2
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.2
Peak Intensity (in/hr)	0.0241
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	151.0
Clear Peak Flow Rate (cfs)	0.0106
Burned Peak Flow Rate (cfs)	0.0106
24-Hr Clear Runoff Volume (ac-ft)	0.0073
24-Hr Clear Runoff Volume (cu-ft)	317.6203



Peak Flow Hydrologic Analysis

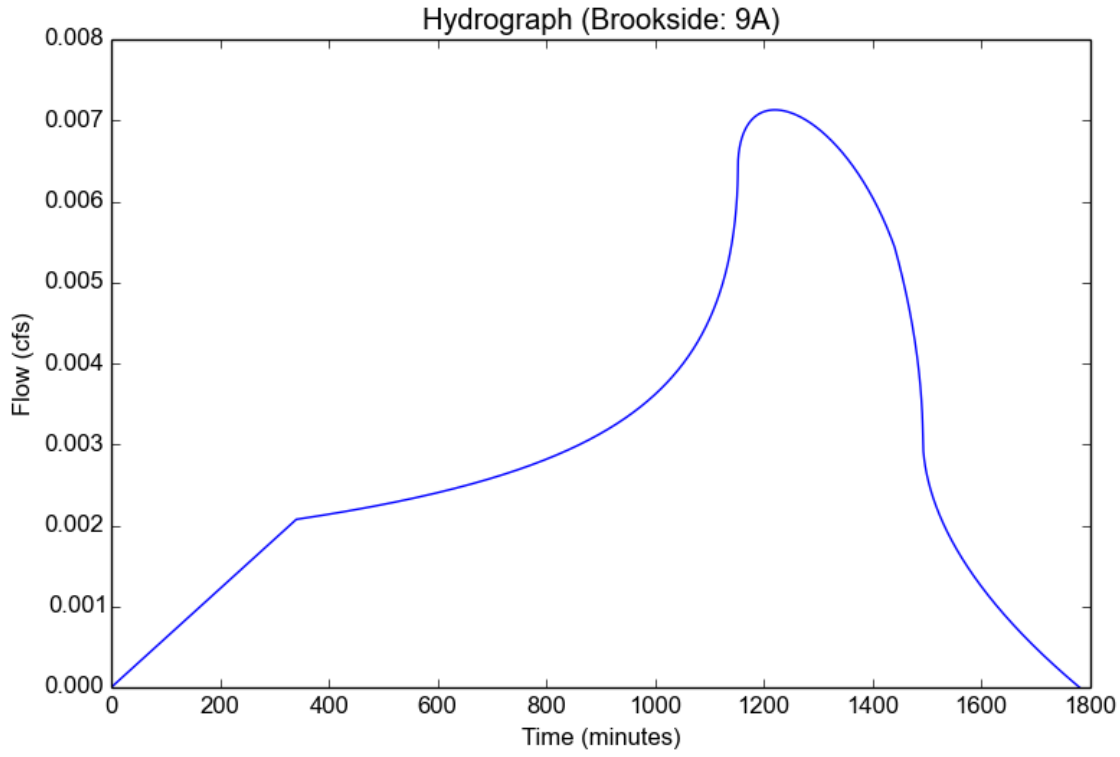
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.2-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	4.02
Flow Path Length (ft)	958.0
Flow Path Slope (vft/hft)	0.05323
85th Percentile Rainfall Depth (in)	0.2
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.2
Peak Intensity (in/hr)	0.0164
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	340.0
Clear Peak Flow Rate (cfs)	0.0071
Burned Peak Flow Rate (cfs)	0.0071
24-Hr Clear Runoff Volume (ac-ft)	0.0072
24-Hr Clear Runoff Volume (cu-ft)	313.1733



Peak Flow Hydrologic Analysis

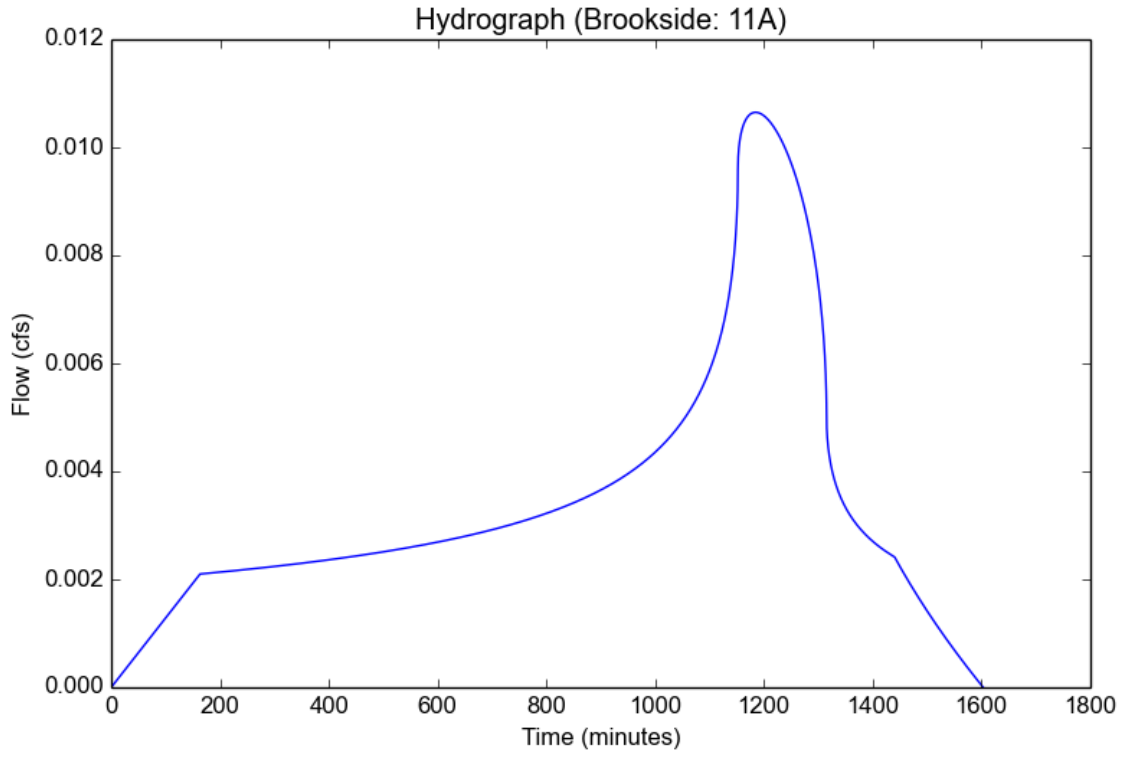
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.2-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	1.53
Flow Path Length (ft)	494.1
Flow Path Slope (vft/hft)	0.00607
85th Percentile Rainfall Depth (in)	0.2
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.2
Peak Intensity (in/hr)	0.0232
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	163.0
Clear Peak Flow Rate (cfs)	0.0106
Burned Peak Flow Rate (cfs)	0.0106
24-Hr Clear Runoff Volume (ac-ft)	0.0076
24-Hr Clear Runoff Volume (cu-ft)	330.6026



Peak Flow Hydrologic Analysis

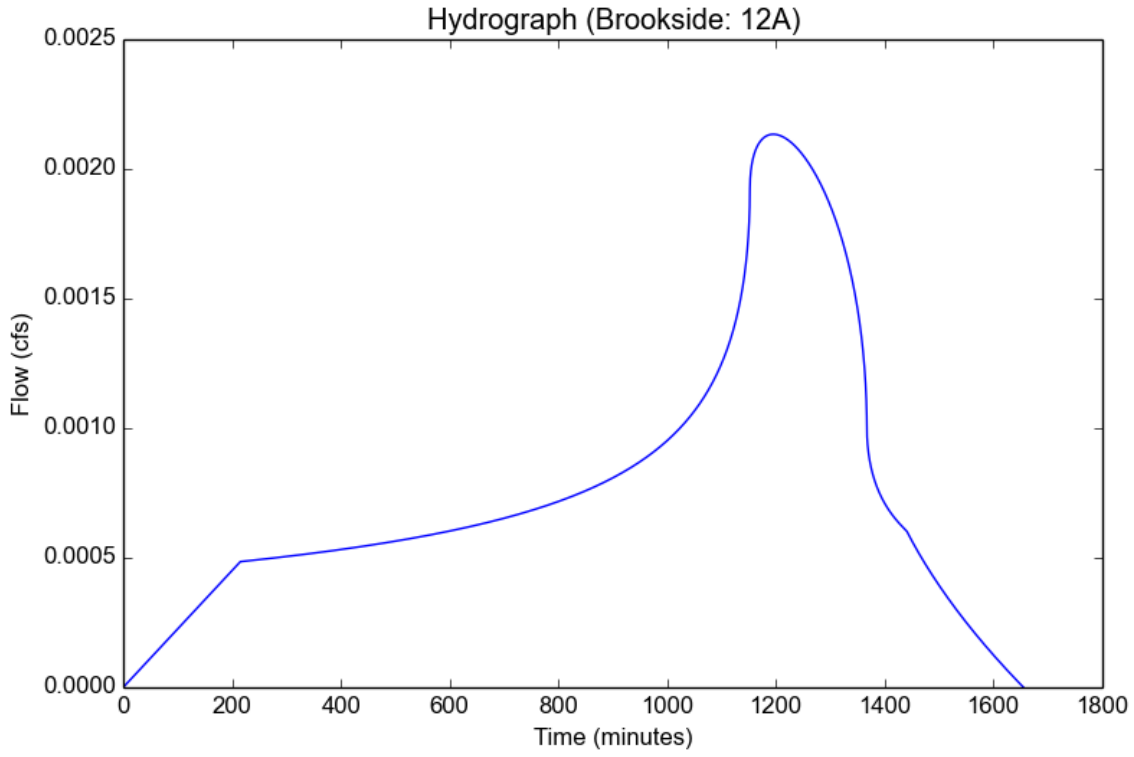
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.2-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.97
Flow Path Length (ft)	512.5
Flow Path Slope (vft/hft)	0.07414
85th Percentile Rainfall Depth (in)	0.2
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.2
Peak Intensity (in/hr)	0.0204
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	215.0
Clear Peak Flow Rate (cfs)	0.0021
Burned Peak Flow Rate (cfs)	0.0021
24-Hr Clear Runoff Volume (ac-ft)	0.0017
24-Hr Clear Runoff Volume (cu-ft)	75.4778



Peak Flow Hydrologic Analysis

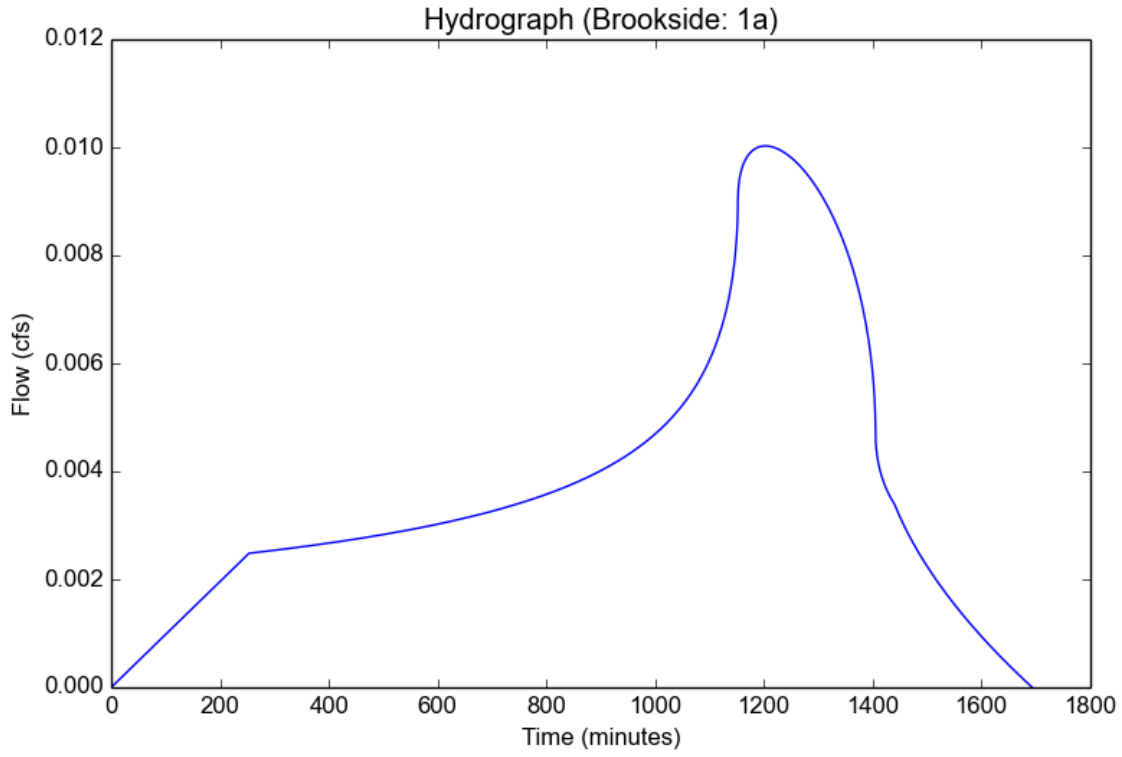
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.3-in Storm/Brookside - 1a.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1a
Area (ac)	3.28
Flow Path Length (ft)	866.7
Flow Path Slope (vft/hft)	0.04038
85th Percentile Rainfall Depth (in)	0.3
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.3
Peak Intensity (in/hr)	0.0283
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	253.0
Clear Peak Flow Rate (cfs)	0.01
Burned Peak Flow Rate (cfs)	0.01
24-Hr Clear Runoff Volume (ac-ft)	0.0088
24-Hr Clear Runoff Volume (cu-ft)	382.9448



Peak Flow Hydrologic Analysis

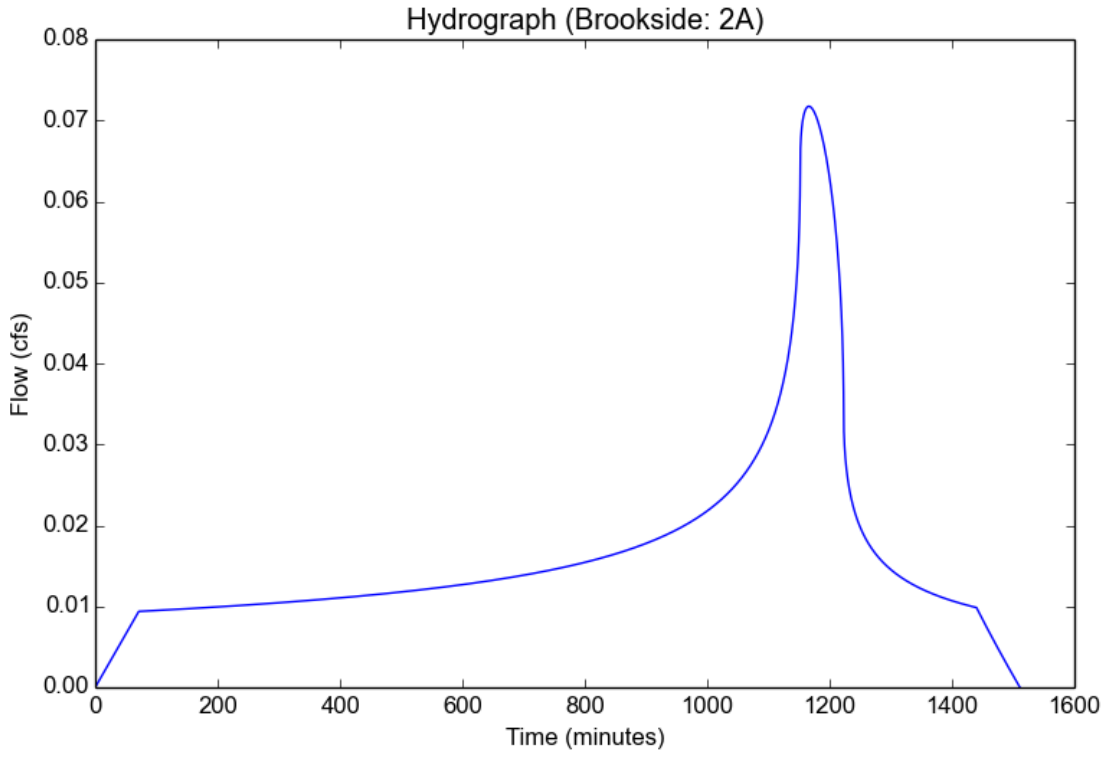
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.3-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	2.75
Flow Path Length (ft)	652.4
Flow Path Slope (vft/hft)	0.04599
85th Percentile Rainfall Depth (in)	0.3
Percent Impervious	0.509
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.3
Peak Intensity (in/hr)	0.0514
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.5072
Time of Concentration (min)	71.0
Clear Peak Flow Rate (cfs)	0.0717
Burned Peak Flow Rate (cfs)	0.0717
24-Hr Clear Runoff Volume (ac-ft)	0.0346
24-Hr Clear Runoff Volume (cu-ft)	1506.4835



Peak Flow Hydrologic Analysis

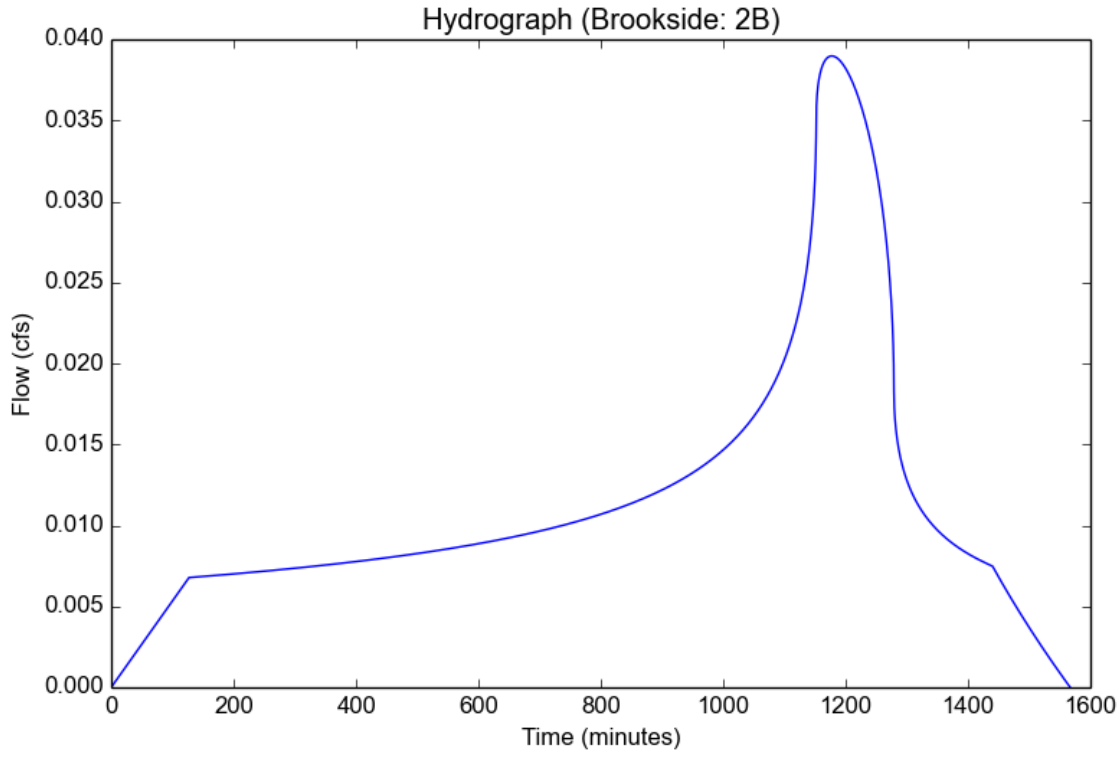
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.3-in Storm/Brookside - 2B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2B
Area (ac)	3.32
Flow Path Length (ft)	861.6
Flow Path Slope (vft/hft)	0.03714
85th Percentile Rainfall Depth (in)	0.3
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.3
Peak Intensity (in/hr)	0.0391
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	127.0
Clear Peak Flow Rate (cfs)	0.039
Burned Peak Flow Rate (cfs)	0.039
24-Hr Clear Runoff Volume (ac-ft)	0.0247
24-Hr Clear Runoff Volume (cu-ft)	1075.9163



Peak Flow Hydrologic Analysis

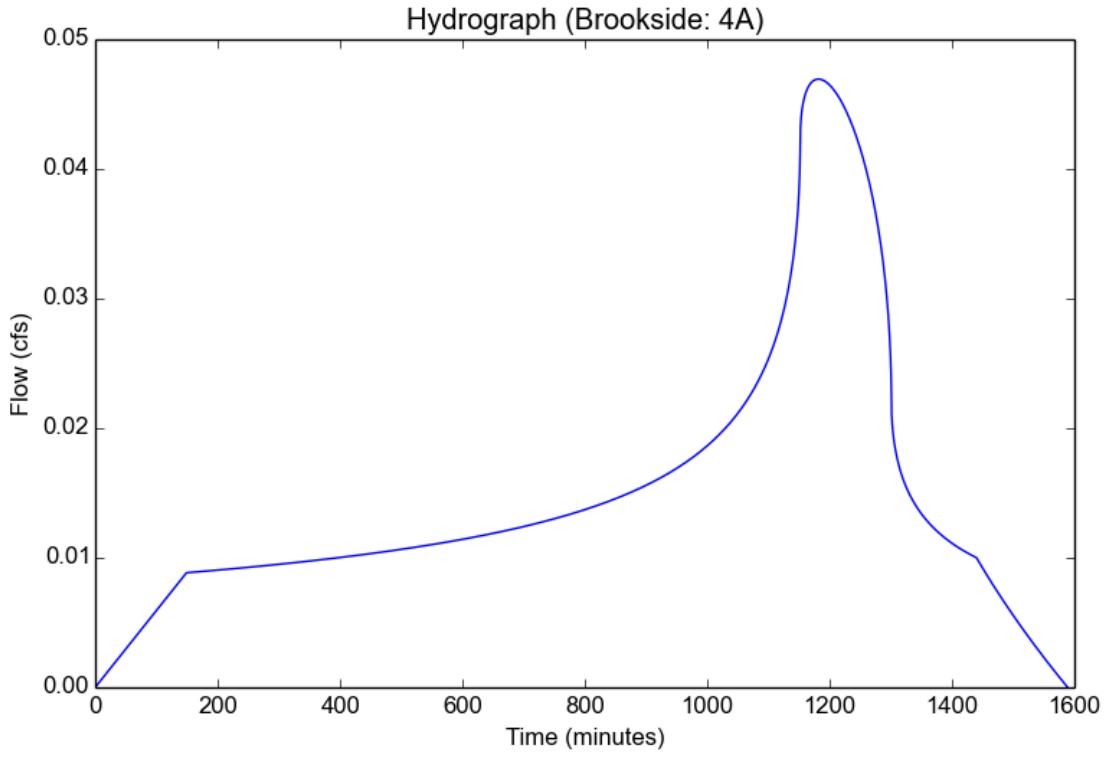
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.3-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	4.31
Flow Path Length (ft)	796.6
Flow Path Slope (vft/hft)	0.0113
85th Percentile Rainfall Depth (in)	0.3
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.3
Peak Intensity (in/hr)	0.0363
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	149.0
Clear Peak Flow Rate (cfs)	0.0469
Burned Peak Flow Rate (cfs)	0.0469
24-Hr Clear Runoff Volume (ac-ft)	0.0321
24-Hr Clear Runoff Volume (cu-ft)	1396.8688



Peak Flow Hydrologic Analysis

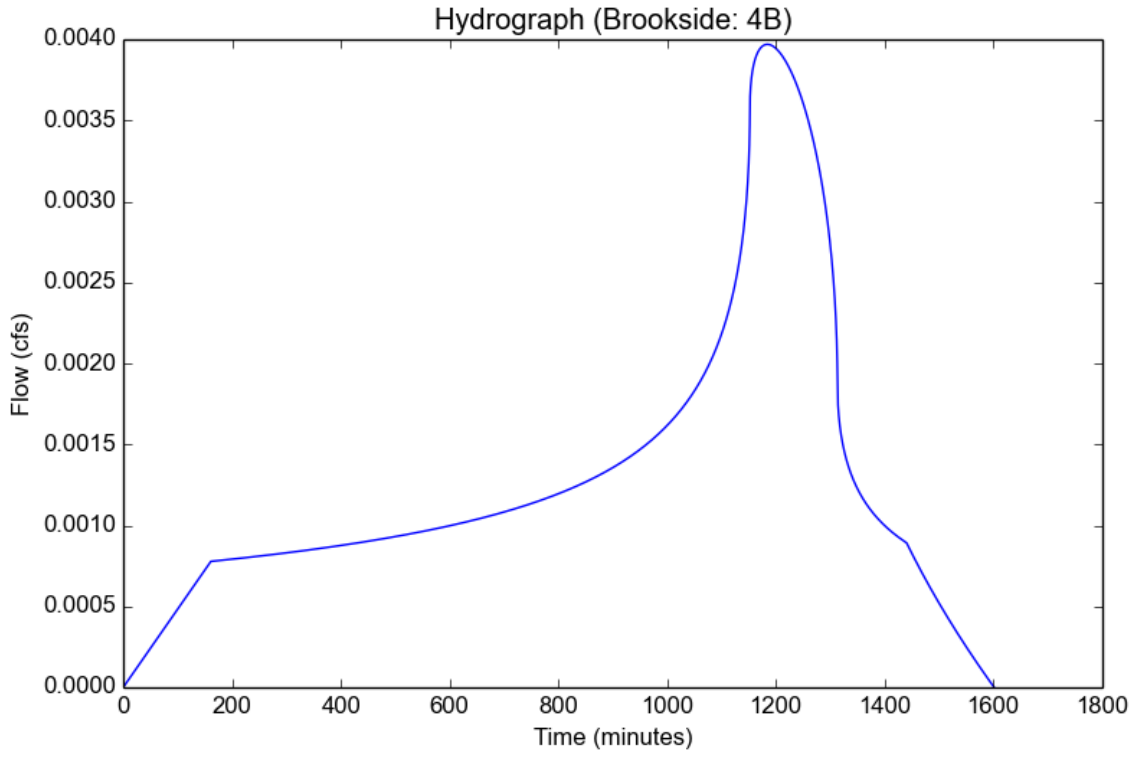
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.3-in Storm/Brookside - 4B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4B
Area (ac)	1.05
Flow Path Length (ft)	377.9
Flow Path Slope (vft/hft)	0.02646
85th Percentile Rainfall Depth (in)	0.3
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.3
Peak Intensity (in/hr)	0.035
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	161.0
Clear Peak Flow Rate (cfs)	0.004
Burned Peak Flow Rate (cfs)	0.004
24-Hr Clear Runoff Volume (ac-ft)	0.0028
24-Hr Clear Runoff Volume (cu-ft)	122.5163



Peak Flow Hydrologic Analysis

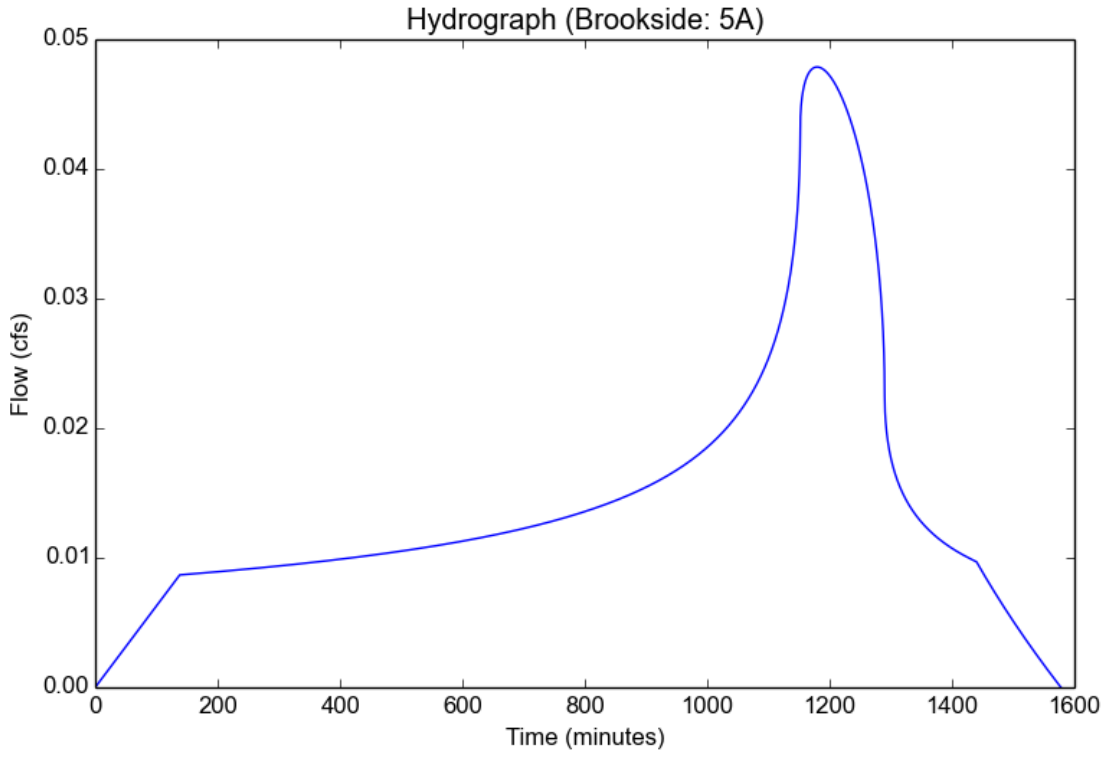
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.3-in Storm/Brookside - 5A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5A
Area (ac)	4.24
Flow Path Length (ft)	954.1
Flow Path Slope (vft/hft)	0.03354
85th Percentile Rainfall Depth (in)	0.3
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.3
Peak Intensity (in/hr)	0.0376
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	138.0
Clear Peak Flow Rate (cfs)	0.0479
Burned Peak Flow Rate (cfs)	0.0479
24-Hr Clear Runoff Volume (ac-ft)	0.0315
24-Hr Clear Runoff Volume (cu-ft)	1374.119



Peak Flow Hydrologic Analysis

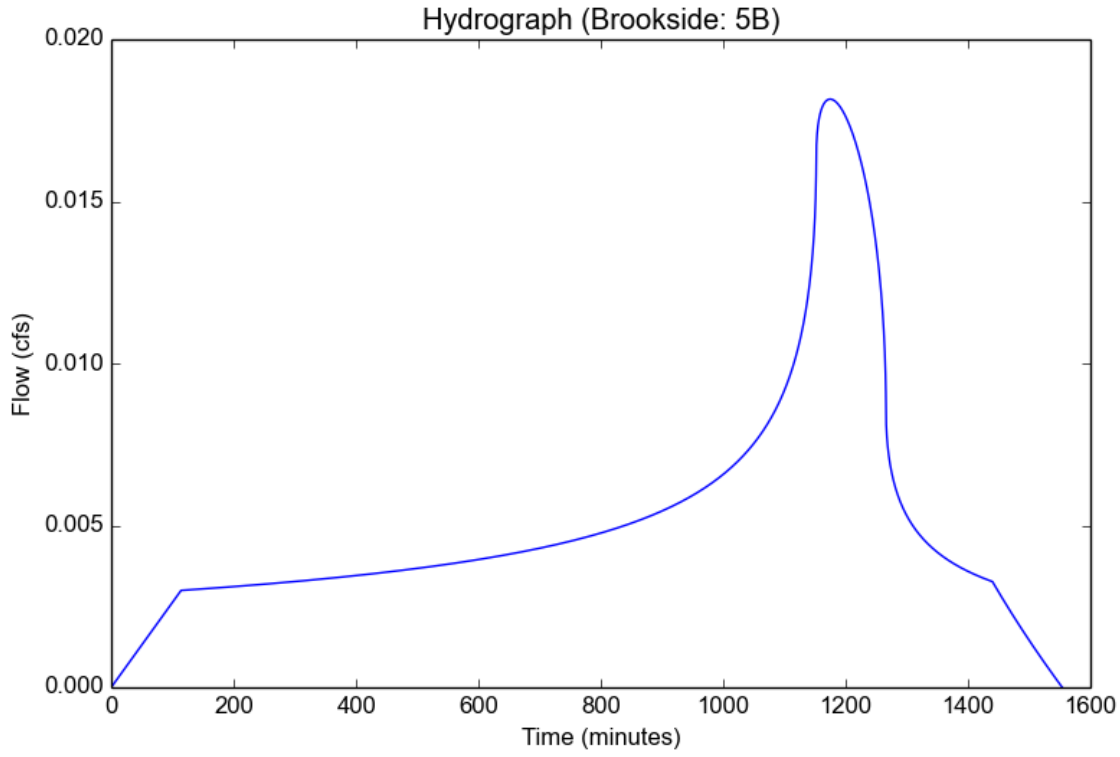
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.3-in Storm/Brookside - 5B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5B
Area (ac)	1.47
Flow Path Length (ft)	542.7
Flow Path Slope (vft/hft)	0.0129
85th Percentile Rainfall Depth (in)	0.3
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.3
Peak Intensity (in/hr)	0.0412
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	114.0
Clear Peak Flow Rate (cfs)	0.0182
Burned Peak Flow Rate (cfs)	0.0182
24-Hr Clear Runoff Volume (ac-ft)	0.0109
24-Hr Clear Runoff Volume (cu-ft)	476.3635



Peak Flow Hydrologic Analysis

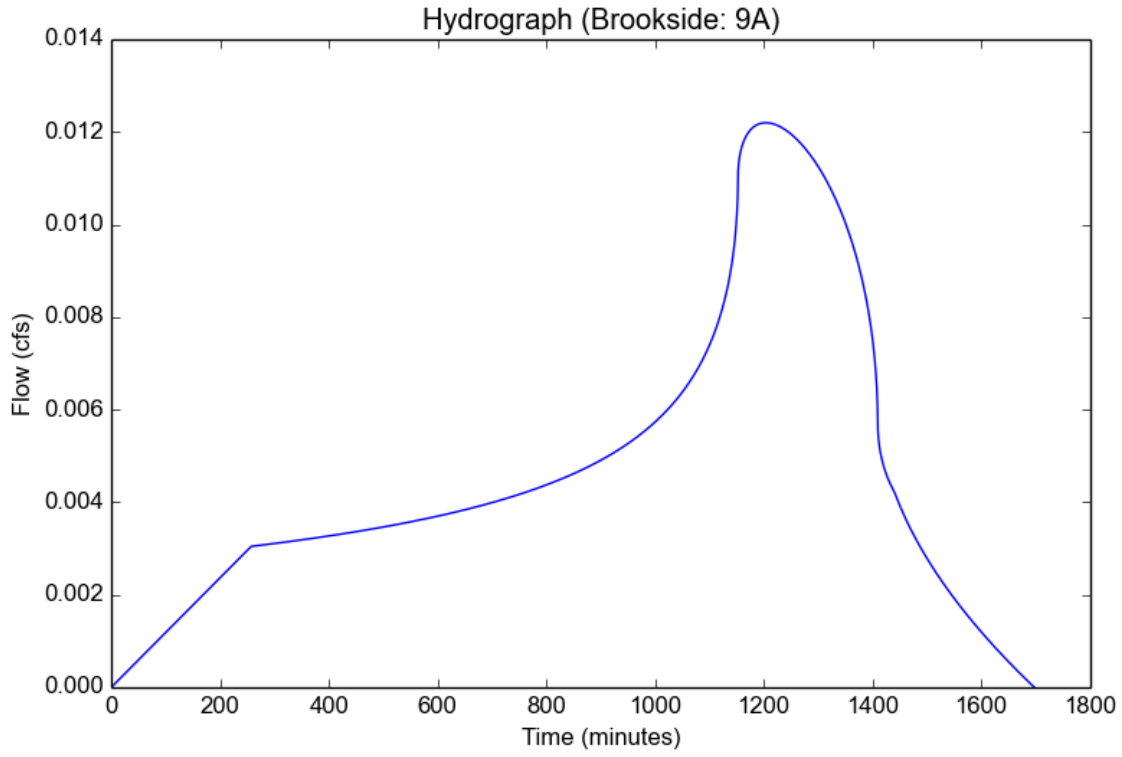
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.3-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	4.02
Flow Path Length (ft)	958.0
Flow Path Slope (vft/hft)	0.05323
85th Percentile Rainfall Depth (in)	0.3
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.3
Peak Intensity (in/hr)	0.0281
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	257.0
Clear Peak Flow Rate (cfs)	0.0122
Burned Peak Flow Rate (cfs)	0.0122
24-Hr Clear Runoff Volume (ac-ft)	0.0108
24-Hr Clear Runoff Volume (cu-ft)	469.3566



Peak Flow Hydrologic Analysis

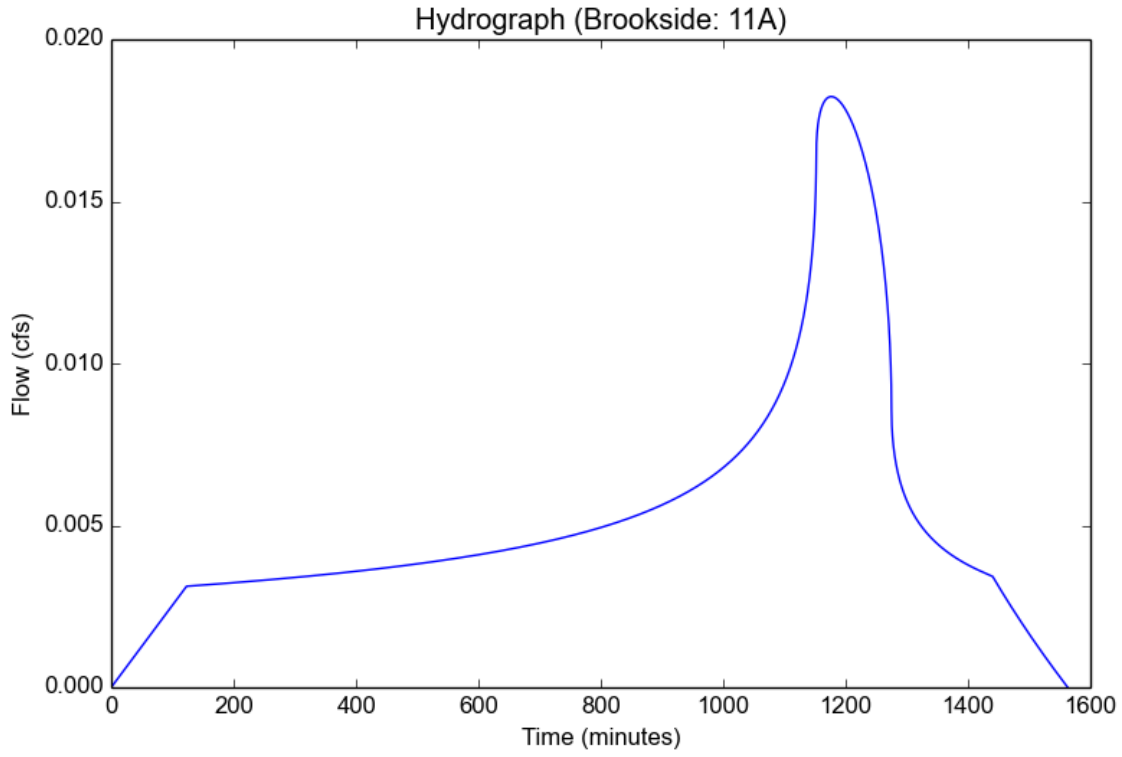
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.3-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	1.53
Flow Path Length (ft)	494.1
Flow Path Slope (vft/hft)	0.00607
85th Percentile Rainfall Depth (in)	0.3
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.3
Peak Intensity (in/hr)	0.0397
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	123.0
Clear Peak Flow Rate (cfs)	0.0182
Burned Peak Flow Rate (cfs)	0.0182
24-Hr Clear Runoff Volume (ac-ft)	0.0114
24-Hr Clear Runoff Volume (cu-ft)	495.8218



Peak Flow Hydrologic Analysis

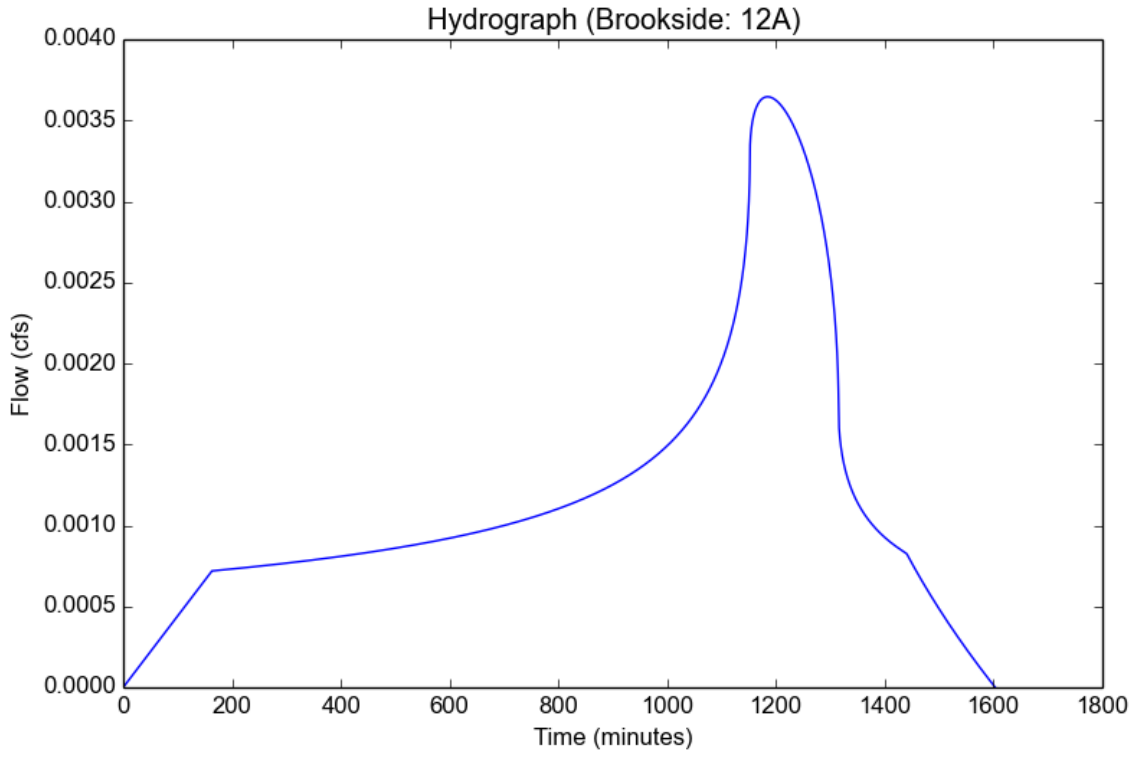
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.3-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.97
Flow Path Length (ft)	512.5
Flow Path Slope (vft/hft)	0.07414
85th Percentile Rainfall Depth (in)	0.3
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.3
Peak Intensity (in/hr)	0.0348
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	163.0
Clear Peak Flow Rate (cfs)	0.0036
Burned Peak Flow Rate (cfs)	0.0036
24-Hr Clear Runoff Volume (ac-ft)	0.0026
24-Hr Clear Runoff Volume (cu-ft)	113.1828



Peak Flow Hydrologic Analysis

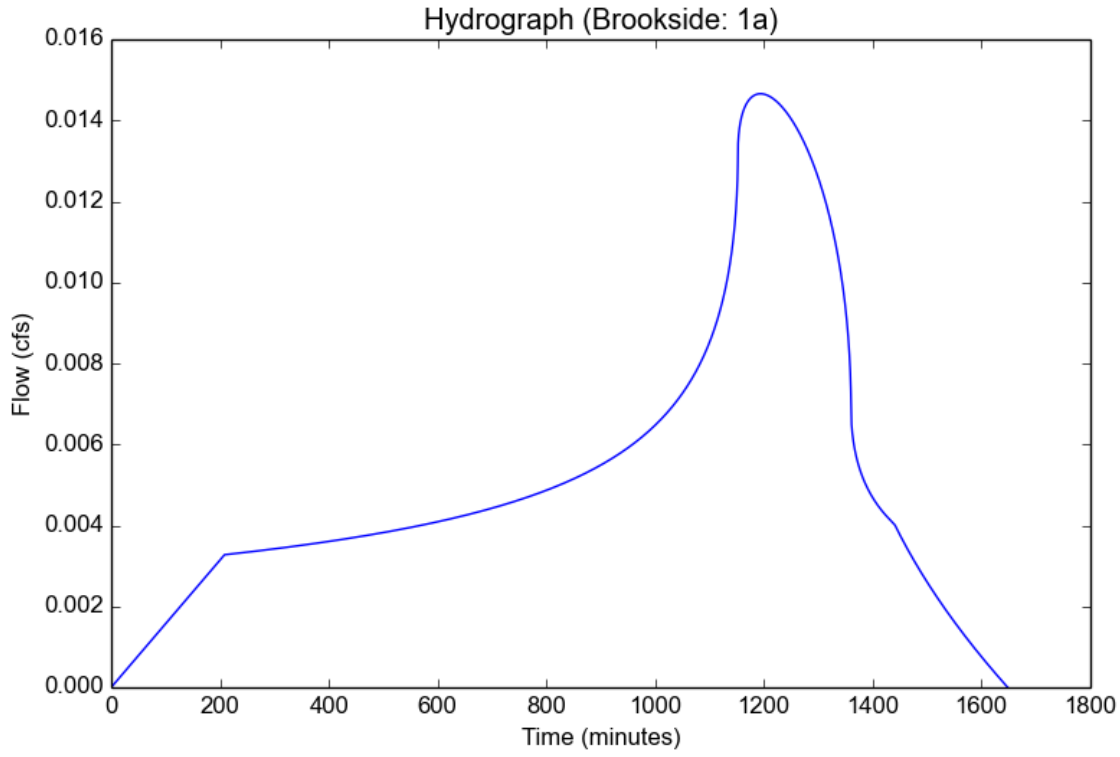
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.4-in Storm/Brookside - 1a.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1a
Area (ac)	3.28
Flow Path Length (ft)	866.7
Flow Path Slope (vft/hft)	0.04038
85th Percentile Rainfall Depth (in)	0.4
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.4
Peak Intensity (in/hr)	0.0414
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	208.0
Clear Peak Flow Rate (cfs)	0.0147
Burned Peak Flow Rate (cfs)	0.0147
24-Hr Clear Runoff Volume (ac-ft)	0.0117
24-Hr Clear Runoff Volume (cu-ft)	510.4241



Peak Flow Hydrologic Analysis

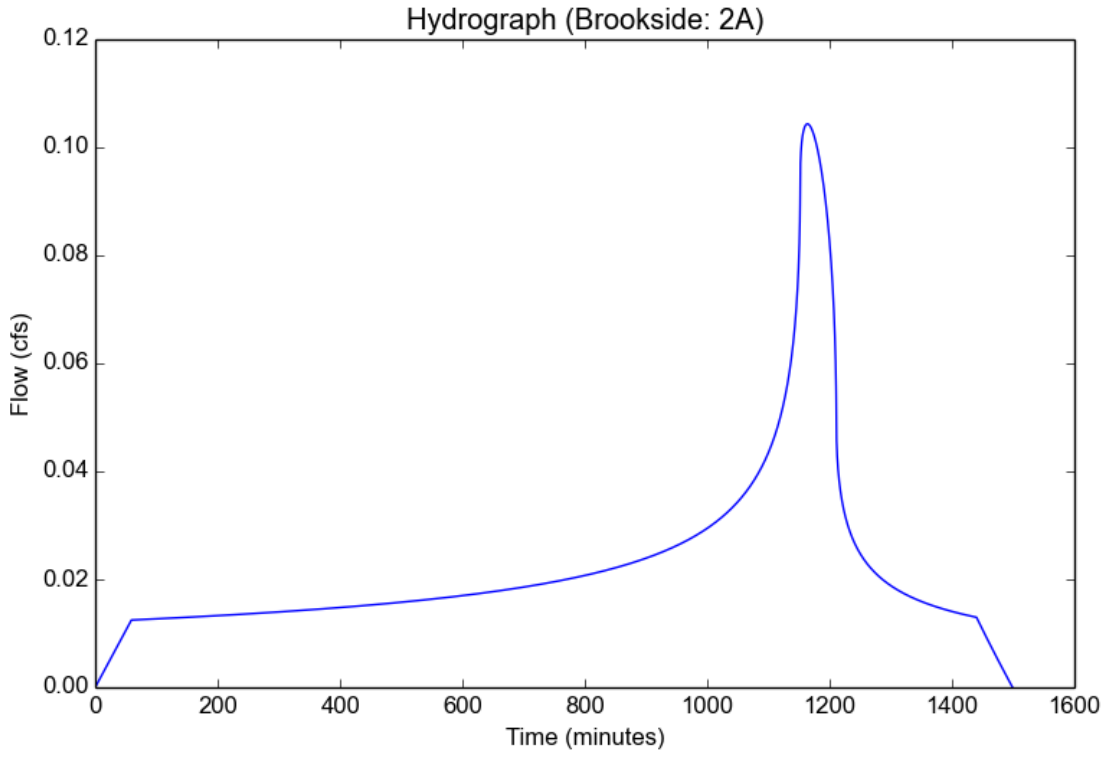
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.4-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	2.75
Flow Path Length (ft)	652.4
Flow Path Slope (vft/hft)	0.04599
85th Percentile Rainfall Depth (in)	0.4
Percent Impervious	0.509
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.4
Peak Intensity (in/hr)	0.0748
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.5072
Time of Concentration (min)	59.0
Clear Peak Flow Rate (cfs)	0.1043
Burned Peak Flow Rate (cfs)	0.1043
24-Hr Clear Runoff Volume (ac-ft)	0.0461
24-Hr Clear Runoff Volume (cu-ft)	2008.6029



Peak Flow Hydrologic Analysis

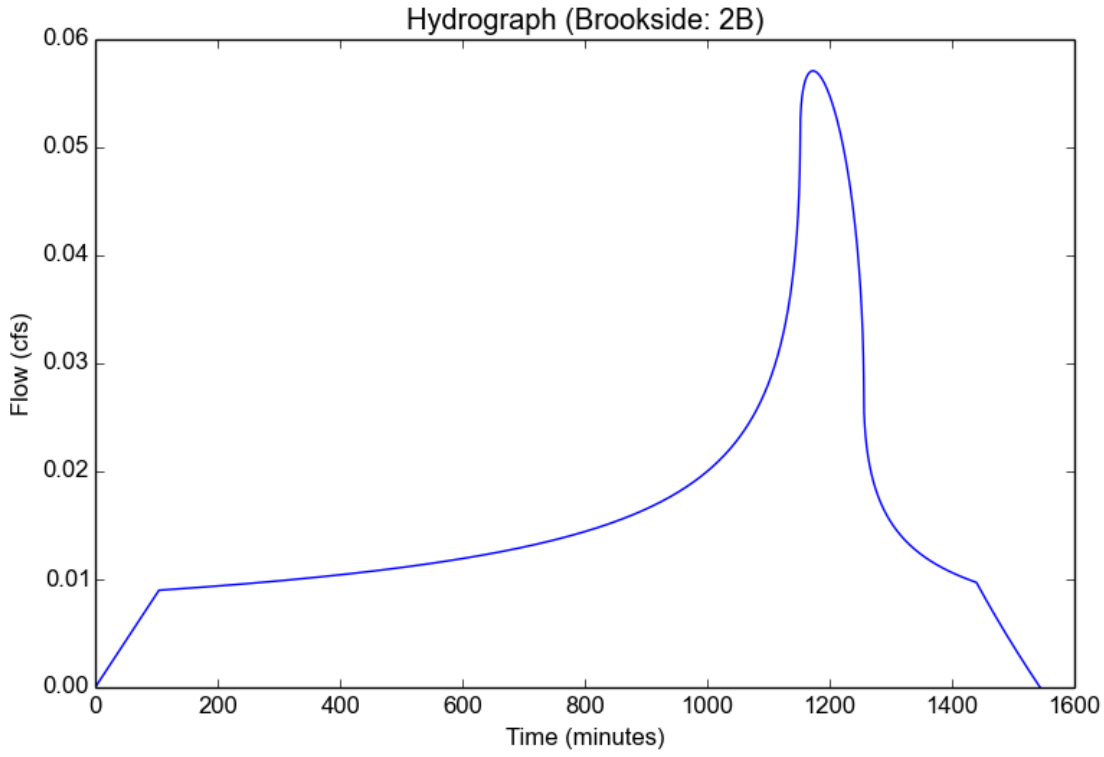
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.4-in Storm/Brookside - 2B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2B
Area (ac)	3.32
Flow Path Length (ft)	861.6
Flow Path Slope (vft/hft)	0.03714
85th Percentile Rainfall Depth (in)	0.4
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.4
Peak Intensity (in/hr)	0.0573
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	104.0
Clear Peak Flow Rate (cfs)	0.0571
Burned Peak Flow Rate (cfs)	0.0571
24-Hr Clear Runoff Volume (ac-ft)	0.0329
24-Hr Clear Runoff Volume (cu-ft)	1434.4479



Peak Flow Hydrologic Analysis

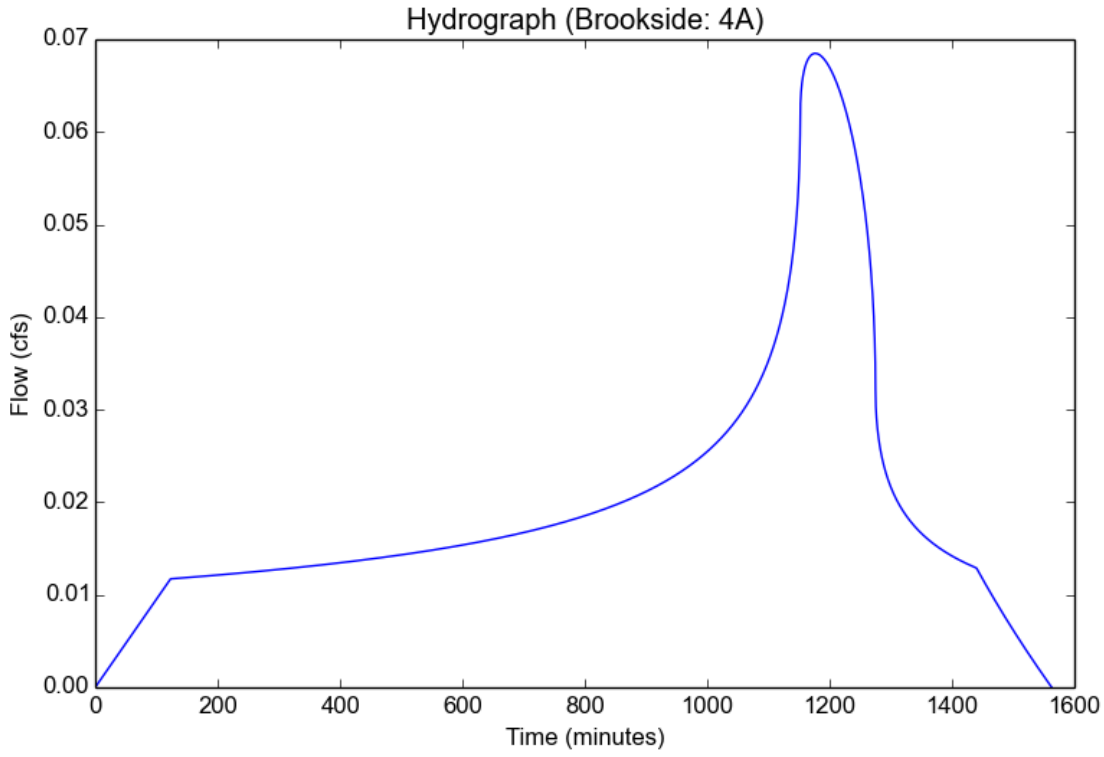
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.4-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	4.31
Flow Path Length (ft)	796.6
Flow Path Slope (vft/hft)	0.0113
85th Percentile Rainfall Depth (in)	0.4
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.4
Peak Intensity (in/hr)	0.053
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	123.0
Clear Peak Flow Rate (cfs)	0.0685
Burned Peak Flow Rate (cfs)	0.0685
24-Hr Clear Runoff Volume (ac-ft)	0.0428
24-Hr Clear Runoff Volume (cu-ft)	1862.3025



Peak Flow Hydrologic Analysis

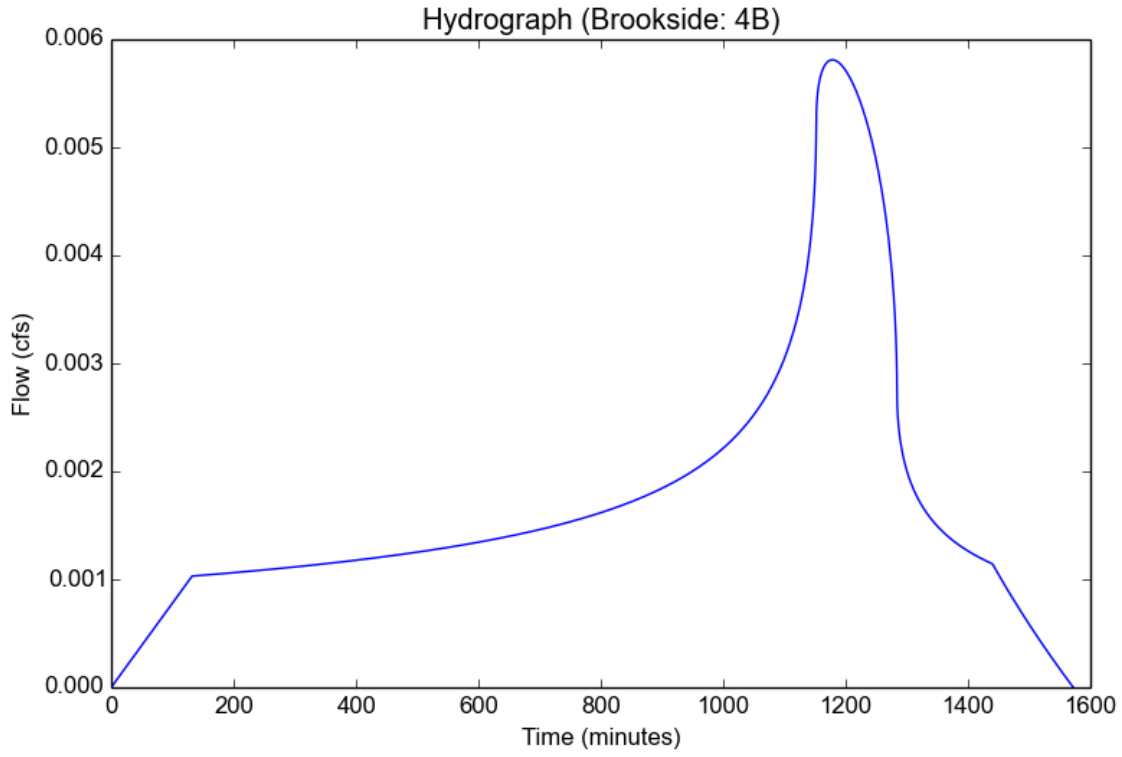
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.4-in Storm/Brookside - 4B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4B
Area (ac)	1.05
Flow Path Length (ft)	377.9
Flow Path Slope (vft/hft)	0.02646
85th Percentile Rainfall Depth (in)	0.4
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.4
Peak Intensity (in/hr)	0.0512
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	132.0
Clear Peak Flow Rate (cfs)	0.0058
Burned Peak Flow Rate (cfs)	0.0058
24-Hr Clear Runoff Volume (ac-ft)	0.0037
24-Hr Clear Runoff Volume (cu-ft)	163.3349



Peak Flow Hydrologic Analysis

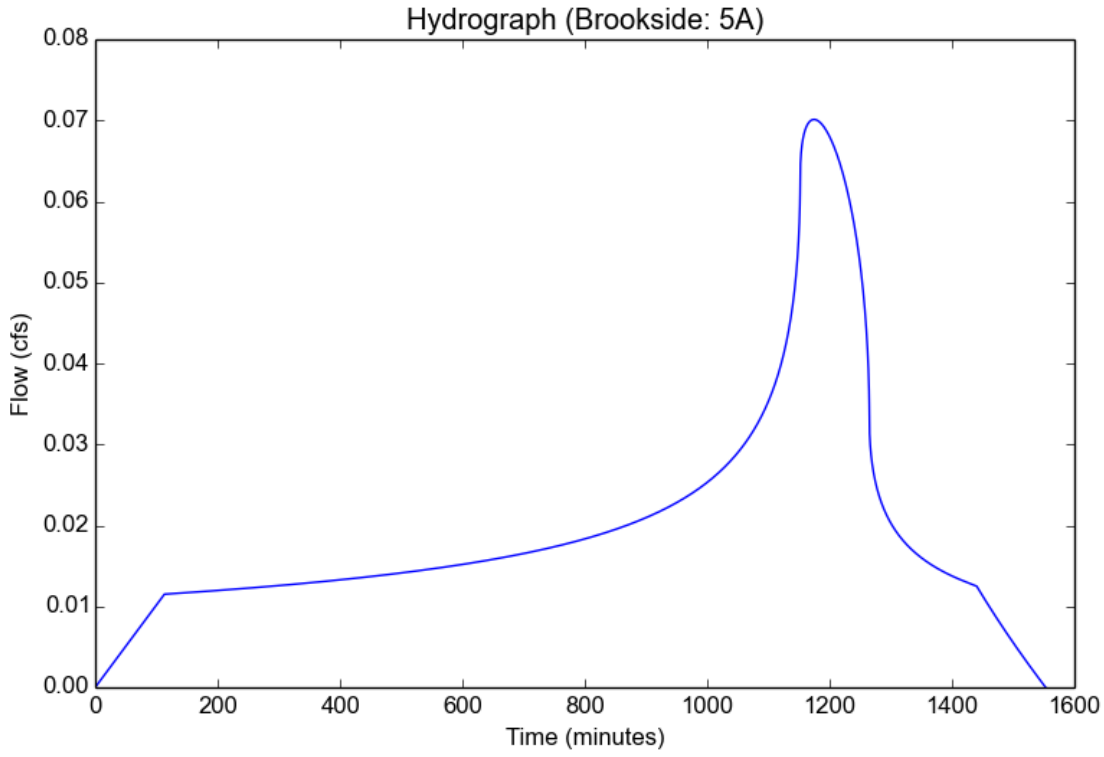
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.4-in Storm/Brookside - 5A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5A
Area (ac)	4.24
Flow Path Length (ft)	954.1
Flow Path Slope (vft/hft)	0.03354
85th Percentile Rainfall Depth (in)	0.4
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.4
Peak Intensity (in/hr)	0.0551
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	113.0
Clear Peak Flow Rate (cfs)	0.0701
Burned Peak Flow Rate (cfs)	0.0701
24-Hr Clear Runoff Volume (ac-ft)	0.0421
24-Hr Clear Runoff Volume (cu-ft)	1831.9954



Peak Flow Hydrologic Analysis

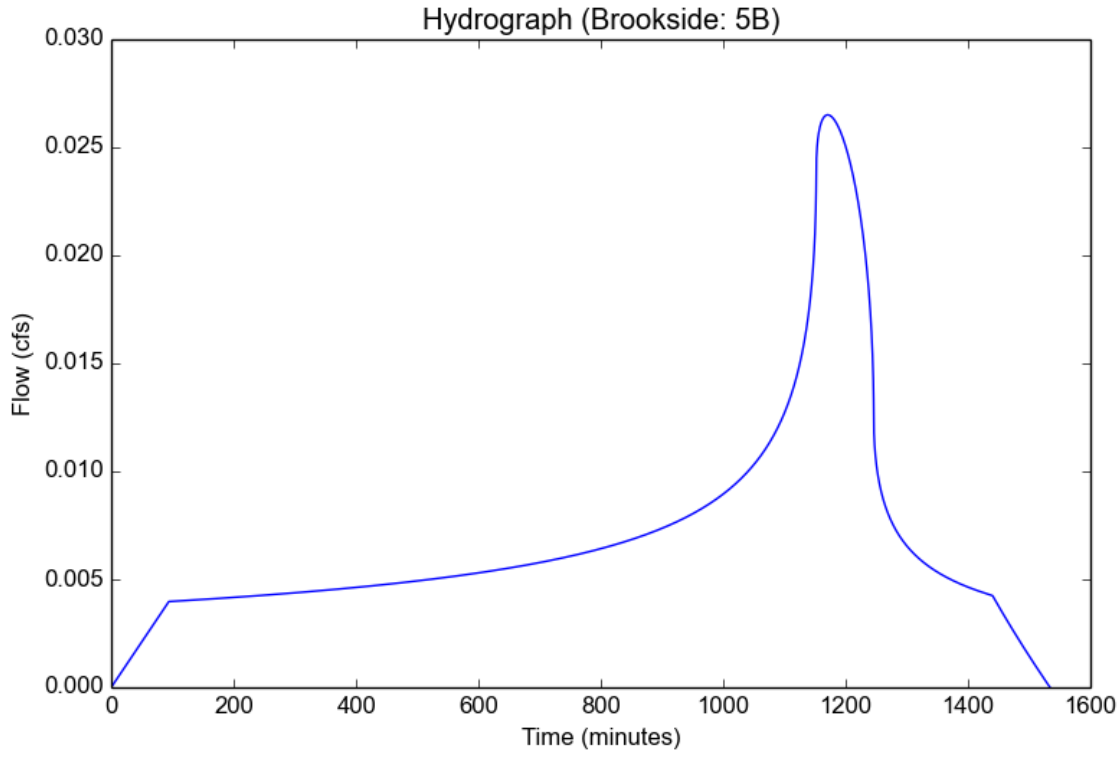
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.4-in Storm/Brookside - 5B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5B
Area (ac)	1.47
Flow Path Length (ft)	542.7
Flow Path Slope (vft/hft)	0.0129
85th Percentile Rainfall Depth (in)	0.4
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.4
Peak Intensity (in/hr)	0.0601
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	94.0
Clear Peak Flow Rate (cfs)	0.0265
Burned Peak Flow Rate (cfs)	0.0265
24-Hr Clear Runoff Volume (ac-ft)	0.0146
24-Hr Clear Runoff Volume (cu-ft)	635.1147



Peak Flow Hydrologic Analysis

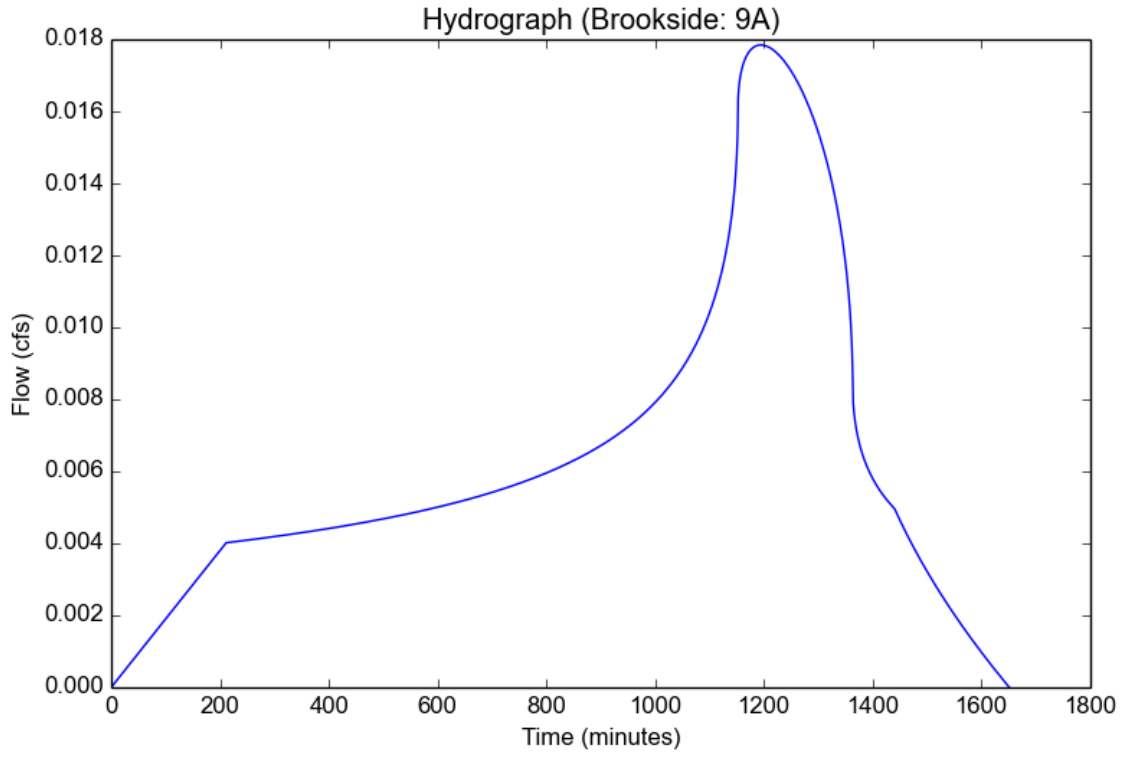
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.4-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	4.02
Flow Path Length (ft)	958.0
Flow Path Slope (vft/hft)	0.05323
85th Percentile Rainfall Depth (in)	0.4
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.4
Peak Intensity (in/hr)	0.0411
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	211.0
Clear Peak Flow Rate (cfs)	0.0178
Burned Peak Flow Rate (cfs)	0.0178
24-Hr Clear Runoff Volume (ac-ft)	0.0144
24-Hr Clear Runoff Volume (cu-ft)	625.593



Peak Flow Hydrologic Analysis

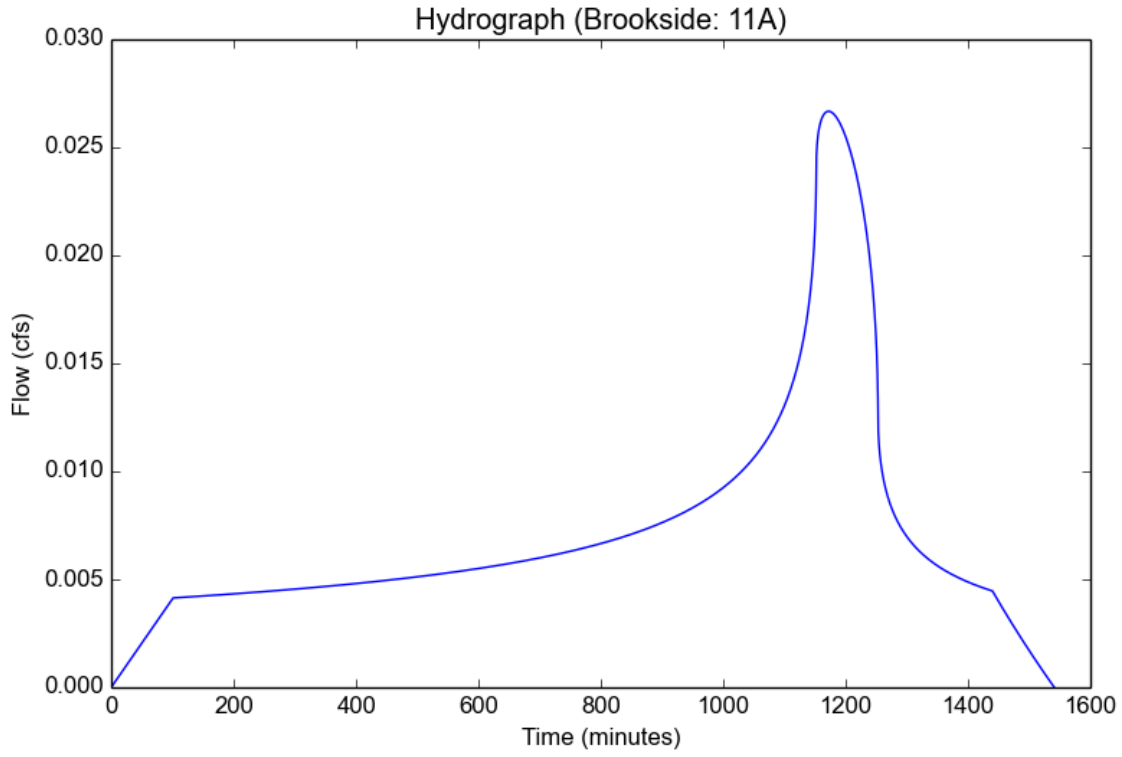
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.4-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	1.53
Flow Path Length (ft)	494.1
Flow Path Slope (vft/hft)	0.00607
85th Percentile Rainfall Depth (in)	0.4
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.4
Peak Intensity (in/hr)	0.0581
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	101.0
Clear Peak Flow Rate (cfs)	0.0267
Burned Peak Flow Rate (cfs)	0.0267
24-Hr Clear Runoff Volume (ac-ft)	0.0152
24-Hr Clear Runoff Volume (cu-ft)	661.0502



Peak Flow Hydrologic Analysis

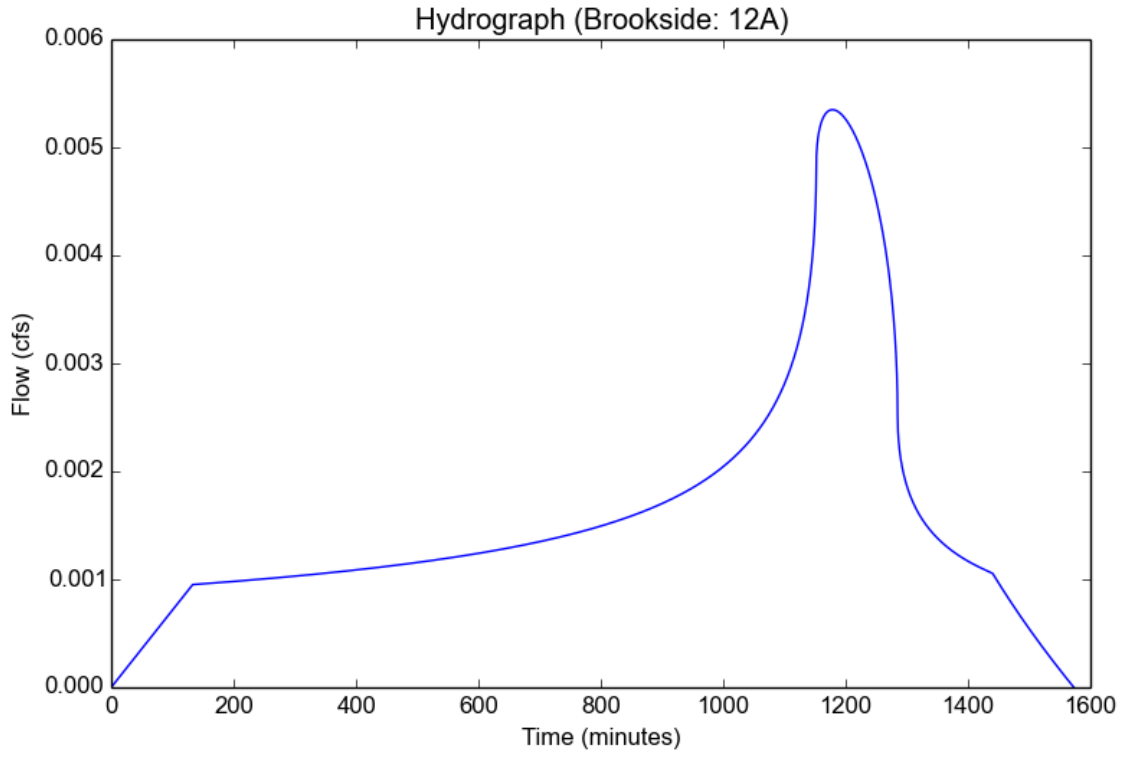
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.4-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.97
Flow Path Length (ft)	512.5
Flow Path Slope (vft/hft)	0.07414
85th Percentile Rainfall Depth (in)	0.4
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.4
Peak Intensity (in/hr)	0.0511
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	133.0
Clear Peak Flow Rate (cfs)	0.0053
Burned Peak Flow Rate (cfs)	0.0053
24-Hr Clear Runoff Volume (ac-ft)	0.0035
24-Hr Clear Runoff Volume (cu-ft)	150.8909



Peak Flow Hydrologic Analysis

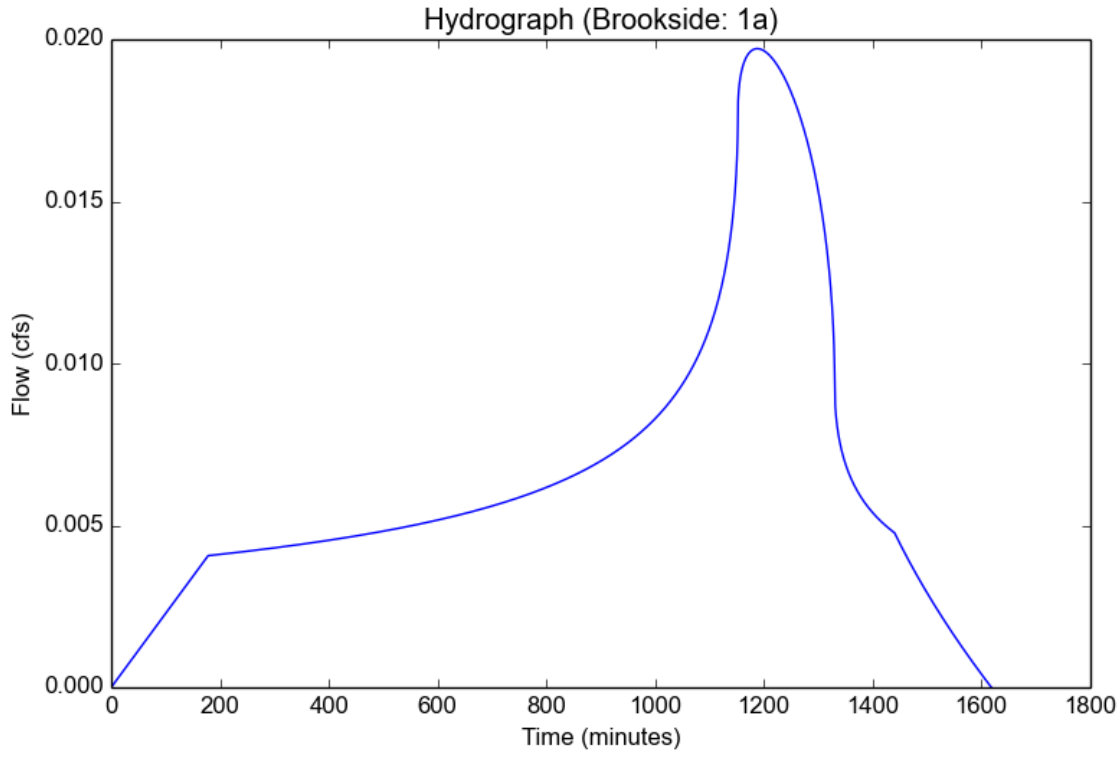
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.5-in Storm/Brookside - 1a.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1a
Area (ac)	3.28
Flow Path Length (ft)	866.7
Flow Path Slope (vft/hft)	0.04038
85th Percentile Rainfall Depth (in)	0.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.5
Peak Intensity (in/hr)	0.0557
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	178.0
Clear Peak Flow Rate (cfs)	0.0197
Burned Peak Flow Rate (cfs)	0.0197
24-Hr Clear Runoff Volume (ac-ft)	0.0146
24-Hr Clear Runoff Volume (cu-ft)	637.9173



Peak Flow Hydrologic Analysis

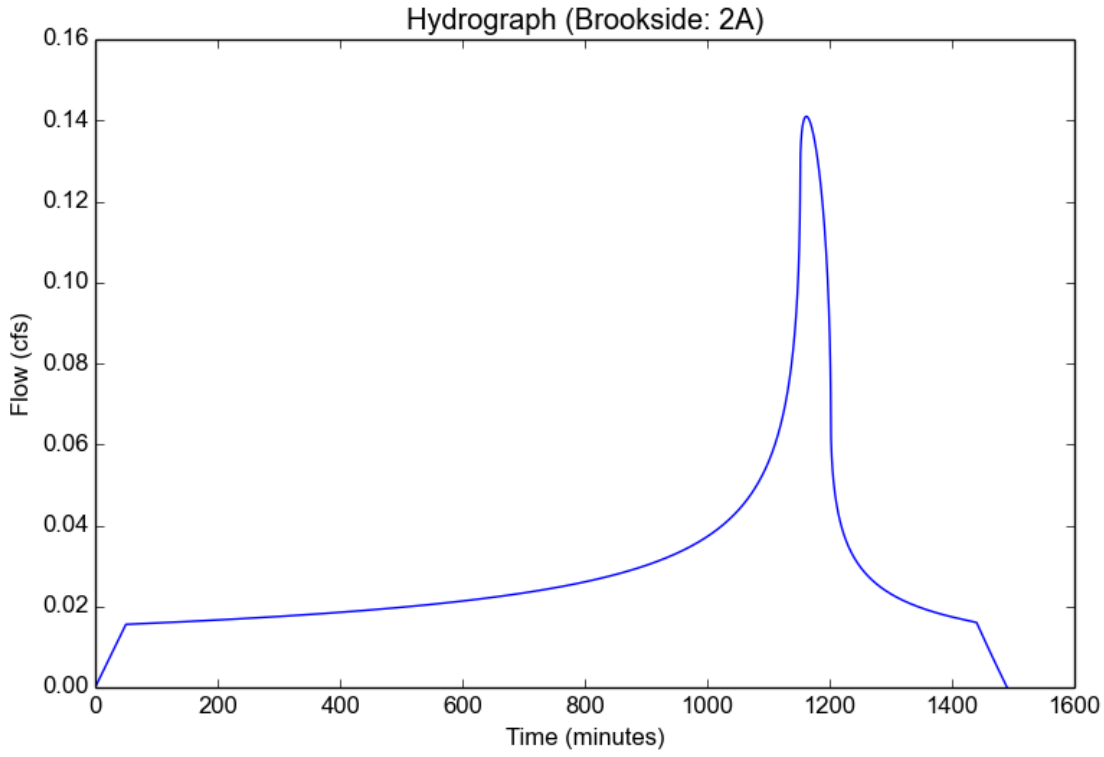
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.5-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	2.75
Flow Path Length (ft)	652.4
Flow Path Slope (vft/hft)	0.04599
85th Percentile Rainfall Depth (in)	0.5
Percent Impervious	0.509
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.5
Peak Intensity (in/hr)	0.1011
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.5072
Time of Concentration (min)	50.0
Clear Peak Flow Rate (cfs)	0.141
Burned Peak Flow Rate (cfs)	0.141
24-Hr Clear Runoff Volume (ac-ft)	0.0576
24-Hr Clear Runoff Volume (cu-ft)	2510.7211



Peak Flow Hydrologic Analysis

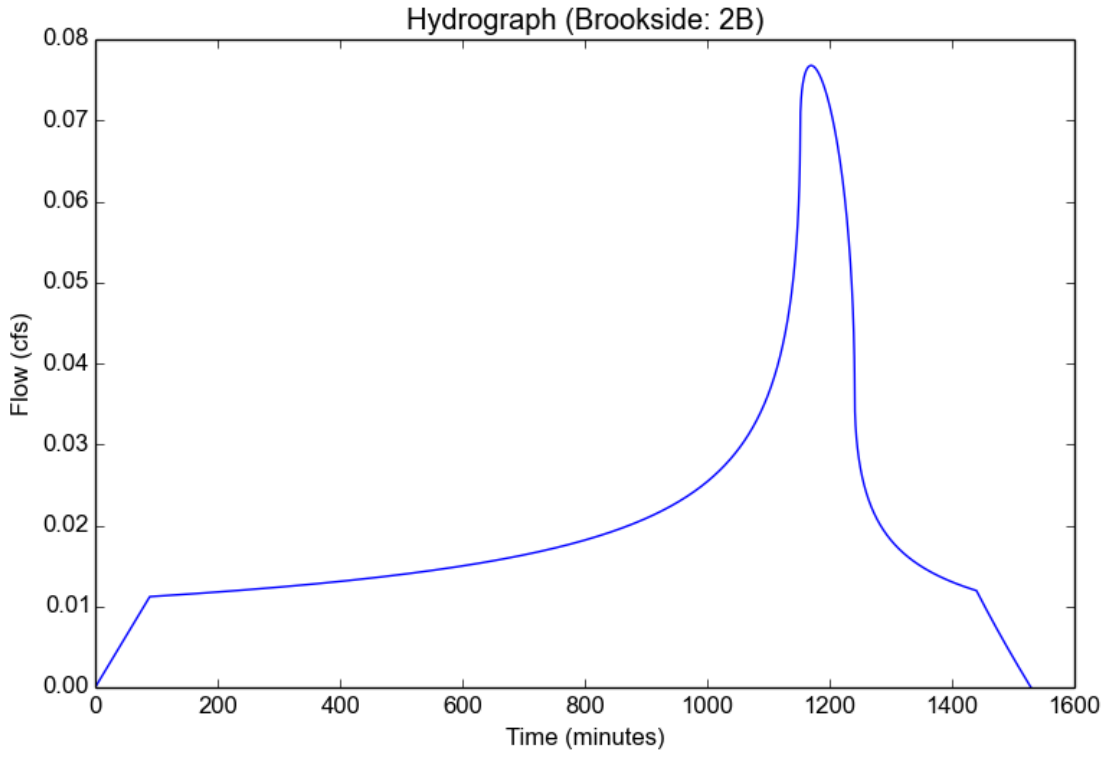
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.5-in Storm/Brookside - 2B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2B
Area (ac)	3.32
Flow Path Length (ft)	861.6
Flow Path Slope (vft/hft)	0.03714
85th Percentile Rainfall Depth (in)	0.5
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.5
Peak Intensity (in/hr)	0.0771
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	89.0
Clear Peak Flow Rate (cfs)	0.0768
Burned Peak Flow Rate (cfs)	0.0768
24-Hr Clear Runoff Volume (ac-ft)	0.0412
24-Hr Clear Runoff Volume (cu-ft)	1792.9884



Peak Flow Hydrologic Analysis

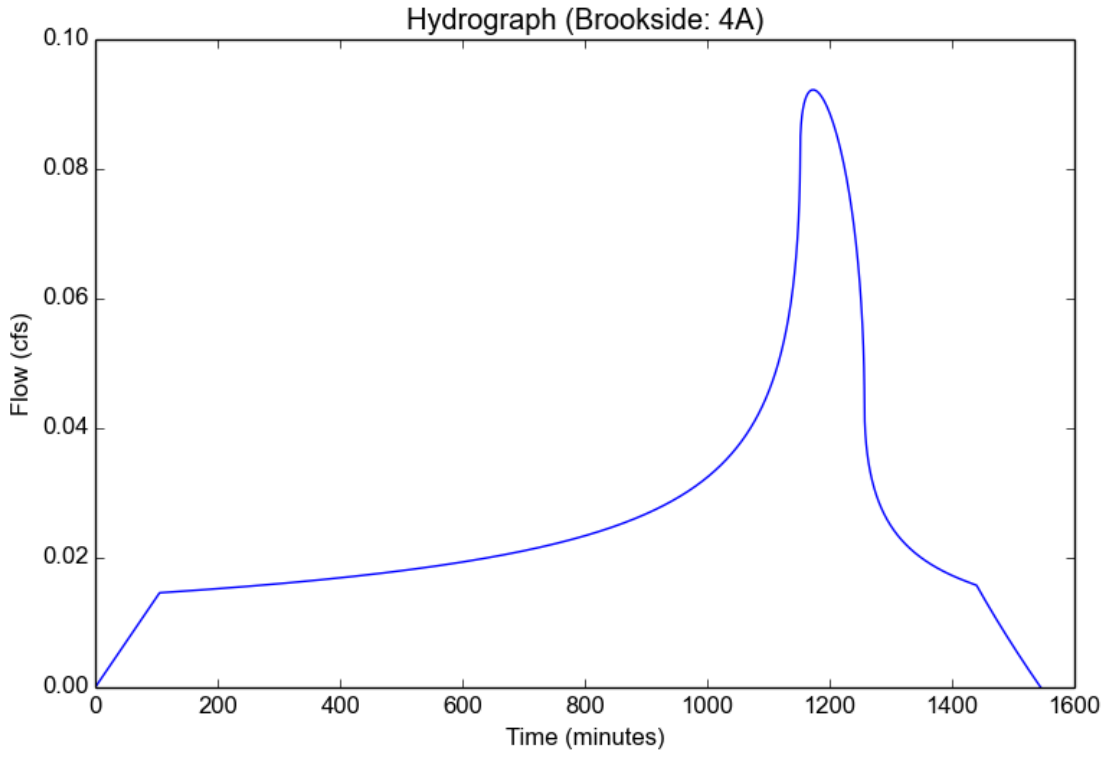
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.5-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	4.31
Flow Path Length (ft)	796.6
Flow Path Slope (vft/hft)	0.0113
85th Percentile Rainfall Depth (in)	0.5
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.5
Peak Intensity (in/hr)	0.0713
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	105.0
Clear Peak Flow Rate (cfs)	0.0922
Burned Peak Flow Rate (cfs)	0.0922
24-Hr Clear Runoff Volume (ac-ft)	0.0534
24-Hr Clear Runoff Volume (cu-ft)	2327.7442



Peak Flow Hydrologic Analysis

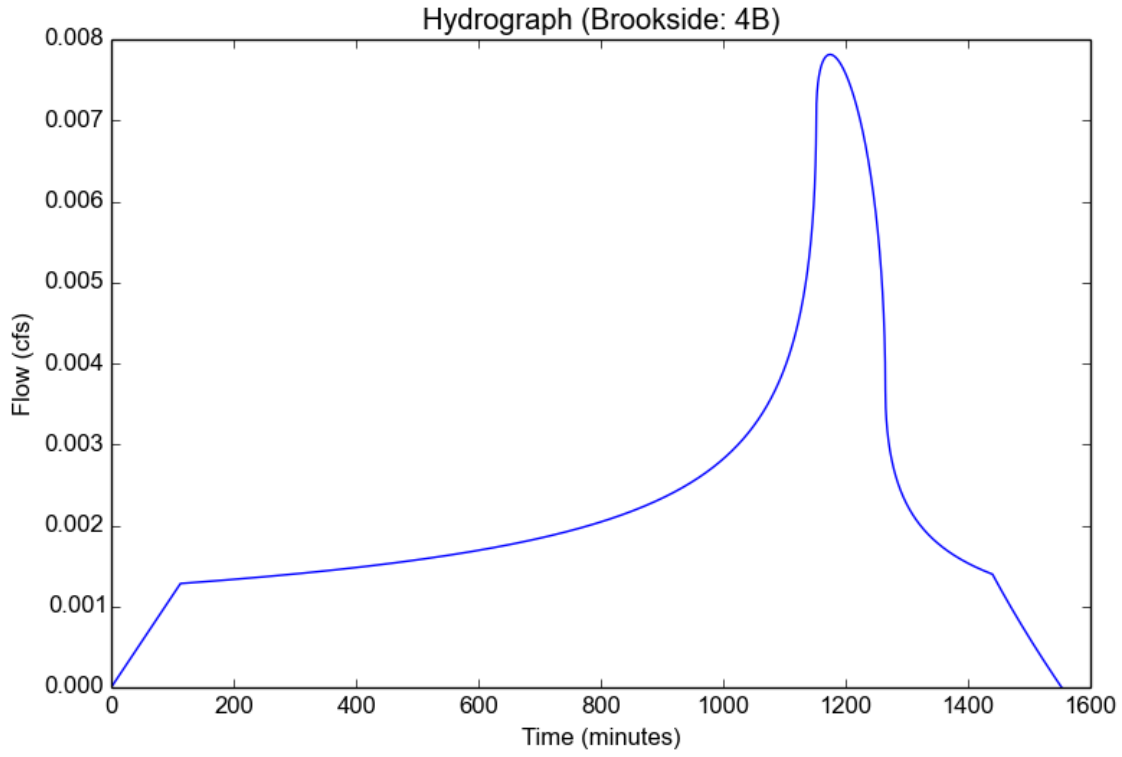
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.5-in Storm/Brookside - 4B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4B
Area (ac)	1.05
Flow Path Length (ft)	377.9
Flow Path Slope (vft/hft)	0.02646
85th Percentile Rainfall Depth (in)	0.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.5
Peak Intensity (in/hr)	0.0689
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	113.0
Clear Peak Flow Rate (cfs)	0.0078
Burned Peak Flow Rate (cfs)	0.0078
24-Hr Clear Runoff Volume (ac-ft)	0.0047
24-Hr Clear Runoff Volume (cu-ft)	204.1552



Peak Flow Hydrologic Analysis

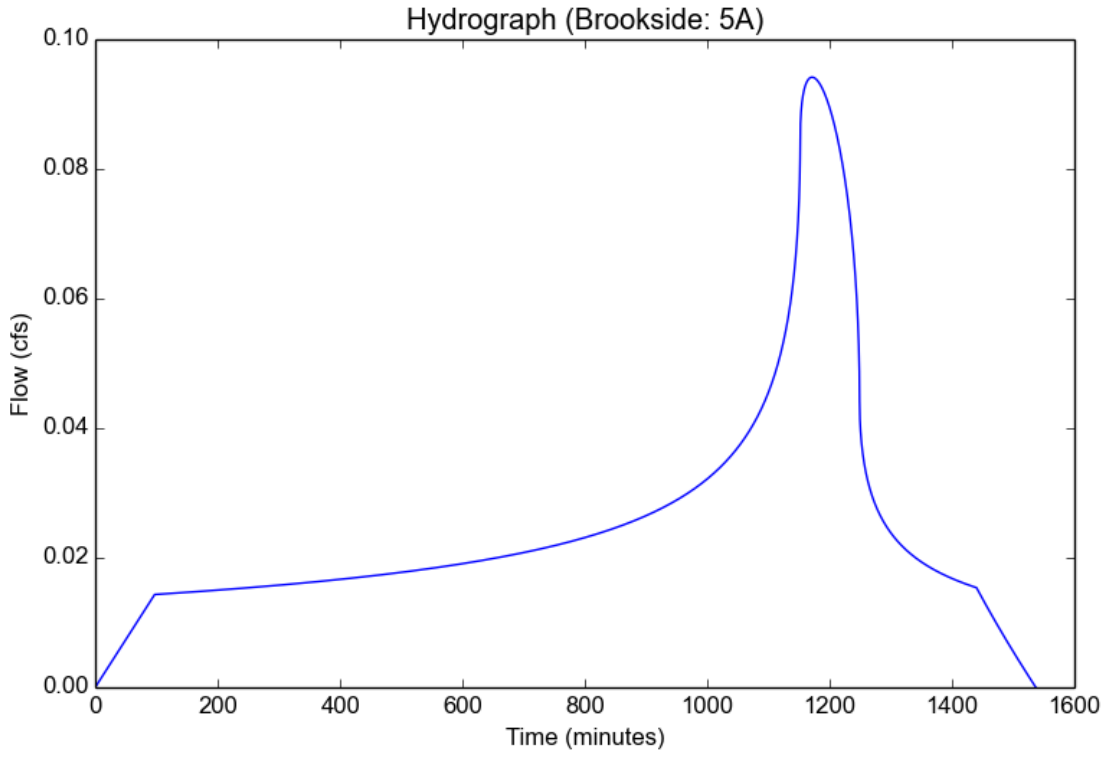
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.5-in Storm/Brookside - 5A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5A
Area (ac)	4.24
Flow Path Length (ft)	954.1
Flow Path Slope (vft/hft)	0.03354
85th Percentile Rainfall Depth (in)	0.5
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.5
Peak Intensity (in/hr)	0.074
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	97.0
Clear Peak Flow Rate (cfs)	0.0942
Burned Peak Flow Rate (cfs)	0.0942
24-Hr Clear Runoff Volume (ac-ft)	0.0526
24-Hr Clear Runoff Volume (cu-ft)	2289.8874



Peak Flow Hydrologic Analysis

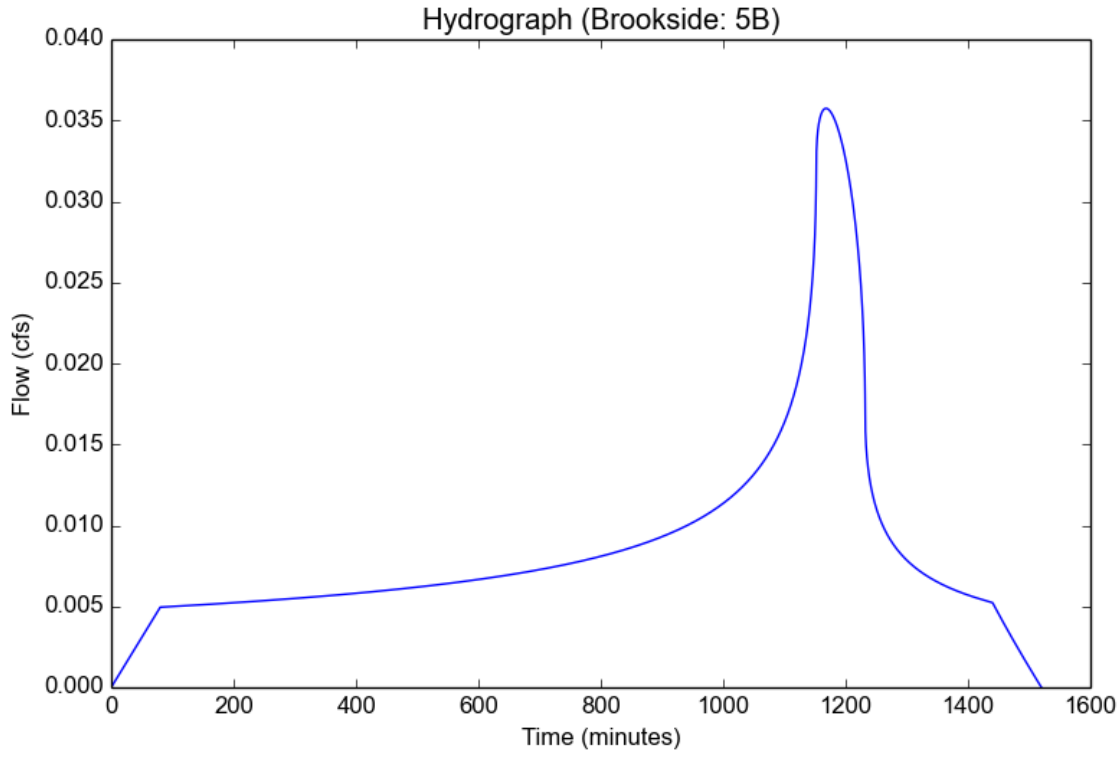
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.5-in Storm/Brookside - 5B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5B
Area (ac)	1.47
Flow Path Length (ft)	542.7
Flow Path Slope (vft/hft)	0.0129
85th Percentile Rainfall Depth (in)	0.5
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.5
Peak Intensity (in/hr)	0.081
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	80.0
Clear Peak Flow Rate (cfs)	0.0357
Burned Peak Flow Rate (cfs)	0.0357
24-Hr Clear Runoff Volume (ac-ft)	0.0182
24-Hr Clear Runoff Volume (cu-ft)	793.867



Peak Flow Hydrologic Analysis

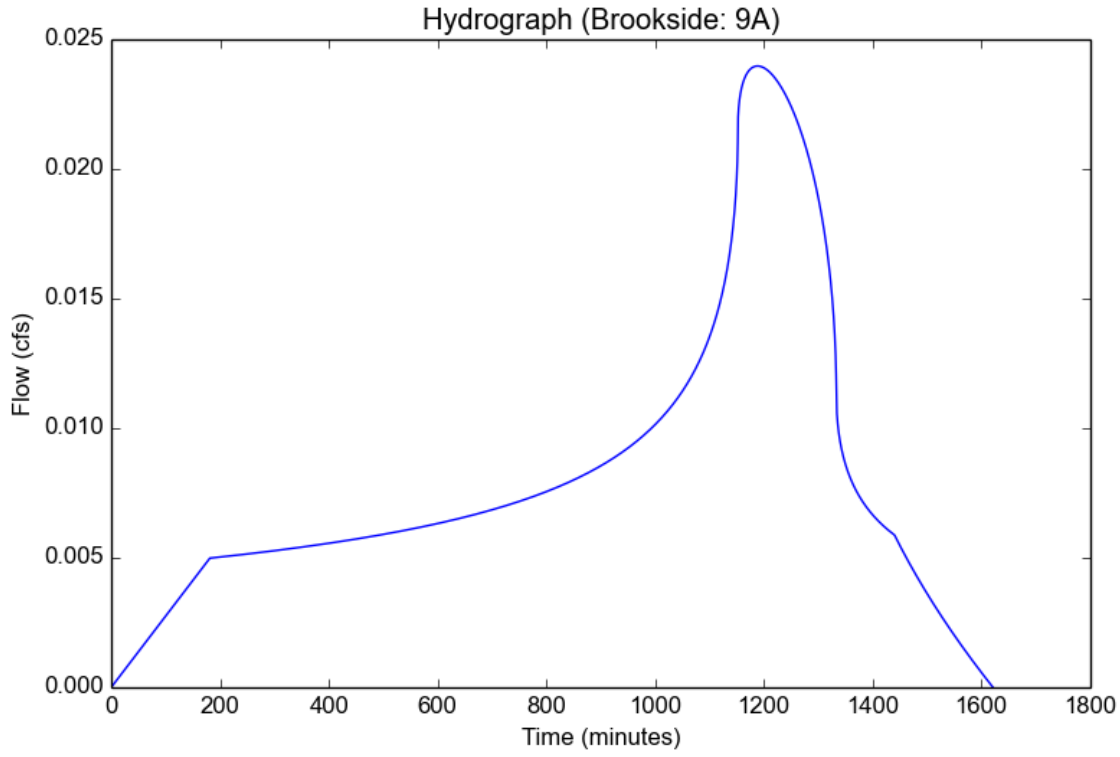
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.5-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	4.02
Flow Path Length (ft)	958.0
Flow Path Slope (vft/hft)	0.05323
85th Percentile Rainfall Depth (in)	0.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.5
Peak Intensity (in/hr)	0.0552
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	181.0
Clear Peak Flow Rate (cfs)	0.024
Burned Peak Flow Rate (cfs)	0.024
24-Hr Clear Runoff Volume (ac-ft)	0.0179
24-Hr Clear Runoff Volume (cu-ft)	781.8503



Peak Flow Hydrologic Analysis

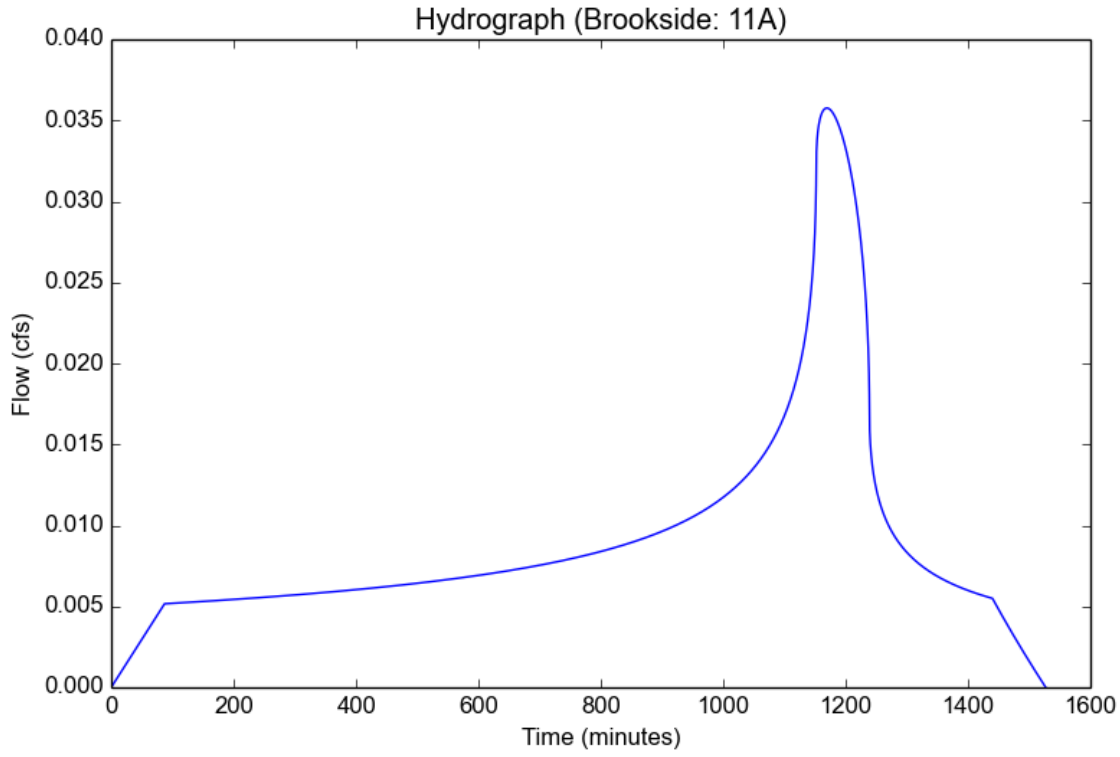
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.5-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	1.53
Flow Path Length (ft)	494.1
Flow Path Slope (vft/hft)	0.00607
85th Percentile Rainfall Depth (in)	0.5
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.5
Peak Intensity (in/hr)	0.0779
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	87.0
Clear Peak Flow Rate (cfs)	0.0358
Burned Peak Flow Rate (cfs)	0.0358
24-Hr Clear Runoff Volume (ac-ft)	0.019
24-Hr Clear Runoff Volume (cu-ft)	826.2829



Peak Flow Hydrologic Analysis

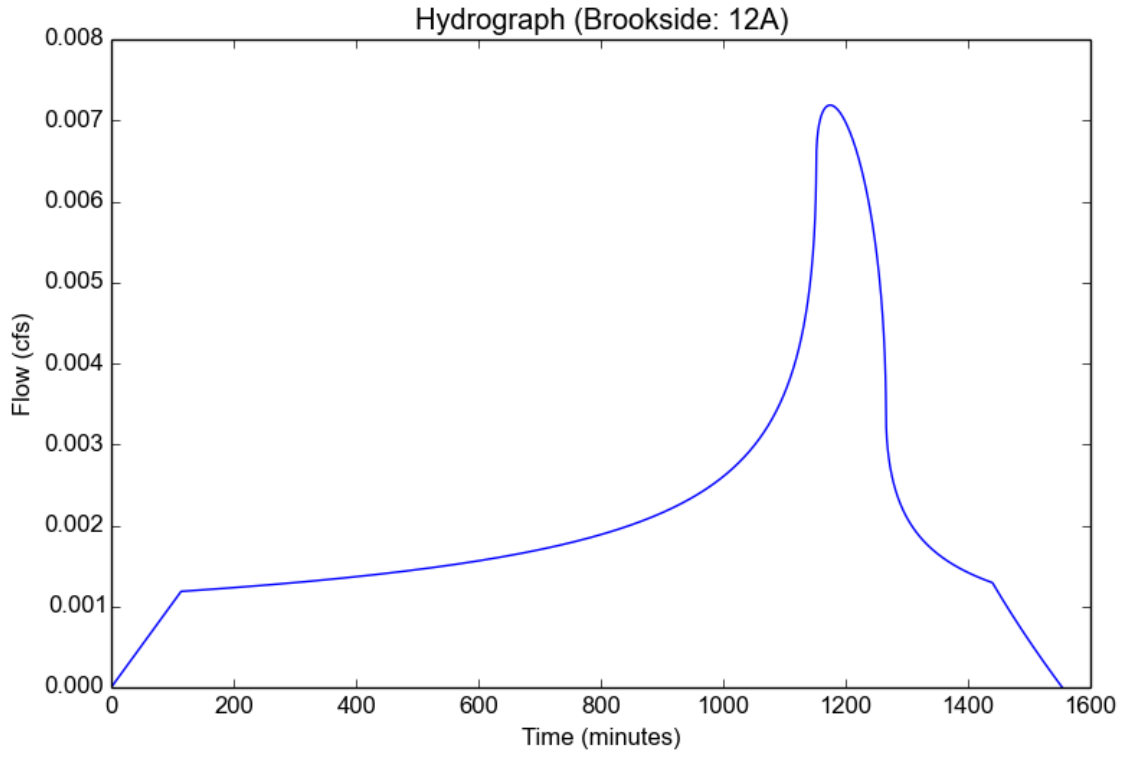
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.5-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.97
Flow Path Length (ft)	512.5
Flow Path Slope (vft/hft)	0.07414
85th Percentile Rainfall Depth (in)	0.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.5
Peak Intensity (in/hr)	0.0686
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	114.0
Clear Peak Flow Rate (cfs)	0.0072
Burned Peak Flow Rate (cfs)	0.0072
24-Hr Clear Runoff Volume (ac-ft)	0.0043
24-Hr Clear Runoff Volume (cu-ft)	188.6011



Peak Flow Hydrologic Analysis

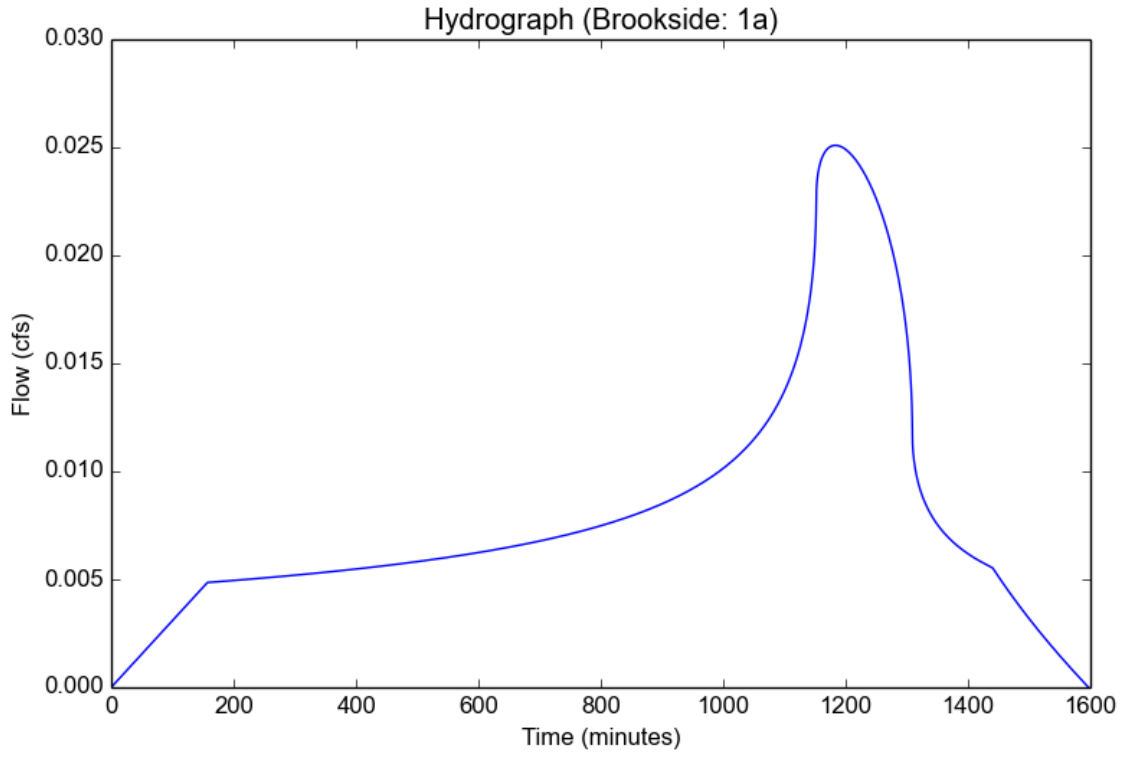
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.6-in Storm/Brookside - 1a.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1a
Area (ac)	3.28
Flow Path Length (ft)	866.7
Flow Path Slope (vft/hft)	0.04038
85th Percentile Rainfall Depth (in)	0.6
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.6
Peak Intensity (in/hr)	0.0708
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	157.0
Clear Peak Flow Rate (cfs)	0.0251
Burned Peak Flow Rate (cfs)	0.0251
24-Hr Clear Runoff Volume (ac-ft)	0.0176
24-Hr Clear Runoff Volume (cu-ft)	765.4207



Peak Flow Hydrologic Analysis

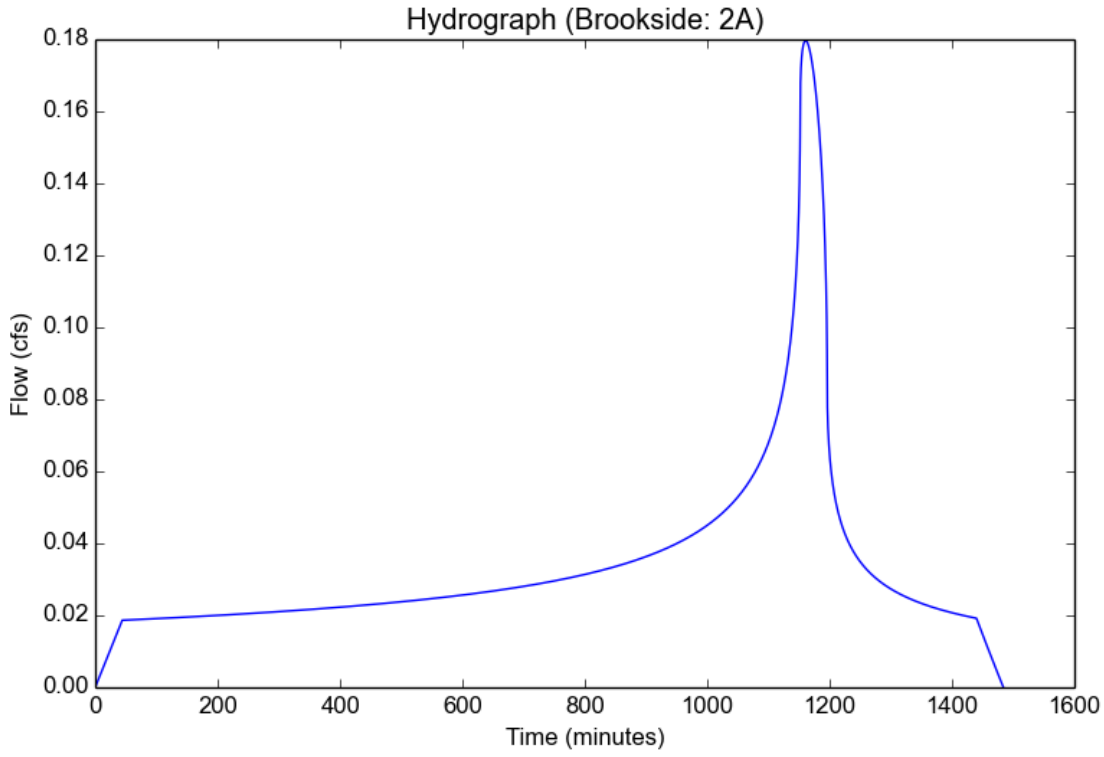
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.6-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	2.75
Flow Path Length (ft)	652.4
Flow Path Slope (vft/hft)	0.04599
85th Percentile Rainfall Depth (in)	0.6
Percent Impervious	0.509
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.6
Peak Intensity (in/hr)	0.1288
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.5072
Time of Concentration (min)	44.0
Clear Peak Flow Rate (cfs)	0.1797
Burned Peak Flow Rate (cfs)	0.1797
24-Hr Clear Runoff Volume (ac-ft)	0.0692
24-Hr Clear Runoff Volume (cu-ft)	3012.8431



Peak Flow Hydrologic Analysis

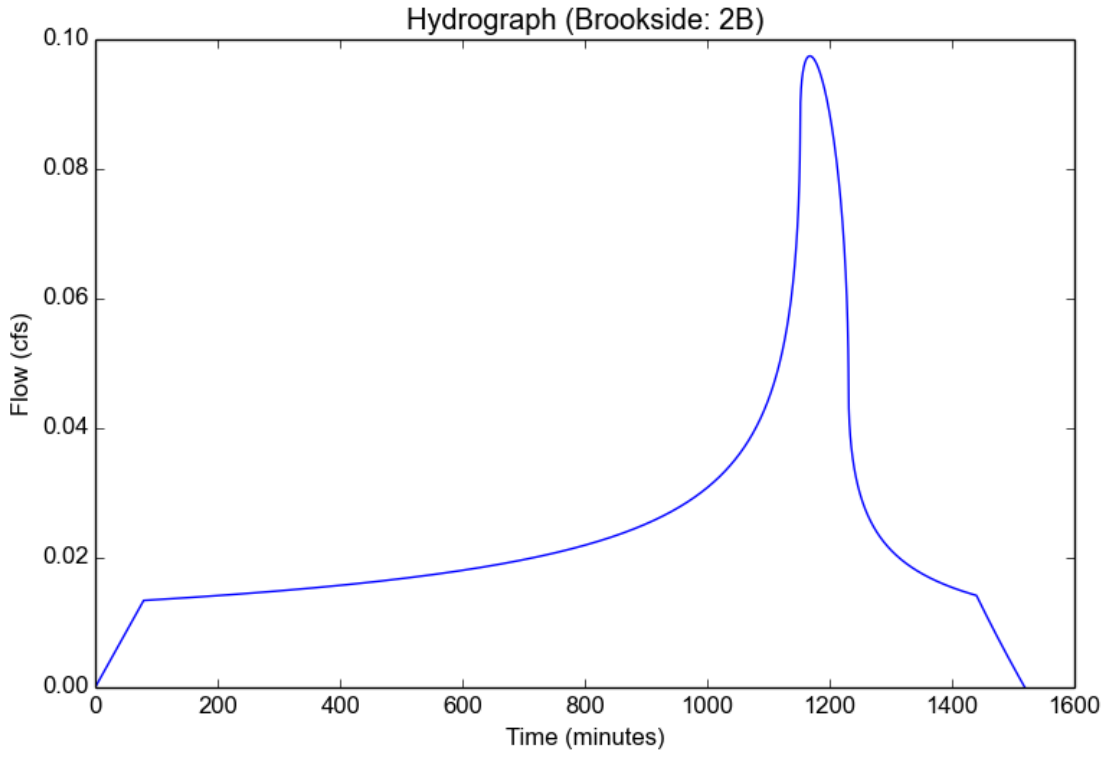
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.6-in Storm/Brookside - 2B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2B
Area (ac)	3.32
Flow Path Length (ft)	861.6
Flow Path Slope (vft/hft)	0.03714
85th Percentile Rainfall Depth (in)	0.6
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.6
Peak Intensity (in/hr)	0.0978
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	79.0
Clear Peak Flow Rate (cfs)	0.0974
Burned Peak Flow Rate (cfs)	0.0974
24-Hr Clear Runoff Volume (ac-ft)	0.0494
24-Hr Clear Runoff Volume (cu-ft)	2151.5369



Peak Flow Hydrologic Analysis

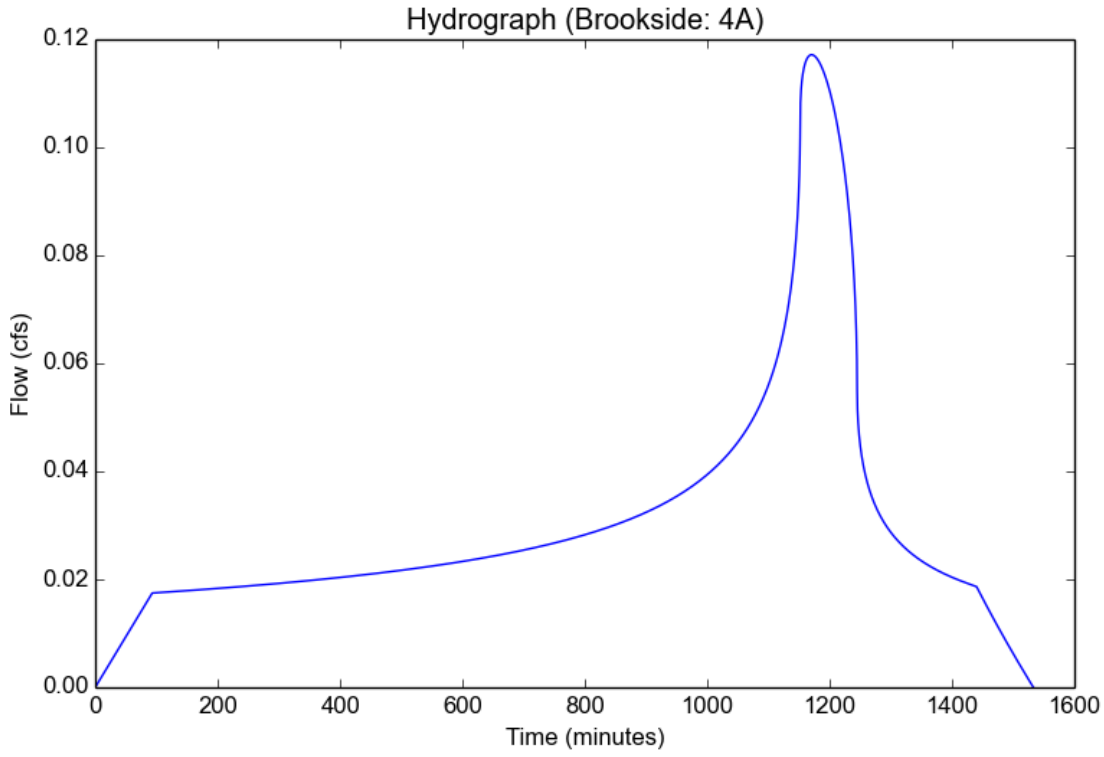
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.6-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	4.31
Flow Path Length (ft)	796.6
Flow Path Slope (vft/hft)	0.0113
85th Percentile Rainfall Depth (in)	0.6
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.6
Peak Intensity (in/hr)	0.0906
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	93.0
Clear Peak Flow Rate (cfs)	0.1172
Burned Peak Flow Rate (cfs)	0.1172
24-Hr Clear Runoff Volume (ac-ft)	0.0641
24-Hr Clear Runoff Volume (cu-ft)	2793.2013



Peak Flow Hydrologic Analysis

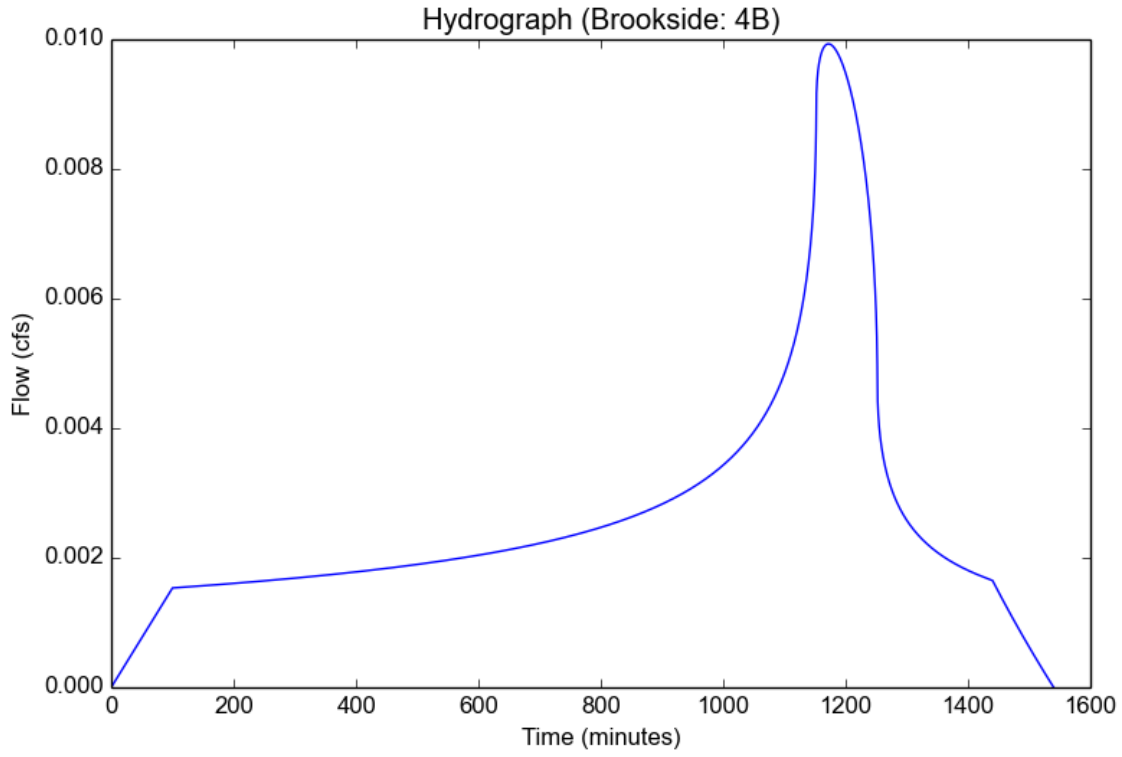
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.6-in Storm/Brookside - 4B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4B
Area (ac)	1.05
Flow Path Length (ft)	377.9
Flow Path Slope (vft/hft)	0.02646
85th Percentile Rainfall Depth (in)	0.6
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.6
Peak Intensity (in/hr)	0.0876
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	100.0
Clear Peak Flow Rate (cfs)	0.0099
Burned Peak Flow Rate (cfs)	0.0099
24-Hr Clear Runoff Volume (ac-ft)	0.0056
24-Hr Clear Runoff Volume (cu-ft)	244.9767



Peak Flow Hydrologic Analysis

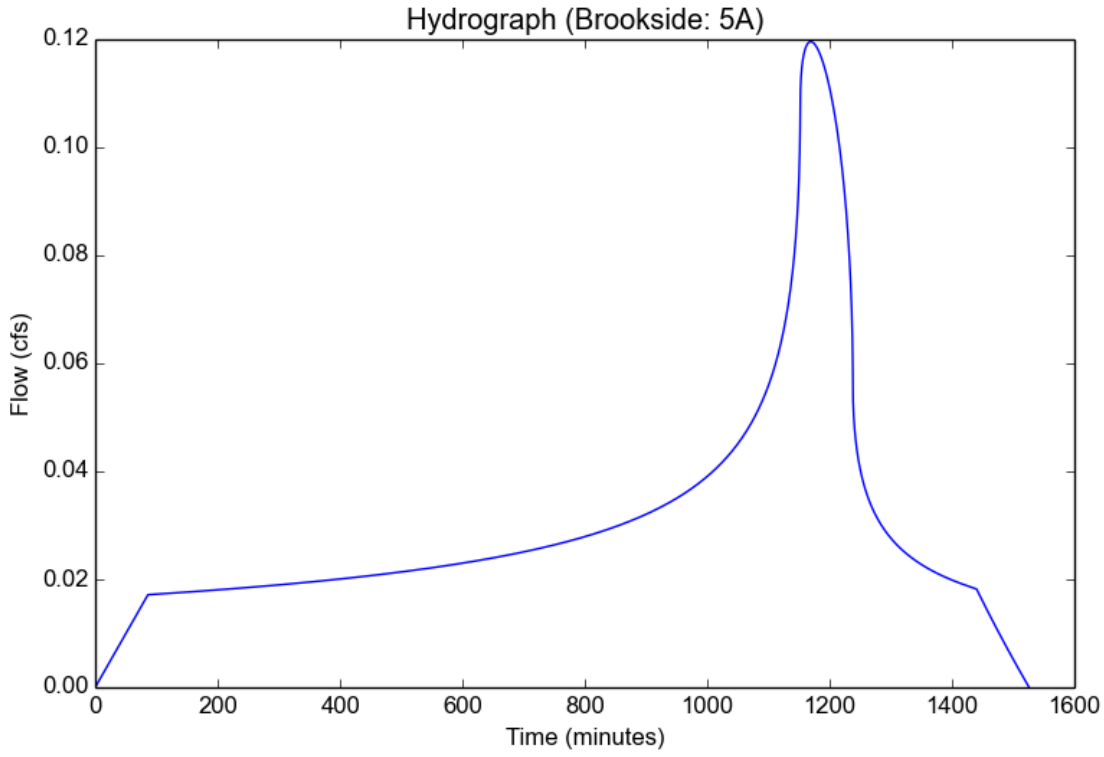
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.6-in Storm/Brookside - 5A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5A
Area (ac)	4.24
Flow Path Length (ft)	954.1
Flow Path Slope (vft/hft)	0.03354
85th Percentile Rainfall Depth (in)	0.6
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.6
Peak Intensity (in/hr)	0.094
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	86.0
Clear Peak Flow Rate (cfs)	0.1196
Burned Peak Flow Rate (cfs)	0.1196
24-Hr Clear Runoff Volume (ac-ft)	0.0631
24-Hr Clear Runoff Volume (cu-ft)	2747.7891



Peak Flow Hydrologic Analysis

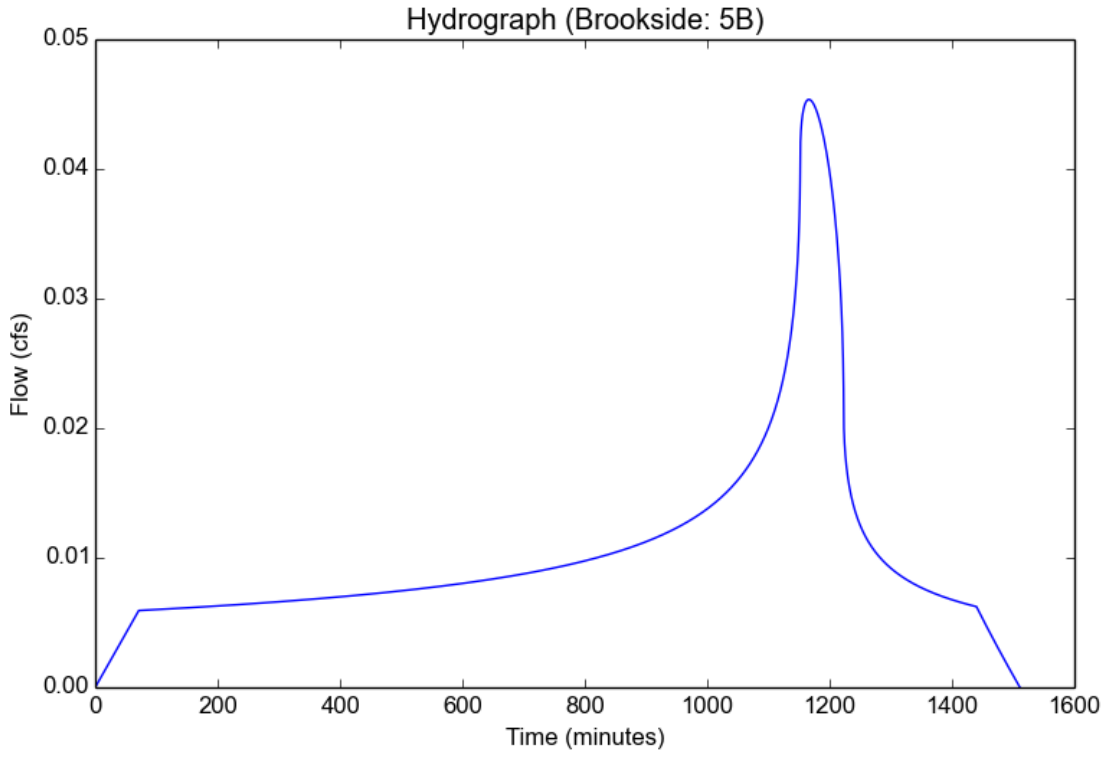
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.6-in Storm/Brookside - 5B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5B
Area (ac)	1.47
Flow Path Length (ft)	542.7
Flow Path Slope (vft/hft)	0.0129
85th Percentile Rainfall Depth (in)	0.6
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.6
Peak Intensity (in/hr)	0.1029
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	71.0
Clear Peak Flow Rate (cfs)	0.0454
Burned Peak Flow Rate (cfs)	0.0454
24-Hr Clear Runoff Volume (ac-ft)	0.0219
24-Hr Clear Runoff Volume (cu-ft)	952.6229



Peak Flow Hydrologic Analysis

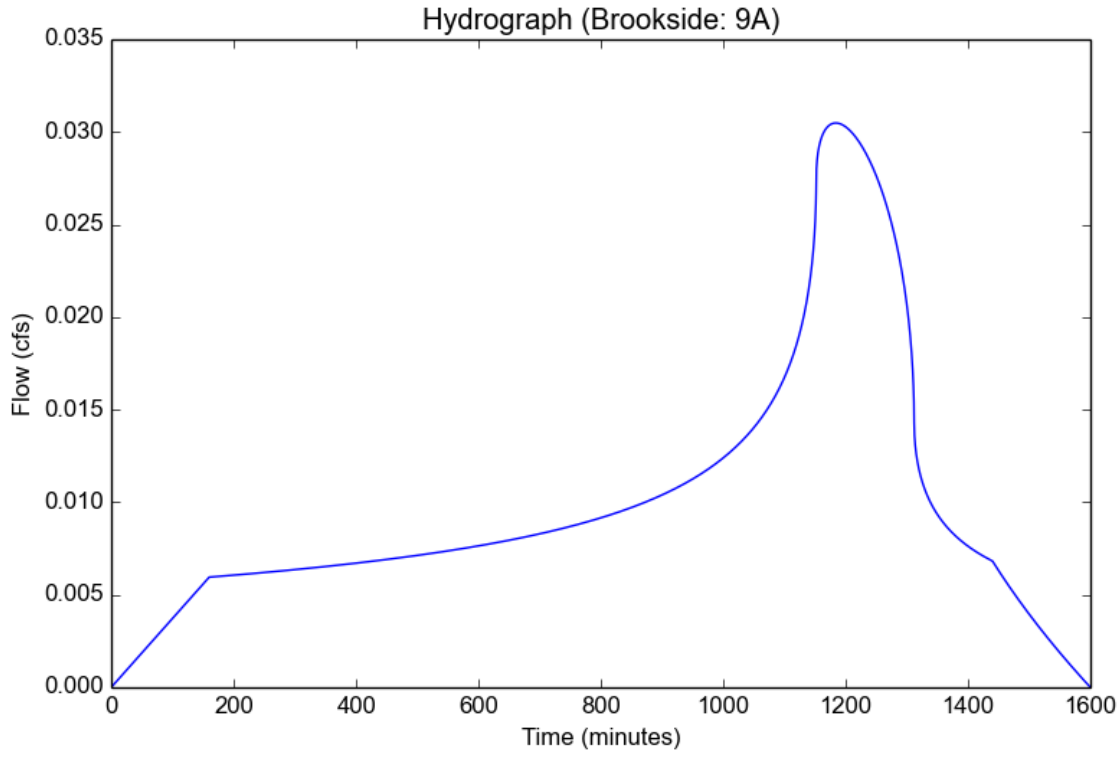
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.6-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	4.02
Flow Path Length (ft)	958.0
Flow Path Slope (vft/hft)	0.05323
85th Percentile Rainfall Depth (in)	0.6
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.6
Peak Intensity (in/hr)	0.0702
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	160.0
Clear Peak Flow Rate (cfs)	0.0305
Burned Peak Flow Rate (cfs)	0.0305
24-Hr Clear Runoff Volume (ac-ft)	0.0215
24-Hr Clear Runoff Volume (cu-ft)	938.1202



Peak Flow Hydrologic Analysis

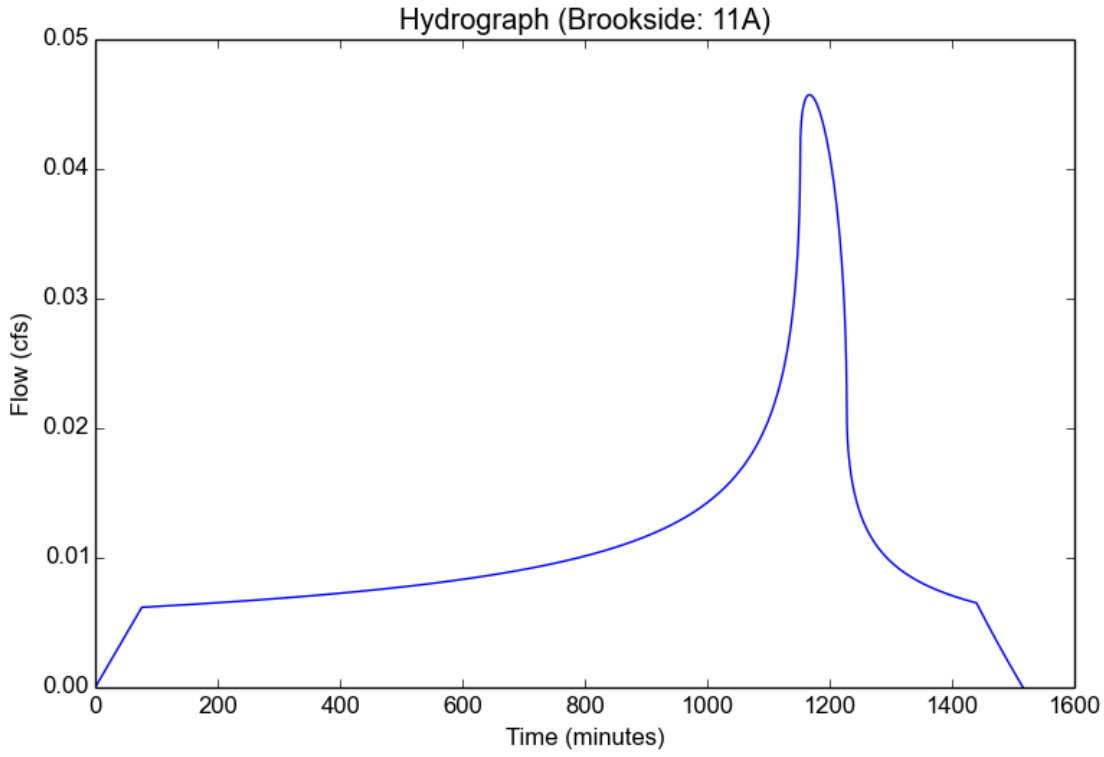
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.6-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	1.53
Flow Path Length (ft)	494.1
Flow Path Slope (vft/hft)	0.00607
85th Percentile Rainfall Depth (in)	0.6
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.6
Peak Intensity (in/hr)	0.0996
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	76.0
Clear Peak Flow Rate (cfs)	0.0457
Burned Peak Flow Rate (cfs)	0.0457
24-Hr Clear Runoff Volume (ac-ft)	0.0228
24-Hr Clear Runoff Volume (cu-ft)	991.5153



Peak Flow Hydrologic Analysis

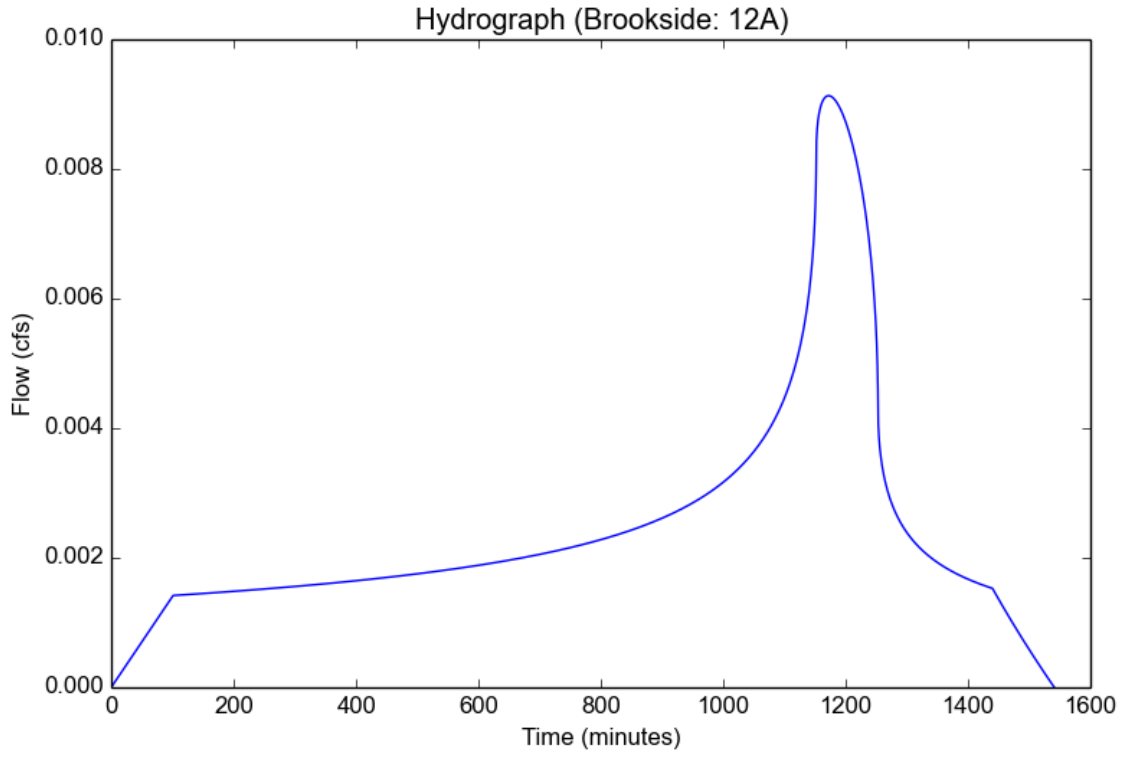
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.6-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.97
Flow Path Length (ft)	512.5
Flow Path Slope (vft/hft)	0.07414
85th Percentile Rainfall Depth (in)	0.6
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.6
Peak Intensity (in/hr)	0.0872
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	101.0
Clear Peak Flow Rate (cfs)	0.0091
Burned Peak Flow Rate (cfs)	0.0091
24-Hr Clear Runoff Volume (ac-ft)	0.0052
24-Hr Clear Runoff Volume (cu-ft)	226.3125



Peak Flow Hydrologic Analysis

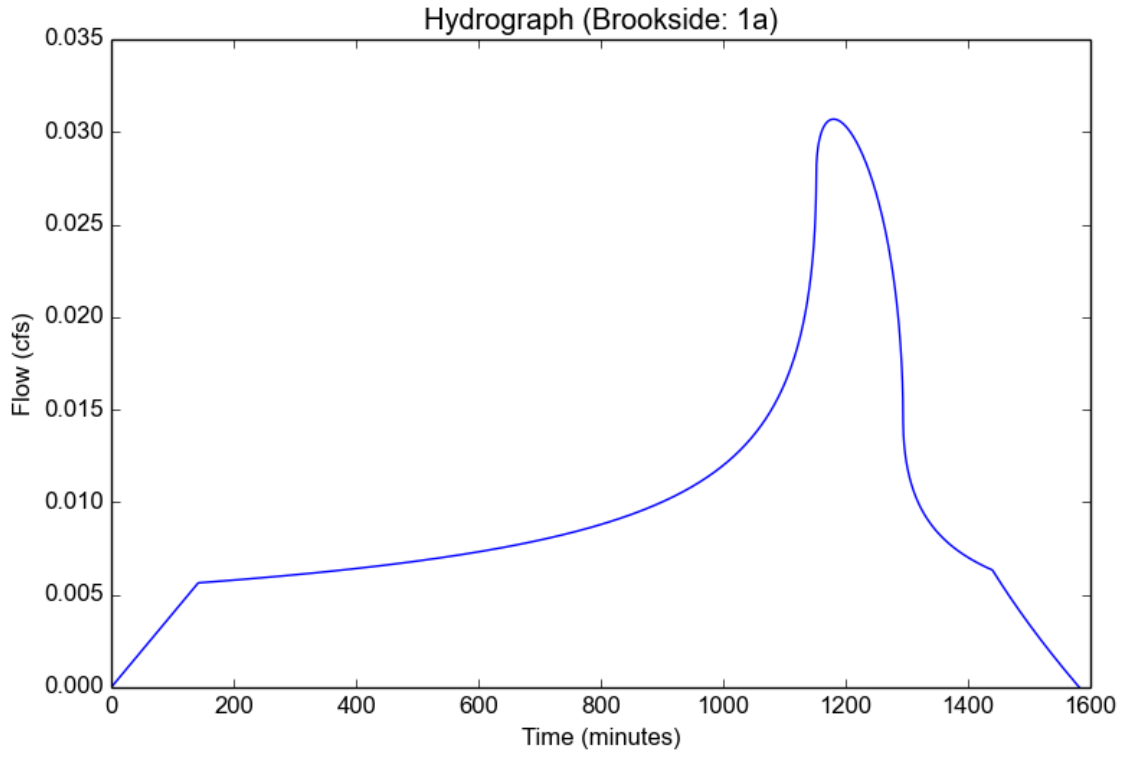
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.7-in Storm/Brookside - 1a.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1a
Area (ac)	3.28
Flow Path Length (ft)	866.7
Flow Path Slope (vft/hft)	0.04038
85th Percentile Rainfall Depth (in)	0.7
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.7
Peak Intensity (in/hr)	0.0866
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	142.0
Clear Peak Flow Rate (cfs)	0.0307
Burned Peak Flow Rate (cfs)	0.0307
24-Hr Clear Runoff Volume (ac-ft)	0.0205
24-Hr Clear Runoff Volume (cu-ft)	892.9325



Peak Flow Hydrologic Analysis

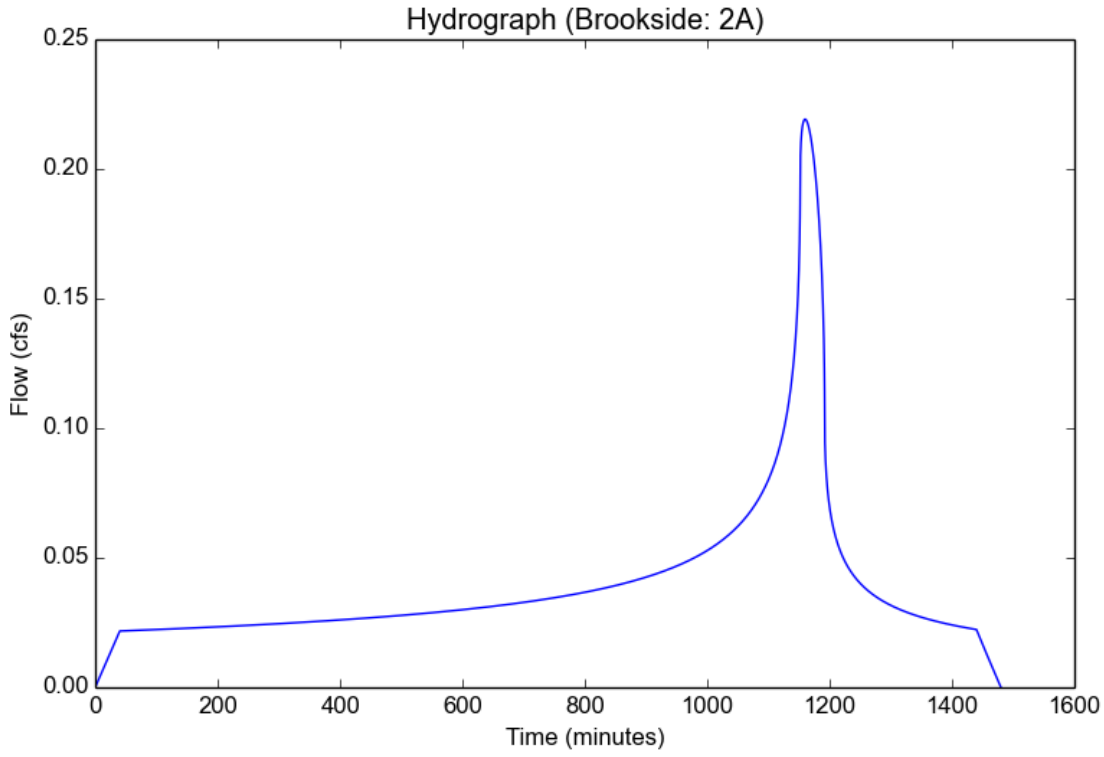
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.7-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	2.75
Flow Path Length (ft)	652.4
Flow Path Slope (vft/hft)	0.04599
85th Percentile Rainfall Depth (in)	0.7
Percent Impervious	0.509
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.7
Peak Intensity (in/hr)	0.1572
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.5072
Time of Concentration (min)	40.0
Clear Peak Flow Rate (cfs)	0.2192
Burned Peak Flow Rate (cfs)	0.2192
24-Hr Clear Runoff Volume (ac-ft)	0.0807
24-Hr Clear Runoff Volume (cu-ft)	3514.9682



Peak Flow Hydrologic Analysis

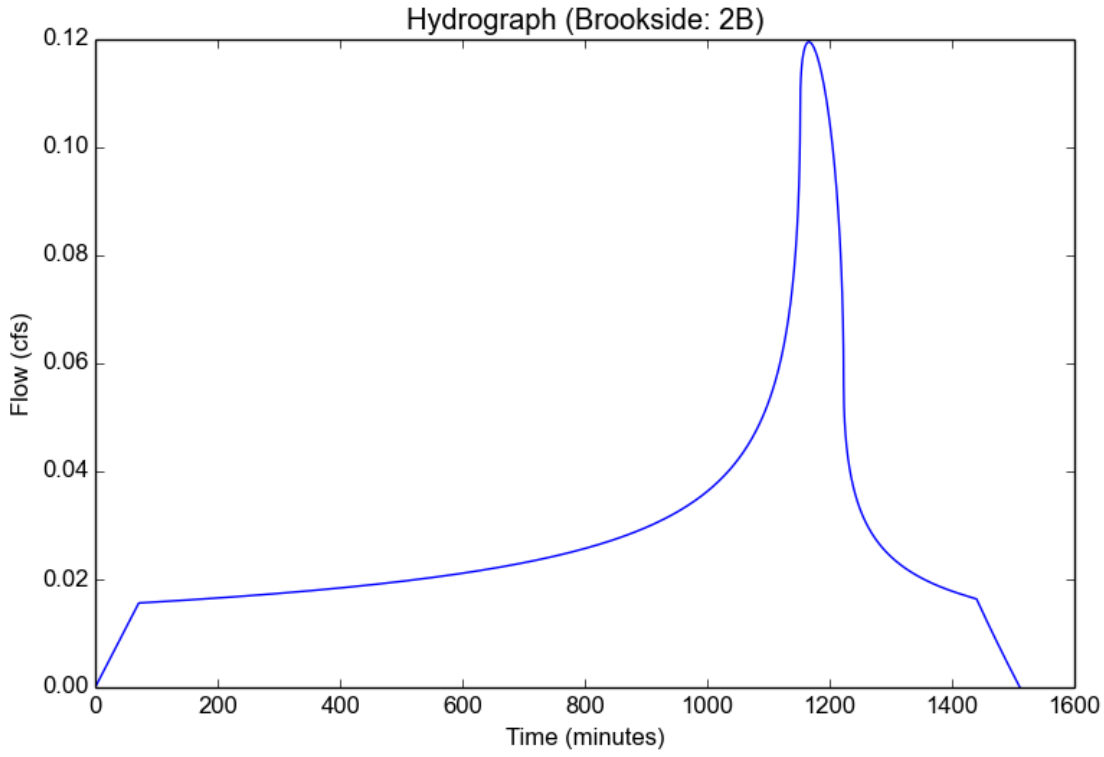
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.7-in Storm/Brookside - 2B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2B
Area (ac)	3.32
Flow Path Length (ft)	861.6
Flow Path Slope (vft/hft)	0.03714
85th Percentile Rainfall Depth (in)	0.7
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.7
Peak Intensity (in/hr)	0.12
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	71.0
Clear Peak Flow Rate (cfs)	0.1195
Burned Peak Flow Rate (cfs)	0.1195
24-Hr Clear Runoff Volume (ac-ft)	0.0576
24-Hr Clear Runoff Volume (cu-ft)	2510.0864



Peak Flow Hydrologic Analysis

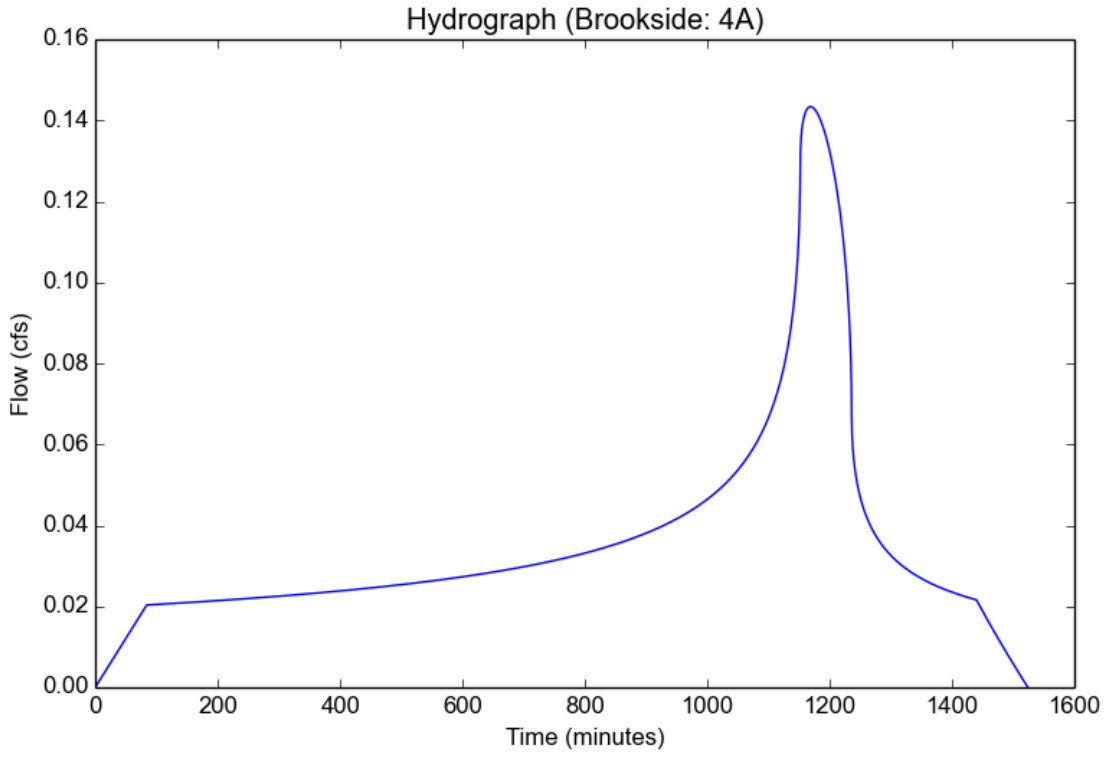
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.7-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	4.31
Flow Path Length (ft)	796.6
Flow Path Slope (vft/hft)	0.0113
85th Percentile Rainfall Depth (in)	0.7
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.7
Peak Intensity (in/hr)	0.1109
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	84.0
Clear Peak Flow Rate (cfs)	0.1434
Burned Peak Flow Rate (cfs)	0.1434
24-Hr Clear Runoff Volume (ac-ft)	0.0748
24-Hr Clear Runoff Volume (cu-ft)	3258.664



Peak Flow Hydrologic Analysis

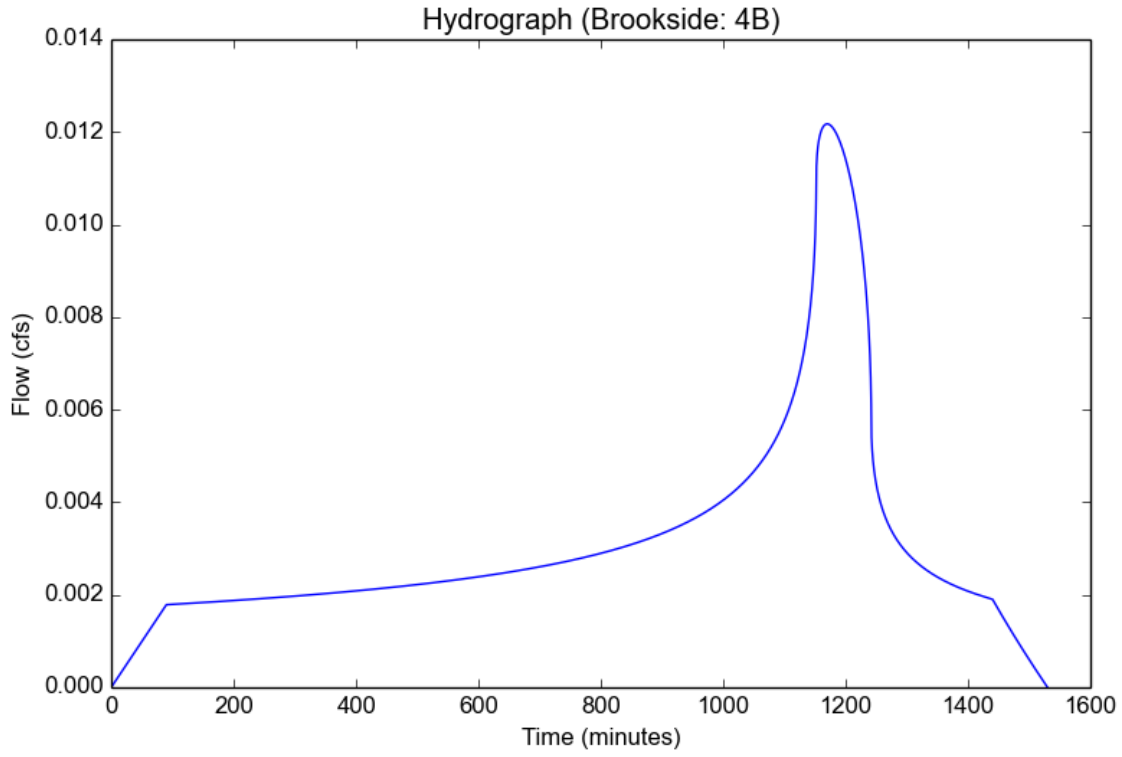
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.7-in Storm/Brookside - 4B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4B
Area (ac)	1.05
Flow Path Length (ft)	377.9
Flow Path Slope (vft/hft)	0.02646
85th Percentile Rainfall Depth (in)	0.7
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.7
Peak Intensity (in/hr)	0.1074
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	90.0
Clear Peak Flow Rate (cfs)	0.0122
Burned Peak Flow Rate (cfs)	0.0122
24-Hr Clear Runoff Volume (ac-ft)	0.0066
24-Hr Clear Runoff Volume (cu-ft)	285.7987



Peak Flow Hydrologic Analysis

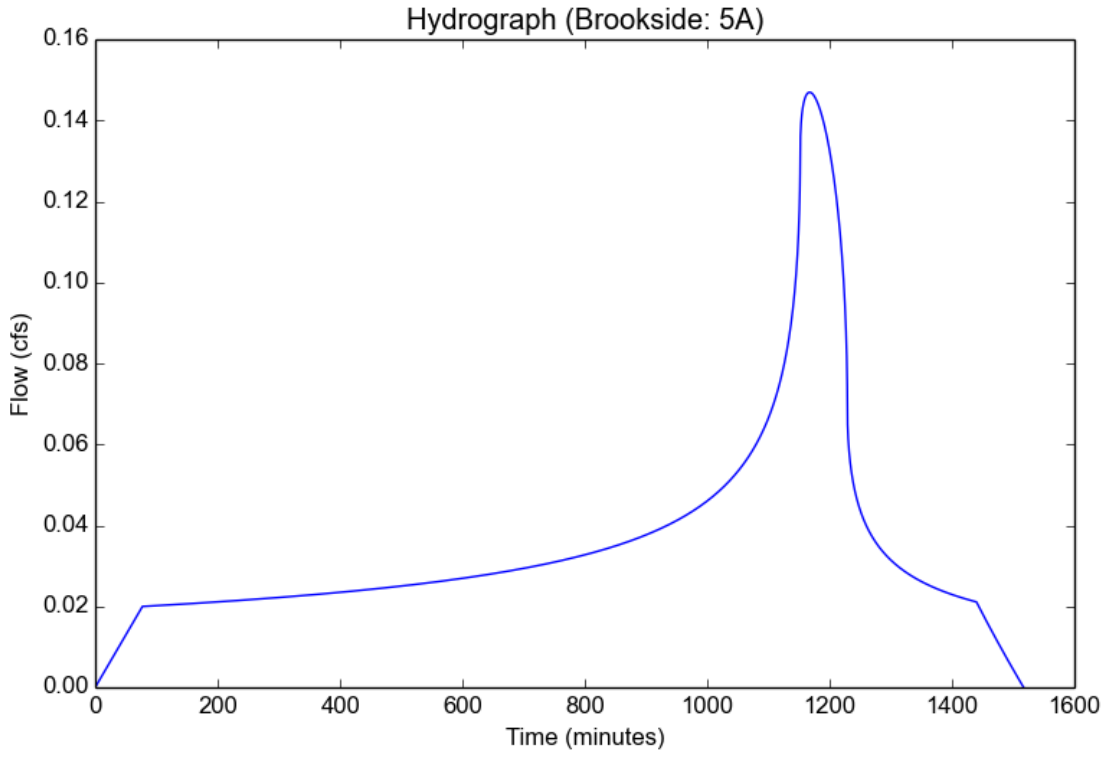
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.7-in Storm/Brookside - 5A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5A
Area (ac)	4.24
Flow Path Length (ft)	954.1
Flow Path Slope (vft/hft)	0.03354
85th Percentile Rainfall Depth (in)	0.7
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.7
Peak Intensity (in/hr)	0.1155
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	77.0
Clear Peak Flow Rate (cfs)	0.1469
Burned Peak Flow Rate (cfs)	0.1469
24-Hr Clear Runoff Volume (ac-ft)	0.0736
24-Hr Clear Runoff Volume (cu-ft)	3205.6901



Peak Flow Hydrologic Analysis

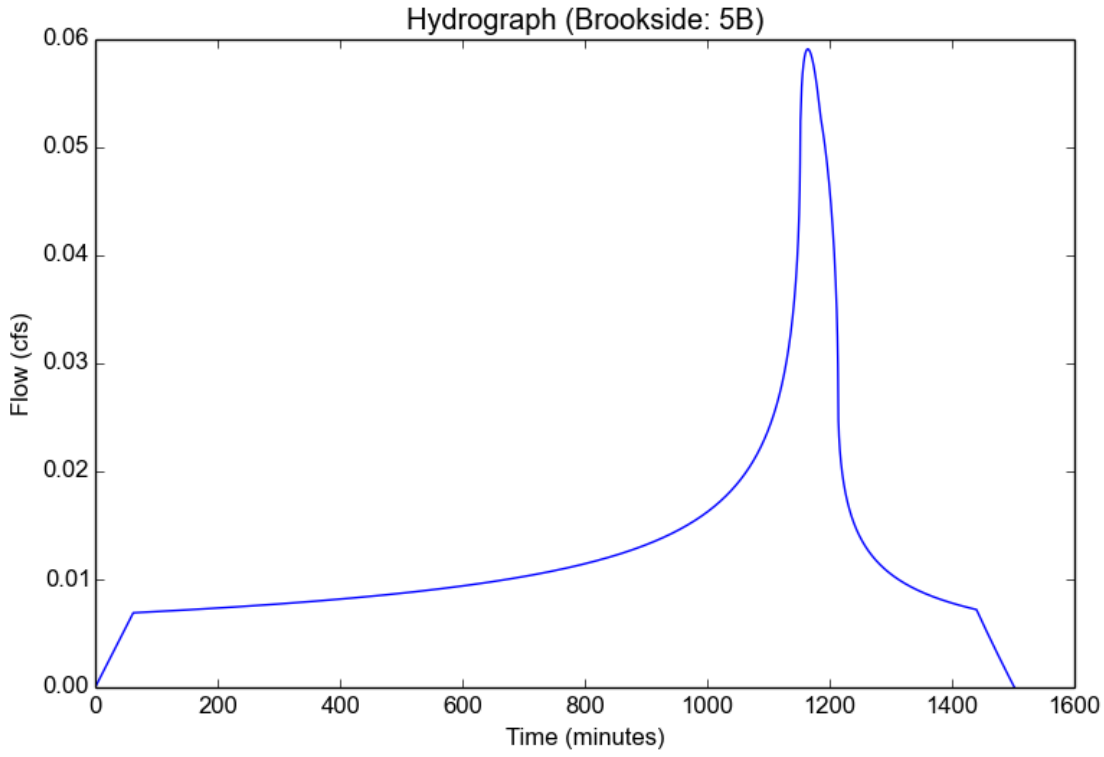
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.7-in Storm/Brookside - 5B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5B
Area (ac)	1.47
Flow Path Length (ft)	542.7
Flow Path Slope (vft/hft)	0.0129
85th Percentile Rainfall Depth (in)	0.7
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.7
Peak Intensity (in/hr)	0.1279
Undeveloped Runoff Coefficient (Cu)	0.1191
Developed Runoff Coefficient (Cd)	0.3144
Time of Concentration (min)	62.0
Clear Peak Flow Rate (cfs)	0.0591
Burned Peak Flow Rate (cfs)	0.0591
24-Hr Clear Runoff Volume (ac-ft)	0.0256
24-Hr Clear Runoff Volume (cu-ft)	1114.9327



Peak Flow Hydrologic Analysis

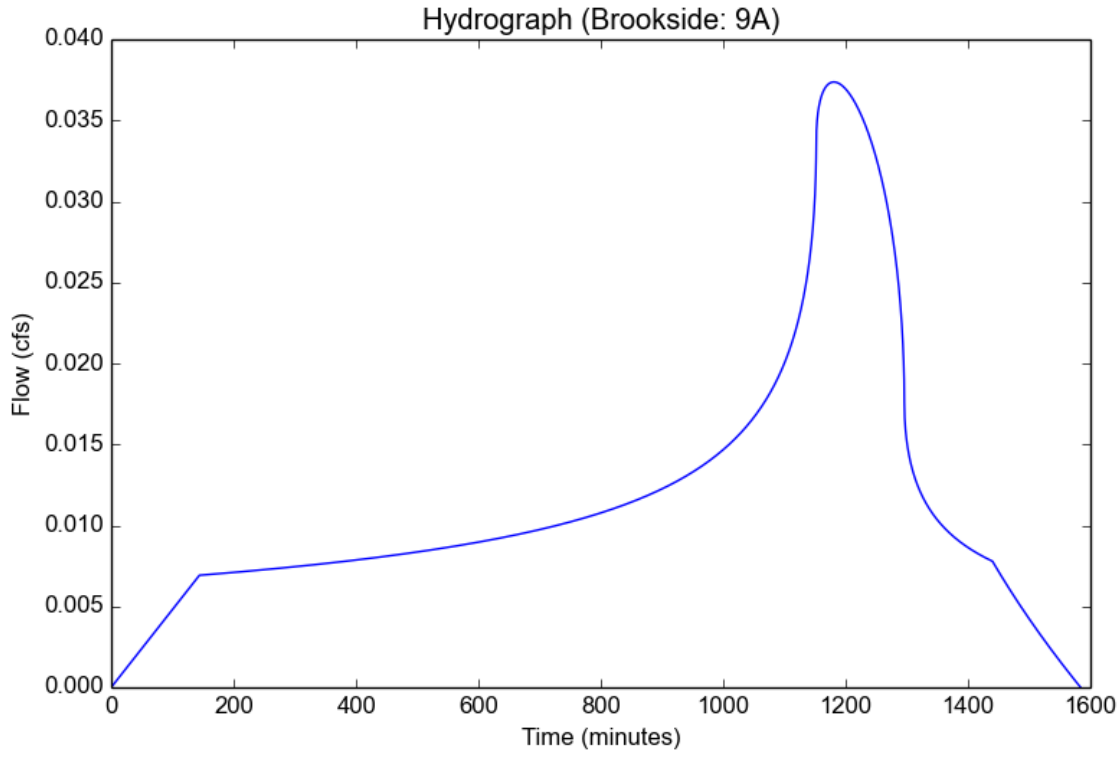
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.7-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	4.02
Flow Path Length (ft)	958.0
Flow Path Slope (vft/hft)	0.05323
85th Percentile Rainfall Depth (in)	0.7
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.7
Peak Intensity (in/hr)	0.0861
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	144.0
Clear Peak Flow Rate (cfs)	0.0374
Burned Peak Flow Rate (cfs)	0.0374
24-Hr Clear Runoff Volume (ac-ft)	0.0251
24-Hr Clear Runoff Volume (cu-ft)	1094.3958



Peak Flow Hydrologic Analysis

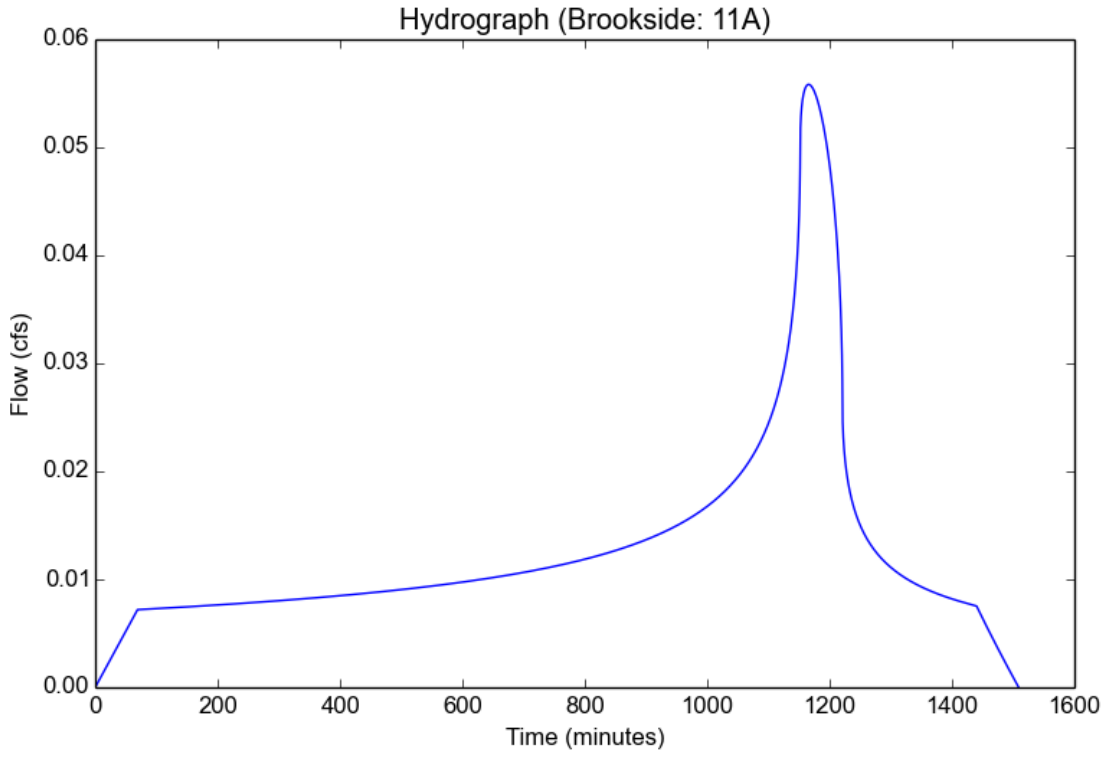
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.7-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	1.53
Flow Path Length (ft)	494.1
Flow Path Slope (vft/hft)	0.00607
85th Percentile Rainfall Depth (in)	0.7
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.7
Peak Intensity (in/hr)	0.1216
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	69.0
Clear Peak Flow Rate (cfs)	0.0558
Burned Peak Flow Rate (cfs)	0.0558
24-Hr Clear Runoff Volume (ac-ft)	0.0266
24-Hr Clear Runoff Volume (cu-ft)	1156.7521



Peak Flow Hydrologic Analysis

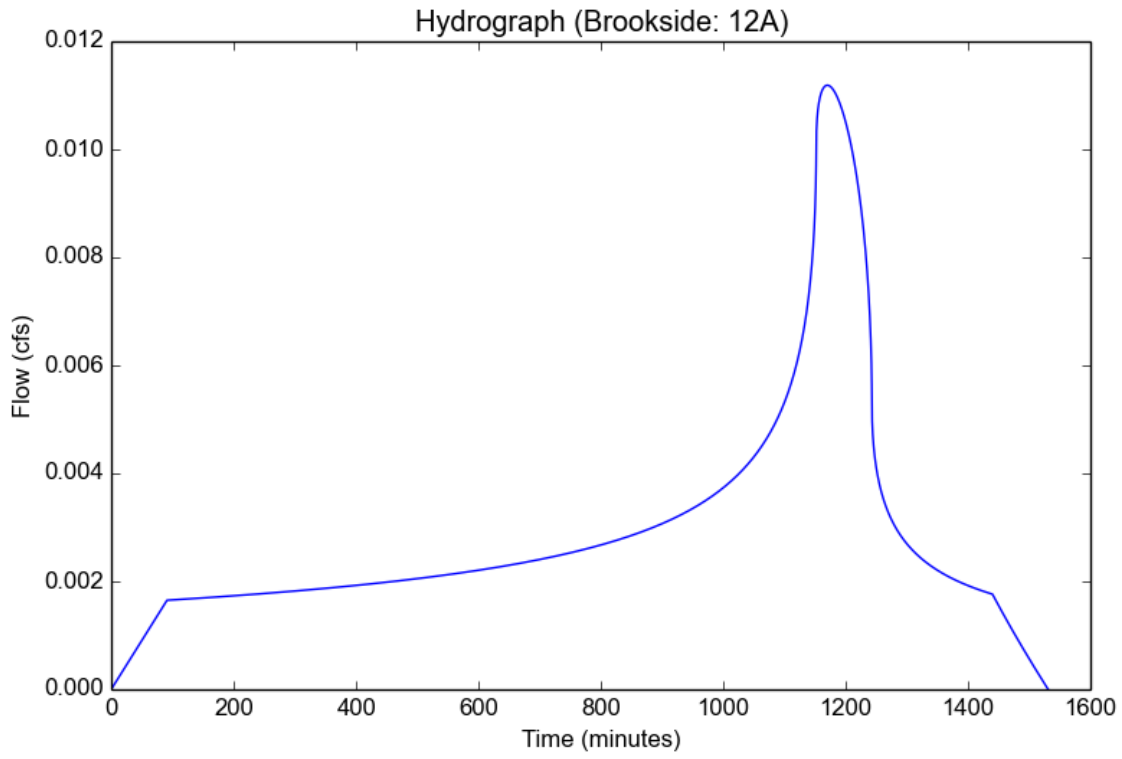
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.7-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.97
Flow Path Length (ft)	512.5
Flow Path Slope (vft/hft)	0.07414
85th Percentile Rainfall Depth (in)	0.7
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.7
Peak Intensity (in/hr)	0.1068
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	91.0
Clear Peak Flow Rate (cfs)	0.0112
Burned Peak Flow Rate (cfs)	0.0112
24-Hr Clear Runoff Volume (ac-ft)	0.0061
24-Hr Clear Runoff Volume (cu-ft)	264.0242



Peak Flow Hydrologic Analysis

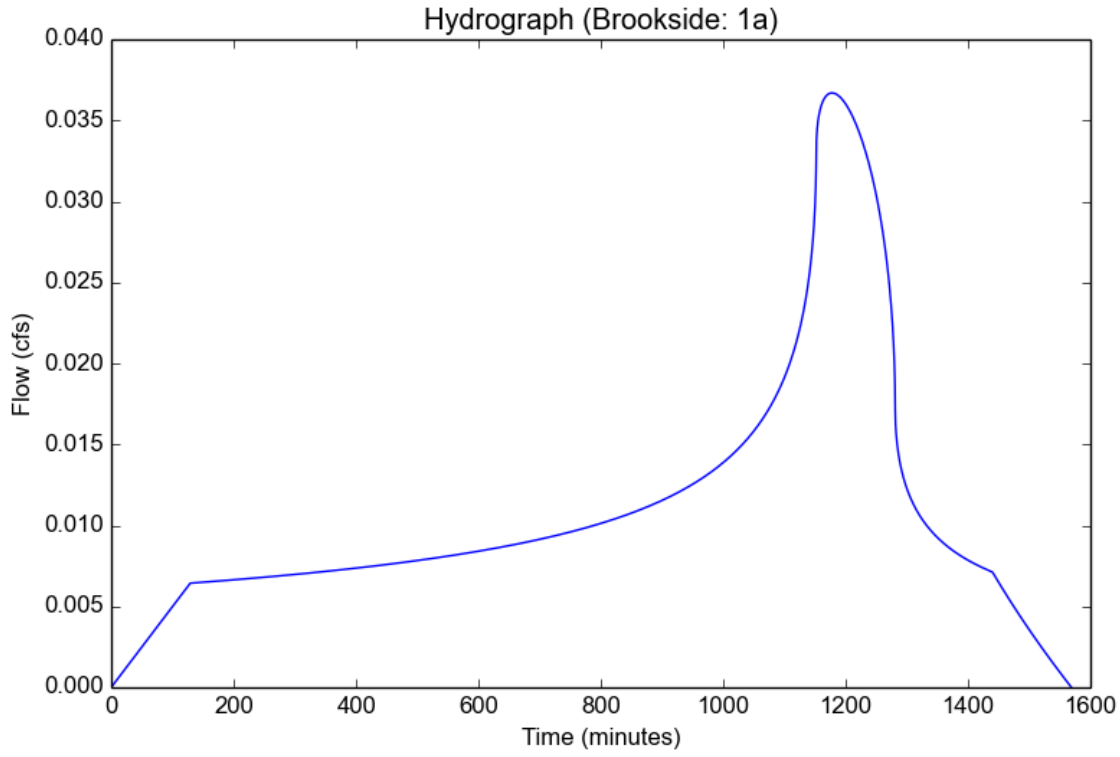
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.8-in Storm/Brookside - 1a.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1a
Area (ac)	3.28
Flow Path Length (ft)	866.7
Flow Path Slope (vft/hft)	0.04038
85th Percentile Rainfall Depth (in)	0.8
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.8
Peak Intensity (in/hr)	0.1036
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	129.0
Clear Peak Flow Rate (cfs)	0.0367
Burned Peak Flow Rate (cfs)	0.0367
24-Hr Clear Runoff Volume (ac-ft)	0.0234
24-Hr Clear Runoff Volume (cu-ft)	1020.4427



Peak Flow Hydrologic Analysis

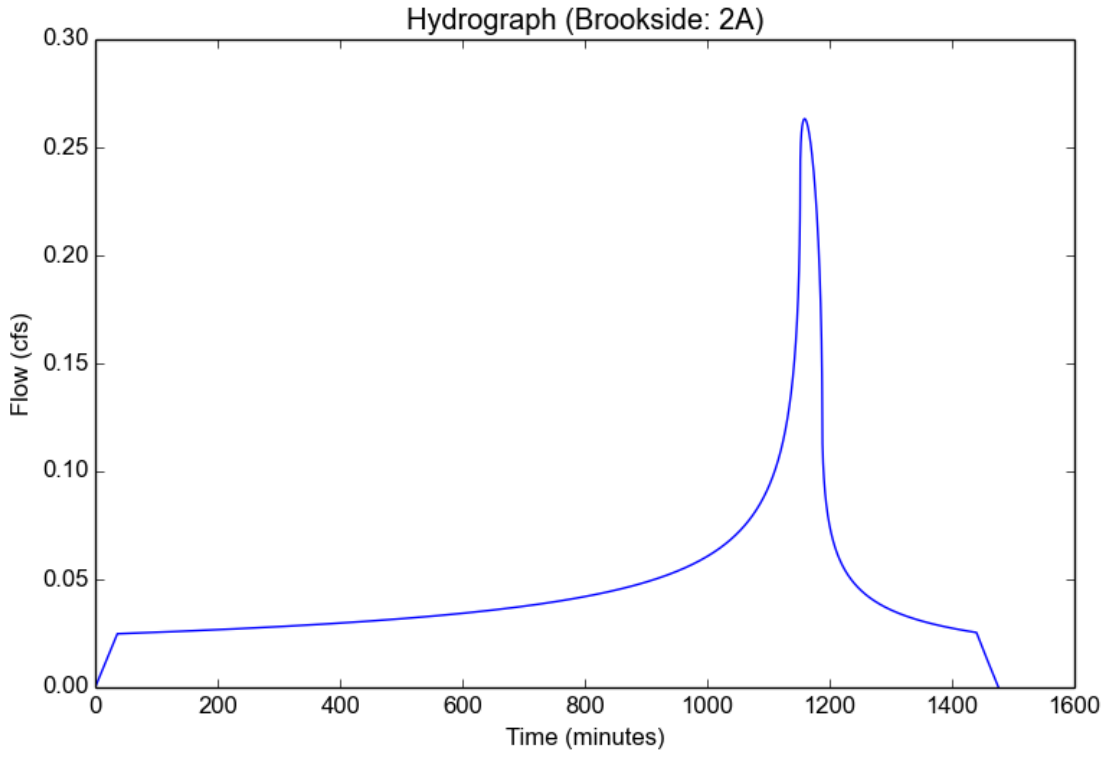
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.8-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	2.75
Flow Path Length (ft)	652.4
Flow Path Slope (vft/hft)	0.04599
85th Percentile Rainfall Depth (in)	0.8
Percent Impervious	0.509
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.8
Peak Intensity (in/hr)	0.1887
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.5072
Time of Concentration (min)	36.0
Clear Peak Flow Rate (cfs)	0.2632
Burned Peak Flow Rate (cfs)	0.2632
24-Hr Clear Runoff Volume (ac-ft)	0.0922
24-Hr Clear Runoff Volume (cu-ft)	4017.0907



Peak Flow Hydrologic Analysis

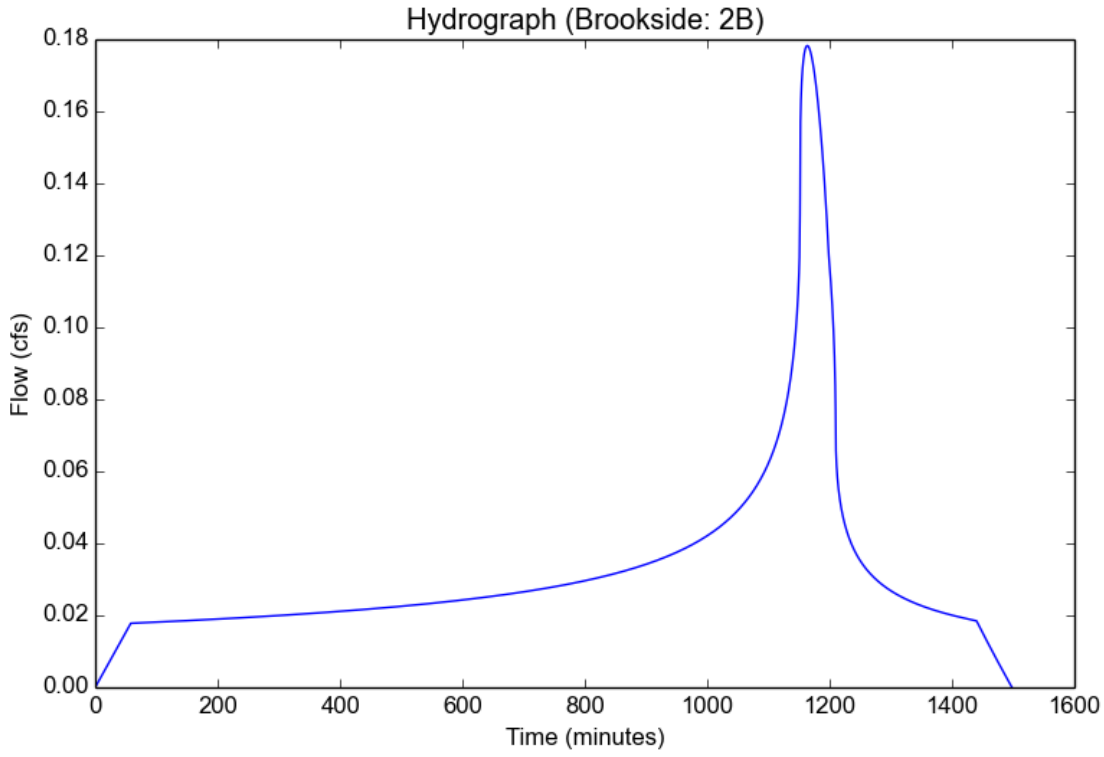
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.8-in Storm/Brookside - 2B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2B
Area (ac)	3.32
Flow Path Length (ft)	861.6
Flow Path Slope (vft/hft)	0.03714
85th Percentile Rainfall Depth (in)	0.8
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.8
Peak Intensity (in/hr)	0.1508
Undeveloped Runoff Coefficient (Cu)	0.1746
Developed Runoff Coefficient (Cd)	0.356
Time of Concentration (min)	58.0
Clear Peak Flow Rate (cfs)	0.1783
Burned Peak Flow Rate (cfs)	0.1783
24-Hr Clear Runoff Volume (ac-ft)	0.0671
24-Hr Clear Runoff Volume (cu-ft)	2924.186



Peak Flow Hydrologic Analysis

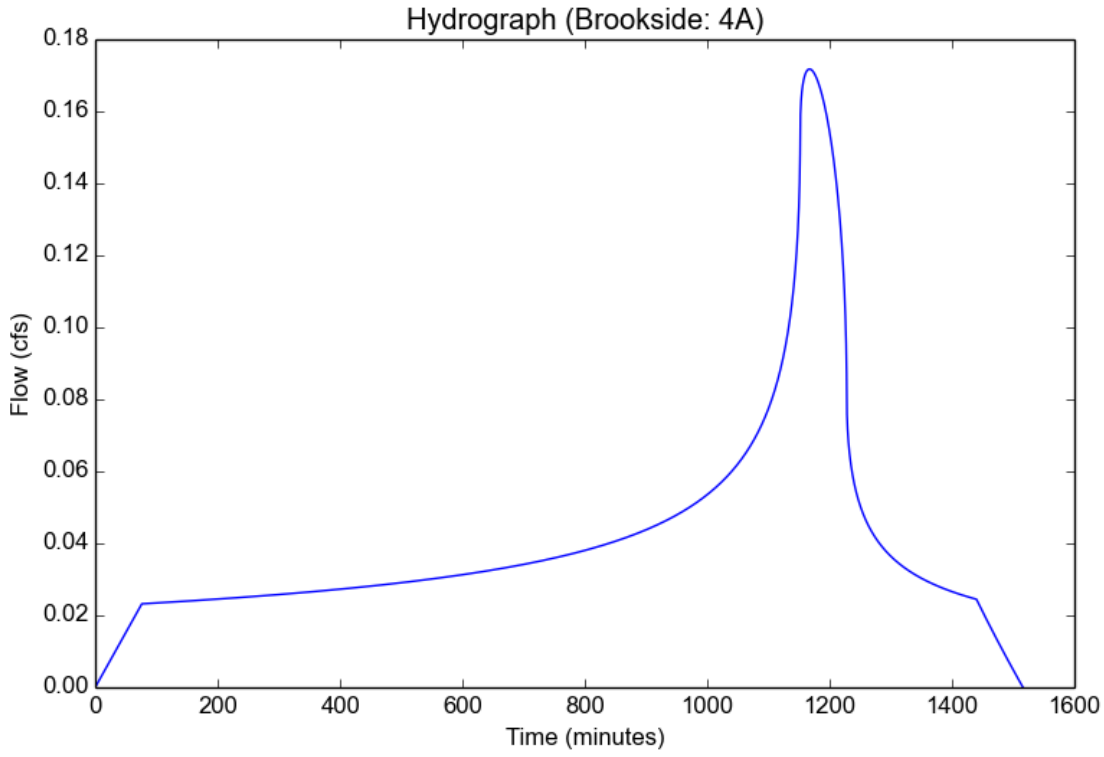
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.8-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	4.31
Flow Path Length (ft)	796.6
Flow Path Slope (vft/hft)	0.0113
85th Percentile Rainfall Depth (in)	0.8
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.8
Peak Intensity (in/hr)	0.1328
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	76.0
Clear Peak Flow Rate (cfs)	0.1718
Burned Peak Flow Rate (cfs)	0.1718
24-Hr Clear Runoff Volume (ac-ft)	0.0855
24-Hr Clear Runoff Volume (cu-ft)	3724.1229



Peak Flow Hydrologic Analysis

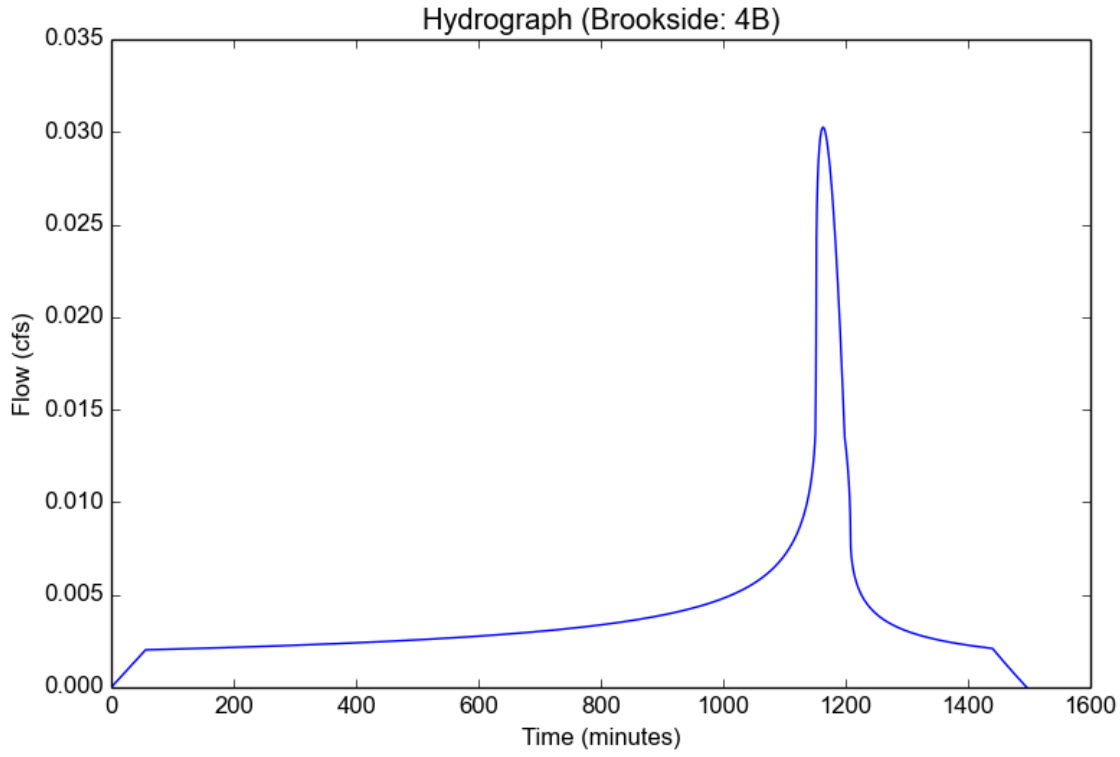
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.8-in Storm/Brookside - 4B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4B
Area (ac)	1.05
Flow Path Length (ft)	377.9
Flow Path Slope (vft/hft)	0.02646
85th Percentile Rainfall Depth (in)	0.8
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.8
Peak Intensity (in/hr)	0.1533
Undeveloped Runoff Coefficient (Cu)	0.1807
Developed Runoff Coefficient (Cd)	0.1879
Time of Concentration (min)	56.0
Clear Peak Flow Rate (cfs)	0.0303
Burned Peak Flow Rate (cfs)	0.0303
24-Hr Clear Runoff Volume (ac-ft)	0.0081
24-Hr Clear Runoff Volume (cu-ft)	351.7978



Peak Flow Hydrologic Analysis

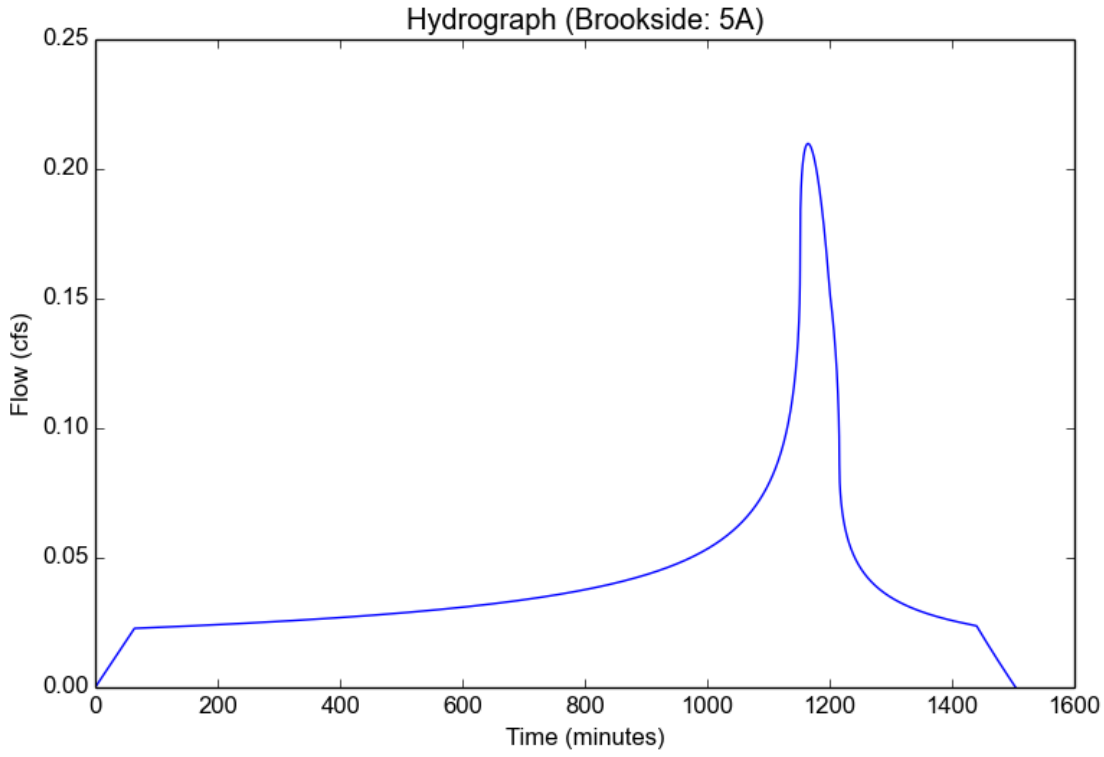
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.8-in Storm/Brookside - 5A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5A
Area (ac)	4.24
Flow Path Length (ft)	954.1
Flow Path Slope (vft/hft)	0.03354
85th Percentile Rainfall Depth (in)	0.8
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.8
Peak Intensity (in/hr)	0.144
Undeveloped Runoff Coefficient (Cu)	0.1581
Developed Runoff Coefficient (Cd)	0.3436
Time of Concentration (min)	64.0
Clear Peak Flow Rate (cfs)	0.2098
Burned Peak Flow Rate (cfs)	0.2098
24-Hr Clear Runoff Volume (ac-ft)	0.0853
24-Hr Clear Runoff Volume (cu-ft)	3717.5878



Peak Flow Hydrologic Analysis

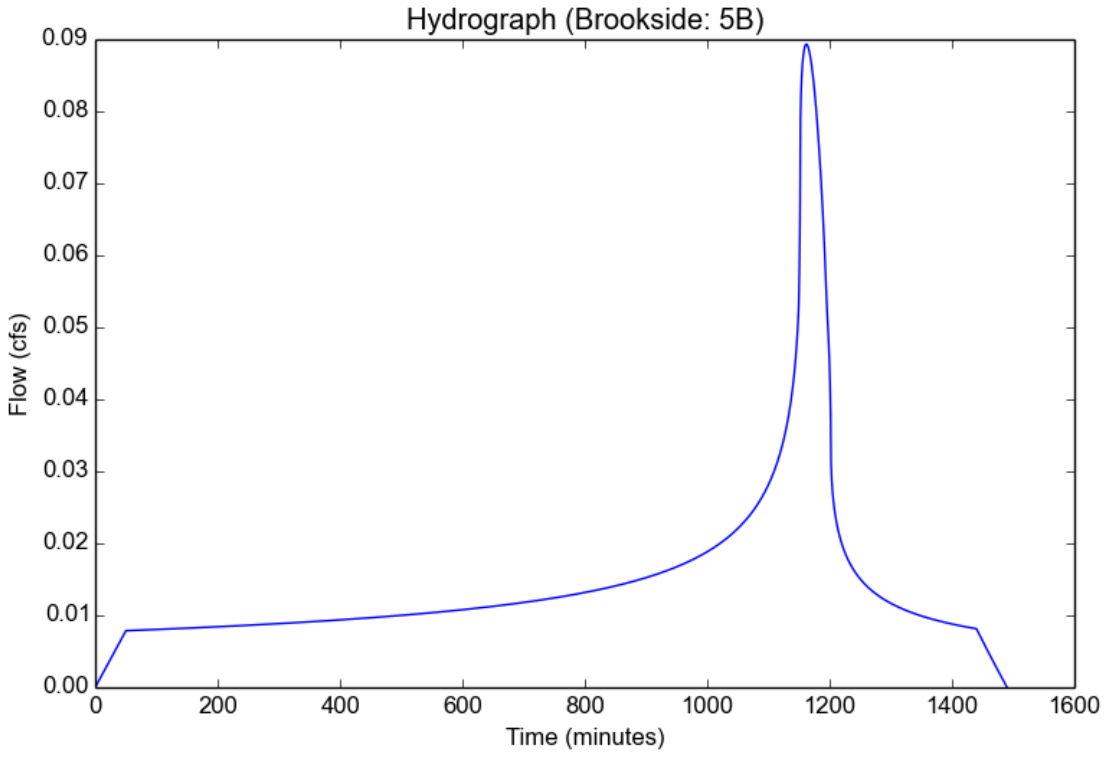
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.8-in Storm/Brookside - 5B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5B
Area (ac)	1.47
Flow Path Length (ft)	542.7
Flow Path Slope (vft/hft)	0.0129
85th Percentile Rainfall Depth (in)	0.8
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.8
Peak Intensity (in/hr)	0.1617
Undeveloped Runoff Coefficient (Cu)	0.201
Developed Runoff Coefficient (Cd)	0.3758
Time of Concentration (min)	50.0
Clear Peak Flow Rate (cfs)	0.0893
Burned Peak Flow Rate (cfs)	0.0893
24-Hr Clear Runoff Volume (ac-ft)	0.0299
24-Hr Clear Runoff Volume (cu-ft)	1303.6529



Peak Flow Hydrologic Analysis

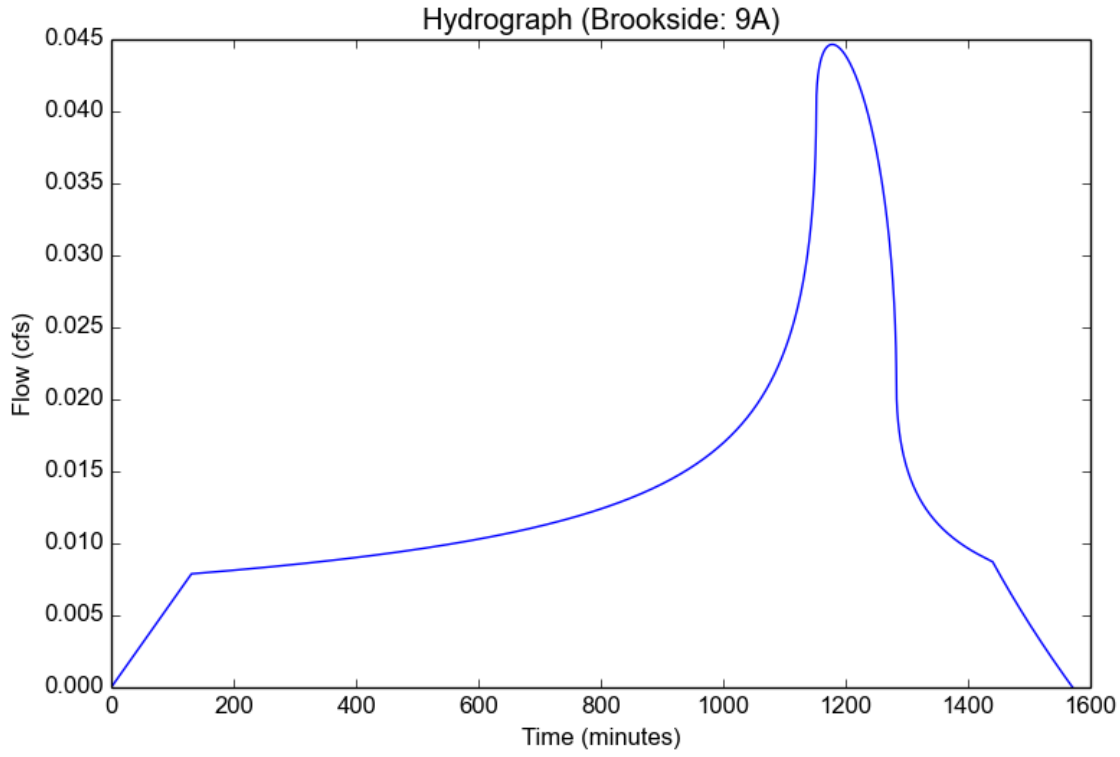
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.8-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	4.02
Flow Path Length (ft)	958.0
Flow Path Slope (vft/hft)	0.05323
85th Percentile Rainfall Depth (in)	0.8
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.8
Peak Intensity (in/hr)	0.1028
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	131.0
Clear Peak Flow Rate (cfs)	0.0447
Burned Peak Flow Rate (cfs)	0.0447
24-Hr Clear Runoff Volume (ac-ft)	0.0287
24-Hr Clear Runoff Volume (cu-ft)	1250.6738



Peak Flow Hydrologic Analysis

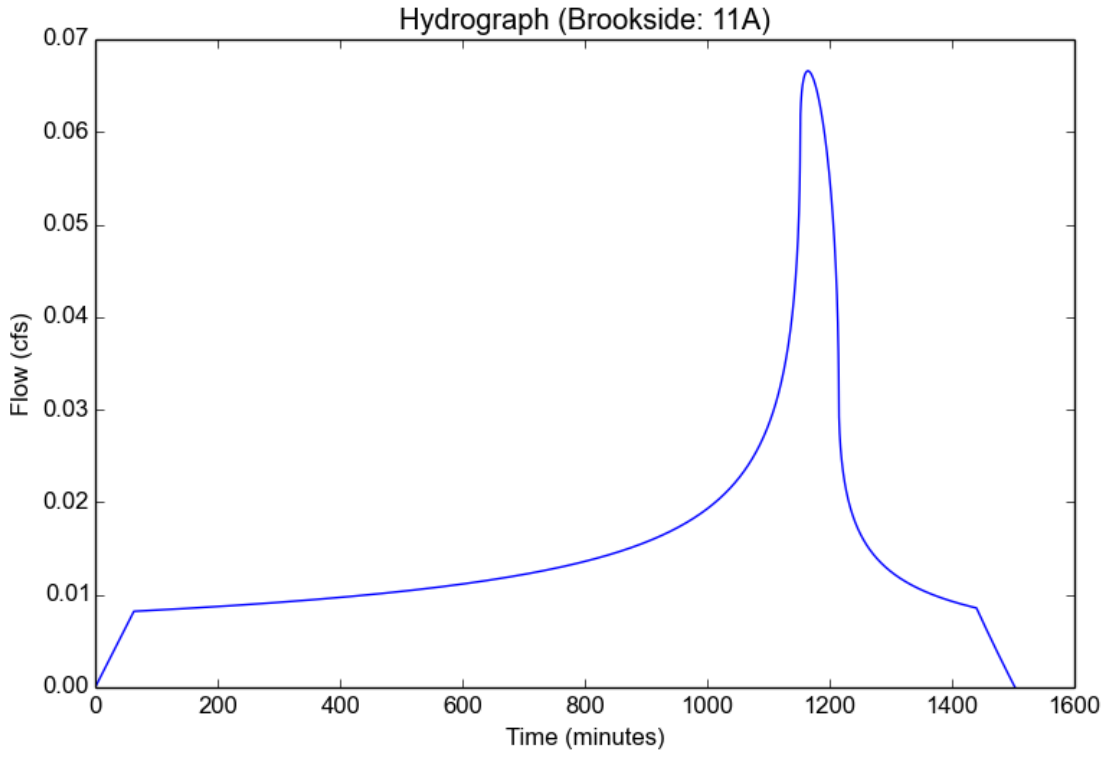
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.8-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	1.53
Flow Path Length (ft)	494.1
Flow Path Slope (vft/hft)	0.00607
85th Percentile Rainfall Depth (in)	0.8
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.8
Peak Intensity (in/hr)	0.1451
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	63.0
Clear Peak Flow Rate (cfs)	0.0666
Burned Peak Flow Rate (cfs)	0.0666
24-Hr Clear Runoff Volume (ac-ft)	0.0303
24-Hr Clear Runoff Volume (cu-ft)	1321.9884



Peak Flow Hydrologic Analysis

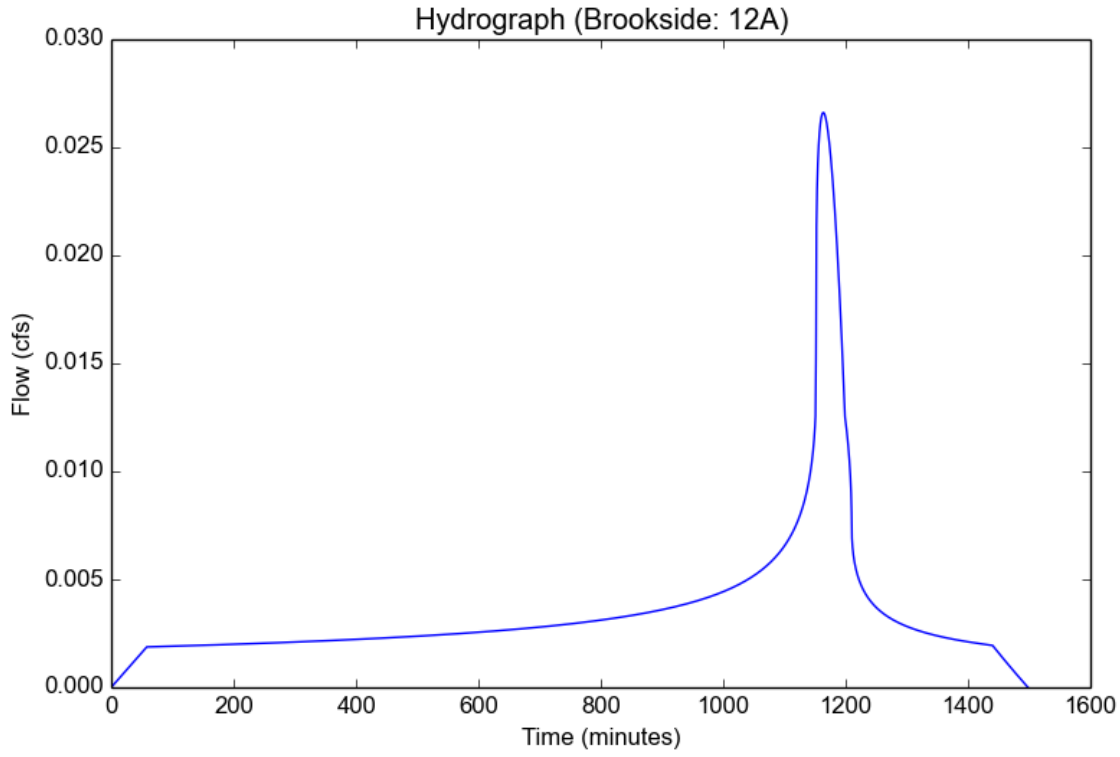
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.8-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.97
Flow Path Length (ft)	512.5
Flow Path Slope (vft/hft)	0.07414
85th Percentile Rainfall Depth (in)	0.8
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.8
Peak Intensity (in/hr)	0.1508
Undeveloped Runoff Coefficient (Cu)	0.1746
Developed Runoff Coefficient (Cd)	0.1819
Time of Concentration (min)	58.0
Clear Peak Flow Rate (cfs)	0.0266
Burned Peak Flow Rate (cfs)	0.0266
24-Hr Clear Runoff Volume (ac-ft)	0.0074
24-Hr Clear Runoff Volume (cu-ft)	323.1573



Peak Flow Hydrologic Analysis

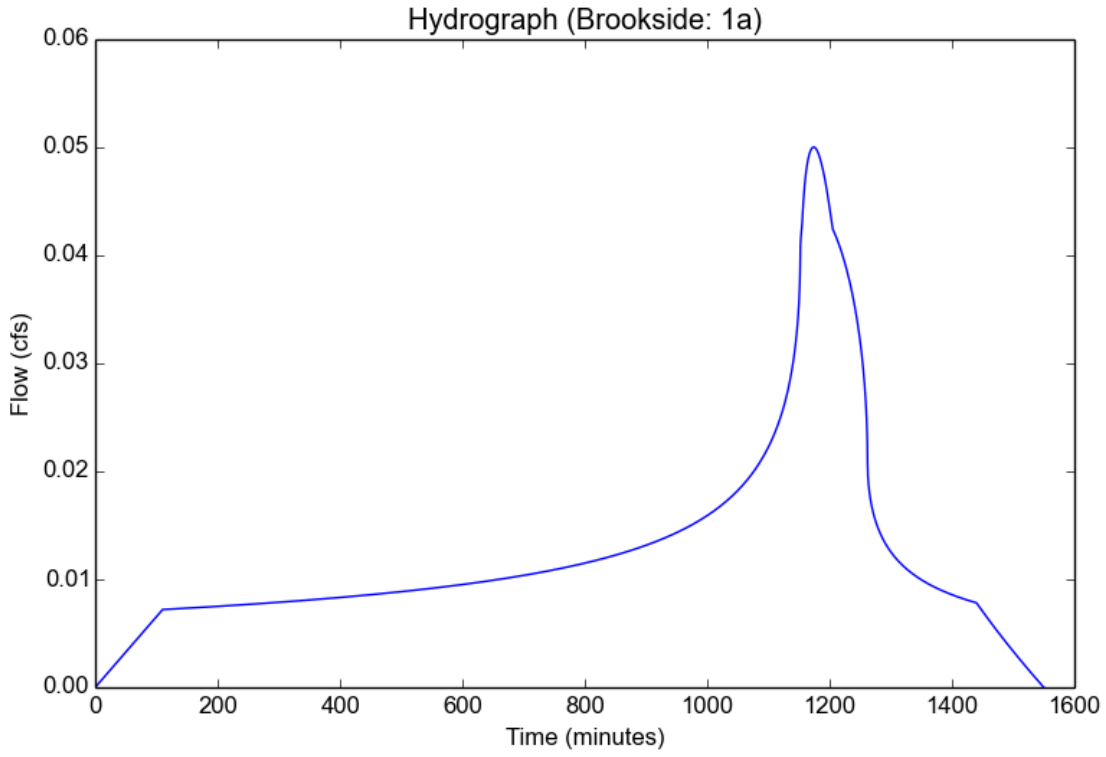
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.9-in Storm/Brookside - 1a.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1a
Area (ac)	3.28
Flow Path Length (ft)	866.7
Flow Path Slope (vft/hft)	0.04038
85th Percentile Rainfall Depth (in)	0.9
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.9
Peak Intensity (in/hr)	0.1256
Undeveloped Runoff Coefficient (Cu)	0.1136
Developed Runoff Coefficient (Cd)	0.1214
Time of Concentration (min)	110.0
Clear Peak Flow Rate (cfs)	0.05
Burned Peak Flow Rate (cfs)	0.05
24-Hr Clear Runoff Volume (ac-ft)	0.0266
24-Hr Clear Runoff Volume (cu-ft)	1159.0999



Peak Flow Hydrologic Analysis

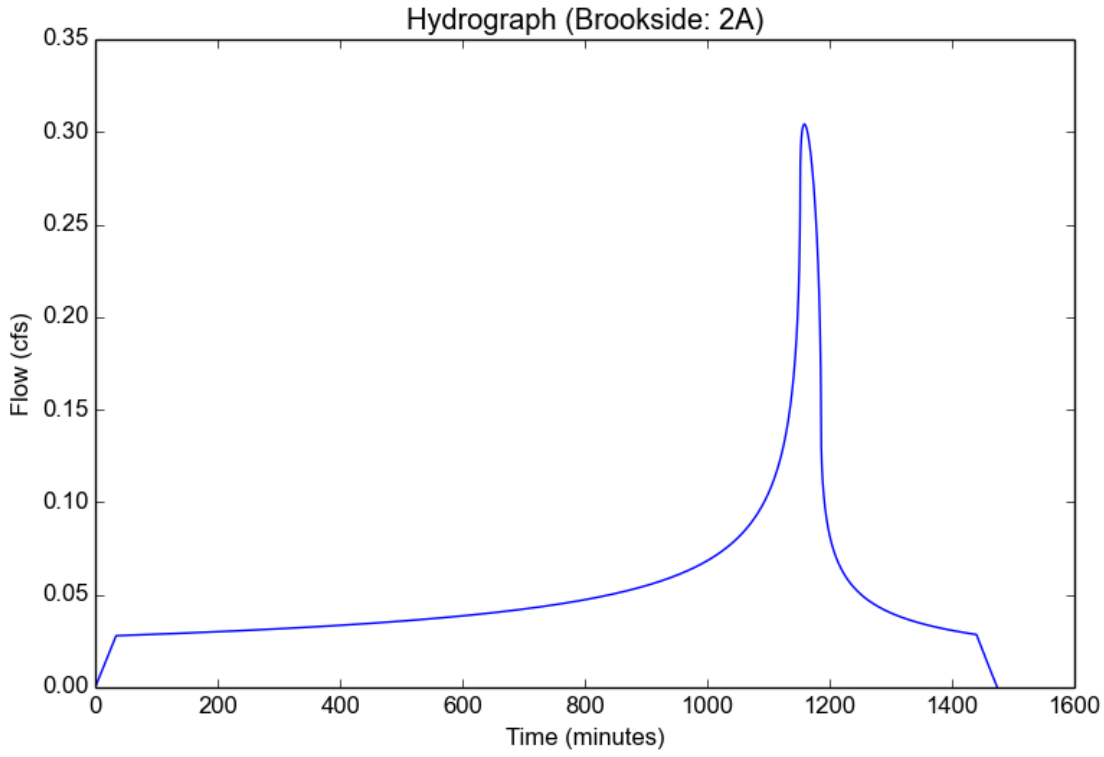
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.9-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	2.75
Flow Path Length (ft)	652.4
Flow Path Slope (vft/hft)	0.04599
85th Percentile Rainfall Depth (in)	0.9
Percent Impervious	0.509
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.9
Peak Intensity (in/hr)	0.2181
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.5072
Time of Concentration (min)	34.0
Clear Peak Flow Rate (cfs)	0.3042
Burned Peak Flow Rate (cfs)	0.3042
24-Hr Clear Runoff Volume (ac-ft)	0.1037
24-Hr Clear Runoff Volume (cu-ft)	4519.2188



Peak Flow Hydrologic Analysis

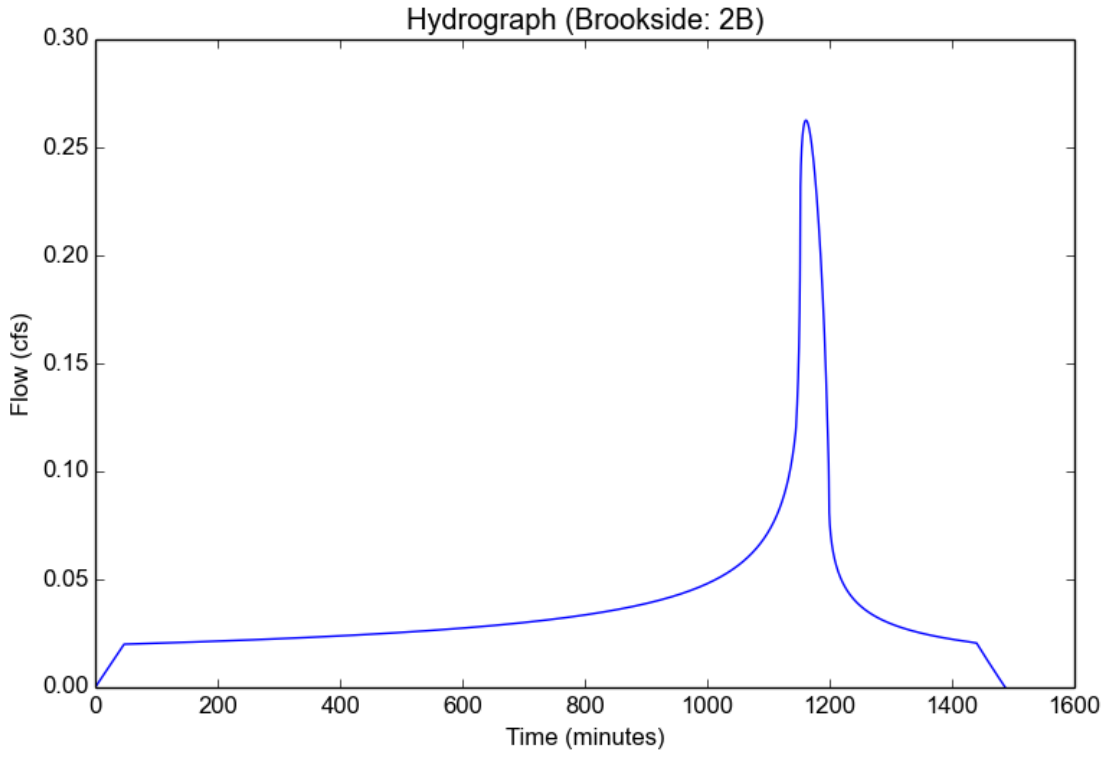
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.9-in Storm/Brookside - 2B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2B
Area (ac)	3.32
Flow Path Length (ft)	861.6
Flow Path Slope (vft/hft)	0.03714
85th Percentile Rainfall Depth (in)	0.9
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.9
Peak Intensity (in/hr)	0.1873
Undeveloped Runoff Coefficient (Cu)	0.2629
Developed Runoff Coefficient (Cd)	0.4222
Time of Concentration (min)	47.0
Clear Peak Flow Rate (cfs)	0.2626
Burned Peak Flow Rate (cfs)	0.2626
24-Hr Clear Runoff Volume (ac-ft)	0.0775
24-Hr Clear Runoff Volume (cu-ft)	3377.6856



Peak Flow Hydrologic Analysis

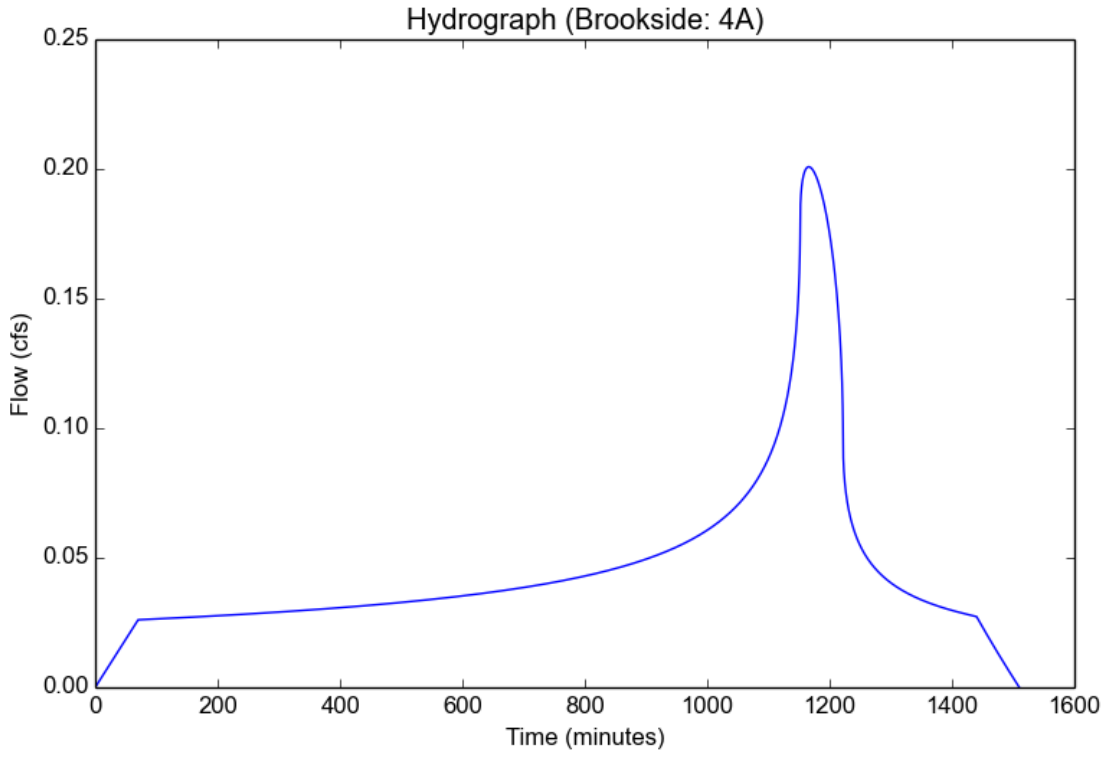
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.9-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	4.31
Flow Path Length (ft)	796.6
Flow Path Slope (vft/hft)	0.0113
85th Percentile Rainfall Depth (in)	0.9
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.9
Peak Intensity (in/hr)	0.1553
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	70.0
Clear Peak Flow Rate (cfs)	0.2008
Burned Peak Flow Rate (cfs)	0.2008
24-Hr Clear Runoff Volume (ac-ft)	0.0962
24-Hr Clear Runoff Volume (cu-ft)	4189.5889



Peak Flow Hydrologic Analysis

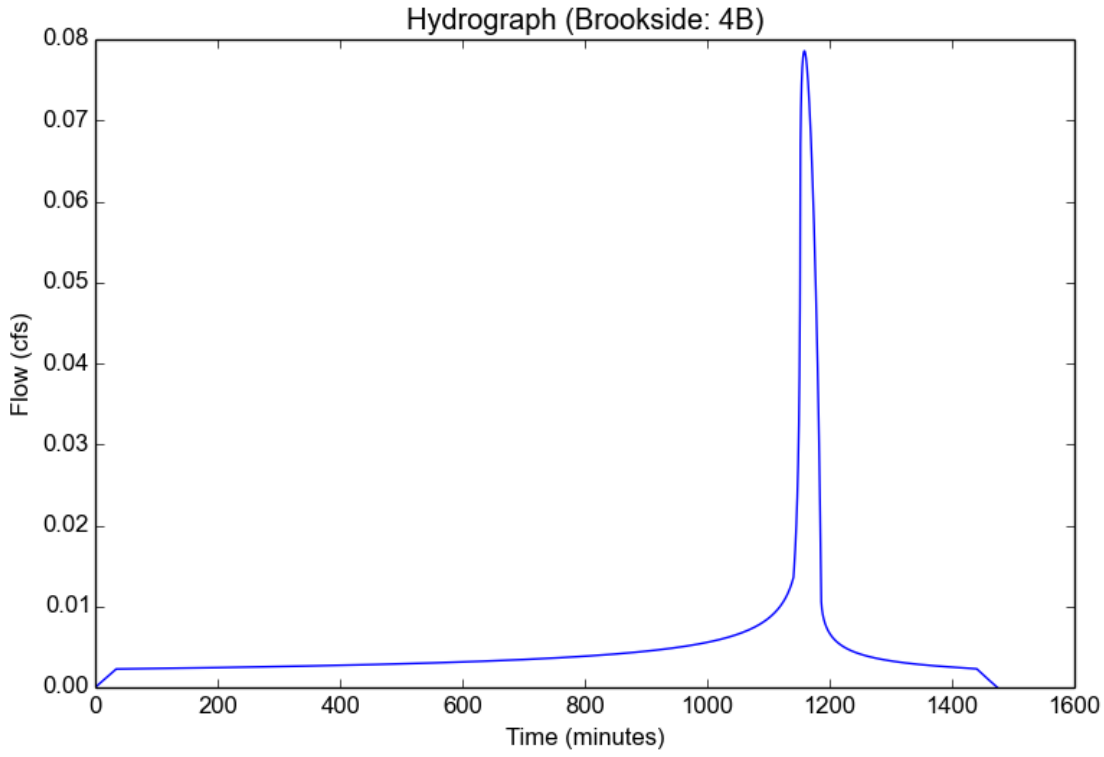
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.9-in Storm/Brookside - 4B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4B
Area (ac)	1.05
Flow Path Length (ft)	377.9
Flow Path Slope (vft/hft)	0.02646
85th Percentile Rainfall Depth (in)	0.9
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.9
Peak Intensity (in/hr)	0.2181
Undeveloped Runoff Coefficient (Cu)	0.3374
Developed Runoff Coefficient (Cd)	0.3431
Time of Concentration (min)	34.0
Clear Peak Flow Rate (cfs)	0.0786
Burned Peak Flow Rate (cfs)	0.0786
24-Hr Clear Runoff Volume (ac-ft)	0.0104
24-Hr Clear Runoff Volume (cu-ft)	451.9043



Peak Flow Hydrologic Analysis

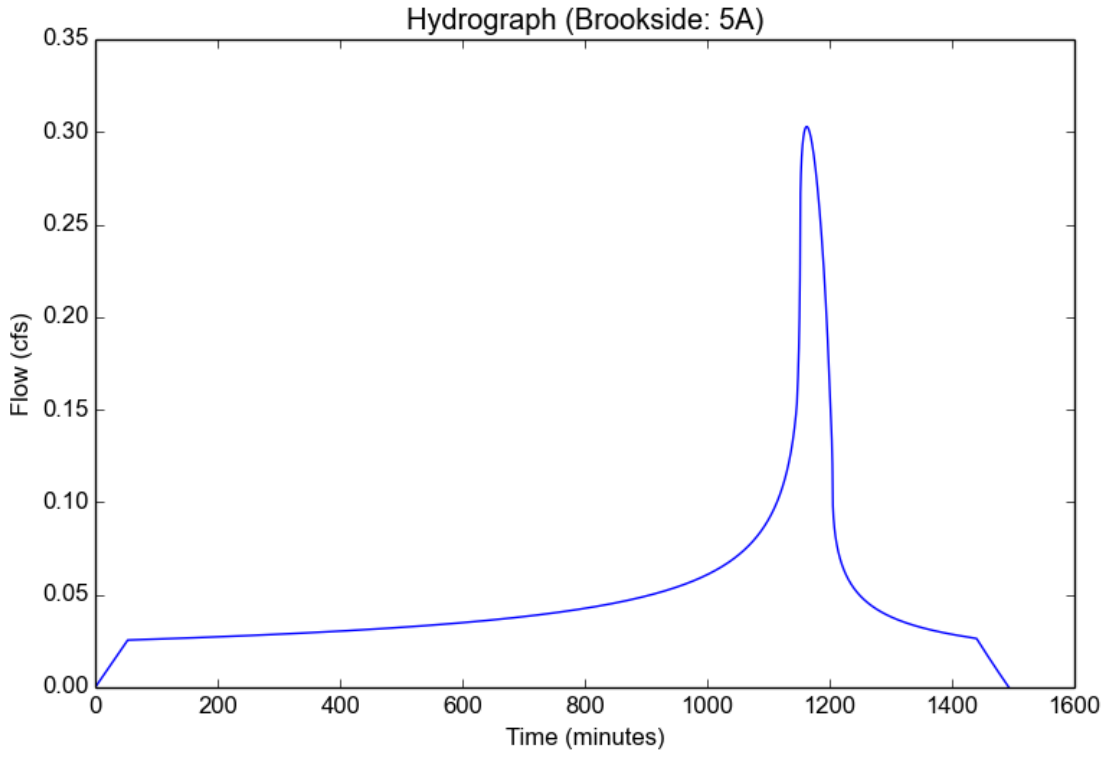
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.9-in Storm/Brookside - 5A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5A
Area (ac)	4.24
Flow Path Length (ft)	954.1
Flow Path Slope (vft/hft)	0.03354
85th Percentile Rainfall Depth (in)	0.9
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.9
Peak Intensity (in/hr)	0.177
Undeveloped Runoff Coefficient (Cu)	0.238
Developed Runoff Coefficient (Cd)	0.4035
Time of Concentration (min)	53.0
Clear Peak Flow Rate (cfs)	0.3029
Burned Peak Flow Rate (cfs)	0.3029
24-Hr Clear Runoff Volume (ac-ft)	0.0984
24-Hr Clear Runoff Volume (cu-ft)	4287.9568



Peak Flow Hydrologic Analysis

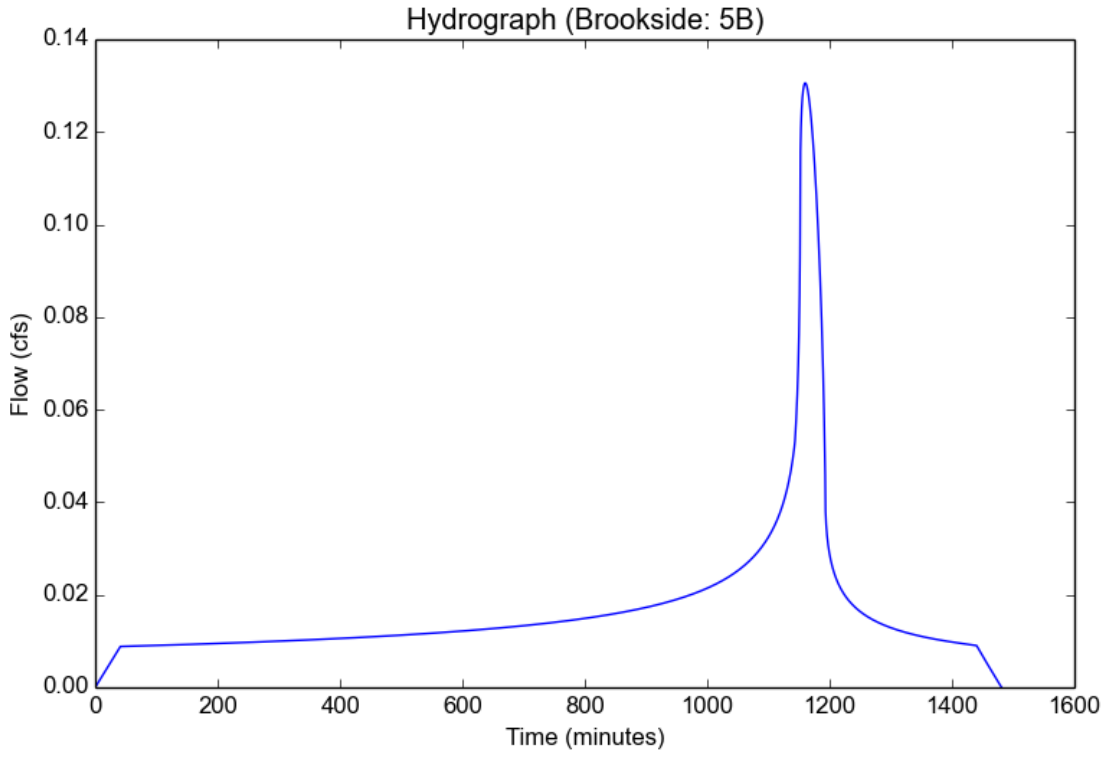
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.9-in Storm/Brookside - 5B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5B
Area (ac)	1.47
Flow Path Length (ft)	542.7
Flow Path Slope (vft/hft)	0.0129
85th Percentile Rainfall Depth (in)	0.9
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.9
Peak Intensity (in/hr)	0.1997
Undeveloped Runoff Coefficient (Cu)	0.293
Developed Runoff Coefficient (Cd)	0.4447
Time of Concentration (min)	41.0
Clear Peak Flow Rate (cfs)	0.1306
Burned Peak Flow Rate (cfs)	0.1306
24-Hr Clear Runoff Volume (ac-ft)	0.0346
24-Hr Clear Runoff Volume (cu-ft)	1505.4148



Peak Flow Hydrologic Analysis

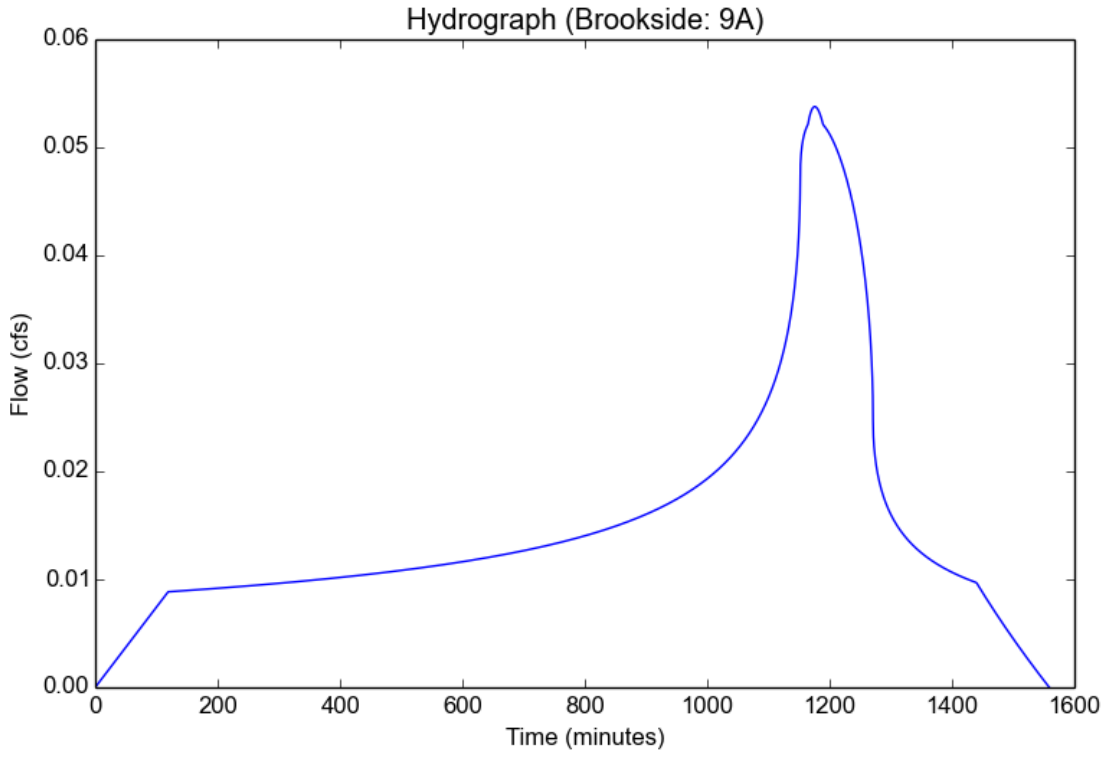
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.9-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	4.02
Flow Path Length (ft)	958.0
Flow Path Slope (vft/hft)	0.05323
85th Percentile Rainfall Depth (in)	0.9
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.9
Peak Intensity (in/hr)	0.121
Undeveloped Runoff Coefficient (Cu)	0.1025
Developed Runoff Coefficient (Cd)	0.1105
Time of Concentration (min)	119.0
Clear Peak Flow Rate (cfs)	0.0538
Burned Peak Flow Rate (cfs)	0.0538
24-Hr Clear Runoff Volume (ac-ft)	0.0323
24-Hr Clear Runoff Volume (cu-ft)	1408.1635



Peak Flow Hydrologic Analysis

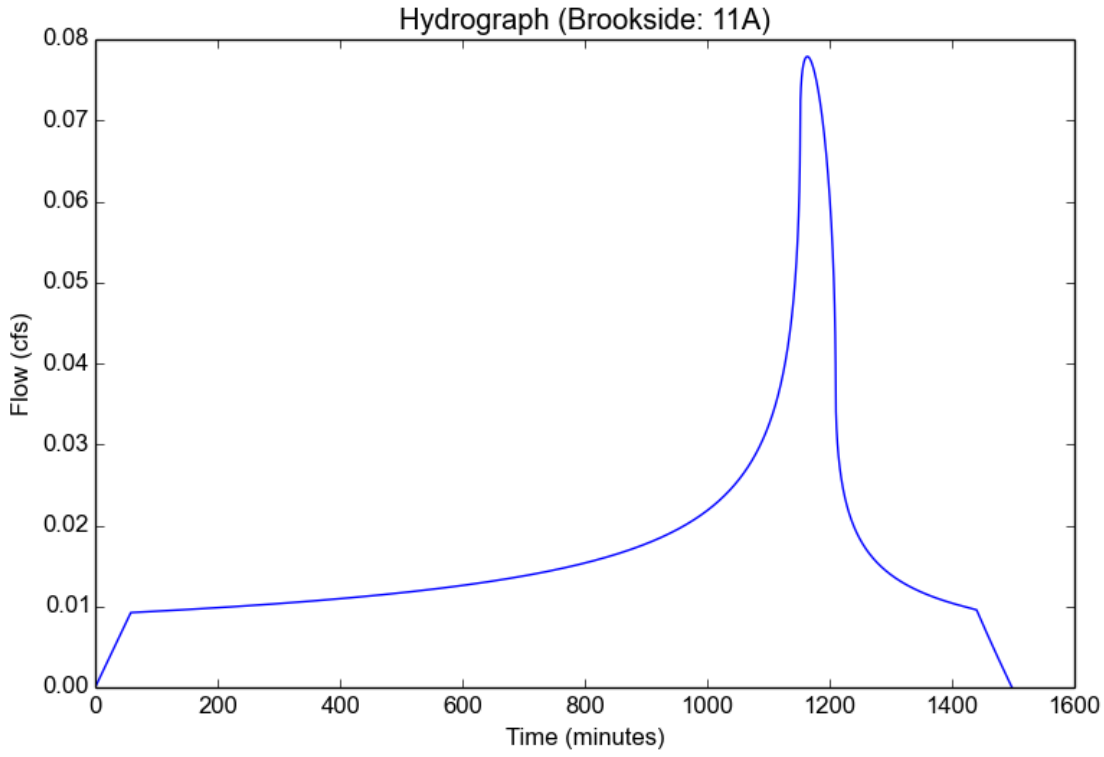
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.9-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	1.53
Flow Path Length (ft)	494.1
Flow Path Slope (vft/hft)	0.00607
85th Percentile Rainfall Depth (in)	0.9
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.9
Peak Intensity (in/hr)	0.1697
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	58.0
Clear Peak Flow Rate (cfs)	0.0779
Burned Peak Flow Rate (cfs)	0.0779
24-Hr Clear Runoff Volume (ac-ft)	0.0341
24-Hr Clear Runoff Volume (cu-ft)	1487.225



Peak Flow Hydrologic Analysis

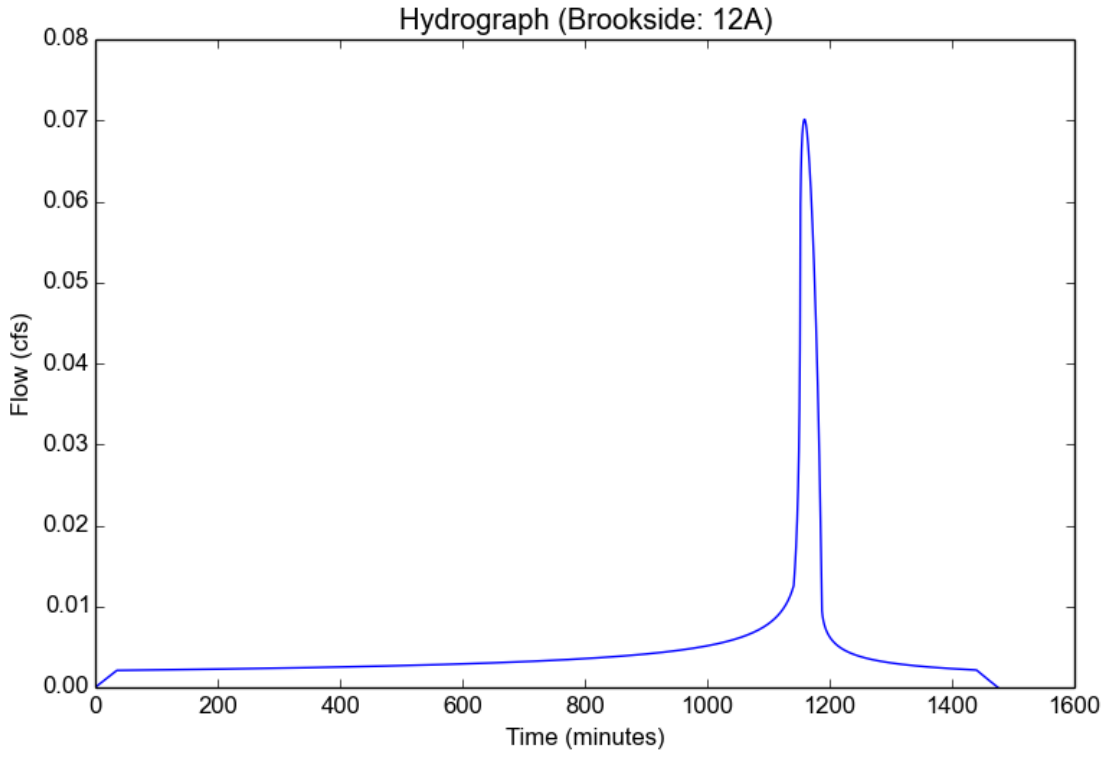
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/0.9-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.97
Flow Path Length (ft)	512.5
Flow Path Slope (vft/hft)	0.07414
85th Percentile Rainfall Depth (in)	0.9
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.9
Peak Intensity (in/hr)	0.2152
Undeveloped Runoff Coefficient (Cu)	0.3303
Developed Runoff Coefficient (Cd)	0.336
Time of Concentration (min)	35.0
Clear Peak Flow Rate (cfs)	0.0701
Burned Peak Flow Rate (cfs)	0.0701
24-Hr Clear Runoff Volume (ac-ft)	0.0095
24-Hr Clear Runoff Volume (cu-ft)	415.7462



Peak Flow Hydrologic Analysis

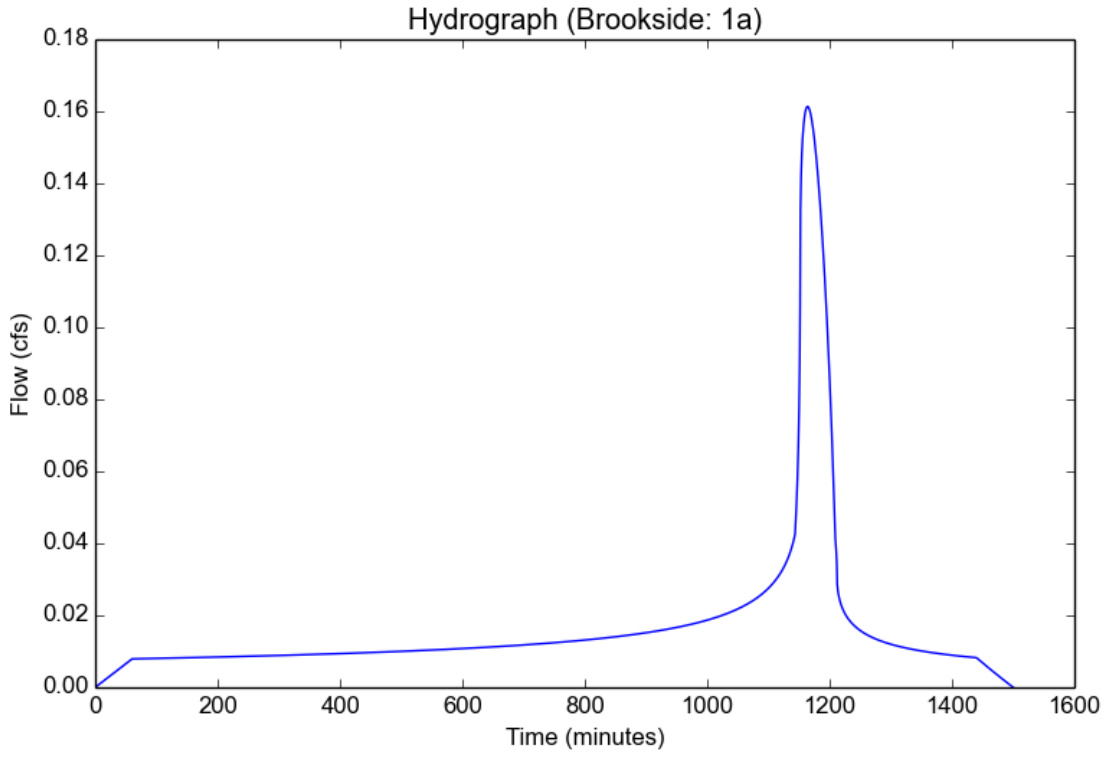
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/1.0-in Storm/Brookside - 1a.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1a
Area (ac)	3.28
Flow Path Length (ft)	866.7
Flow Path Slope (vft/hft)	0.04038
85th Percentile Rainfall Depth (in)	1.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.0
Peak Intensity (in/hr)	0.1856
Undeveloped Runoff Coefficient (Cu)	0.2587
Developed Runoff Coefficient (Cd)	0.2651
Time of Concentration (min)	60.0
Clear Peak Flow Rate (cfs)	0.1613
Burned Peak Flow Rate (cfs)	0.1613
24-Hr Clear Runoff Volume (ac-ft)	0.0348
24-Hr Clear Runoff Volume (cu-ft)	1515.5599



Peak Flow Hydrologic Analysis

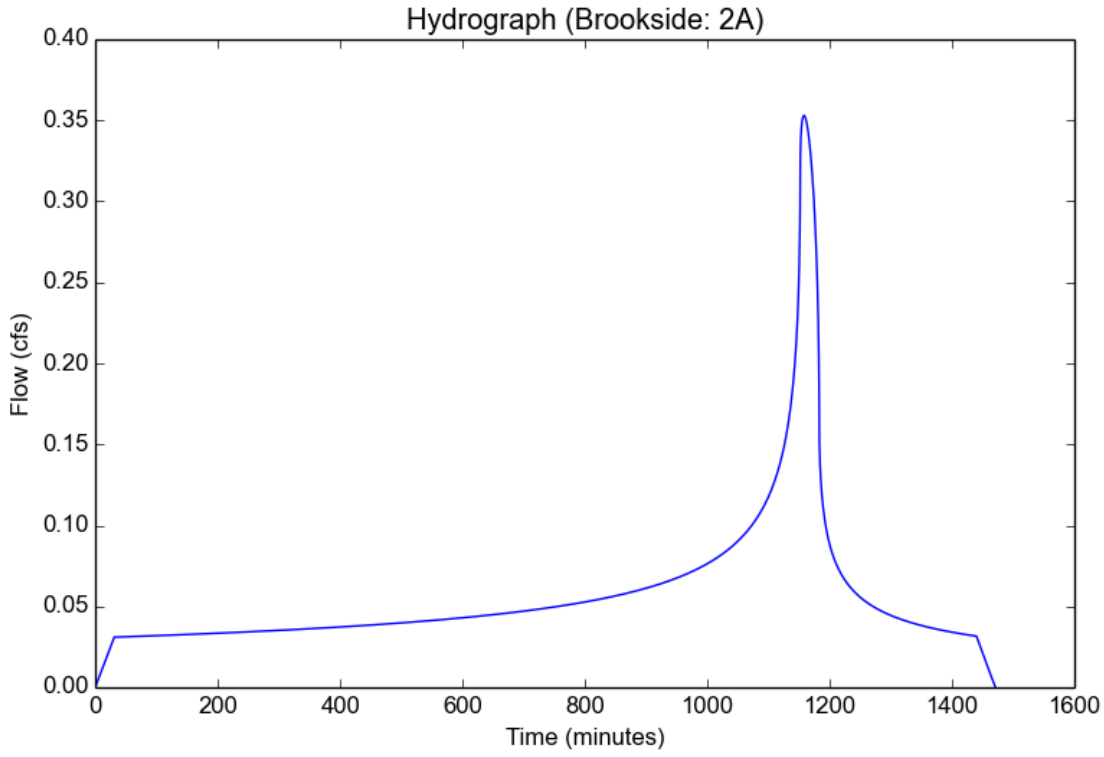
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/1.0-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	2.75
Flow Path Length (ft)	652.4
Flow Path Slope (vft/hft)	0.04599
85th Percentile Rainfall Depth (in)	1.0
Percent Impervious	0.509
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.0
Peak Intensity (in/hr)	0.2531
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.5072
Time of Concentration (min)	31.0
Clear Peak Flow Rate (cfs)	0.353
Burned Peak Flow Rate (cfs)	0.353
24-Hr Clear Runoff Volume (ac-ft)	0.1153
24-Hr Clear Runoff Volume (cu-ft)	5021.3416



Peak Flow Hydrologic Analysis

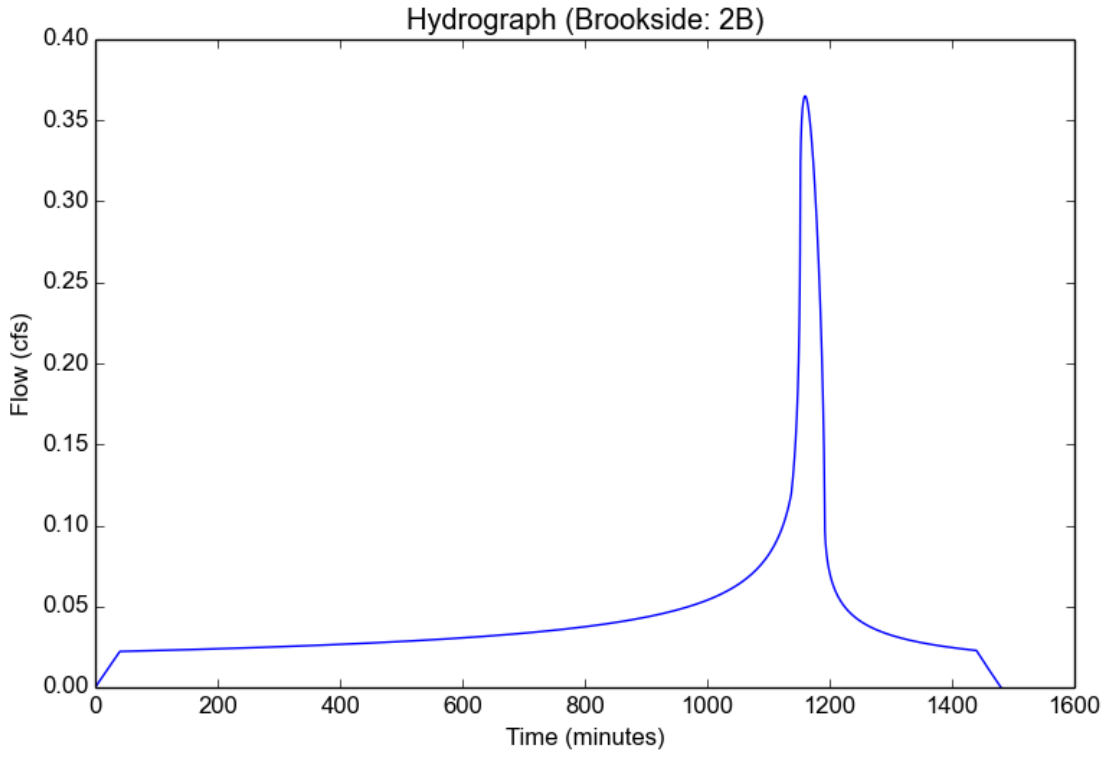
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/1.0-in Storm/Brookside - 2B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2B
Area (ac)	3.32
Flow Path Length (ft)	861.6
Flow Path Slope (vft/hft)	0.03714
85th Percentile Rainfall Depth (in)	1.0
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.0
Peak Intensity (in/hr)	0.2245
Undeveloped Runoff Coefficient (Cu)	0.353
Developed Runoff Coefficient (Cd)	0.4897
Time of Concentration (min)	40.0
Clear Peak Flow Rate (cfs)	0.365
Burned Peak Flow Rate (cfs)	0.365
24-Hr Clear Runoff Volume (ac-ft)	0.0884
24-Hr Clear Runoff Volume (cu-ft)	3850.6895



Peak Flow Hydrologic Analysis

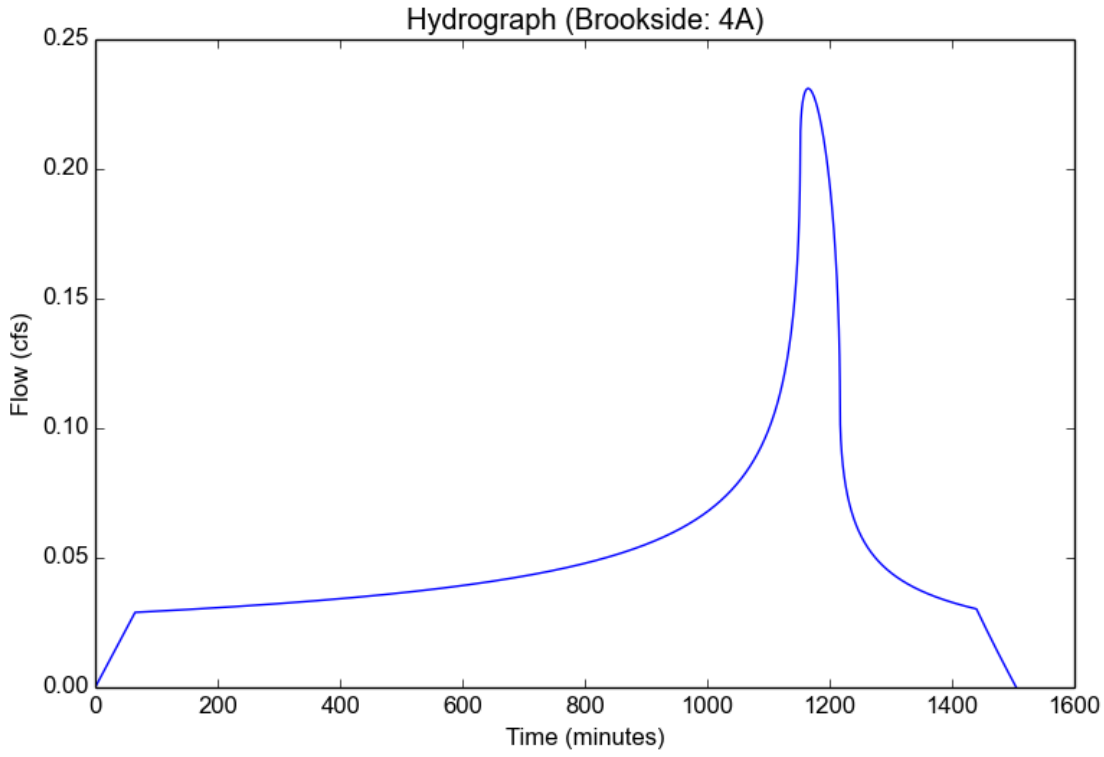
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/1.0-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	4.31
Flow Path Length (ft)	796.6
Flow Path Slope (vft/hft)	0.0113
85th Percentile Rainfall Depth (in)	1.0
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.0
Peak Intensity (in/hr)	0.1787
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	65.0
Clear Peak Flow Rate (cfs)	0.2311
Burned Peak Flow Rate (cfs)	0.2311
24-Hr Clear Runoff Volume (ac-ft)	0.1069
24-Hr Clear Runoff Volume (cu-ft)	4655.0567



Peak Flow Hydrologic Analysis

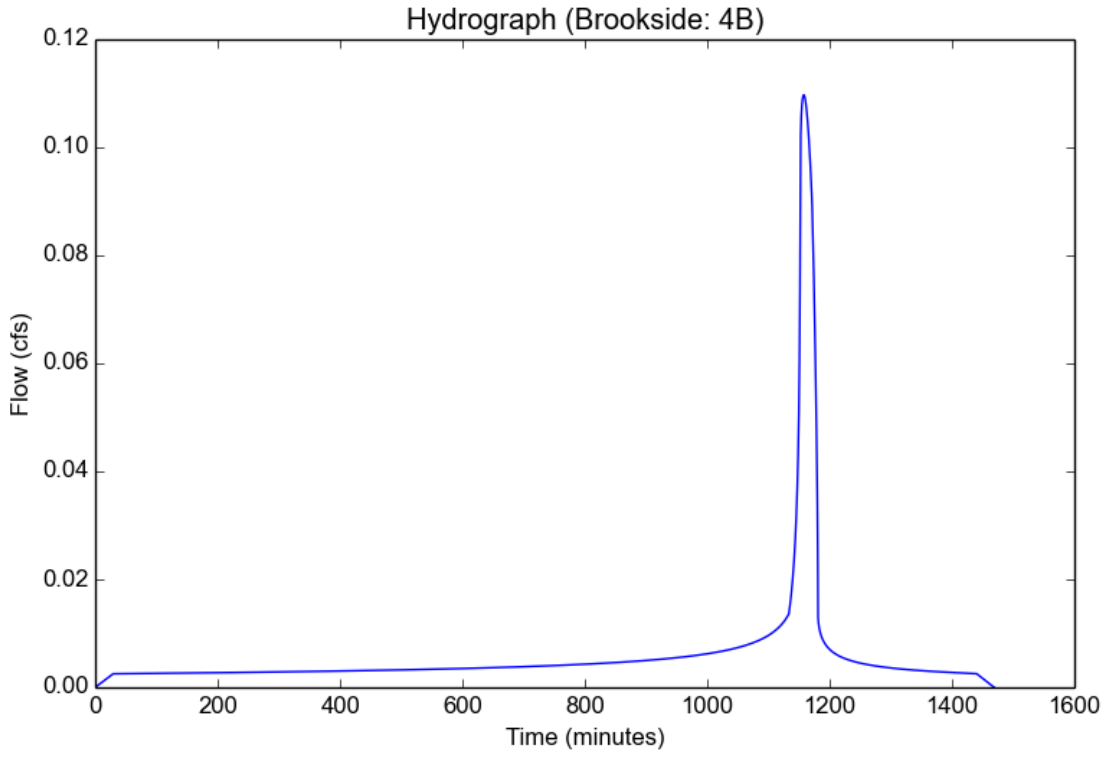
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/1.0-in Storm/Brookside - 4B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4B
Area (ac)	1.05
Flow Path Length (ft)	377.9
Flow Path Slope (vft/hft)	0.02646
85th Percentile Rainfall Depth (in)	1.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.0
Peak Intensity (in/hr)	0.2612
Undeveloped Runoff Coefficient (Cu)	0.3951
Developed Runoff Coefficient (Cd)	0.4001
Time of Concentration (min)	29.0
Clear Peak Flow Rate (cfs)	0.1097
Burned Peak Flow Rate (cfs)	0.1097
24-Hr Clear Runoff Volume (ac-ft)	0.0122
24-Hr Clear Runoff Volume (cu-ft)	533.1732



Peak Flow Hydrologic Analysis

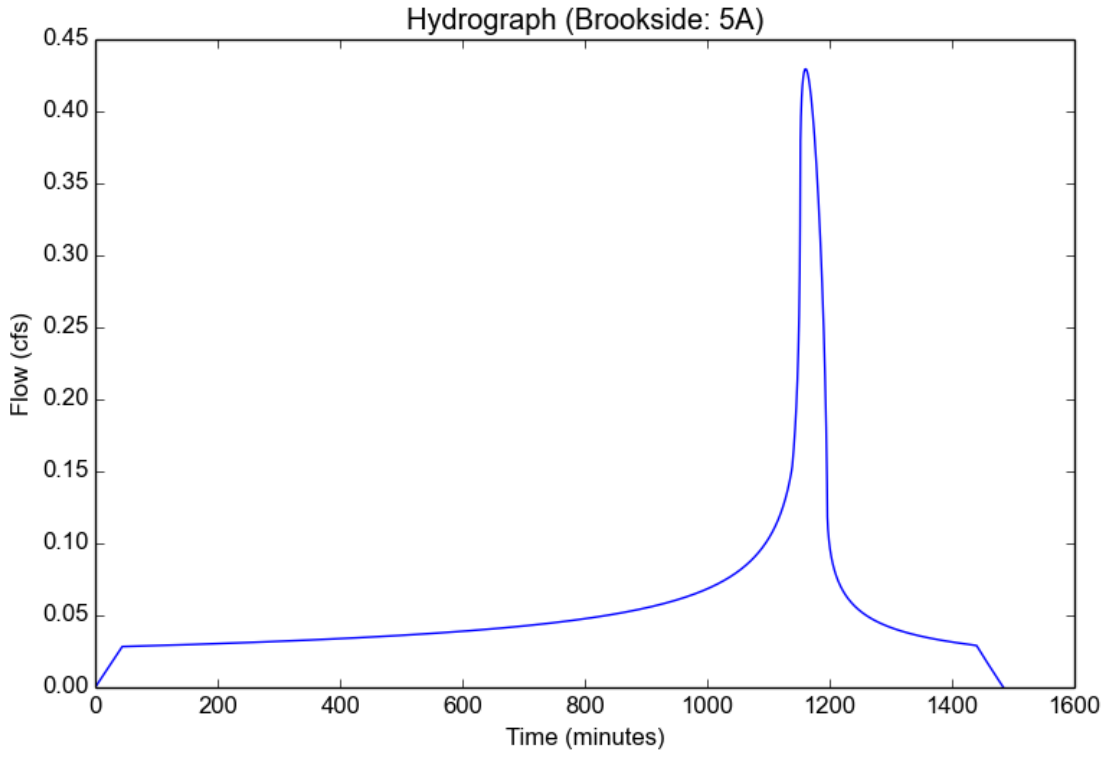
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/1.0-in Storm/Brookside - 5A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5A
Area (ac)	4.24
Flow Path Length (ft)	954.1
Flow Path Slope (vft/hft)	0.03354
85th Percentile Rainfall Depth (in)	1.0
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.0
Peak Intensity (in/hr)	0.2147
Undeveloped Runoff Coefficient (Cu)	0.3292
Developed Runoff Coefficient (Cd)	0.4719
Time of Concentration (min)	44.0
Clear Peak Flow Rate (cfs)	0.4295
Burned Peak Flow Rate (cfs)	0.4295
24-Hr Clear Runoff Volume (ac-ft)	0.1124
24-Hr Clear Runoff Volume (cu-ft)	4894.374



Peak Flow Hydrologic Analysis

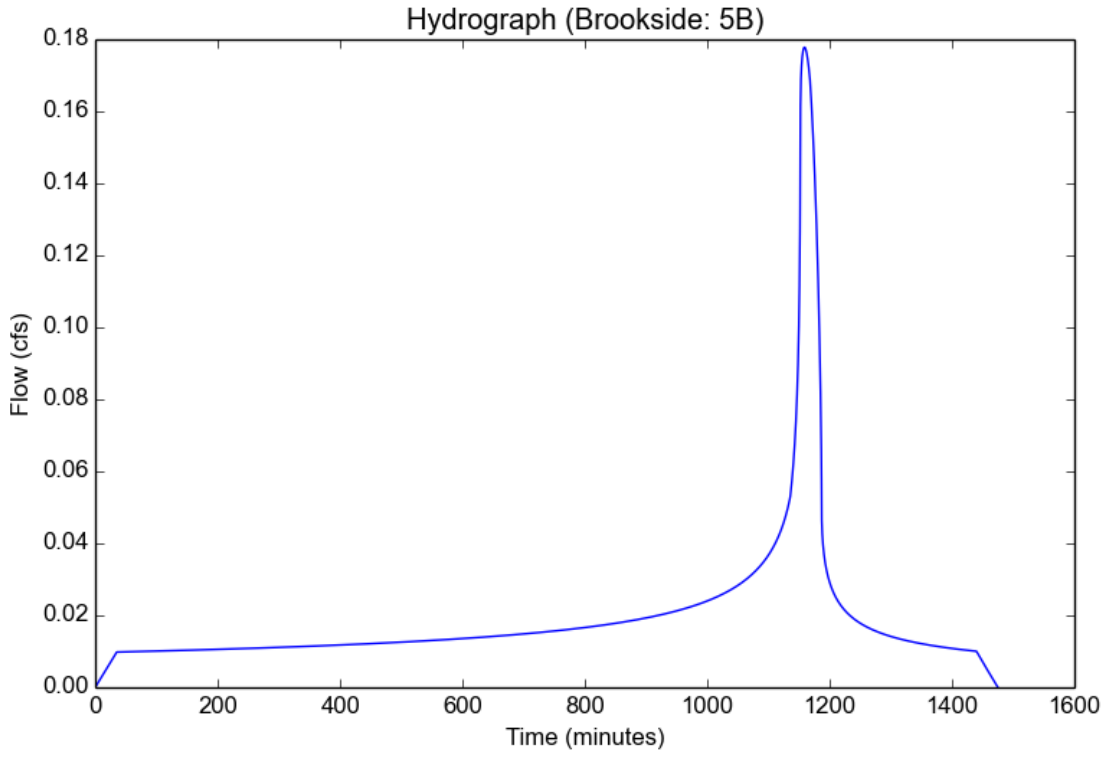
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/1.0-in Storm/Brookside - 5B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5B
Area (ac)	1.47
Flow Path Length (ft)	542.7
Flow Path Slope (vft/hft)	0.0129
85th Percentile Rainfall Depth (in)	1.0
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.0
Peak Intensity (in/hr)	0.2391
Undeveloped Runoff Coefficient (Cu)	0.3746
Developed Runoff Coefficient (Cd)	0.506
Time of Concentration (min)	35.0
Clear Peak Flow Rate (cfs)	0.1778
Burned Peak Flow Rate (cfs)	0.1778
24-Hr Clear Runoff Volume (ac-ft)	0.0393
24-Hr Clear Runoff Volume (cu-ft)	1713.8926



Peak Flow Hydrologic Analysis

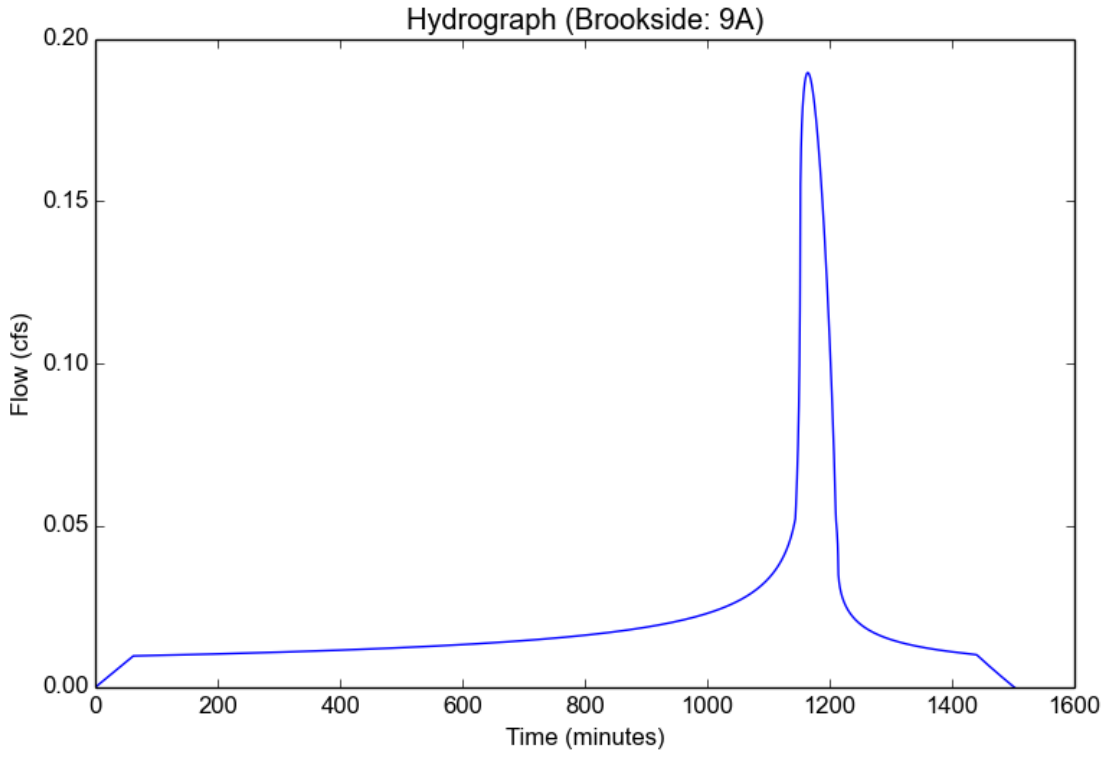
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/1.0-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	4.02
Flow Path Length (ft)	958.0
Flow Path Slope (vft/hft)	0.05323
85th Percentile Rainfall Depth (in)	1.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.0
Peak Intensity (in/hr)	0.1827
Undeveloped Runoff Coefficient (Cu)	0.2518
Developed Runoff Coefficient (Cd)	0.2583
Time of Concentration (min)	62.0
Clear Peak Flow Rate (cfs)	0.1897
Burned Peak Flow Rate (cfs)	0.1897
24-Hr Clear Runoff Volume (ac-ft)	0.0424
24-Hr Clear Runoff Volume (cu-ft)	1846.5365



Peak Flow Hydrologic Analysis

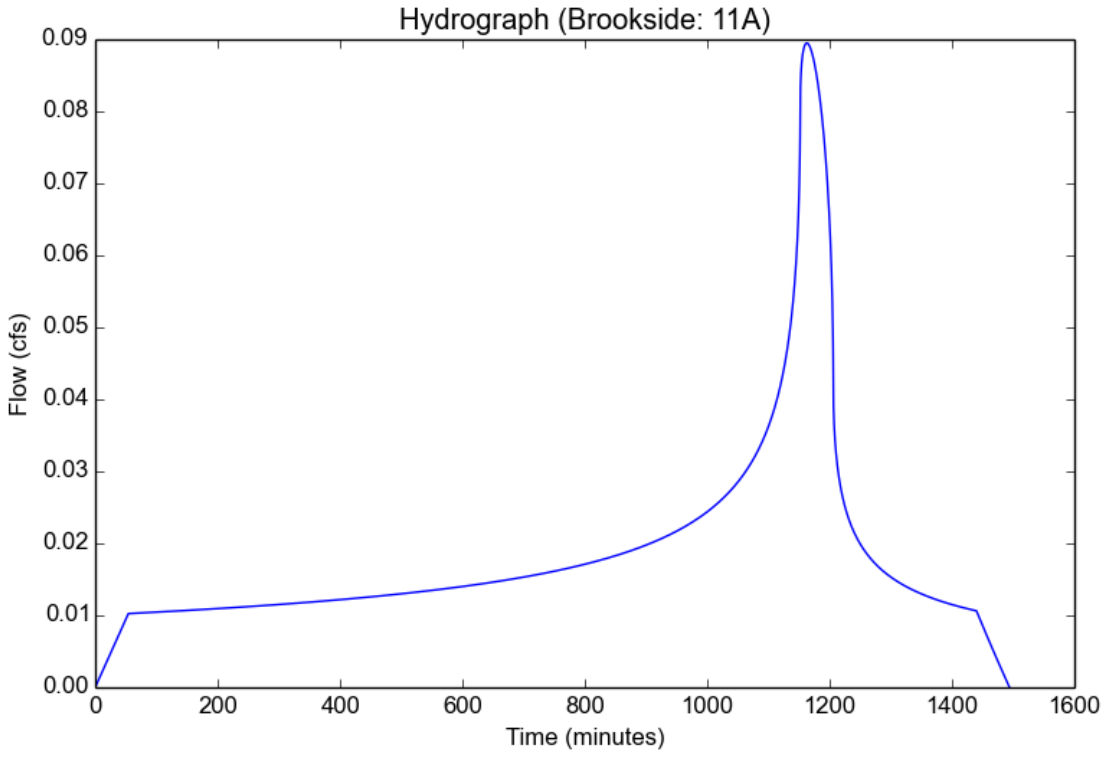
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/1.0-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	1.53
Flow Path Length (ft)	494.1
Flow Path Slope (vft/hft)	0.00607
85th Percentile Rainfall Depth (in)	1.0
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.0
Peak Intensity (in/hr)	0.195
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	54.0
Clear Peak Flow Rate (cfs)	0.0895
Burned Peak Flow Rate (cfs)	0.0895
24-Hr Clear Runoff Volume (ac-ft)	0.0379
24-Hr Clear Runoff Volume (cu-ft)	1652.4624



Peak Flow Hydrologic Analysis

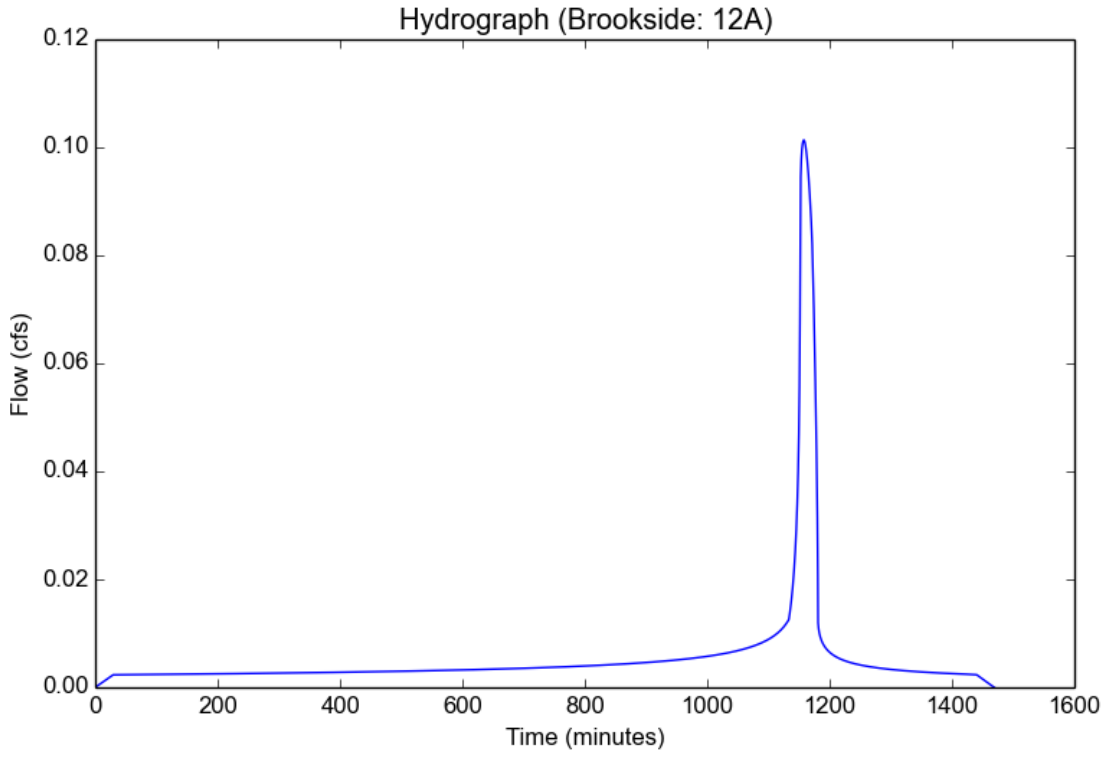
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/1.0-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.97
Flow Path Length (ft)	512.5
Flow Path Slope (vft/hft)	0.07414
85th Percentile Rainfall Depth (in)	1.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.0
Peak Intensity (in/hr)	0.2612
Undeveloped Runoff Coefficient (Cu)	0.3951
Developed Runoff Coefficient (Cd)	0.4001
Time of Concentration (min)	29.0
Clear Peak Flow Rate (cfs)	0.1014
Burned Peak Flow Rate (cfs)	0.1014
24-Hr Clear Runoff Volume (ac-ft)	0.0113
24-Hr Clear Runoff Volume (cu-ft)	492.5504



Peak Flow Hydrologic Analysis

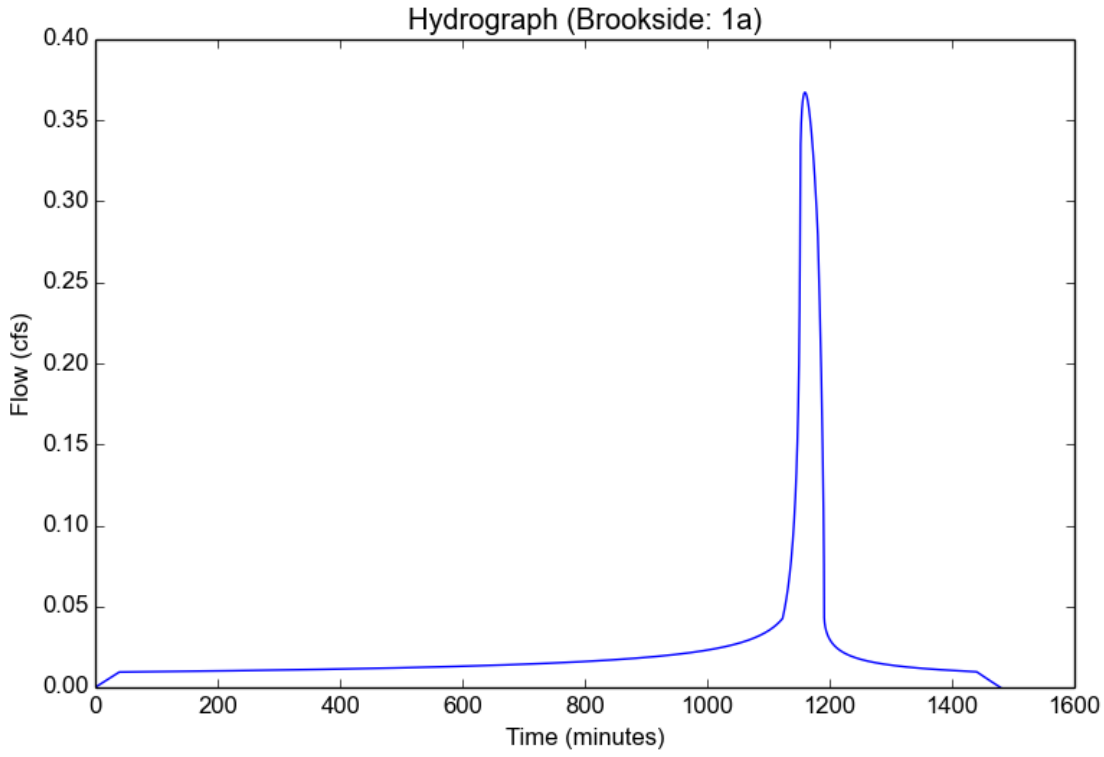
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/1.2-in Storm/Brookside - 1a.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1a
Area (ac)	3.28
Flow Path Length (ft)	866.7
Flow Path Slope (vft/hft)	0.04038
85th Percentile Rainfall Depth (in)	1.2
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.2
Peak Intensity (in/hr)	0.2726
Undeveloped Runoff Coefficient (Cu)	0.4057
Developed Runoff Coefficient (Cd)	0.4107
Time of Concentration (min)	39.0
Clear Peak Flow Rate (cfs)	0.3673
Burned Peak Flow Rate (cfs)	0.3673
24-Hr Clear Runoff Volume (ac-ft)	0.0486
24-Hr Clear Runoff Volume (cu-ft)	2115.2192



Peak Flow Hydrologic Analysis

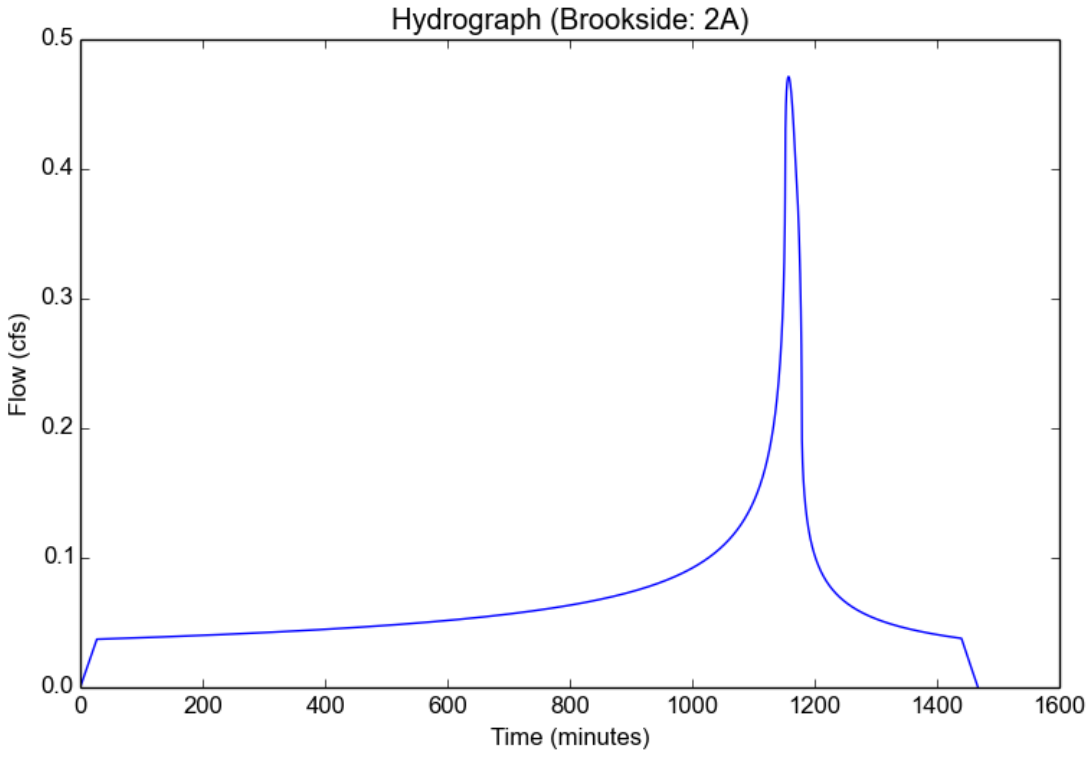
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/1.2-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	2.75
Flow Path Length (ft)	652.4
Flow Path Slope (vft/hft)	0.04599
85th Percentile Rainfall Depth (in)	1.2
Percent Impervious	0.509
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.2
Peak Intensity (in/hr)	0.3241
Undeveloped Runoff Coefficient (Cu)	0.1439
Developed Runoff Coefficient (Cd)	0.5288
Time of Concentration (min)	27.0
Clear Peak Flow Rate (cfs)	0.4713
Burned Peak Flow Rate (cfs)	0.4713
24-Hr Clear Runoff Volume (ac-ft)	0.1386
24-Hr Clear Runoff Volume (cu-ft)	6037.5459



Peak Flow Hydrologic Analysis

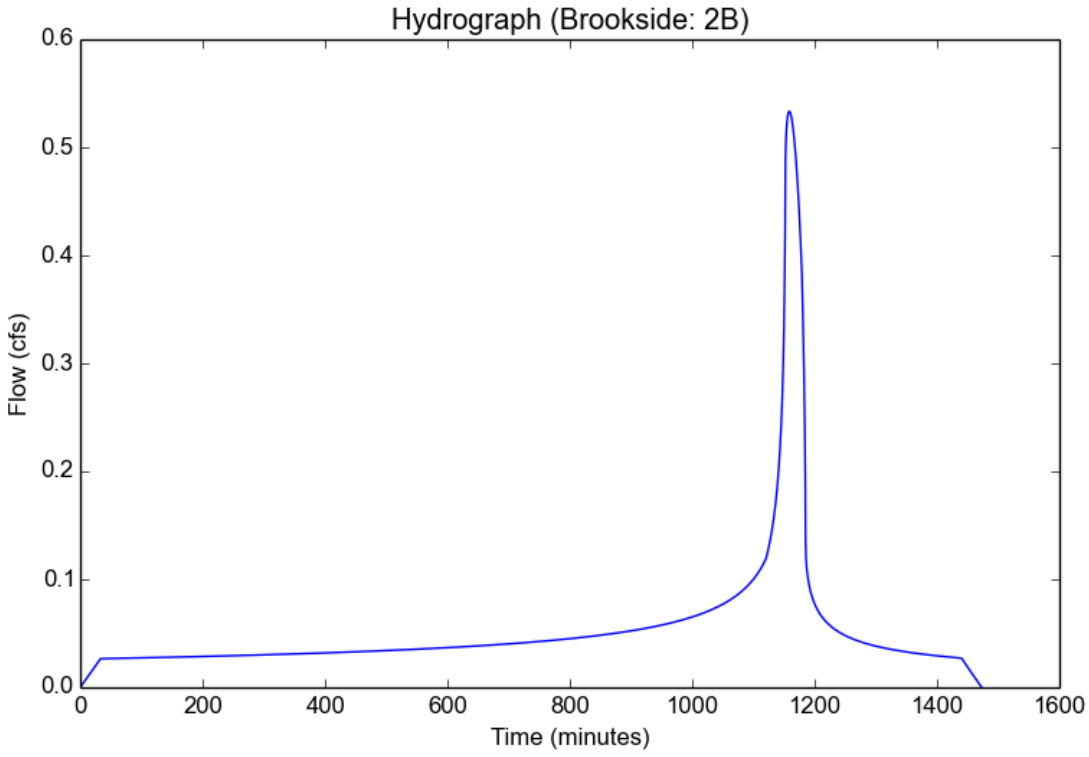
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/1.2-in Storm/Brookside - 2B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2B
Area (ac)	3.32
Flow Path Length (ft)	861.6
Flow Path Slope (vft/hft)	0.03714
85th Percentile Rainfall Depth (in)	1.2
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.2
Peak Intensity (in/hr)	0.2949
Undeveloped Runoff Coefficient (Cu)	0.4264
Developed Runoff Coefficient (Cd)	0.5448
Time of Concentration (min)	33.0
Clear Peak Flow Rate (cfs)	0.5334
Burned Peak Flow Rate (cfs)	0.5334
24-Hr Clear Runoff Volume (ac-ft)	0.1093
24-Hr Clear Runoff Volume (cu-ft)	4762.7933



Peak Flow Hydrologic Analysis

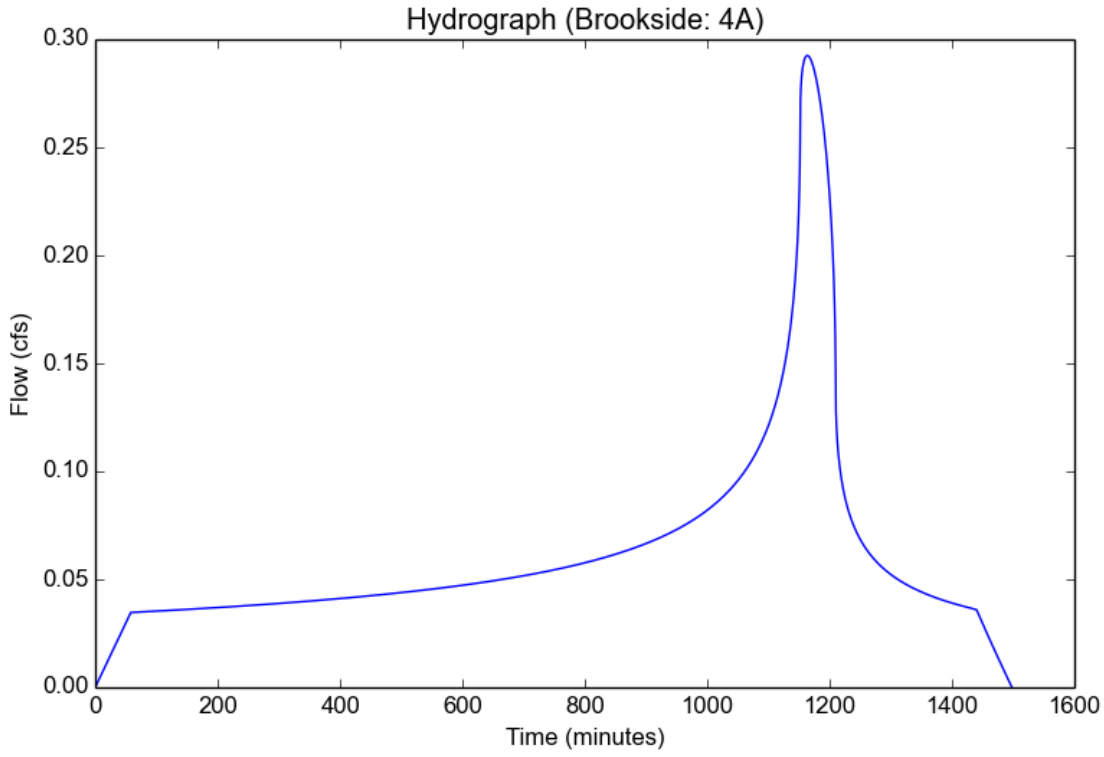
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/1.2-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	4.31
Flow Path Length (ft)	796.6
Flow Path Slope (vft/hft)	0.0113
85th Percentile Rainfall Depth (in)	1.2
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.2
Peak Intensity (in/hr)	0.2263
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	58.0
Clear Peak Flow Rate (cfs)	0.2925
Burned Peak Flow Rate (cfs)	0.2925
24-Hr Clear Runoff Volume (ac-ft)	0.1282
24-Hr Clear Runoff Volume (cu-ft)	5586.0042



Peak Flow Hydrologic Analysis

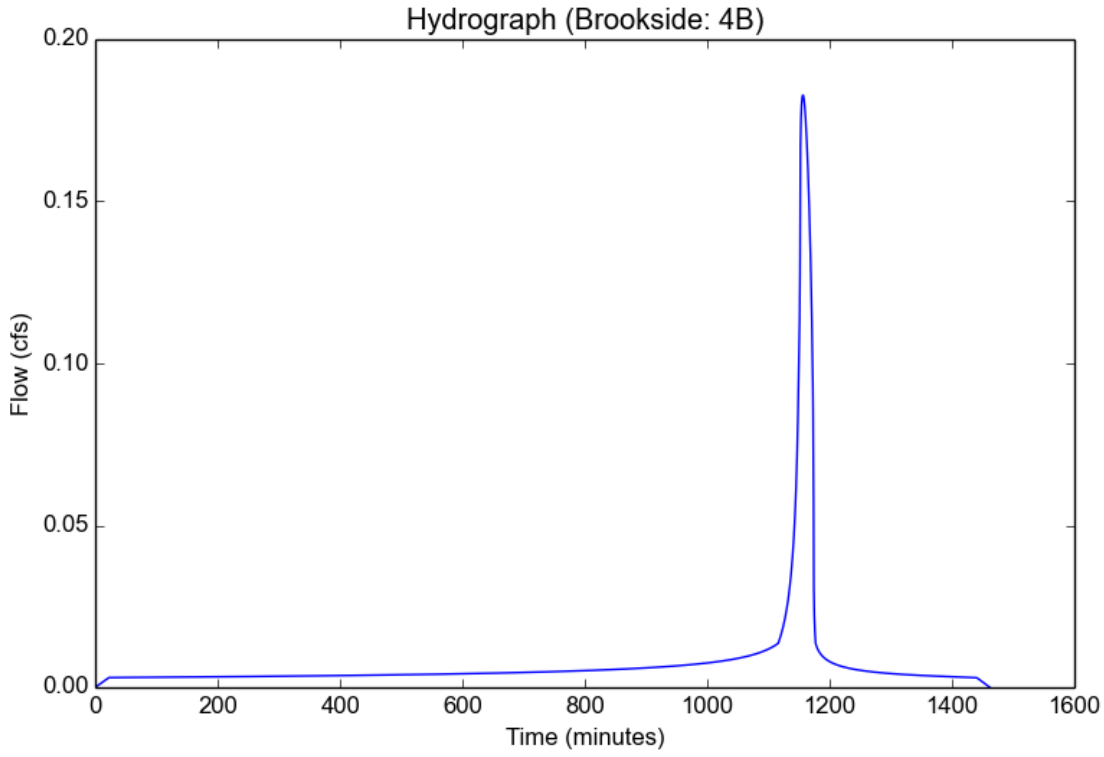
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/1.2-in Storm/Brookside - 4B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4B
Area (ac)	1.05
Flow Path Length (ft)	377.9
Flow Path Slope (vft/hft)	0.02646
85th Percentile Rainfall Depth (in)	1.2
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.2
Peak Intensity (in/hr)	0.3568
Undeveloped Runoff Coefficient (Cu)	0.4837
Developed Runoff Coefficient (Cd)	0.4879
Time of Concentration (min)	22.0
Clear Peak Flow Rate (cfs)	0.1828
Burned Peak Flow Rate (cfs)	0.1828
24-Hr Clear Runoff Volume (ac-ft)	0.0159
24-Hr Clear Runoff Volume (cu-ft)	692.1506



Peak Flow Hydrologic Analysis

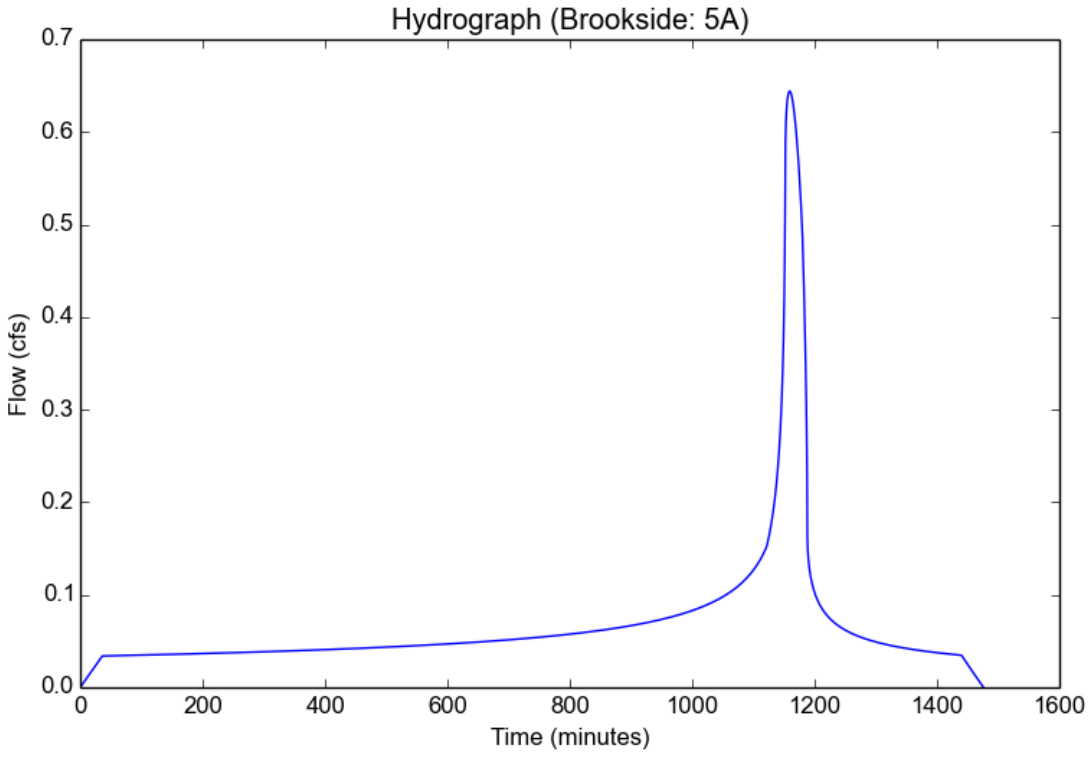
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/1.2-in Storm/Brookside - 5A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5A
Area (ac)	4.24
Flow Path Length (ft)	954.1
Flow Path Slope (vft/hft)	0.03354
85th Percentile Rainfall Depth (in)	1.2
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.2
Peak Intensity (in/hr)	0.2831
Undeveloped Runoff Coefficient (Cu)	0.4154
Developed Runoff Coefficient (Cd)	0.5366
Time of Concentration (min)	36.0
Clear Peak Flow Rate (cfs)	0.6441
Burned Peak Flow Rate (cfs)	0.6441
24-Hr Clear Runoff Volume (ac-ft)	0.1395
24-Hr Clear Runoff Volume (cu-ft)	6075.2585



Peak Flow Hydrologic Analysis

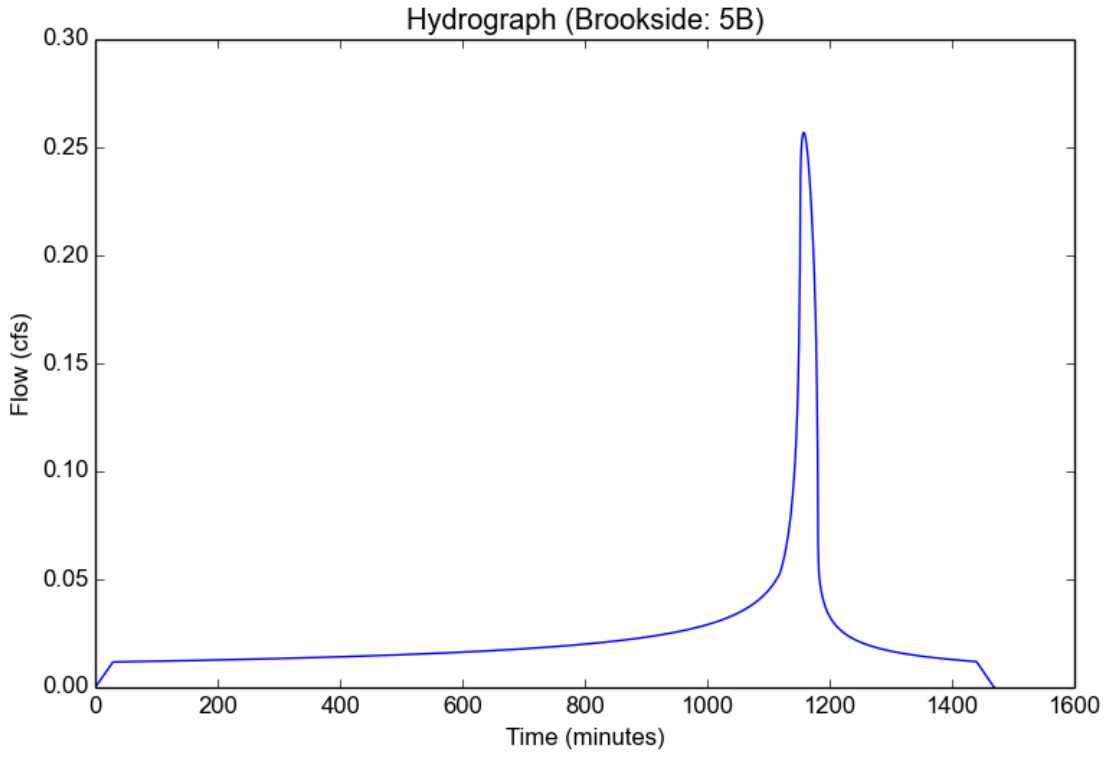
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/1.2-in Storm/Brookside - 5B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5B
Area (ac)	1.47
Flow Path Length (ft)	542.7
Flow Path Slope (vft/hft)	0.0129
85th Percentile Rainfall Depth (in)	1.2
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.2
Peak Intensity (in/hr)	0.3134
Undeveloped Runoff Coefficient (Cu)	0.4435
Developed Runoff Coefficient (Cd)	0.5576
Time of Concentration (min)	29.0
Clear Peak Flow Rate (cfs)	0.2569
Burned Peak Flow Rate (cfs)	0.2569
24-Hr Clear Runoff Volume (ac-ft)	0.0485
24-Hr Clear Runoff Volume (cu-ft)	2112.3642



Peak Flow Hydrologic Analysis

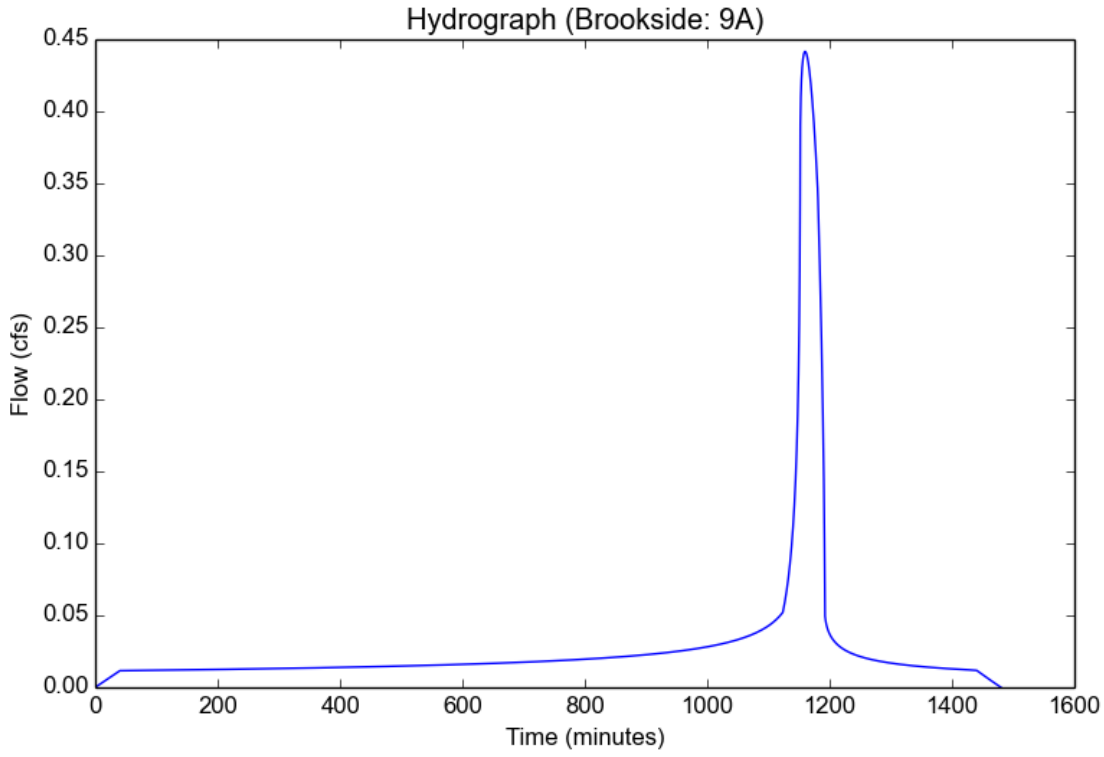
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/1.2-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	4.02
Flow Path Length (ft)	958.0
Flow Path Slope (vft/hft)	0.05323
85th Percentile Rainfall Depth (in)	1.2
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.2
Peak Intensity (in/hr)	0.2694
Undeveloped Runoff Coefficient (Cu)	0.4027
Developed Runoff Coefficient (Cd)	0.4077
Time of Concentration (min)	40.0
Clear Peak Flow Rate (cfs)	0.4416
Burned Peak Flow Rate (cfs)	0.4416
24-Hr Clear Runoff Volume (ac-ft)	0.0594
24-Hr Clear Runoff Volume (cu-ft)	2589.3219



Peak Flow Hydrologic Analysis

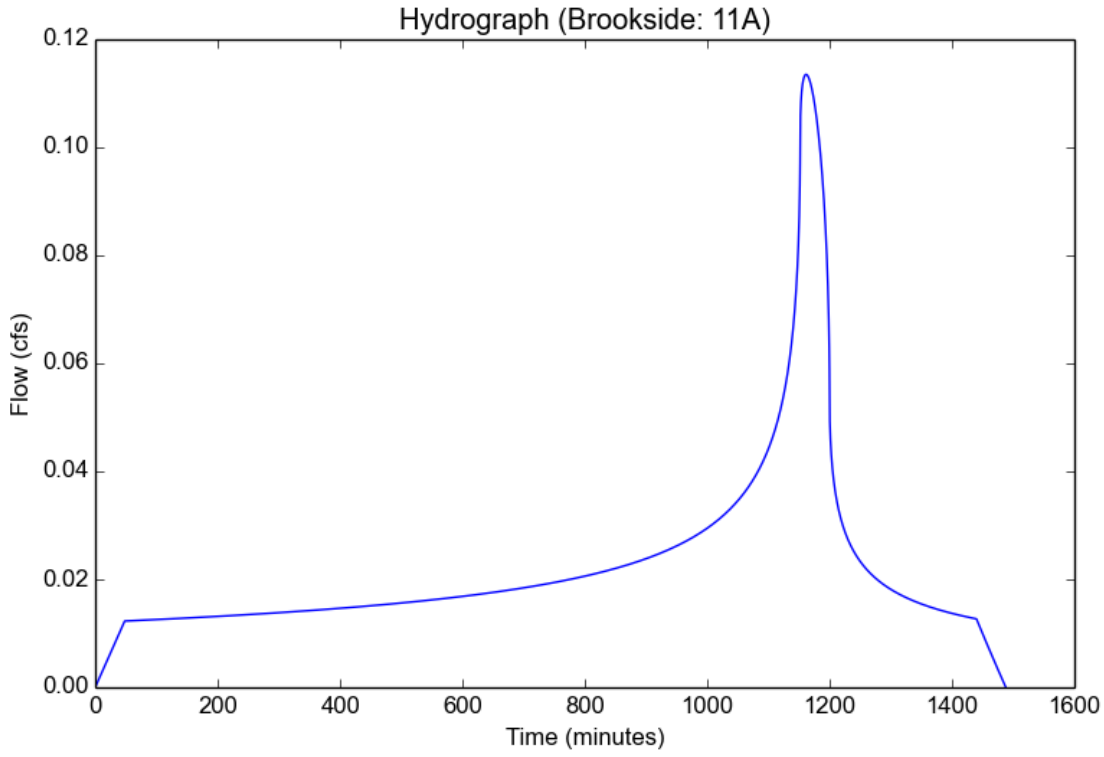
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/1.2-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	1.53
Flow Path Length (ft)	494.1
Flow Path Slope (vft/hft)	0.00607
85th Percentile Rainfall Depth (in)	1.2
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.2
Peak Intensity (in/hr)	0.2473
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.3
Time of Concentration (min)	48.0
Clear Peak Flow Rate (cfs)	0.1135
Burned Peak Flow Rate (cfs)	0.1135
24-Hr Clear Runoff Volume (ac-ft)	0.0455
24-Hr Clear Runoff Volume (cu-ft)	1982.939



Peak Flow Hydrologic Analysis

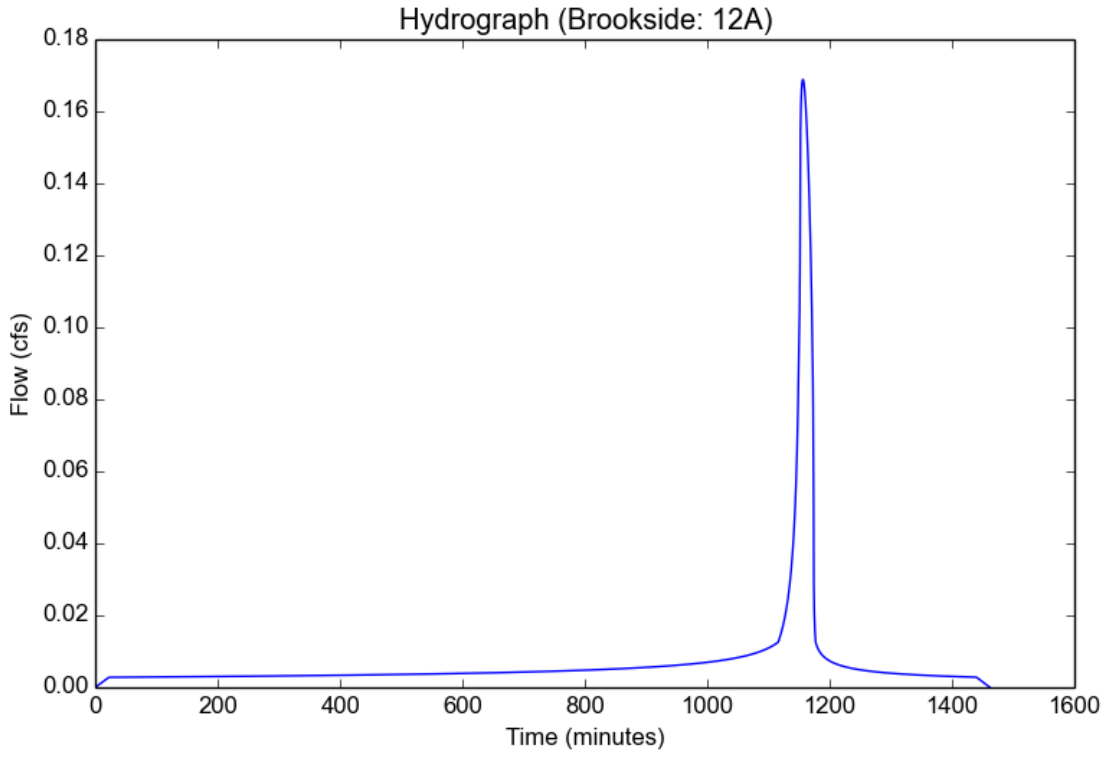
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/1.2-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.97
Flow Path Length (ft)	512.5
Flow Path Slope (vft/hft)	0.07414
85th Percentile Rainfall Depth (in)	1.2
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.2
Peak Intensity (in/hr)	0.3568
Undeveloped Runoff Coefficient (Cu)	0.4837
Developed Runoff Coefficient (Cd)	0.4879
Time of Concentration (min)	22.0
Clear Peak Flow Rate (cfs)	0.1689
Burned Peak Flow Rate (cfs)	0.1689
24-Hr Clear Runoff Volume (ac-ft)	0.0147
24-Hr Clear Runoff Volume (cu-ft)	639.4153



Peak Flow Hydrologic Analysis

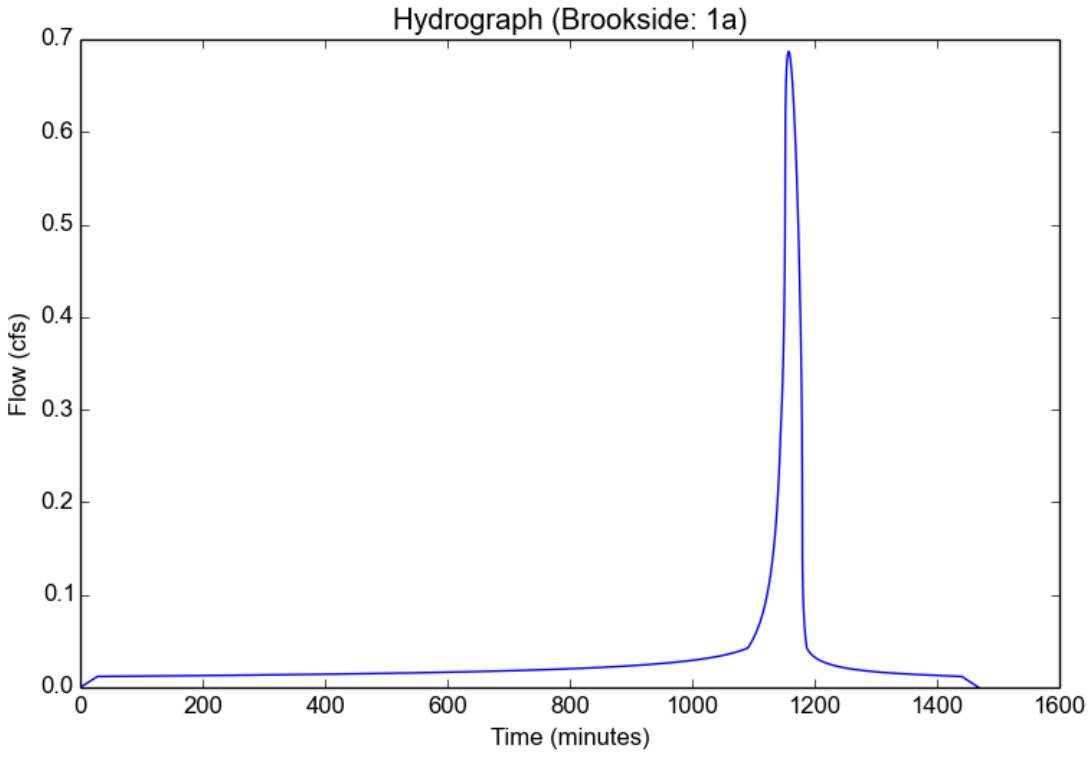
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/1.5-in Storm/Brookside - 1a.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1a
Area (ac)	3.28
Flow Path Length (ft)	866.7
Flow Path Slope (vft/hft)	0.04038
85th Percentile Rainfall Depth (in)	1.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.5
Peak Intensity (in/hr)	0.3982
Undeveloped Runoff Coefficient (Cu)	0.5221
Developed Runoff Coefficient (Cd)	0.5258
Time of Concentration (min)	28.0
Clear Peak Flow Rate (cfs)	0.6869
Burned Peak Flow Rate (cfs)	0.6869
24-Hr Clear Runoff Volume (ac-ft)	0.0679
24-Hr Clear Runoff Volume (cu-ft)	2958.9126



Peak Flow Hydrologic Analysis

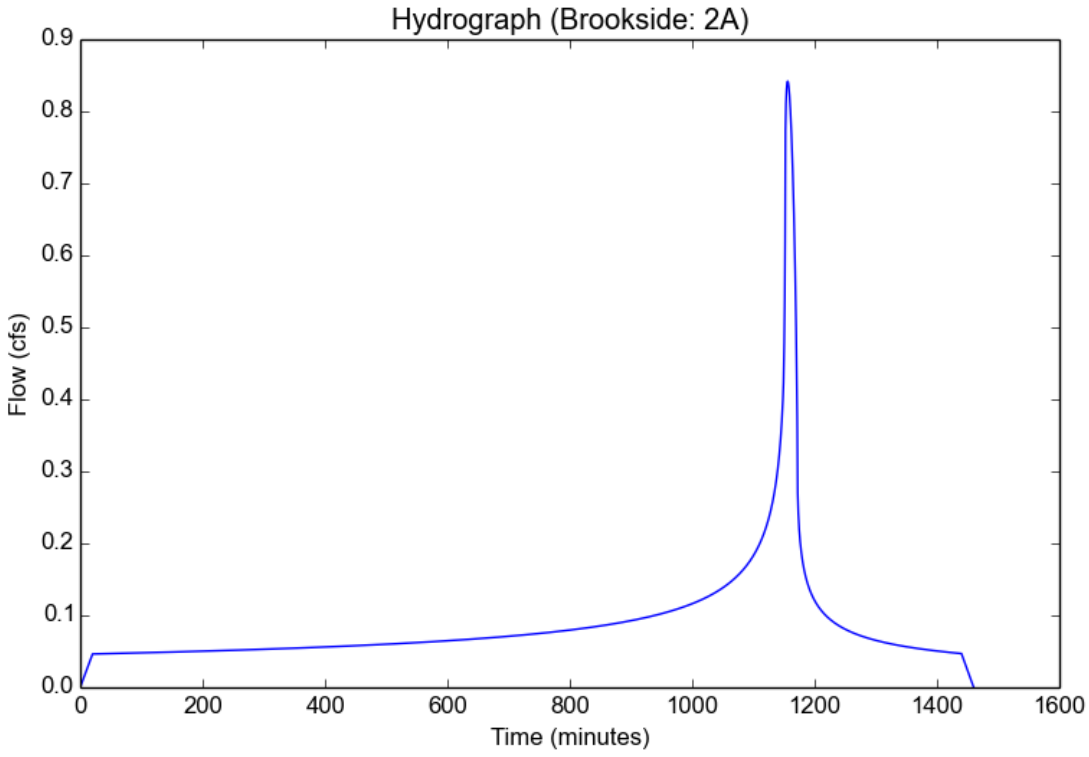
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/1.5-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	2.75
Flow Path Length (ft)	652.4
Flow Path Slope (vft/hft)	0.04599
85th Percentile Rainfall Depth (in)	1.5
Percent Impervious	0.509
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.5
Peak Intensity (in/hr)	0.4665
Undeveloped Runoff Coefficient (Cu)	0.4036
Developed Runoff Coefficient (Cd)	0.6562
Time of Concentration (min)	20.0
Clear Peak Flow Rate (cfs)	0.8418
Burned Peak Flow Rate (cfs)	0.8418
24-Hr Clear Runoff Volume (ac-ft)	0.1766
24-Hr Clear Runoff Volume (cu-ft)	7692.755



Peak Flow Hydrologic Analysis

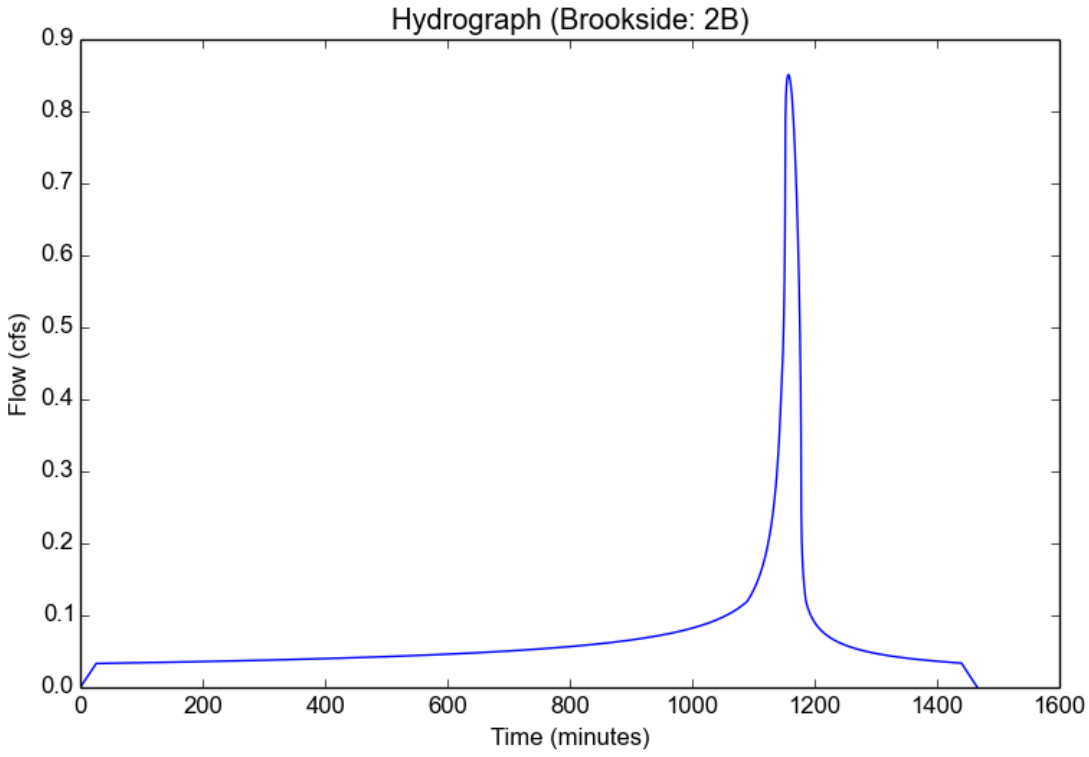
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/1.5-in Storm/Brookside - 2B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2B
Area (ac)	3.32
Flow Path Length (ft)	861.6
Flow Path Slope (vft/hft)	0.03714
85th Percentile Rainfall Depth (in)	1.5
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.5
Peak Intensity (in/hr)	0.4124
Undeveloped Runoff Coefficient (Cu)	0.5288
Developed Runoff Coefficient (Cd)	0.6216
Time of Concentration (min)	26.0
Clear Peak Flow Rate (cfs)	0.8509
Burned Peak Flow Rate (cfs)	0.8509
24-Hr Clear Runoff Volume (ac-ft)	0.142
24-Hr Clear Runoff Volume (cu-ft)	6185.5977



Peak Flow Hydrologic Analysis

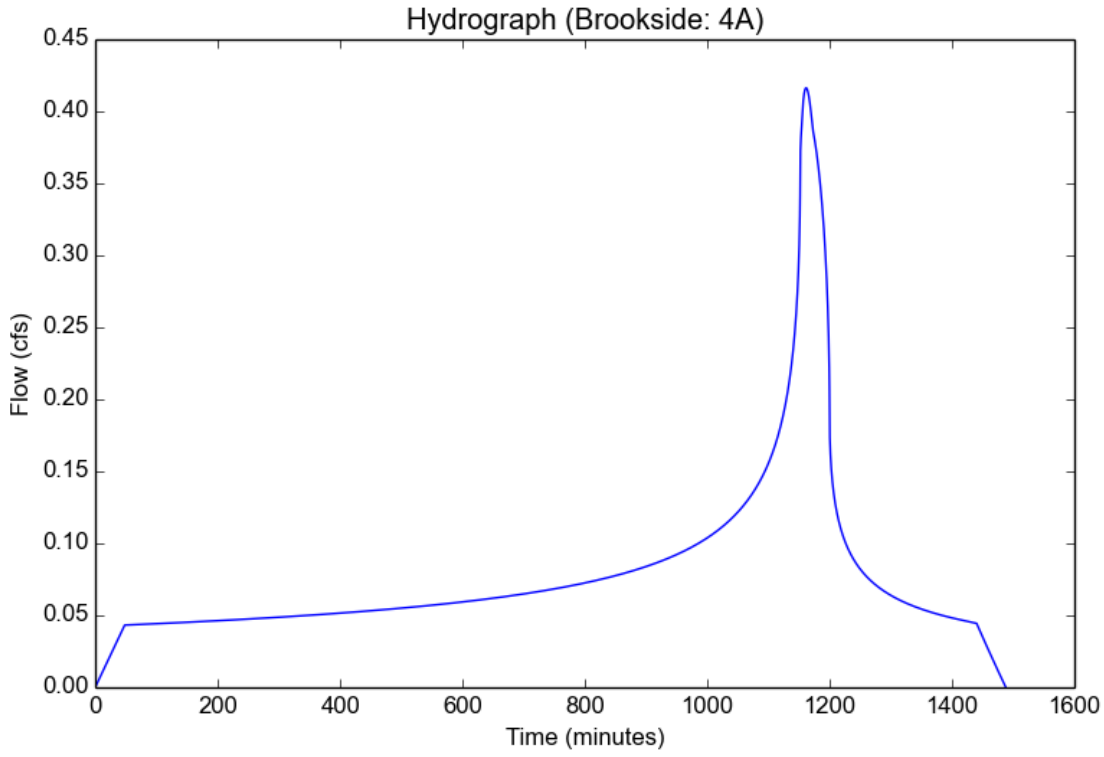
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/1.5-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	4.31
Flow Path Length (ft)	796.6
Flow Path Slope (vft/hft)	0.0113
85th Percentile Rainfall Depth (in)	1.5
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.5
Peak Intensity (in/hr)	0.3091
Undeveloped Runoff Coefficient (Cu)	0.1166
Developed Runoff Coefficient (Cd)	0.3125
Time of Concentration (min)	48.0
Clear Peak Flow Rate (cfs)	0.4163
Burned Peak Flow Rate (cfs)	0.4163
24-Hr Clear Runoff Volume (ac-ft)	0.1606
24-Hr Clear Runoff Volume (cu-ft)	6994.4889



Peak Flow Hydrologic Analysis

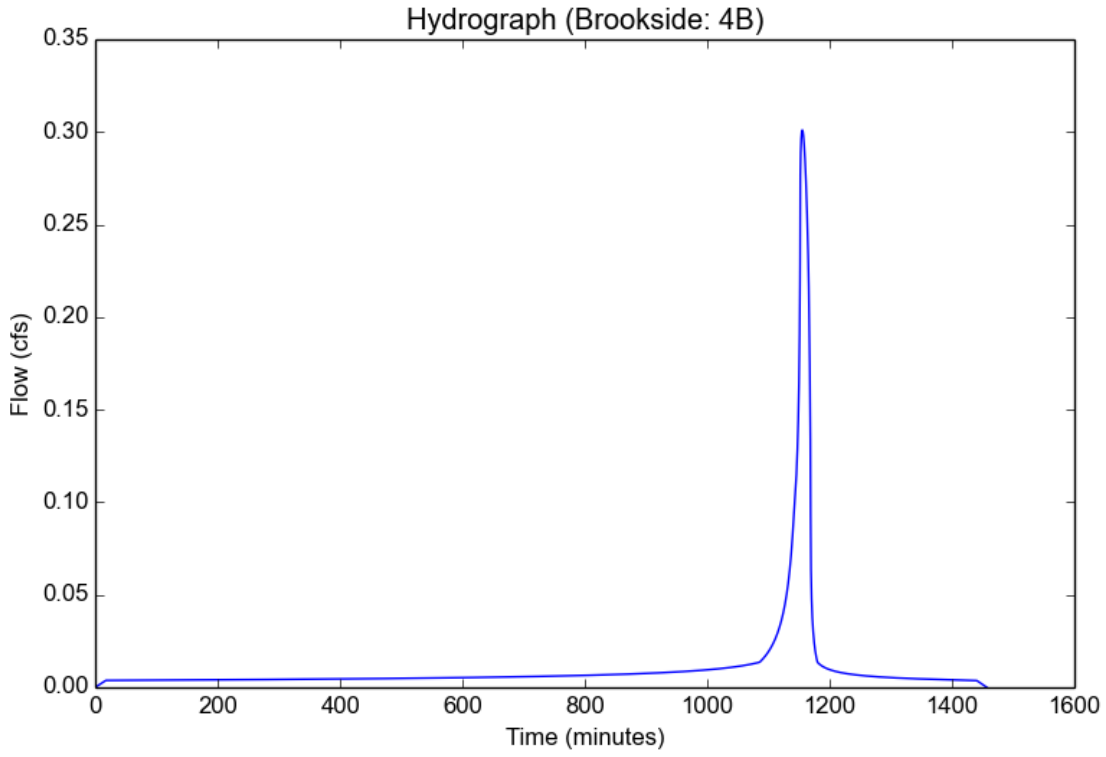
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/1.5-in Storm/Brookside - 4B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4B
Area (ac)	1.05
Flow Path Length (ft)	377.9
Flow Path Slope (vft/hft)	0.02646
85th Percentile Rainfall Depth (in)	1.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.5
Peak Intensity (in/hr)	0.5035
Undeveloped Runoff Coefficient (Cu)	0.566
Developed Runoff Coefficient (Cd)	0.5694
Time of Concentration (min)	17.0
Clear Peak Flow Rate (cfs)	0.301
Burned Peak Flow Rate (cfs)	0.301
24-Hr Clear Runoff Volume (ac-ft)	0.0219
24-Hr Clear Runoff Volume (cu-ft)	953.8629



Peak Flow Hydrologic Analysis

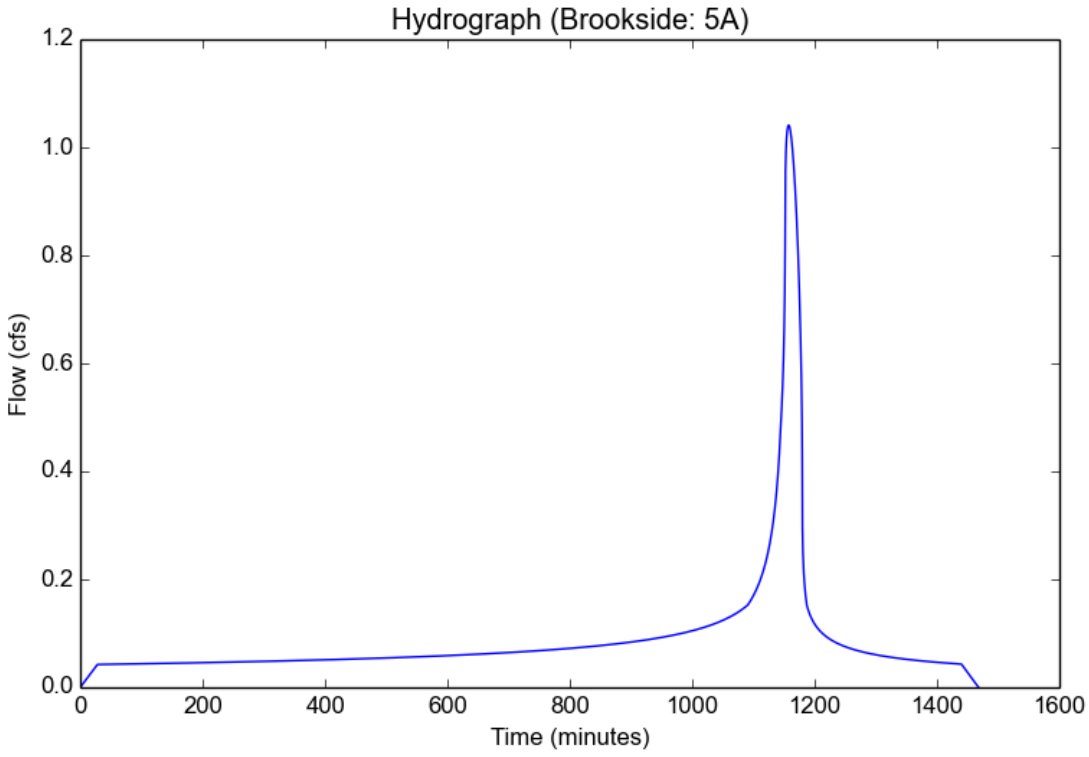
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/1.5-in Storm/Brookside - 5A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5A
Area (ac)	4.24
Flow Path Length (ft)	954.1
Flow Path Slope (vft/hft)	0.03354
85th Percentile Rainfall Depth (in)	1.5
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.5
Peak Intensity (in/hr)	0.3982
Undeveloped Runoff Coefficient (Cu)	0.5221
Developed Runoff Coefficient (Cd)	0.6166
Time of Concentration (min)	28.0
Clear Peak Flow Rate (cfs)	1.0411
Burned Peak Flow Rate (cfs)	1.0411
24-Hr Clear Runoff Volume (ac-ft)	0.1812
24-Hr Clear Runoff Volume (cu-ft)	7893.2195



Peak Flow Hydrologic Analysis

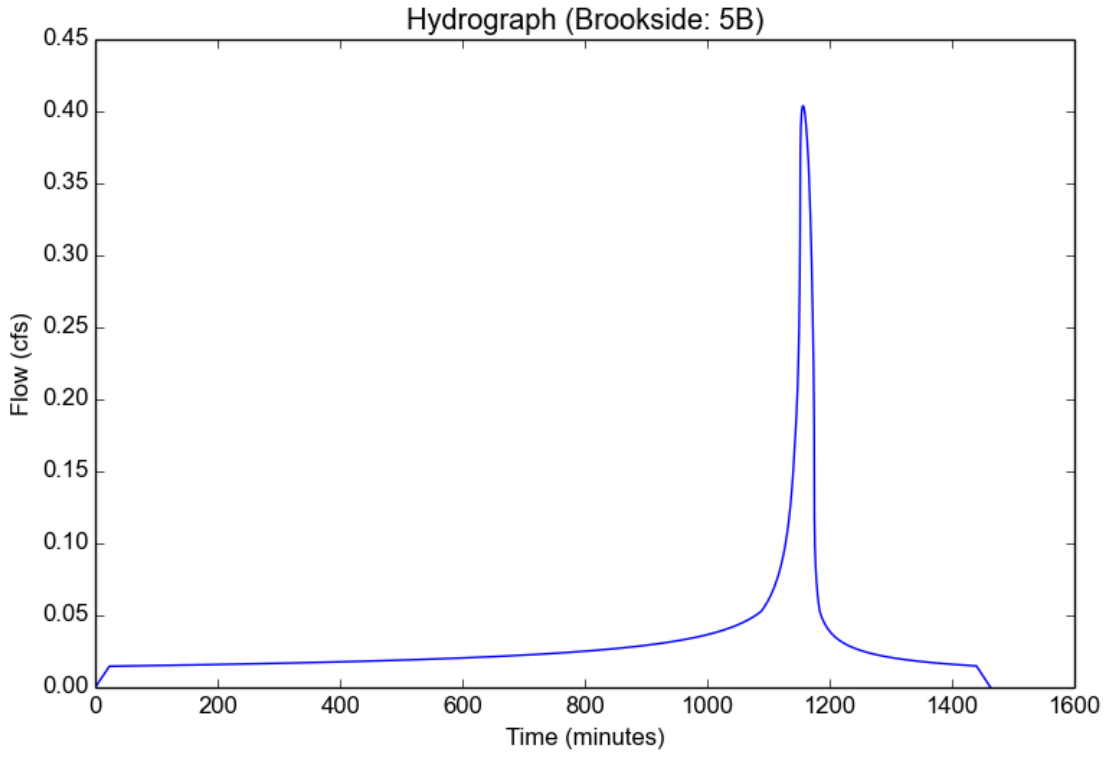
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/1.5-in Storm/Brookside - 5B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5B
Area (ac)	1.47
Flow Path Length (ft)	542.7
Flow Path Slope (vft/hft)	0.0129
85th Percentile Rainfall Depth (in)	1.5
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.5
Peak Intensity (in/hr)	0.4368
Undeveloped Runoff Coefficient (Cu)	0.5388
Developed Runoff Coefficient (Cd)	0.6291
Time of Concentration (min)	23.0
Clear Peak Flow Rate (cfs)	0.4039
Burned Peak Flow Rate (cfs)	0.4039
24-Hr Clear Runoff Volume (ac-ft)	0.0629
24-Hr Clear Runoff Volume (cu-ft)	2740.6102



Peak Flow Hydrologic Analysis

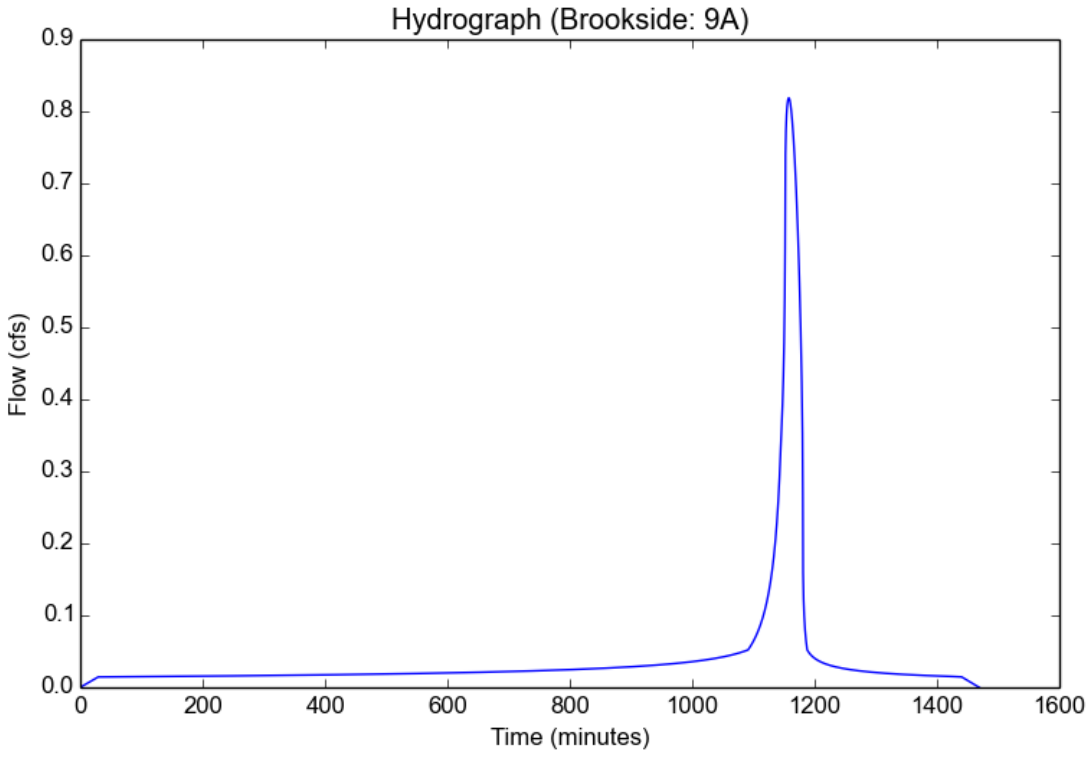
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/1.5-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	4.02
Flow Path Length (ft)	958.0
Flow Path Slope (vft/hft)	0.05323
85th Percentile Rainfall Depth (in)	1.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.5
Peak Intensity (in/hr)	0.3917
Undeveloped Runoff Coefficient (Cu)	0.516
Developed Runoff Coefficient (Cd)	0.5199
Time of Concentration (min)	29.0
Clear Peak Flow Rate (cfs)	0.8187
Burned Peak Flow Rate (cfs)	0.8187
24-Hr Clear Runoff Volume (ac-ft)	0.0831
24-Hr Clear Runoff Volume (cu-ft)	3620.7557



Peak Flow Hydrologic Analysis

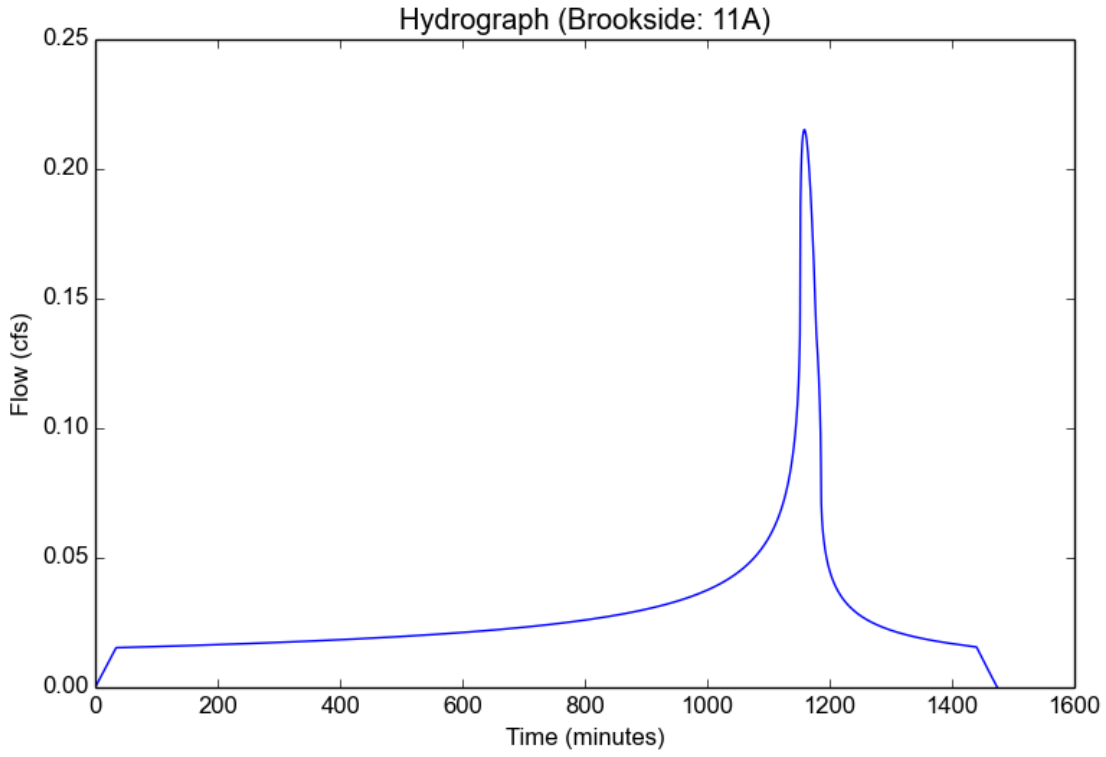
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/1.5-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	1.53
Flow Path Length (ft)	494.1
Flow Path Slope (vft/hft)	0.00607
85th Percentile Rainfall Depth (in)	1.5
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.5
Peak Intensity (in/hr)	0.3635
Undeveloped Runoff Coefficient (Cu)	0.2158
Developed Runoff Coefficient (Cd)	0.3869
Time of Concentration (min)	34.0
Clear Peak Flow Rate (cfs)	0.2152
Burned Peak Flow Rate (cfs)	0.2152
24-Hr Clear Runoff Volume (ac-ft)	0.0581
24-Hr Clear Runoff Volume (cu-ft)	2531.6488



Peak Flow Hydrologic Analysis

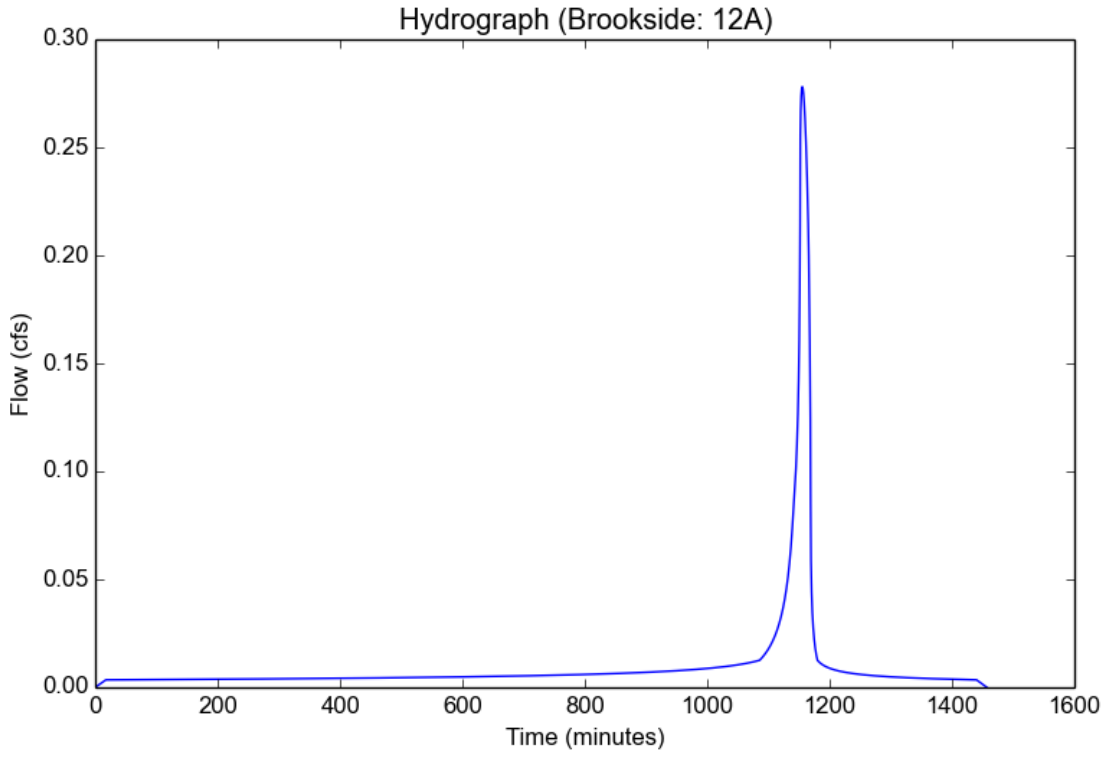
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/1.5-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.97
Flow Path Length (ft)	512.5
Flow Path Slope (vft/hft)	0.07414
85th Percentile Rainfall Depth (in)	1.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.5
Peak Intensity (in/hr)	0.5035
Undeveloped Runoff Coefficient (Cu)	0.566
Developed Runoff Coefficient (Cd)	0.5694
Time of Concentration (min)	17.0
Clear Peak Flow Rate (cfs)	0.2781
Burned Peak Flow Rate (cfs)	0.2781
24-Hr Clear Runoff Volume (ac-ft)	0.0202
24-Hr Clear Runoff Volume (cu-ft)	881.1876



Peak Flow Hydrologic Analysis

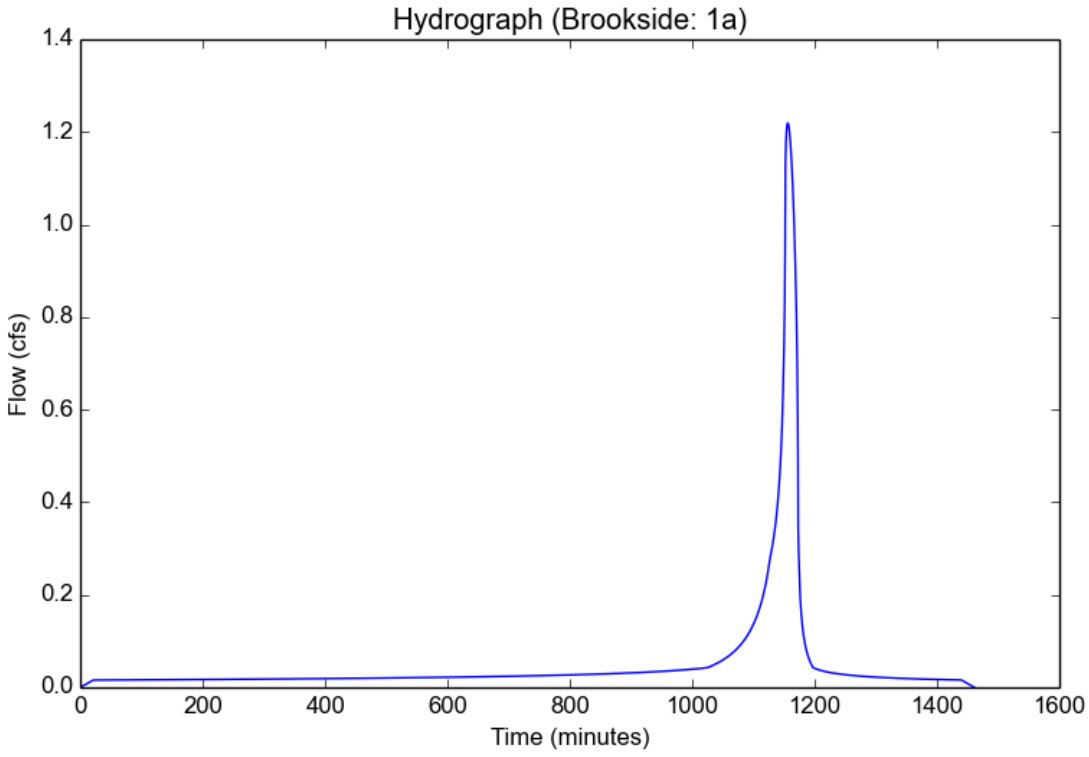
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/2.0-in Storm/Brookside - 1a.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1a
Area (ac)	3.28
Flow Path Length (ft)	866.7
Flow Path Slope (vft/hft)	0.04038
85th Percentile Rainfall Depth (in)	2.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	2.0
Peak Intensity (in/hr)	0.6079
Undeveloped Runoff Coefficient (Cu)	0.6087
Developed Runoff Coefficient (Cd)	0.6116
Time of Concentration (min)	21.0
Clear Peak Flow Rate (cfs)	1.2194
Burned Peak Flow Rate (cfs)	1.2194
24-Hr Clear Runoff Volume (ac-ft)	0.1043
24-Hr Clear Runoff Volume (cu-ft)	4544.9414



Peak Flow Hydrologic Analysis

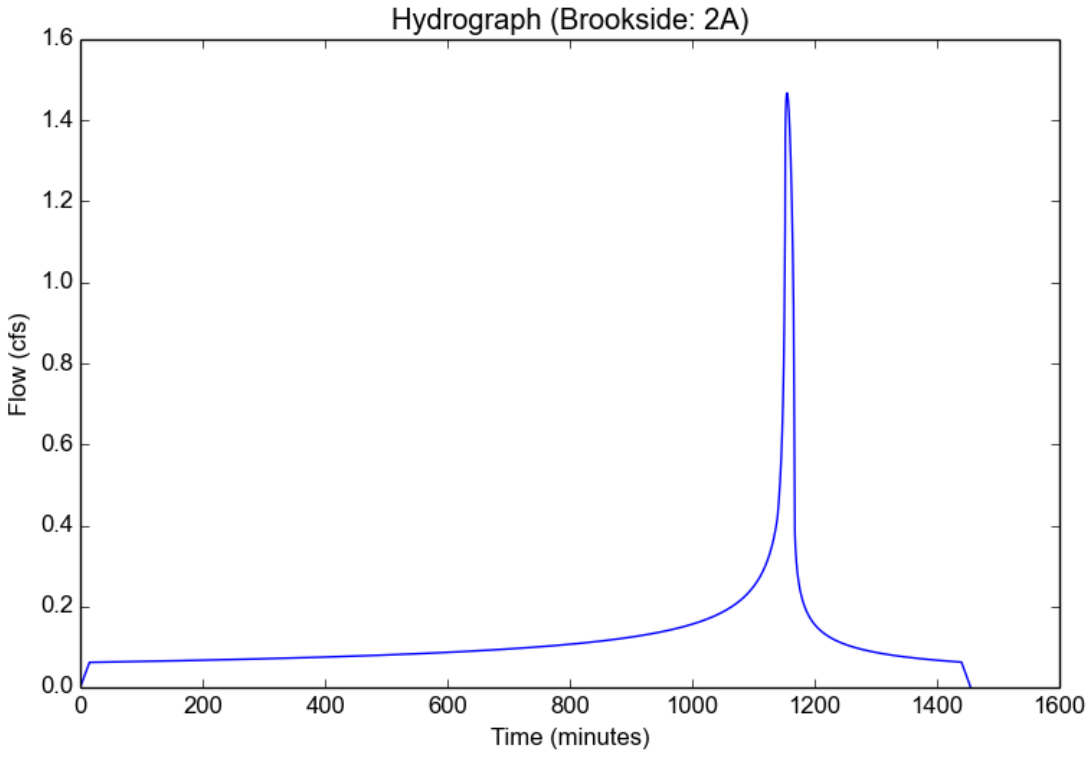
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/2.0-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	2.75
Flow Path Length (ft)	652.4
Flow Path Slope (vft/hft)	0.04599
85th Percentile Rainfall Depth (in)	2.0
Percent Impervious	0.509
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	2.0
Peak Intensity (in/hr)	0.712
Undeveloped Runoff Coefficient (Cu)	0.5933
Developed Runoff Coefficient (Cd)	0.7494
Time of Concentration (min)	15.0
Clear Peak Flow Rate (cfs)	1.4674
Burned Peak Flow Rate (cfs)	1.4674
24-Hr Clear Runoff Volume (ac-ft)	0.2402
24-Hr Clear Runoff Volume (cu-ft)	10461.3577



Peak Flow Hydrologic Analysis

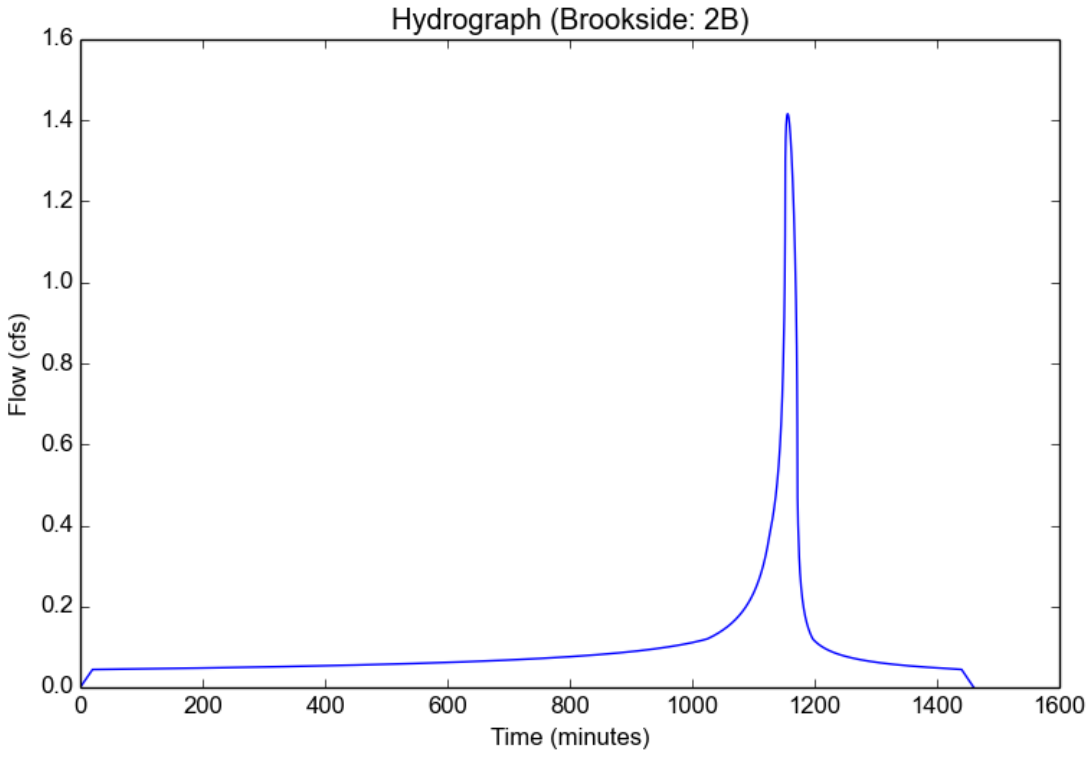
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/2.0-in Storm/Brookside - 2B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2B
Area (ac)	3.32
Flow Path Length (ft)	861.6
Flow Path Slope (vft/hft)	0.03714
85th Percentile Rainfall Depth (in)	2.0
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	2.0
Peak Intensity (in/hr)	0.622
Undeveloped Runoff Coefficient (Cu)	0.6145
Developed Runoff Coefficient (Cd)	0.6858
Time of Concentration (min)	20.0
Clear Peak Flow Rate (cfs)	1.4162
Burned Peak Flow Rate (cfs)	1.4162
24-Hr Clear Runoff Volume (ac-ft)	0.1998
24-Hr Clear Runoff Volume (cu-ft)	8703.5938



Peak Flow Hydrologic Analysis

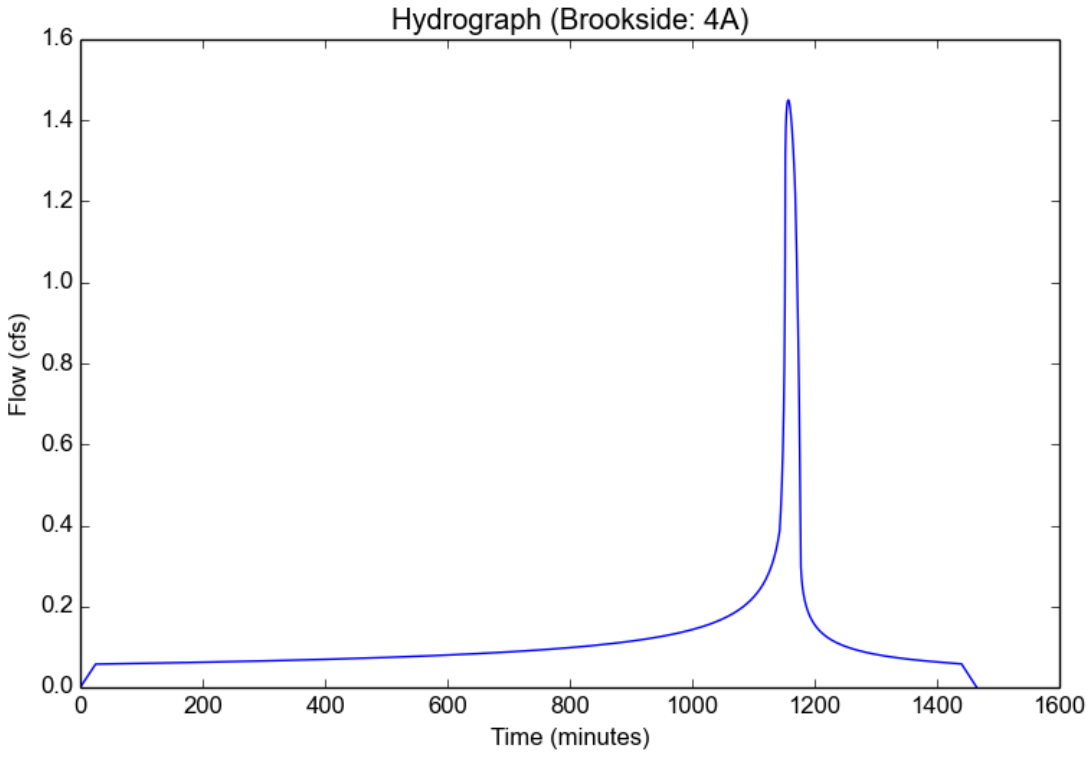
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/2.0-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	4.31
Flow Path Length (ft)	796.6
Flow Path Slope (vft/hft)	0.0113
85th Percentile Rainfall Depth (in)	2.0
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	2.0
Peak Intensity (in/hr)	0.56
Undeveloped Runoff Coefficient (Cu)	0.5011
Developed Runoff Coefficient (Cd)	0.6008
Time of Concentration (min)	25.0
Clear Peak Flow Rate (cfs)	1.4503
Burned Peak Flow Rate (cfs)	1.4503
24-Hr Clear Runoff Volume (ac-ft)	0.2347
24-Hr Clear Runoff Volume (cu-ft)	10225.4251



Peak Flow Hydrologic Analysis

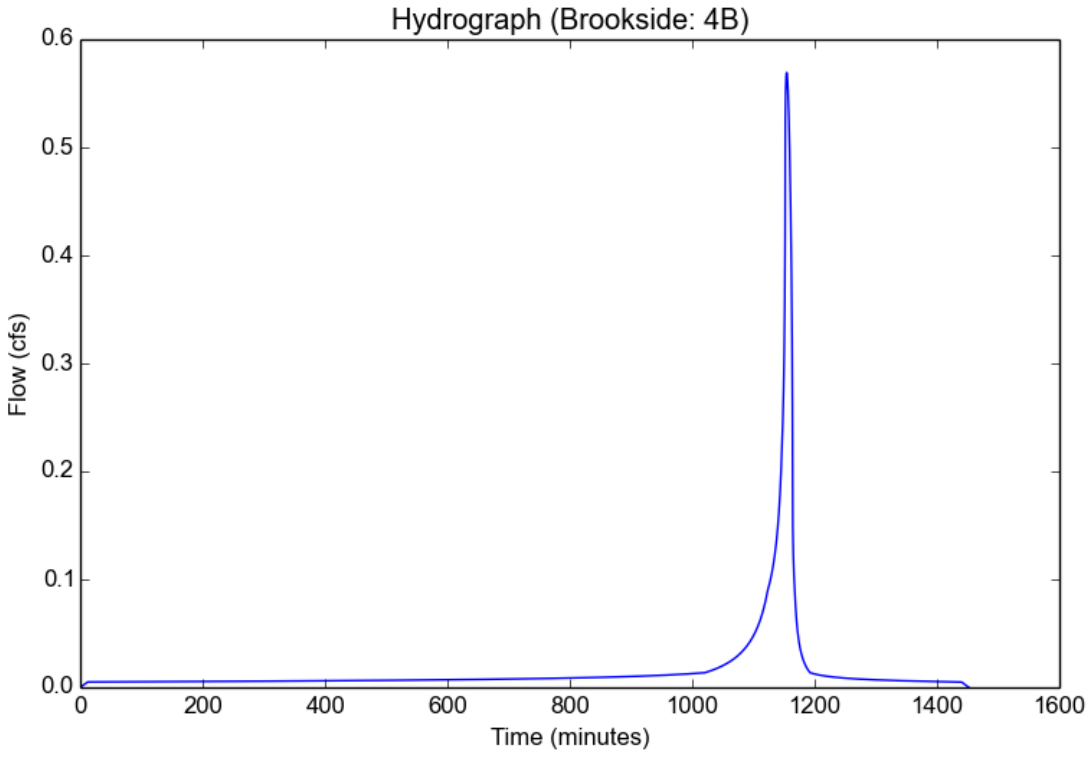
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/2.0-in Storm/Brookside - 4B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4B
Area (ac)	1.05
Flow Path Length (ft)	377.9
Flow Path Slope (vft/hft)	0.02646
85th Percentile Rainfall Depth (in)	2.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	2.0
Peak Intensity (in/hr)	0.7907
Undeveloped Runoff Coefficient (Cu)	0.6835
Developed Runoff Coefficient (Cd)	0.6856
Time of Concentration (min)	12.0
Clear Peak Flow Rate (cfs)	0.5693
Burned Peak Flow Rate (cfs)	0.5693
24-Hr Clear Runoff Volume (ac-ft)	0.0338
24-Hr Clear Runoff Volume (cu-ft)	1471.8128



Peak Flow Hydrologic Analysis

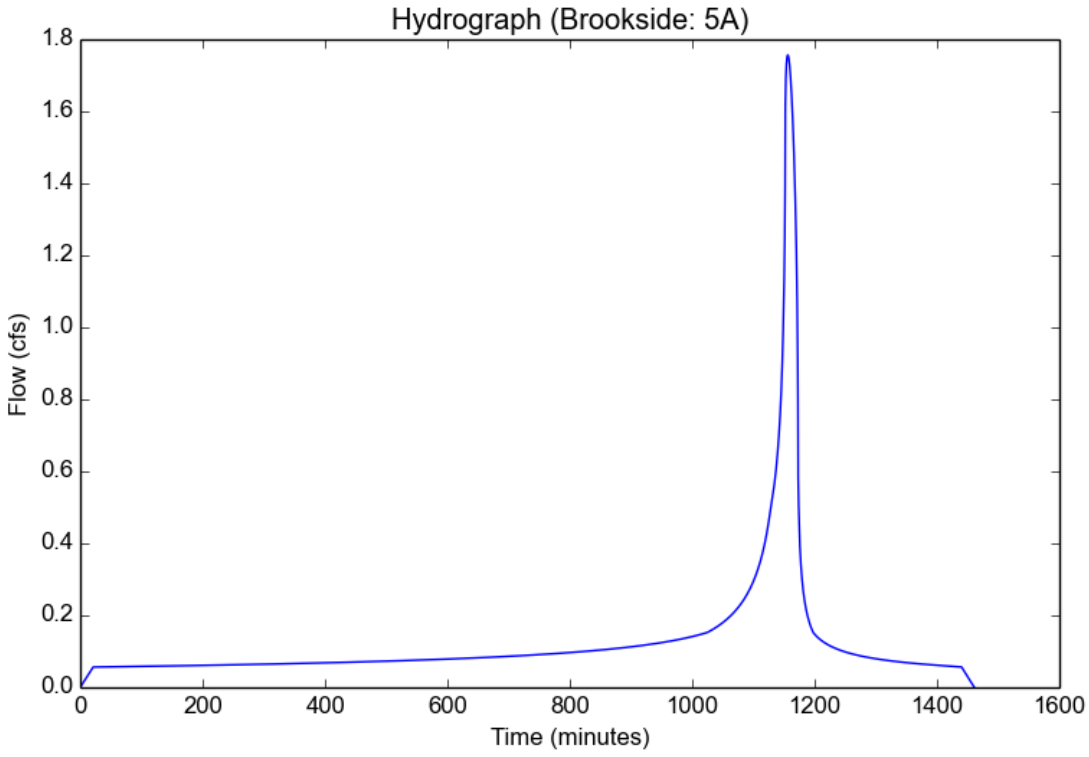
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/2.0-in Storm/Brookside - 5A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5A
Area (ac)	4.24
Flow Path Length (ft)	954.1
Flow Path Slope (vft/hft)	0.03354
85th Percentile Rainfall Depth (in)	2.0
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	2.0
Peak Intensity (in/hr)	0.6079
Undeveloped Runoff Coefficient (Cu)	0.6087
Developed Runoff Coefficient (Cd)	0.6815
Time of Concentration (min)	21.0
Clear Peak Flow Rate (cfs)	1.7565
Burned Peak Flow Rate (cfs)	1.7565
24-Hr Clear Runoff Volume (ac-ft)	0.2551
24-Hr Clear Runoff Volume (cu-ft)	11111.5767



Peak Flow Hydrologic Analysis

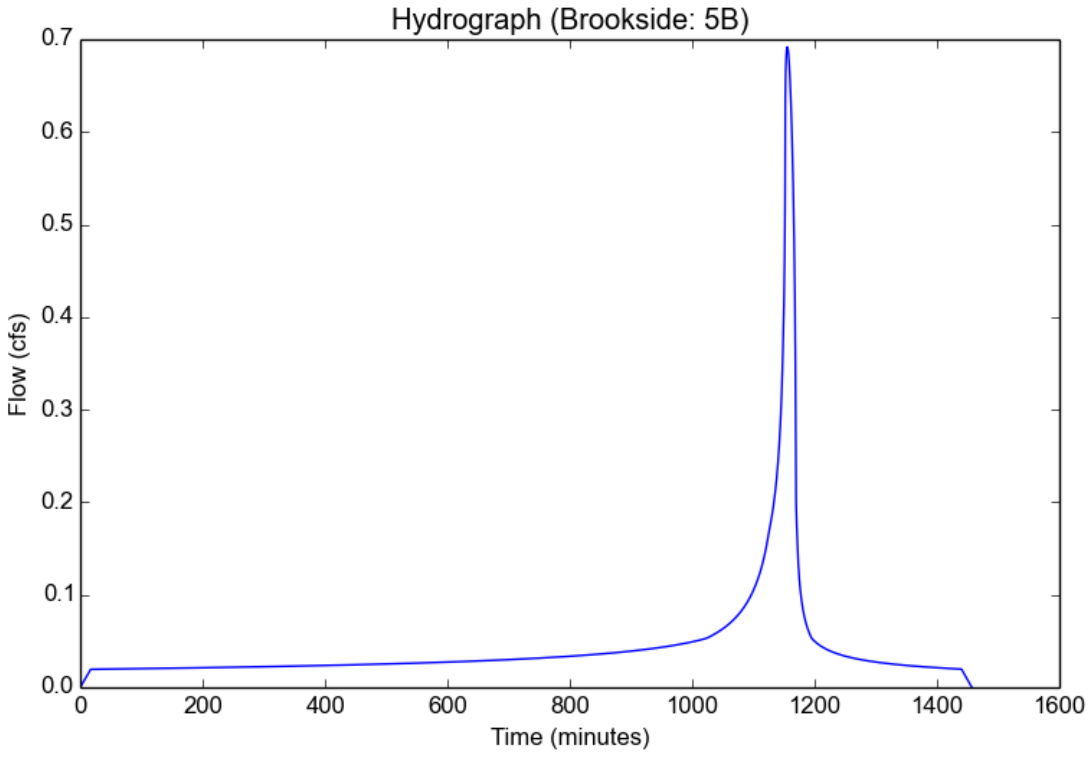
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/2.0-in Storm/Brookside - 5B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5B
Area (ac)	1.47
Flow Path Length (ft)	542.7
Flow Path Slope (vft/hft)	0.0129
85th Percentile Rainfall Depth (in)	2.0
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	2.0
Peak Intensity (in/hr)	0.6713
Undeveloped Runoff Coefficient (Cu)	0.6346
Developed Runoff Coefficient (Cd)	0.701
Time of Concentration (min)	17.0
Clear Peak Flow Rate (cfs)	0.6918
Burned Peak Flow Rate (cfs)	0.6918
24-Hr Clear Runoff Volume (ac-ft)	0.0886
24-Hr Clear Runoff Volume (cu-ft)	3858.4798



Peak Flow Hydrologic Analysis

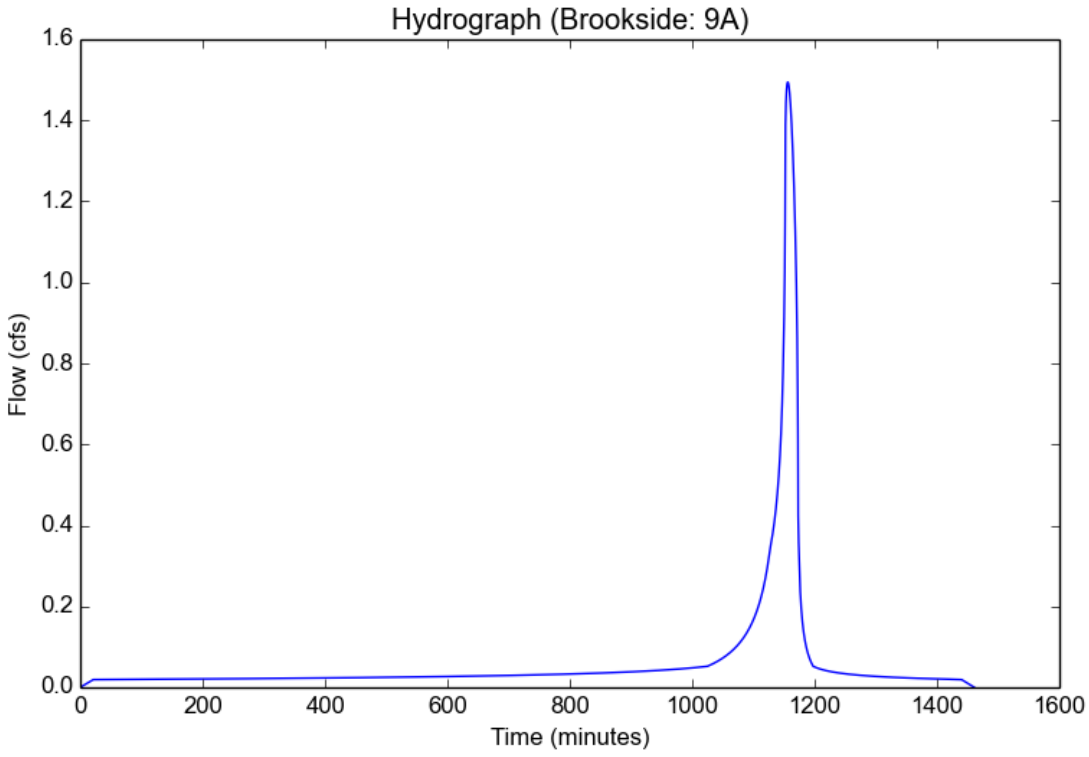
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/2.0-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	4.02
Flow Path Length (ft)	958.0
Flow Path Slope (vft/hft)	0.05323
85th Percentile Rainfall Depth (in)	2.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	2.0
Peak Intensity (in/hr)	0.6079
Undeveloped Runoff Coefficient (Cu)	0.6087
Developed Runoff Coefficient (Cd)	0.6116
Time of Concentration (min)	21.0
Clear Peak Flow Rate (cfs)	1.4945
Burned Peak Flow Rate (cfs)	1.4945
24-Hr Clear Runoff Volume (ac-ft)	0.1279
24-Hr Clear Runoff Volume (cu-ft)	5570.3245



Peak Flow Hydrologic Analysis

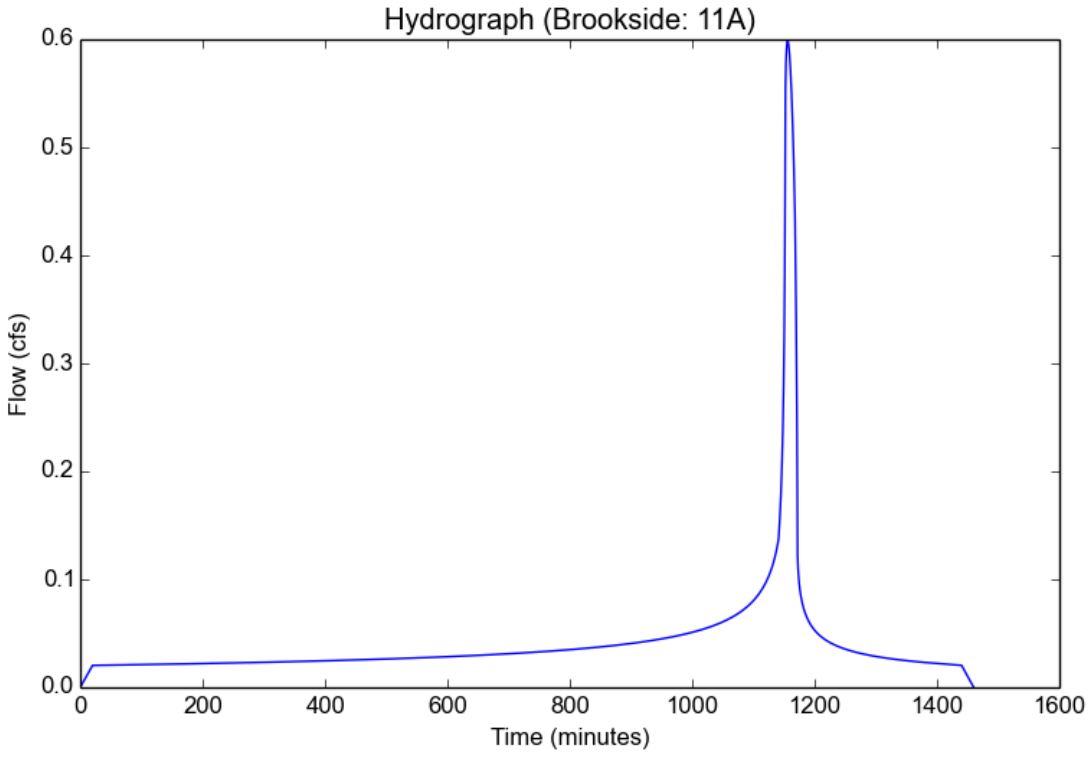
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/2.0-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	1.53
Flow Path Length (ft)	494.1
Flow Path Slope (vft/hft)	0.00607
85th Percentile Rainfall Depth (in)	2.0
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	2.0
Peak Intensity (in/hr)	0.622
Undeveloped Runoff Coefficient (Cu)	0.5387
Developed Runoff Coefficient (Cd)	0.629
Time of Concentration (min)	20.0
Clear Peak Flow Rate (cfs)	0.5986
Burned Peak Flow Rate (cfs)	0.5986
24-Hr Clear Runoff Volume (ac-ft)	0.0837
24-Hr Clear Runoff Volume (cu-ft)	3645.7101



Peak Flow Hydrologic Analysis

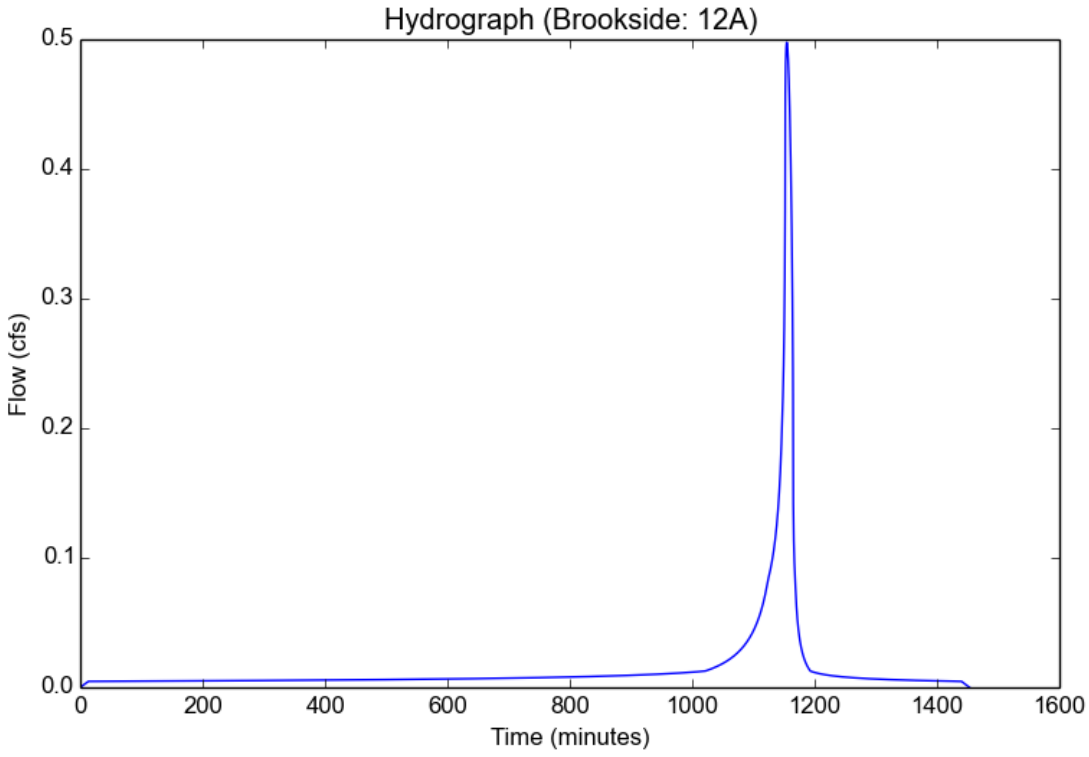
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/2.0-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.97
Flow Path Length (ft)	512.5
Flow Path Slope (vft/hft)	0.07414
85th Percentile Rainfall Depth (in)	2.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	2.0
Peak Intensity (in/hr)	0.7615
Undeveloped Runoff Coefficient (Cu)	0.6715
Developed Runoff Coefficient (Cd)	0.6738
Time of Concentration (min)	13.0
Clear Peak Flow Rate (cfs)	0.4977
Burned Peak Flow Rate (cfs)	0.4977
24-Hr Clear Runoff Volume (ac-ft)	0.0312
24-Hr Clear Runoff Volume (cu-ft)	1357.1649



Peak Flow Hydrologic Analysis

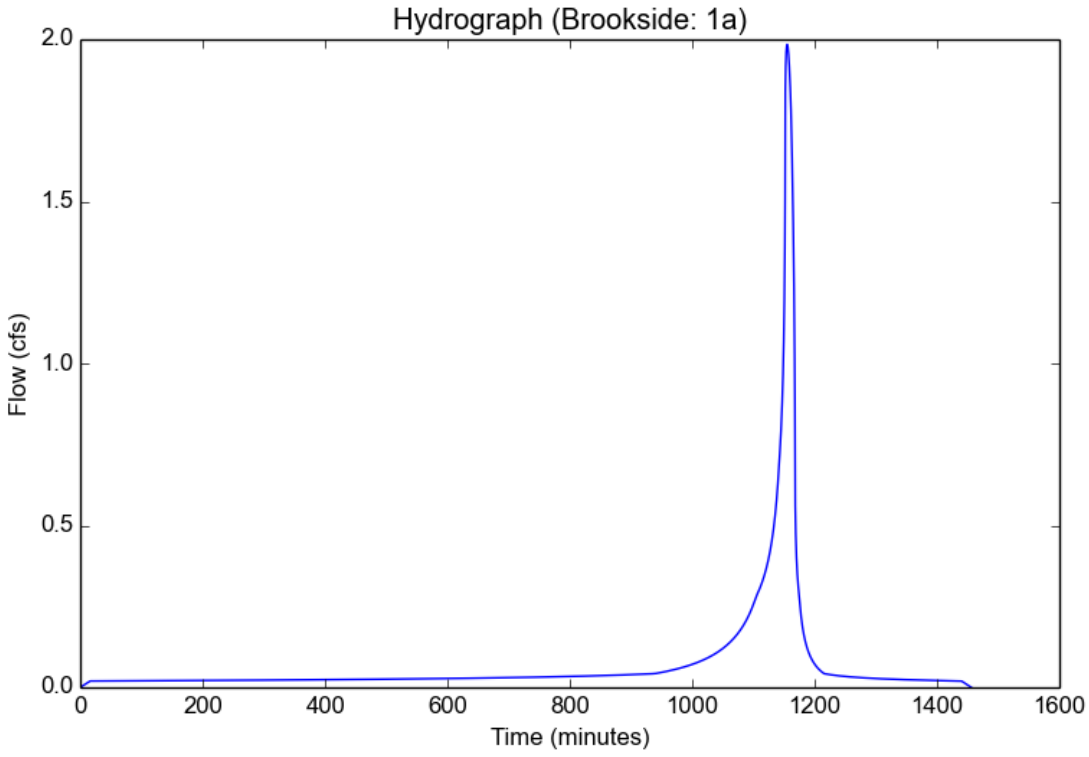
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/2.5-in Storm/Brookside - 1a.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1a
Area (ac)	3.28
Flow Path Length (ft)	866.7
Flow Path Slope (vft/hft)	0.04038
85th Percentile Rainfall Depth (in)	2.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	2.5
Peak Intensity (in/hr)	0.8634
Undeveloped Runoff Coefficient (Cu)	0.6987
Developed Runoff Coefficient (Cd)	0.7007
Time of Concentration (min)	16.0
Clear Peak Flow Rate (cfs)	1.9844
Burned Peak Flow Rate (cfs)	1.9844
24-Hr Clear Runoff Volume (ac-ft)	0.1492
24-Hr Clear Runoff Volume (cu-ft)	6497.715



Peak Flow Hydrologic Analysis

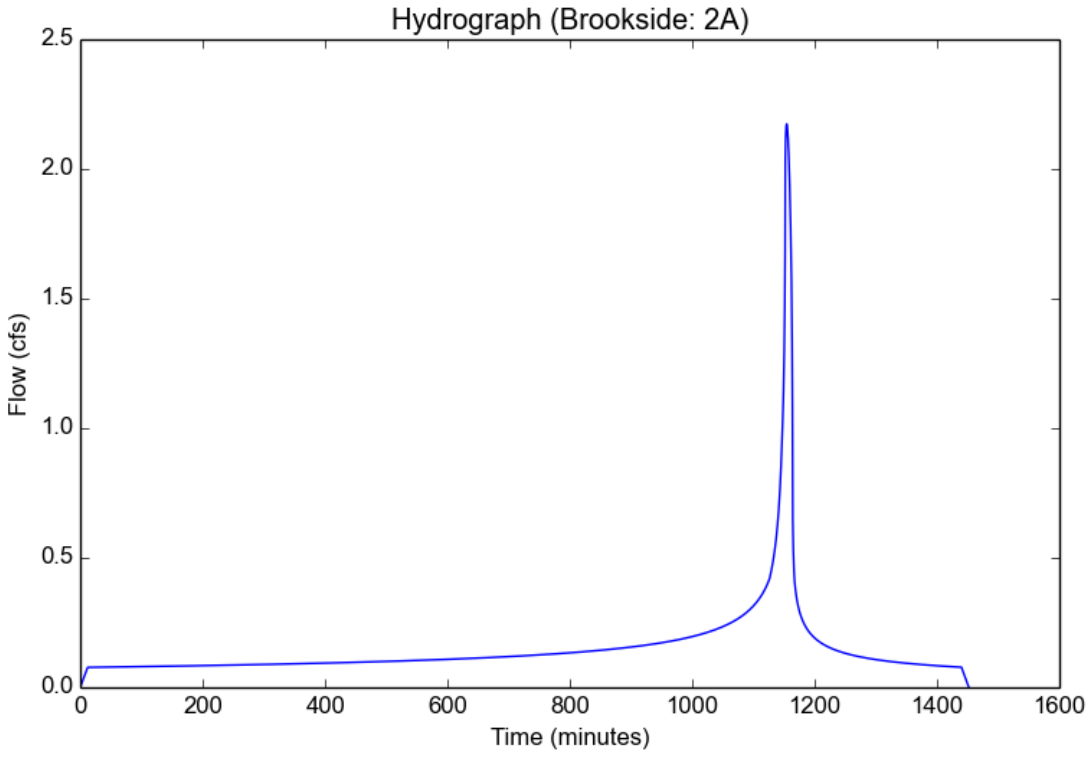
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/2.5-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	2.75
Flow Path Length (ft)	652.4
Flow Path Slope (vft/hft)	0.04599
85th Percentile Rainfall Depth (in)	2.5
Percent Impervious	0.509
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	2.5
Peak Intensity (in/hr)	0.9884
Undeveloped Runoff Coefficient (Cu)	0.6956
Developed Runoff Coefficient (Cd)	0.7996
Time of Concentration (min)	12.0
Clear Peak Flow Rate (cfs)	2.1736
Burned Peak Flow Rate (cfs)	2.1736
24-Hr Clear Runoff Volume (ac-ft)	0.3043
24-Hr Clear Runoff Volume (cu-ft)	13253.3864



Peak Flow Hydrologic Analysis

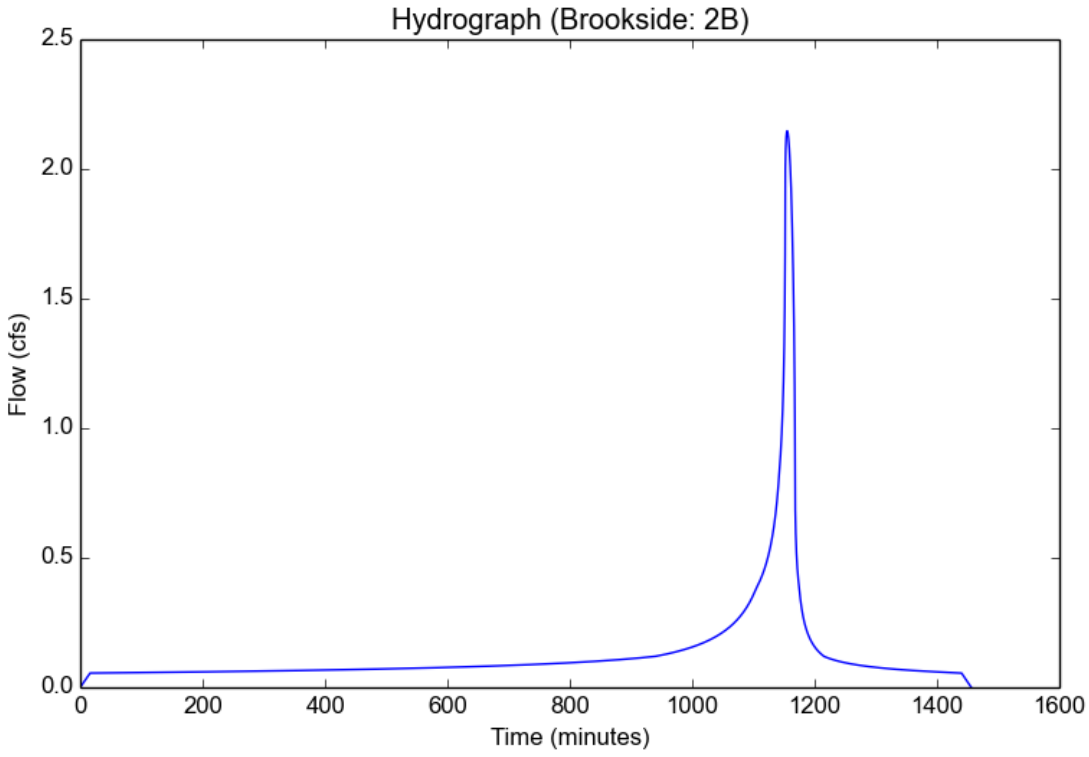
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/2.5-in Storm/Brookside - 2B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2B
Area (ac)	3.32
Flow Path Length (ft)	861.6
Flow Path Slope (vft/hft)	0.03714
85th Percentile Rainfall Depth (in)	2.5
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	2.5
Peak Intensity (in/hr)	0.8634
Undeveloped Runoff Coefficient (Cu)	0.6987
Developed Runoff Coefficient (Cd)	0.749
Time of Concentration (min)	16.0
Clear Peak Flow Rate (cfs)	2.1471
Burned Peak Flow Rate (cfs)	2.1471
24-Hr Clear Runoff Volume (ac-ft)	0.264
24-Hr Clear Runoff Volume (cu-ft)	11501.8358



Peak Flow Hydrologic Analysis

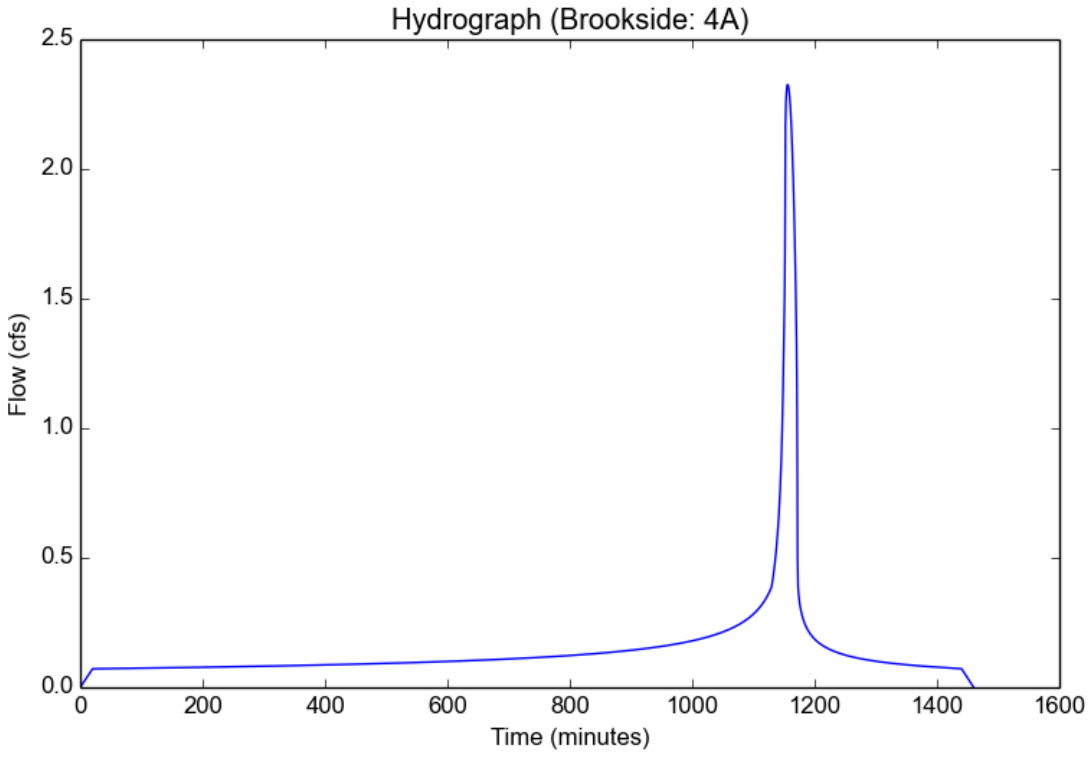
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/2.5-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	4.31
Flow Path Length (ft)	796.6
Flow Path Slope (vft/hft)	0.0113
85th Percentile Rainfall Depth (in)	2.5
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	2.5
Peak Intensity (in/hr)	0.7775
Undeveloped Runoff Coefficient (Cu)	0.6255
Developed Runoff Coefficient (Cd)	0.6941
Time of Concentration (min)	20.0
Clear Peak Flow Rate (cfs)	2.3258
Burned Peak Flow Rate (cfs)	2.3258
24-Hr Clear Runoff Volume (ac-ft)	0.3049
24-Hr Clear Runoff Volume (cu-ft)	13282.3215



Peak Flow Hydrologic Analysis

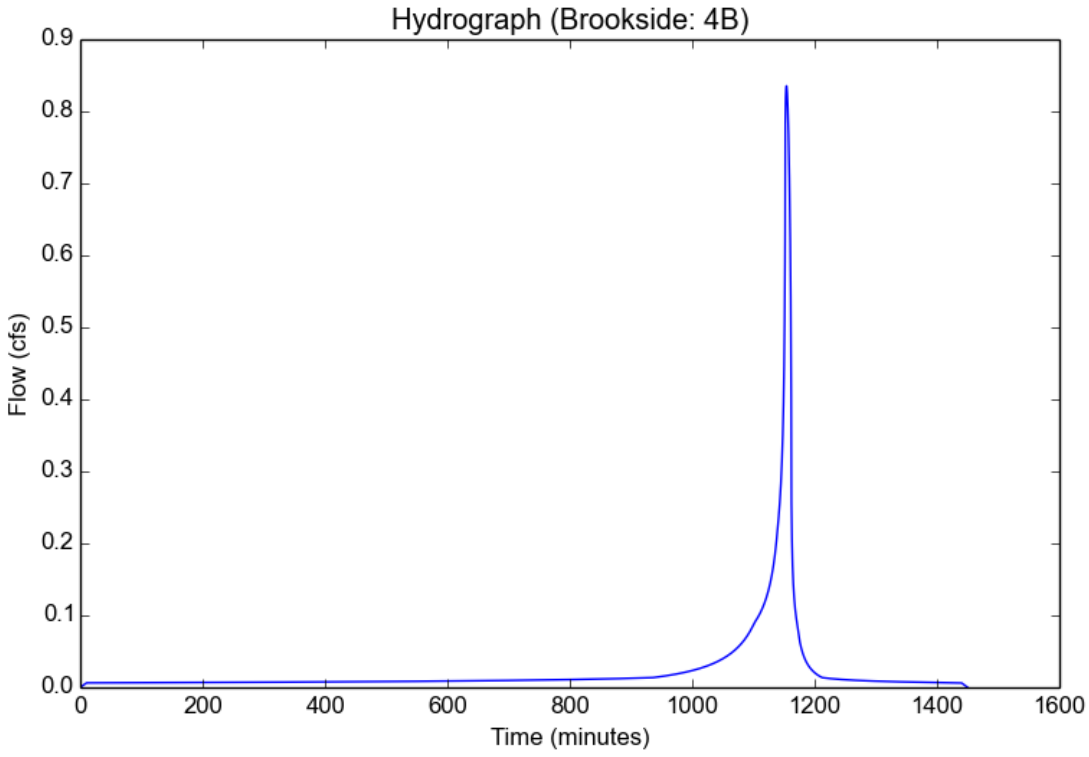
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/2.5-in Storm/Brookside - 4B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4B
Area (ac)	1.05
Flow Path Length (ft)	377.9
Flow Path Slope (vft/hft)	0.02646
85th Percentile Rainfall Depth (in)	2.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	2.5
Peak Intensity (in/hr)	1.0769
Undeveloped Runoff Coefficient (Cu)	0.7372
Developed Runoff Coefficient (Cd)	0.7388
Time of Concentration (min)	10.0
Clear Peak Flow Rate (cfs)	0.8353
Burned Peak Flow Rate (cfs)	0.8353
24-Hr Clear Runoff Volume (ac-ft)	0.0479
24-Hr Clear Runoff Volume (cu-ft)	2087.261



Peak Flow Hydrologic Analysis

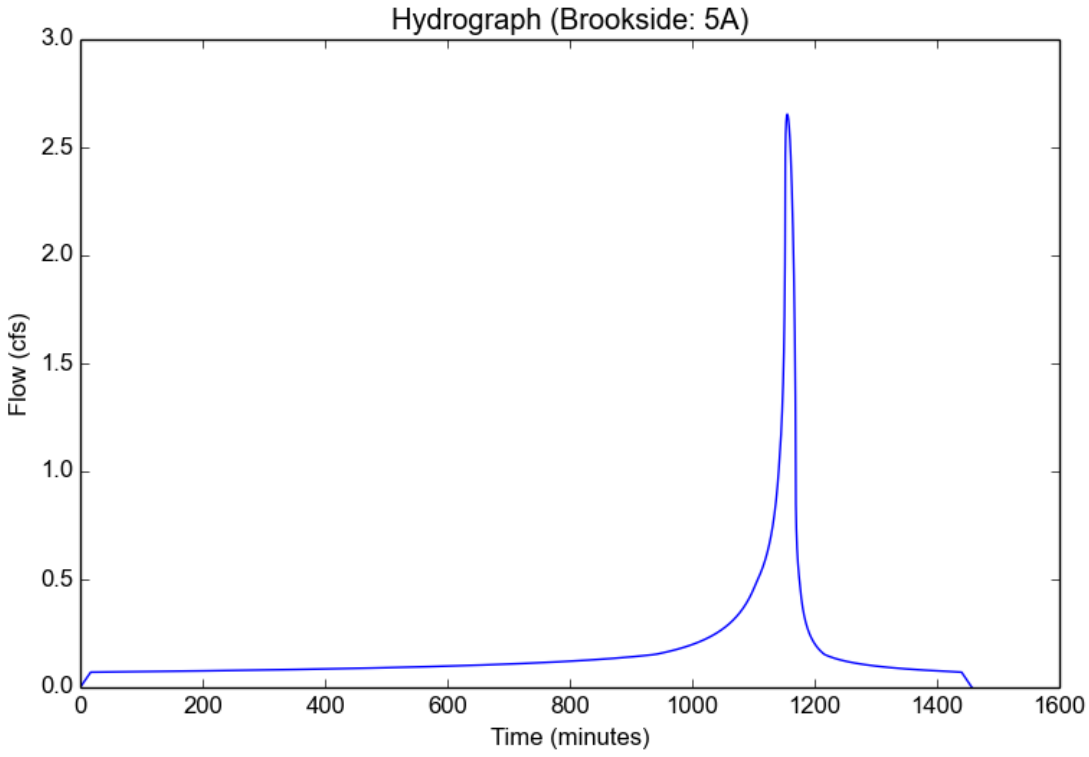
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/2.5-in Storm/Brookside - 5A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5A
Area (ac)	4.24
Flow Path Length (ft)	954.1
Flow Path Slope (vft/hft)	0.03354
85th Percentile Rainfall Depth (in)	2.5
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	2.5
Peak Intensity (in/hr)	0.8392
Undeveloped Runoff Coefficient (Cu)	0.6943
Developed Runoff Coefficient (Cd)	0.7457
Time of Concentration (min)	17.0
Clear Peak Flow Rate (cfs)	2.6534
Burned Peak Flow Rate (cfs)	2.6534
24-Hr Clear Runoff Volume (ac-ft)	0.3371
24-Hr Clear Runoff Volume (cu-ft)	14685.2875



Peak Flow Hydrologic Analysis

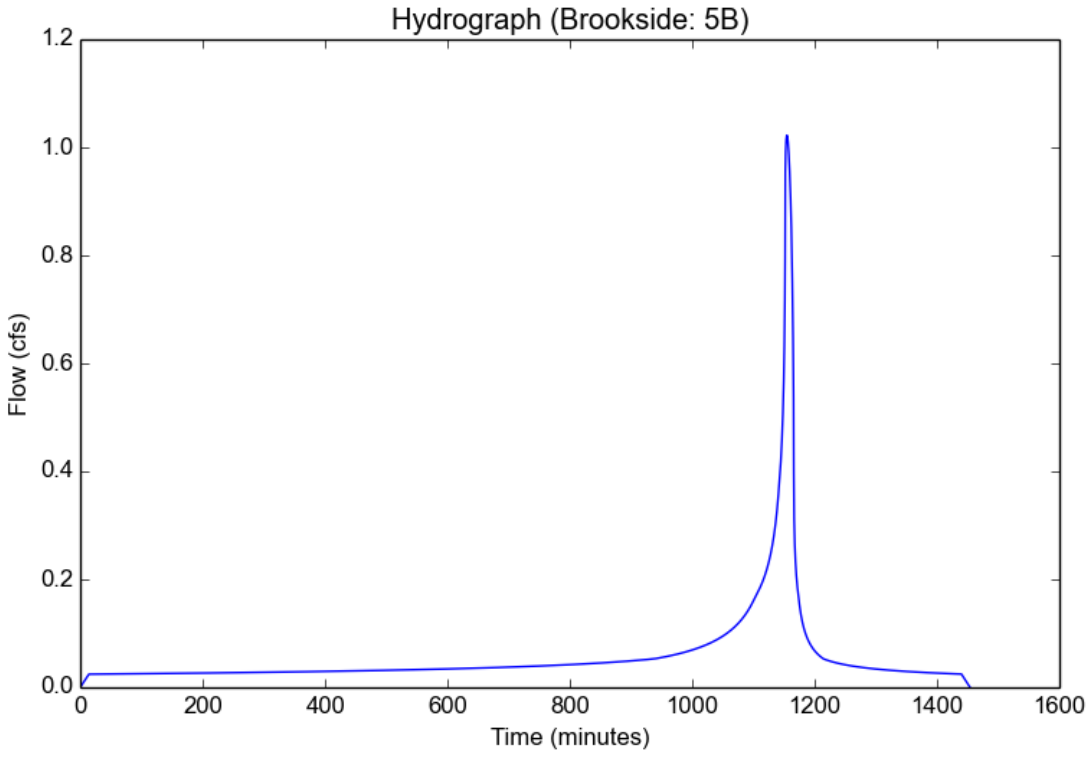
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/2.5-in Storm/Brookside - 5B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5B
Area (ac)	1.47
Flow Path Length (ft)	542.7
Flow Path Slope (vft/hft)	0.0129
85th Percentile Rainfall Depth (in)	2.5
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	2.5
Peak Intensity (in/hr)	0.9193
Undeveloped Runoff Coefficient (Cu)	0.7088
Developed Runoff Coefficient (Cd)	0.7566
Time of Concentration (min)	14.0
Clear Peak Flow Rate (cfs)	1.0225
Burned Peak Flow Rate (cfs)	1.0225
24-Hr Clear Runoff Volume (ac-ft)	0.117
24-Hr Clear Runoff Volume (cu-ft)	5094.992



Peak Flow Hydrologic Analysis

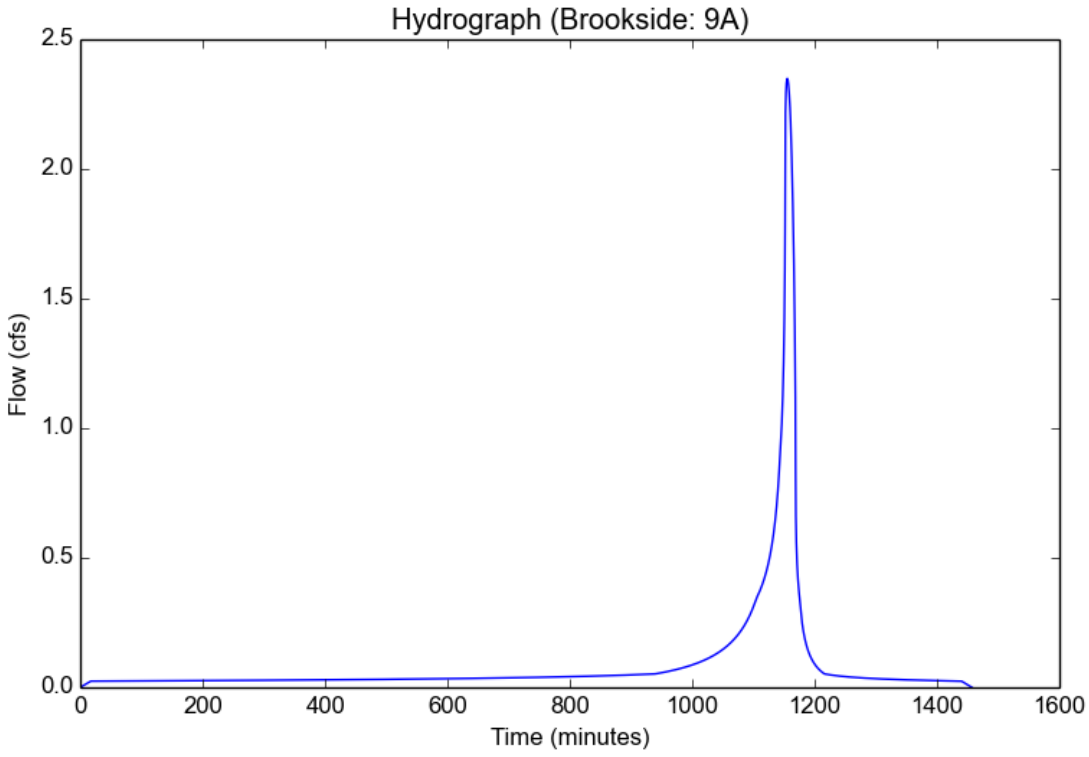
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/2.5-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	4.02
Flow Path Length (ft)	958.0
Flow Path Slope (vft/hft)	0.05323
85th Percentile Rainfall Depth (in)	2.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	2.5
Peak Intensity (in/hr)	0.8392
Undeveloped Runoff Coefficient (Cu)	0.6943
Developed Runoff Coefficient (Cd)	0.6964
Time of Concentration (min)	17.0
Clear Peak Flow Rate (cfs)	2.3492
Burned Peak Flow Rate (cfs)	2.3492
24-Hr Clear Runoff Volume (ac-ft)	0.1827
24-Hr Clear Runoff Volume (cu-ft)	7958.8978



Peak Flow Hydrologic Analysis

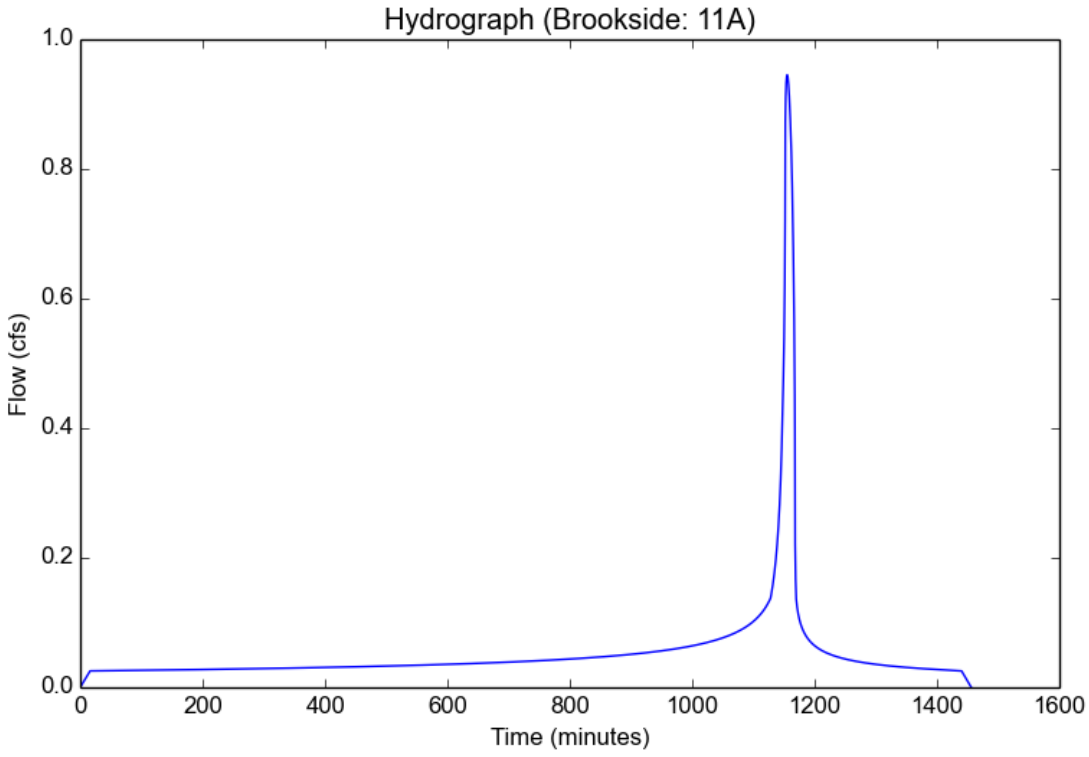
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/2.5-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	1.53
Flow Path Length (ft)	494.1
Flow Path Slope (vft/hft)	0.00607
85th Percentile Rainfall Depth (in)	2.5
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	2.5
Peak Intensity (in/hr)	0.8634
Undeveloped Runoff Coefficient (Cu)	0.654
Developed Runoff Coefficient (Cd)	0.7155
Time of Concentration (min)	16.0
Clear Peak Flow Rate (cfs)	0.9452
Burned Peak Flow Rate (cfs)	0.9452
24-Hr Clear Runoff Volume (ac-ft)	0.1084
24-Hr Clear Runoff Volume (cu-ft)	4720.1575



Peak Flow Hydrologic Analysis

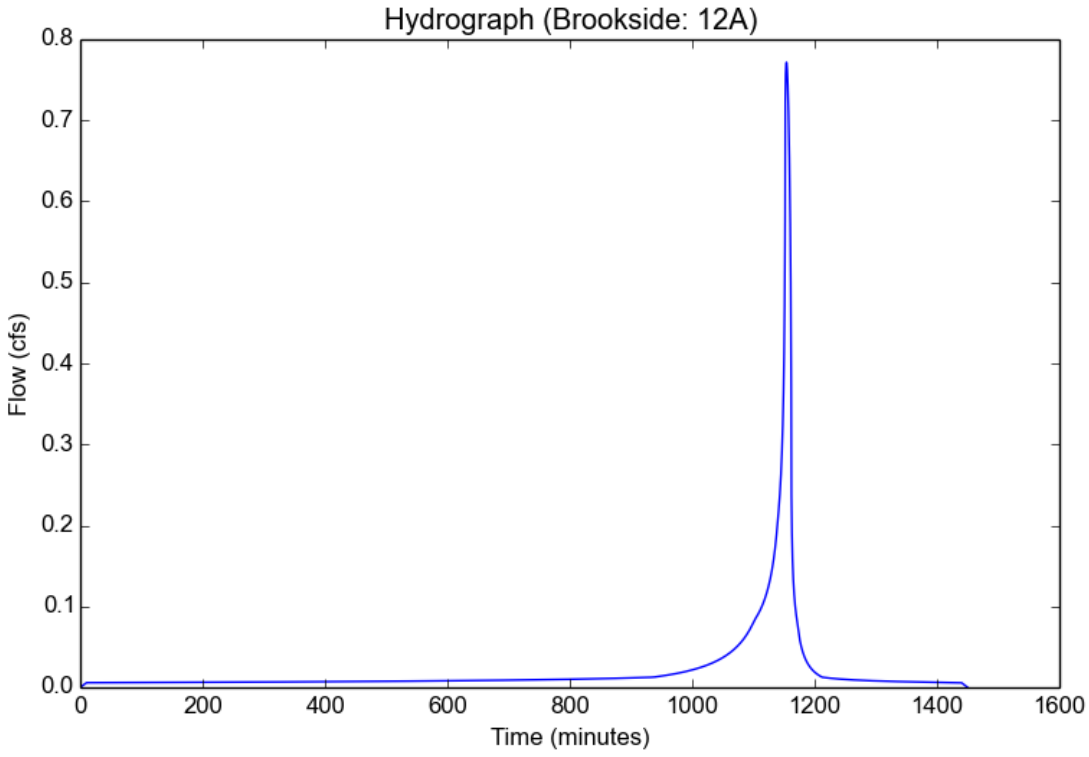
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/2.5-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.97
Flow Path Length (ft)	512.5
Flow Path Slope (vft/hft)	0.07414
85th Percentile Rainfall Depth (in)	2.5
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	2.5
Peak Intensity (in/hr)	1.0769
Undeveloped Runoff Coefficient (Cu)	0.7372
Developed Runoff Coefficient (Cd)	0.7388
Time of Concentration (min)	10.0
Clear Peak Flow Rate (cfs)	0.7717
Burned Peak Flow Rate (cfs)	0.7717
24-Hr Clear Runoff Volume (ac-ft)	0.0443
24-Hr Clear Runoff Volume (cu-ft)	1928.2316



Peak Flow Hydrologic Analysis

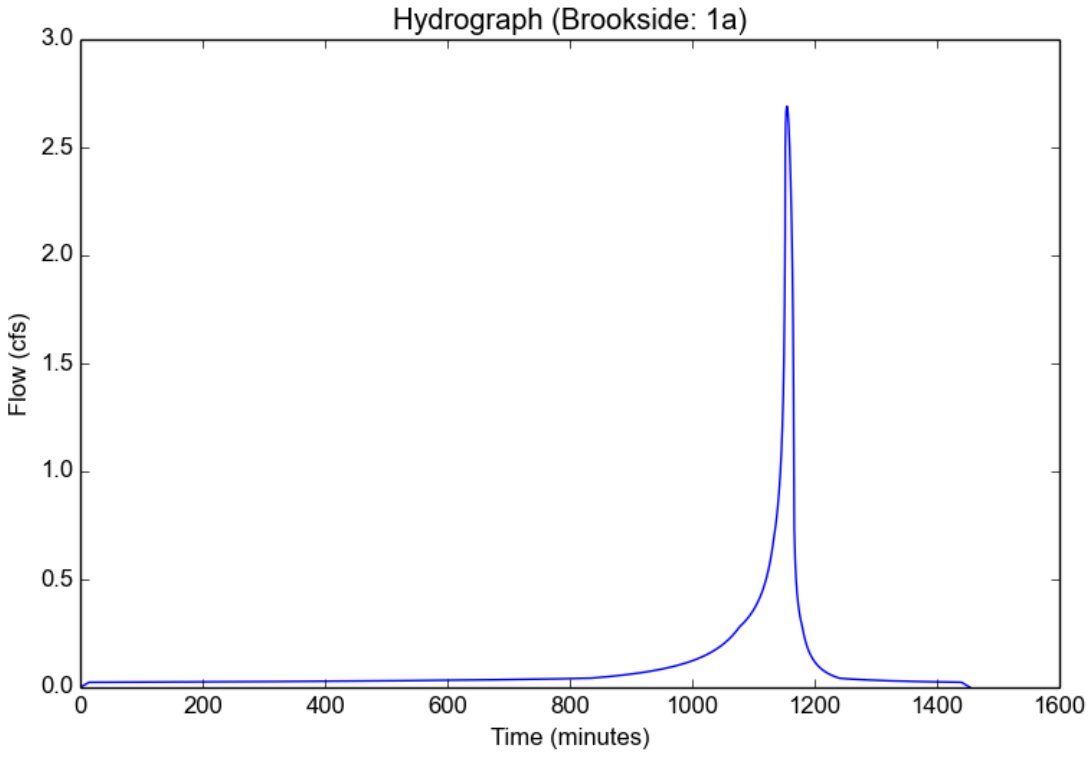
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/3.0-in Storm/Brookside - 1a.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1a
Area (ac)	3.28
Flow Path Length (ft)	866.7
Flow Path Slope (vft/hft)	0.04038
85th Percentile Rainfall Depth (in)	3.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	3.0
Peak Intensity (in/hr)	1.1032
Undeveloped Runoff Coefficient (Cu)	0.7419
Developed Runoff Coefficient (Cd)	0.7435
Time of Concentration (min)	14.0
Clear Peak Flow Rate (cfs)	2.6903
Burned Peak Flow Rate (cfs)	2.6903
24-Hr Clear Runoff Volume (ac-ft)	0.2007
24-Hr Clear Runoff Volume (cu-ft)	8740.6957



Peak Flow Hydrologic Analysis

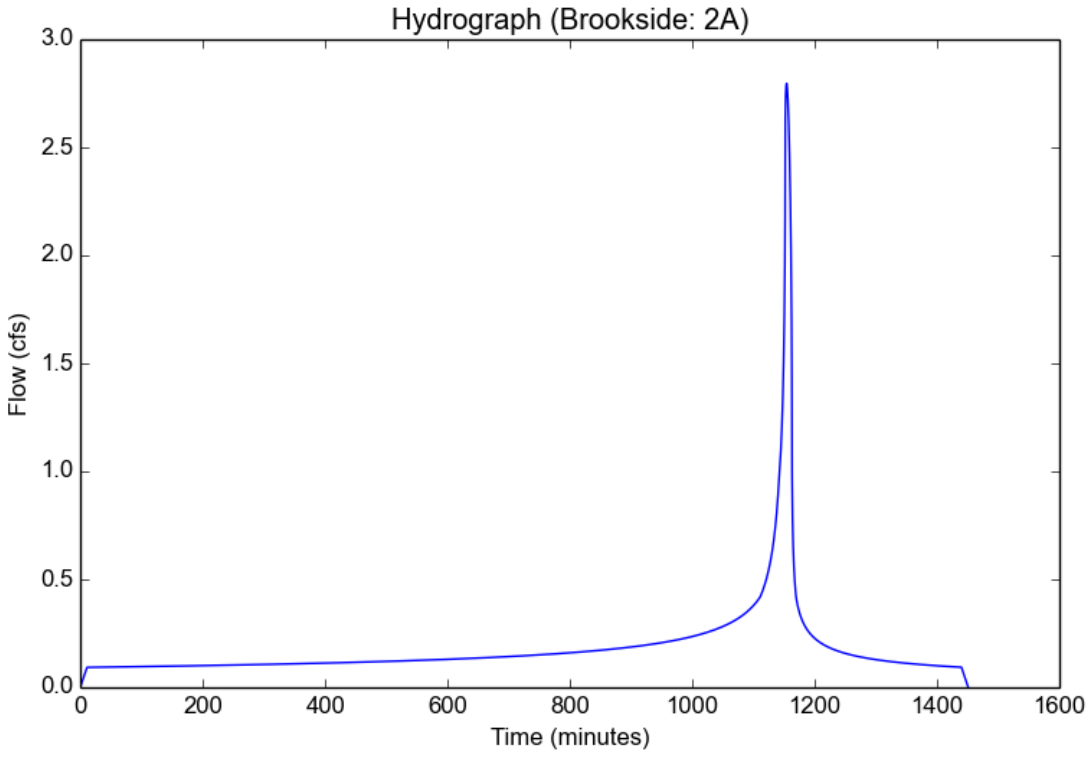
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/3.0-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	2.75
Flow Path Length (ft)	652.4
Flow Path Slope (vft/hft)	0.04599
85th Percentile Rainfall Depth (in)	3.0
Percent Impervious	0.509
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	3.0
Peak Intensity (in/hr)	1.2356
Undeveloped Runoff Coefficient (Cu)	0.7427
Developed Runoff Coefficient (Cd)	0.8228
Time of Concentration (min)	11.0
Clear Peak Flow Rate (cfs)	2.7957
Burned Peak Flow Rate (cfs)	2.7957
24-Hr Clear Runoff Volume (ac-ft)	0.3696
24-Hr Clear Runoff Volume (cu-ft)	16100.9527



Peak Flow Hydrologic Analysis

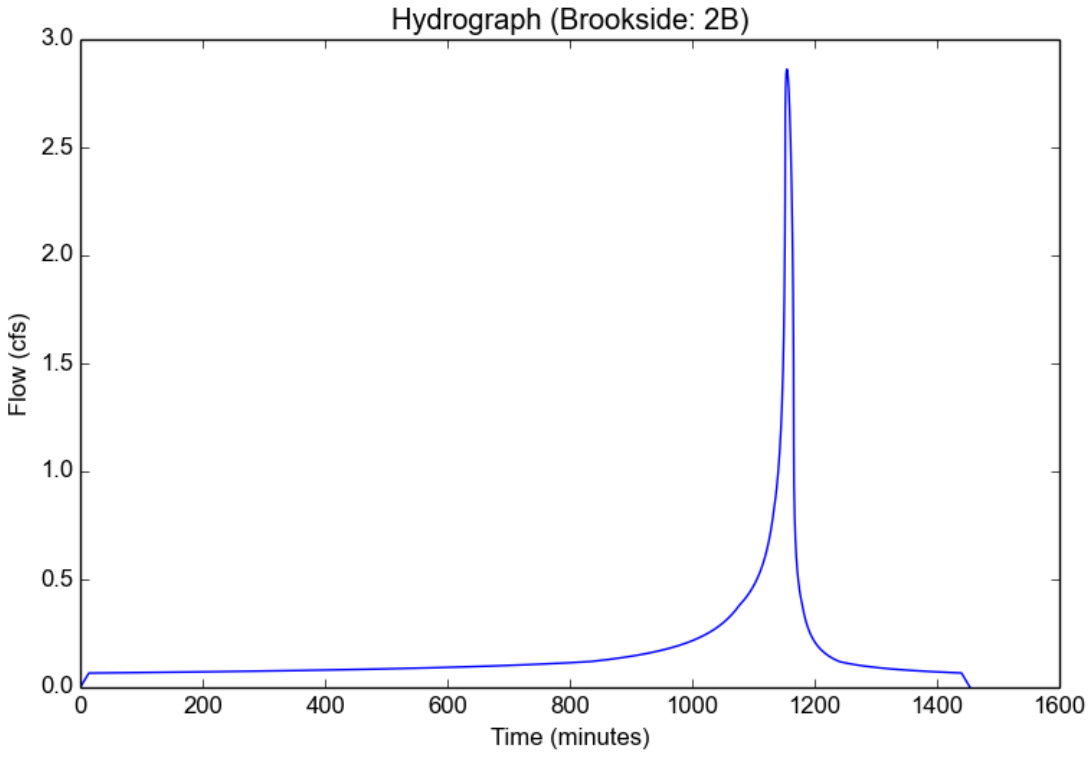
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/3.0-in Storm/Brookside - 2B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2B
Area (ac)	3.32
Flow Path Length (ft)	861.6
Flow Path Slope (vft/hft)	0.03714
85th Percentile Rainfall Depth (in)	3.0
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	3.0
Peak Intensity (in/hr)	1.1032
Undeveloped Runoff Coefficient (Cu)	0.7419
Developed Runoff Coefficient (Cd)	0.7814
Time of Concentration (min)	14.0
Clear Peak Flow Rate (cfs)	2.8621
Burned Peak Flow Rate (cfs)	2.8621
24-Hr Clear Runoff Volume (ac-ft)	0.3335
24-Hr Clear Runoff Volume (cu-ft)	14525.6387



Peak Flow Hydrologic Analysis

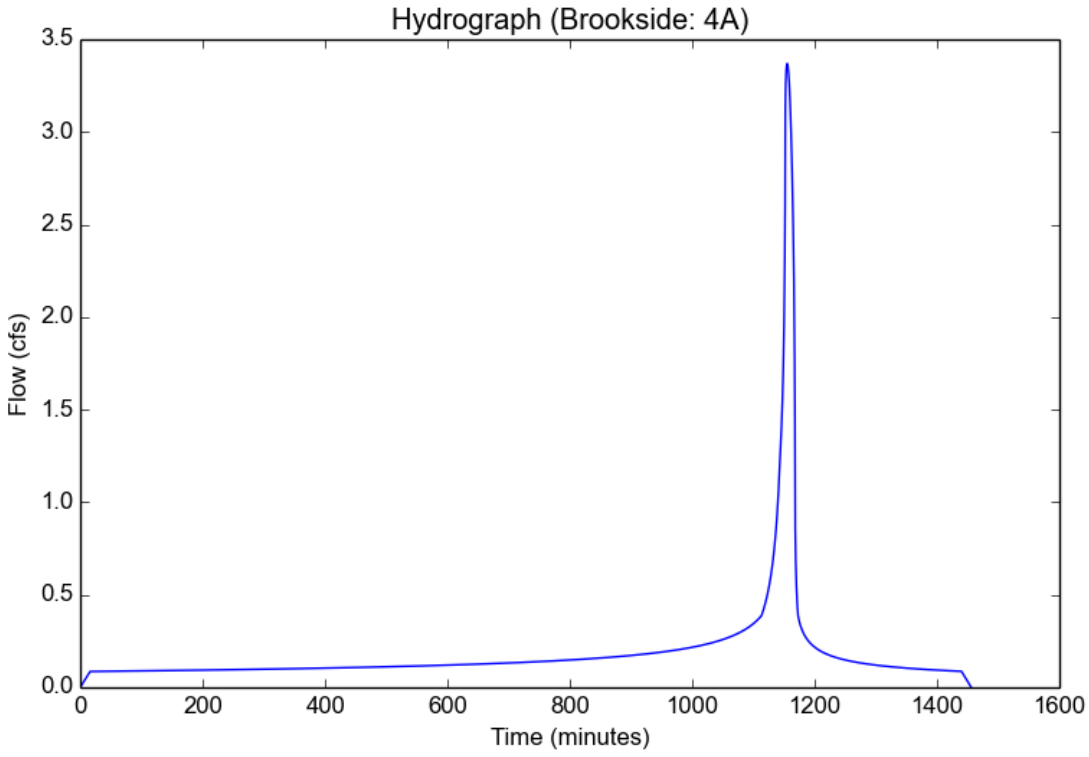
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/3.0-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	4.31
Flow Path Length (ft)	796.6
Flow Path Slope (vft/hft)	0.0113
85th Percentile Rainfall Depth (in)	3.0
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	3.0
Peak Intensity (in/hr)	1.0361
Undeveloped Runoff Coefficient (Cu)	0.7061
Developed Runoff Coefficient (Cd)	0.7546
Time of Concentration (min)	16.0
Clear Peak Flow Rate (cfs)	3.3695
Burned Peak Flow Rate (cfs)	3.3695
24-Hr Clear Runoff Volume (ac-ft)	0.3774
24-Hr Clear Runoff Volume (cu-ft)	16441.2176



Peak Flow Hydrologic Analysis

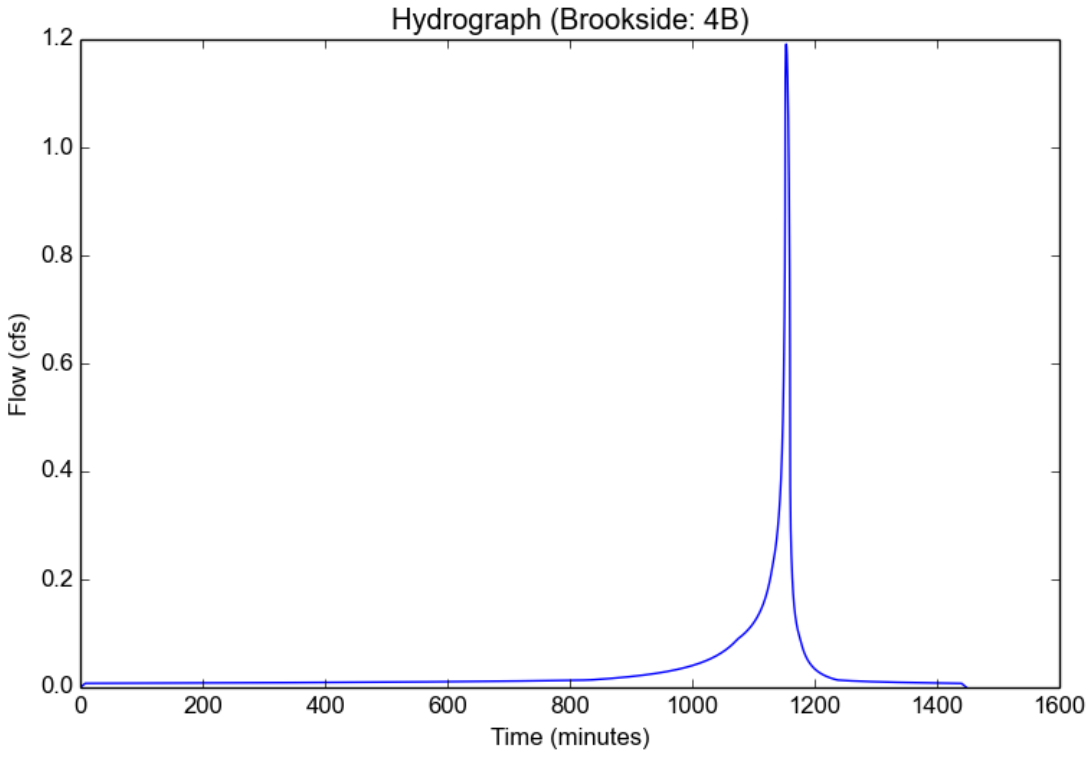
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/3.0-in Storm/Brookside - 4B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4B
Area (ac)	1.05
Flow Path Length (ft)	377.9
Flow Path Slope (vft/hft)	0.02646
85th Percentile Rainfall Depth (in)	3.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	3.0
Peak Intensity (in/hr)	1.4351
Undeveloped Runoff Coefficient (Cu)	0.7893
Developed Runoff Coefficient (Cd)	0.7905
Time of Concentration (min)	8.0
Clear Peak Flow Rate (cfs)	1.1911
Burned Peak Flow Rate (cfs)	1.1911
24-Hr Clear Runoff Volume (ac-ft)	0.0645
24-Hr Clear Runoff Volume (cu-ft)	2809.6046



Peak Flow Hydrologic Analysis

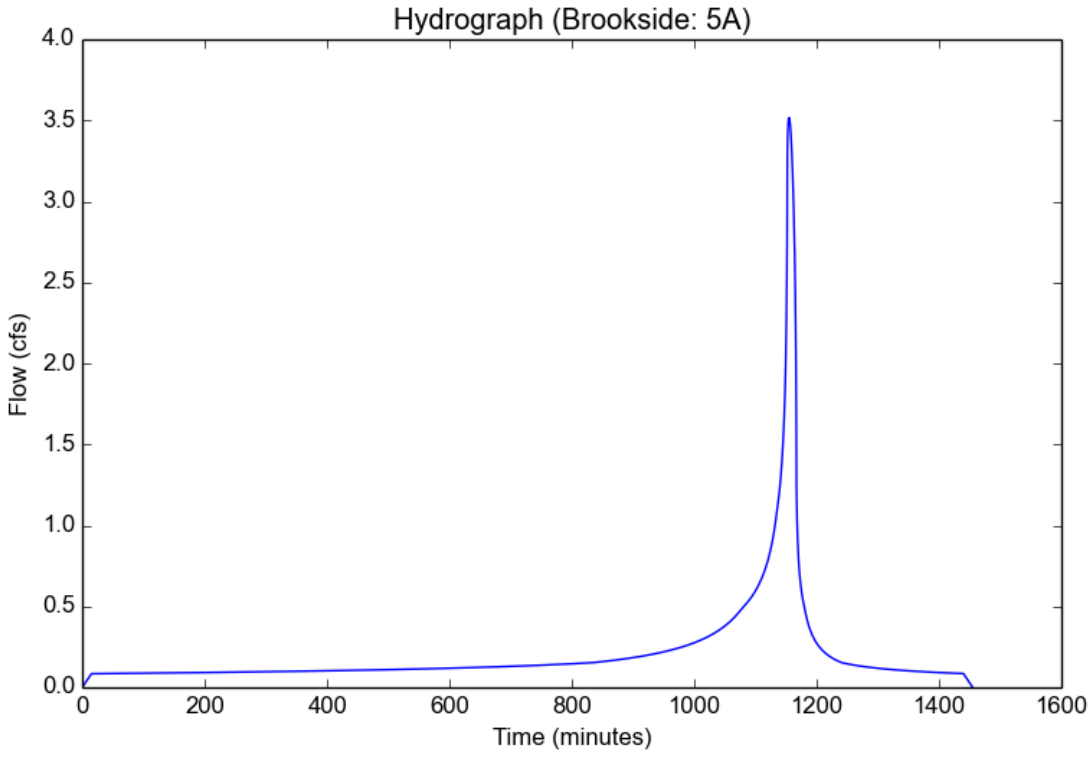
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/3.0-in Storm/Brookside - 5A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5A
Area (ac)	4.24
Flow Path Length (ft)	954.1
Flow Path Slope (vft/hft)	0.03354
85th Percentile Rainfall Depth (in)	3.0
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	3.0
Peak Intensity (in/hr)	1.068
Undeveloped Runoff Coefficient (Cu)	0.7356
Developed Runoff Coefficient (Cd)	0.7767
Time of Concentration (min)	15.0
Clear Peak Flow Rate (cfs)	3.5171
Burned Peak Flow Rate (cfs)	3.5171
24-Hr Clear Runoff Volume (ac-ft)	0.4258
24-Hr Clear Runoff Volume (cu-ft)	18545.9168



Peak Flow Hydrologic Analysis

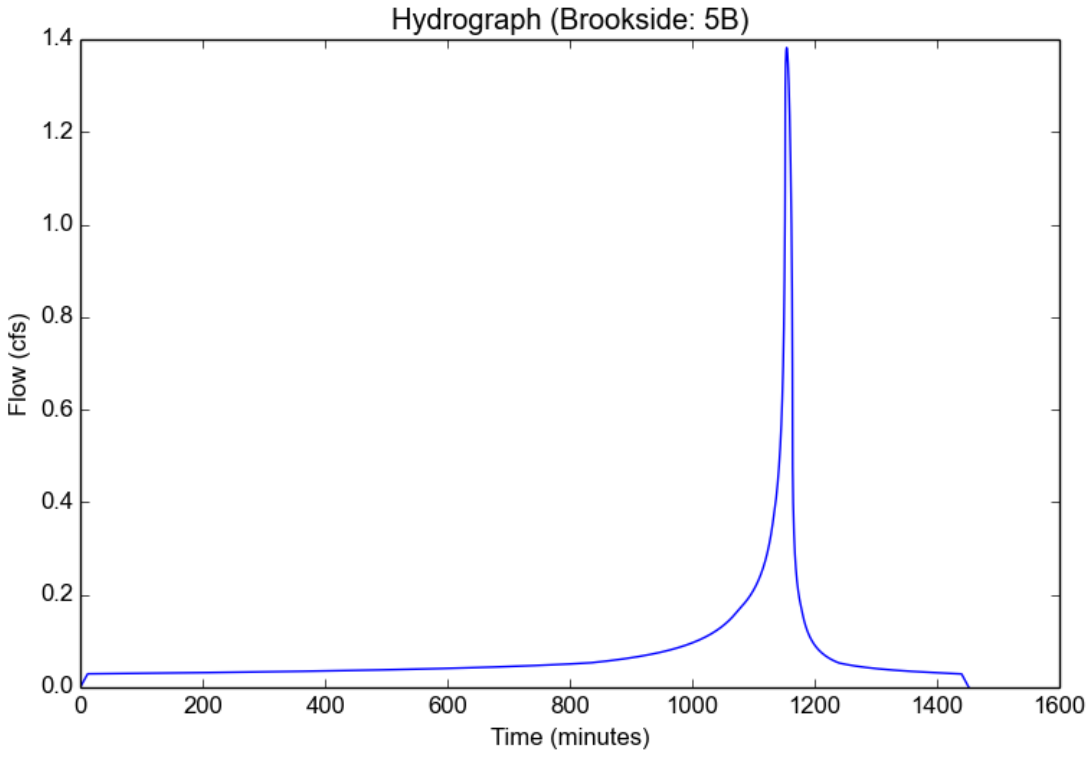
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/3.0-in Storm/Brookside - 5B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5B
Area (ac)	1.47
Flow Path Length (ft)	542.7
Flow Path Slope (vft/hft)	0.0129
85th Percentile Rainfall Depth (in)	3.0
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	3.0
Peak Intensity (in/hr)	1.1861
Undeveloped Runoff Coefficient (Cu)	0.7568
Developed Runoff Coefficient (Cd)	0.7926
Time of Concentration (min)	12.0
Clear Peak Flow Rate (cfs)	1.382
Burned Peak Flow Rate (cfs)	1.382
24-Hr Clear Runoff Volume (ac-ft)	0.1477
24-Hr Clear Runoff Volume (cu-ft)	6435.5304



Peak Flow Hydrologic Analysis

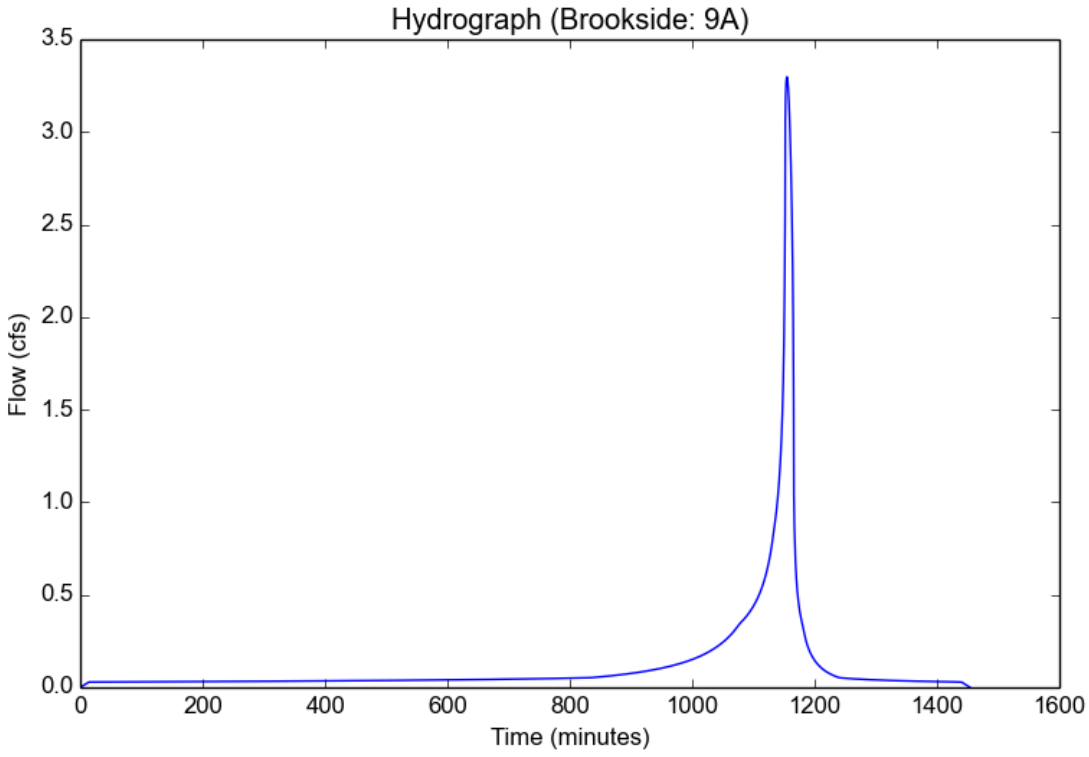
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/3.0-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	4.02
Flow Path Length (ft)	958.0
Flow Path Slope (vft/hft)	0.05323
85th Percentile Rainfall Depth (in)	3.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	3.0
Peak Intensity (in/hr)	1.1032
Undeveloped Runoff Coefficient (Cu)	0.7419
Developed Runoff Coefficient (Cd)	0.7435
Time of Concentration (min)	14.0
Clear Peak Flow Rate (cfs)	3.2973
Burned Peak Flow Rate (cfs)	3.2973
24-Hr Clear Runoff Volume (ac-ft)	0.2459
24-Hr Clear Runoff Volume (cu-ft)	10712.6819



Peak Flow Hydrologic Analysis

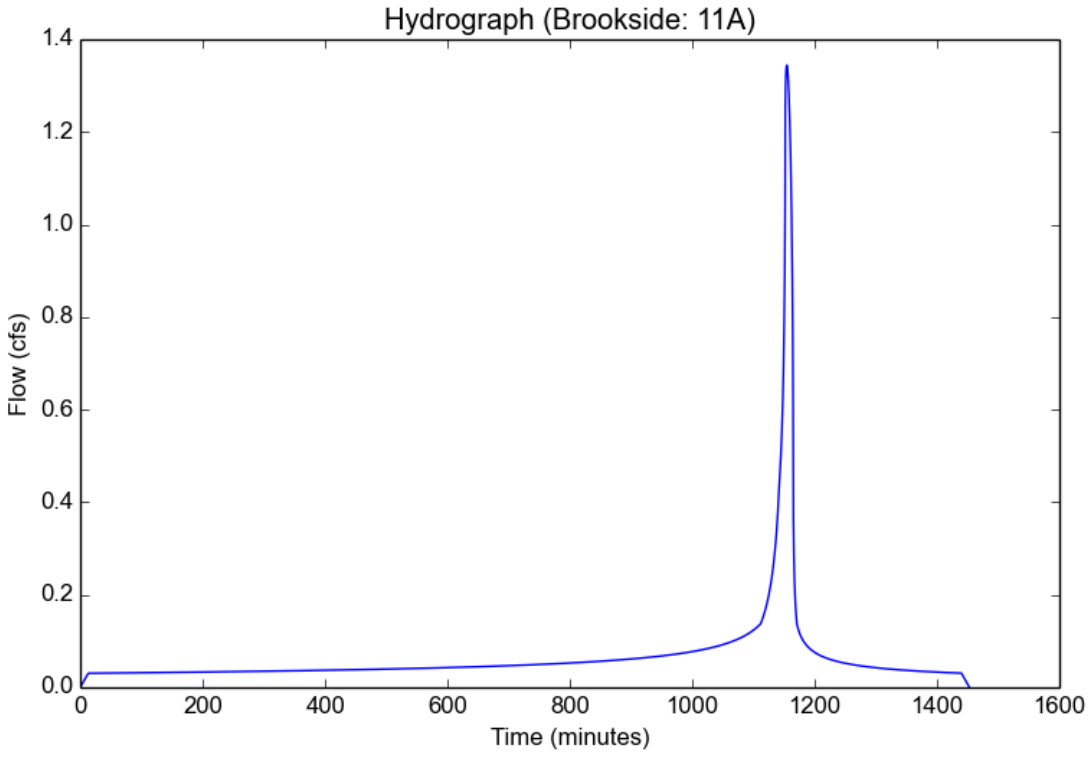
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/3.0-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	1.53
Flow Path Length (ft)	494.1
Flow Path Slope (vft/hft)	0.00607
85th Percentile Rainfall Depth (in)	3.0
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	3.0
Peak Intensity (in/hr)	1.1423
Undeveloped Runoff Coefficient (Cu)	0.7256
Developed Runoff Coefficient (Cd)	0.7692
Time of Concentration (min)	13.0
Clear Peak Flow Rate (cfs)	1.3443
Burned Peak Flow Rate (cfs)	1.3443
24-Hr Clear Runoff Volume (ac-ft)	0.134
24-Hr Clear Runoff Volume (cu-ft)	5837.3831



Peak Flow Hydrologic Analysis

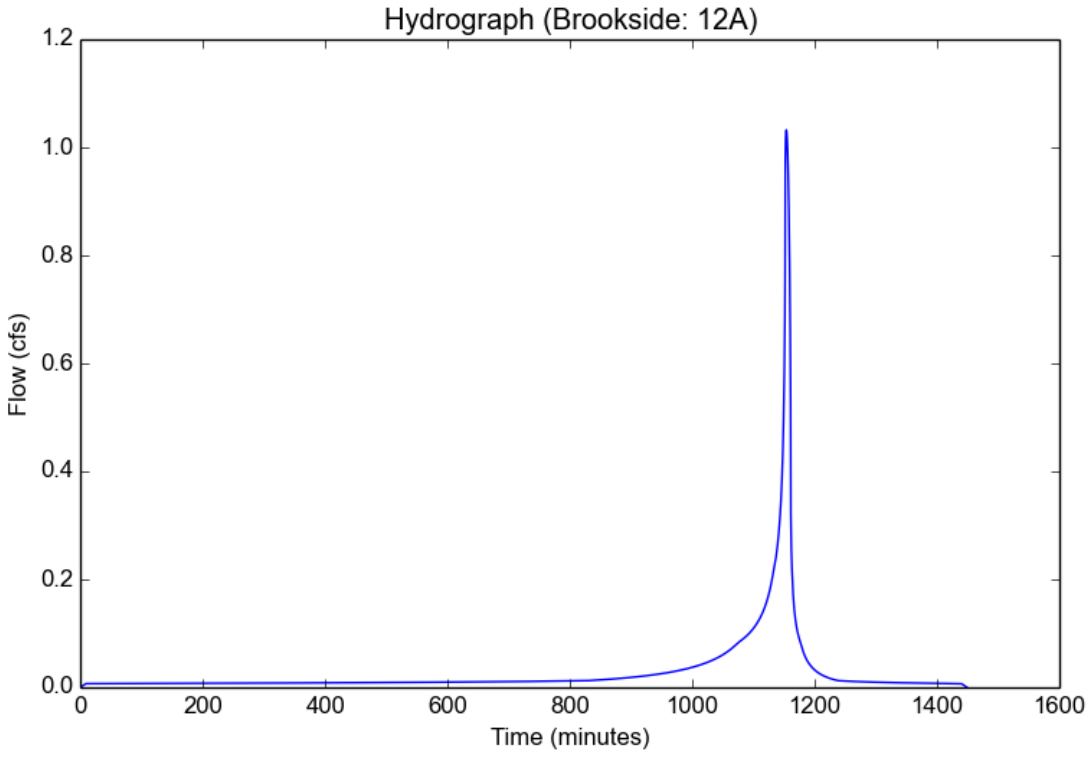
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/3.0-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.97
Flow Path Length (ft)	512.5
Flow Path Slope (vft/hft)	0.07414
85th Percentile Rainfall Depth (in)	3.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	3.0
Peak Intensity (in/hr)	1.3578
Undeveloped Runoff Coefficient (Cu)	0.7825
Developed Runoff Coefficient (Cd)	0.7837
Time of Concentration (min)	9.0
Clear Peak Flow Rate (cfs)	1.0322
Burned Peak Flow Rate (cfs)	1.0322
24-Hr Clear Runoff Volume (ac-ft)	0.0596
24-Hr Clear Runoff Volume (cu-ft)	2594.5951



Peak Flow Hydrologic Analysis

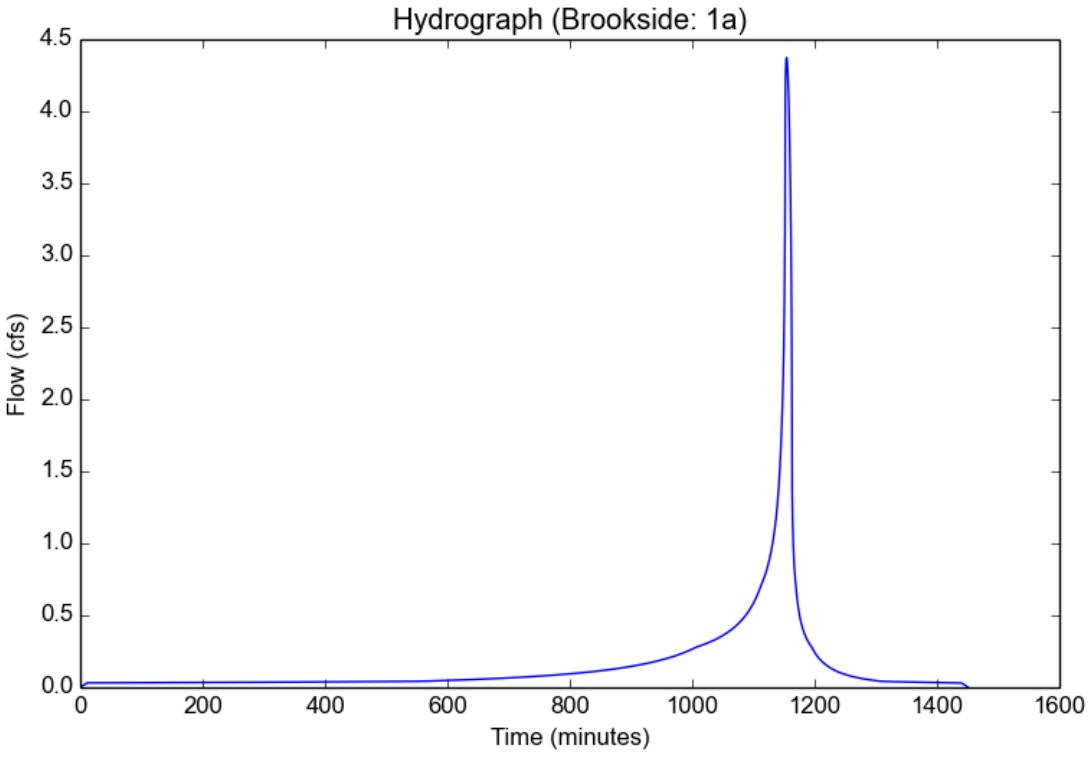
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/4-in Storm/Brookside - 1a.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1a
Area (ac)	3.28
Flow Path Length (ft)	866.7
Flow Path Slope (vft/hft)	0.04038
85th Percentile Rainfall Depth (in)	4.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	4.0
Peak Intensity (in/hr)	1.6475
Undeveloped Runoff Coefficient (Cu)	0.8082
Developed Runoff Coefficient (Cd)	0.8091
Time of Concentration (min)	11.0
Clear Peak Flow Rate (cfs)	4.3722
Burned Peak Flow Rate (cfs)	4.3722
24-Hr Clear Runoff Volume (ac-ft)	0.327
24-Hr Clear Runoff Volume (cu-ft)	14244.2228



Peak Flow Hydrologic Analysis

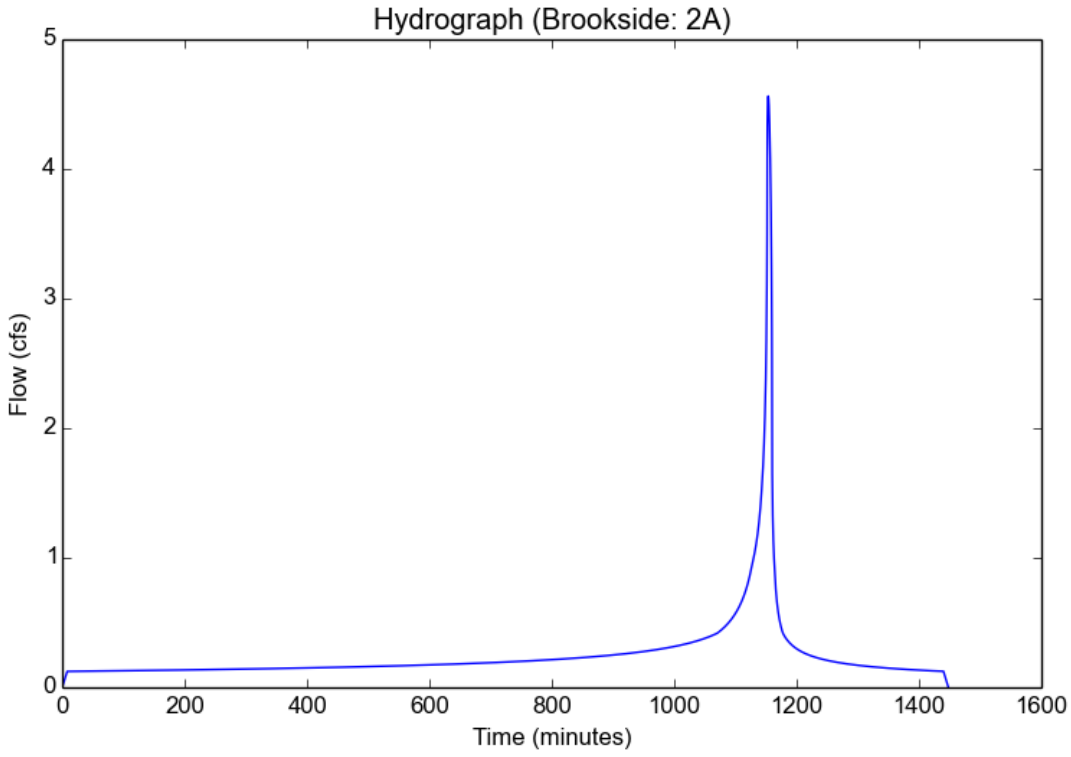
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/4-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	2.75
Flow Path Length (ft)	652.4
Flow Path Slope (vft/hft)	0.04599
85th Percentile Rainfall Depth (in)	4.0
Percent Impervious	0.509
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	4.0
Peak Intensity (in/hr)	1.9135
Undeveloped Runoff Coefficient (Cu)	0.8328
Developed Runoff Coefficient (Cd)	0.867
Time of Concentration (min)	8.0
Clear Peak Flow Rate (cfs)	4.5622
Burned Peak Flow Rate (cfs)	4.5622
24-Hr Clear Runoff Volume (ac-ft)	0.5055
24-Hr Clear Runoff Volume (cu-ft)	22021.0207



Peak Flow Hydrologic Analysis

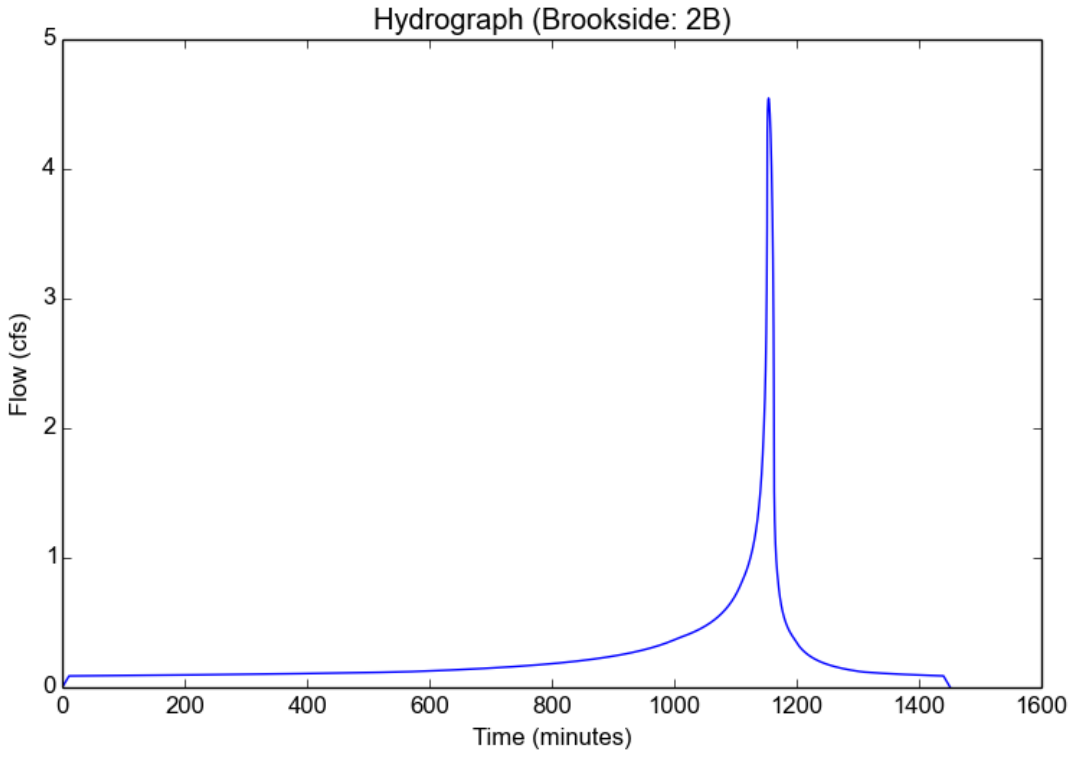
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/4-in Storm/Brookside - 2B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2B
Area (ac)	3.32
Flow Path Length (ft)	861.6
Flow Path Slope (vft/hft)	0.03714
85th Percentile Rainfall Depth (in)	4.0
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	4.0
Peak Intensity (in/hr)	1.6475
Undeveloped Runoff Coefficient (Cu)	0.8082
Developed Runoff Coefficient (Cd)	0.8311
Time of Concentration (min)	11.0
Clear Peak Flow Rate (cfs)	4.5461
Burned Peak Flow Rate (cfs)	4.5461
24-Hr Clear Runoff Volume (ac-ft)	0.4902
24-Hr Clear Runoff Volume (cu-ft)	21353.5286



Peak Flow Hydrologic Analysis

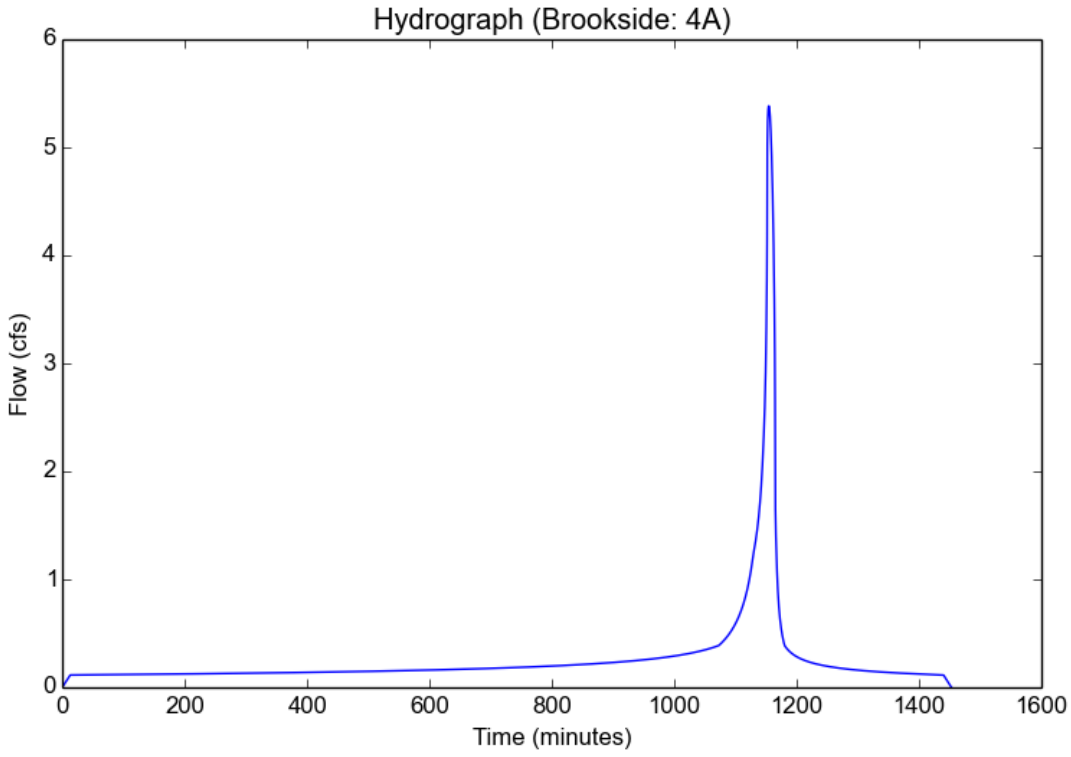
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/4-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	4.31
Flow Path Length (ft)	796.6
Flow Path Slope (vft/hft)	0.0113
85th Percentile Rainfall Depth (in)	4.0
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	4.0
Peak Intensity (in/hr)	1.5231
Undeveloped Runoff Coefficient (Cu)	0.7935
Developed Runoff Coefficient (Cd)	0.8201
Time of Concentration (min)	13.0
Clear Peak Flow Rate (cfs)	5.3837
Burned Peak Flow Rate (cfs)	5.3837
24-Hr Clear Runoff Volume (ac-ft)	0.5334
24-Hr Clear Runoff Volume (cu-ft)	23235.951



Peak Flow Hydrologic Analysis

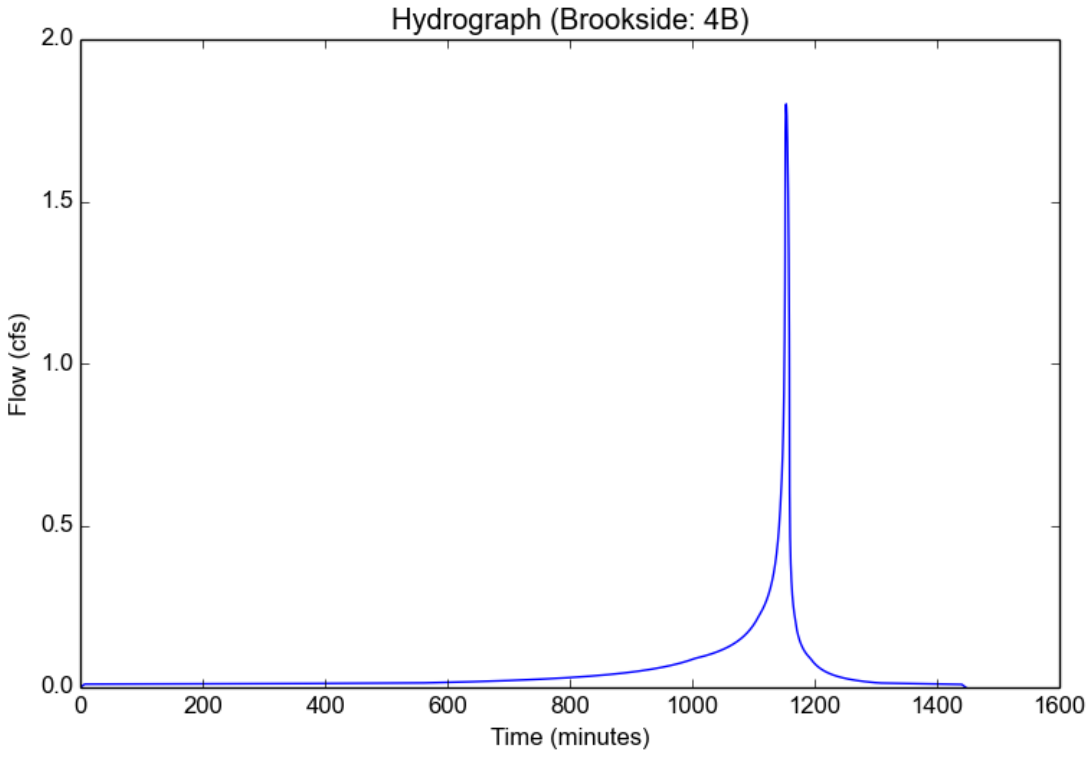
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/4-in Storm/Brookside - 4B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4B
Area (ac)	1.05
Flow Path Length (ft)	377.9
Flow Path Slope (vft/hft)	0.02646
85th Percentile Rainfall Depth (in)	4.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	4.0
Peak Intensity (in/hr)	2.0374
Undeveloped Runoff Coefficient (Cu)	0.8411
Developed Runoff Coefficient (Cd)	0.8417
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	1.8006
Burned Peak Flow Rate (cfs)	1.8006
24-Hr Clear Runoff Volume (ac-ft)	0.1049
24-Hr Clear Runoff Volume (cu-ft)	4568.1213



Peak Flow Hydrologic Analysis

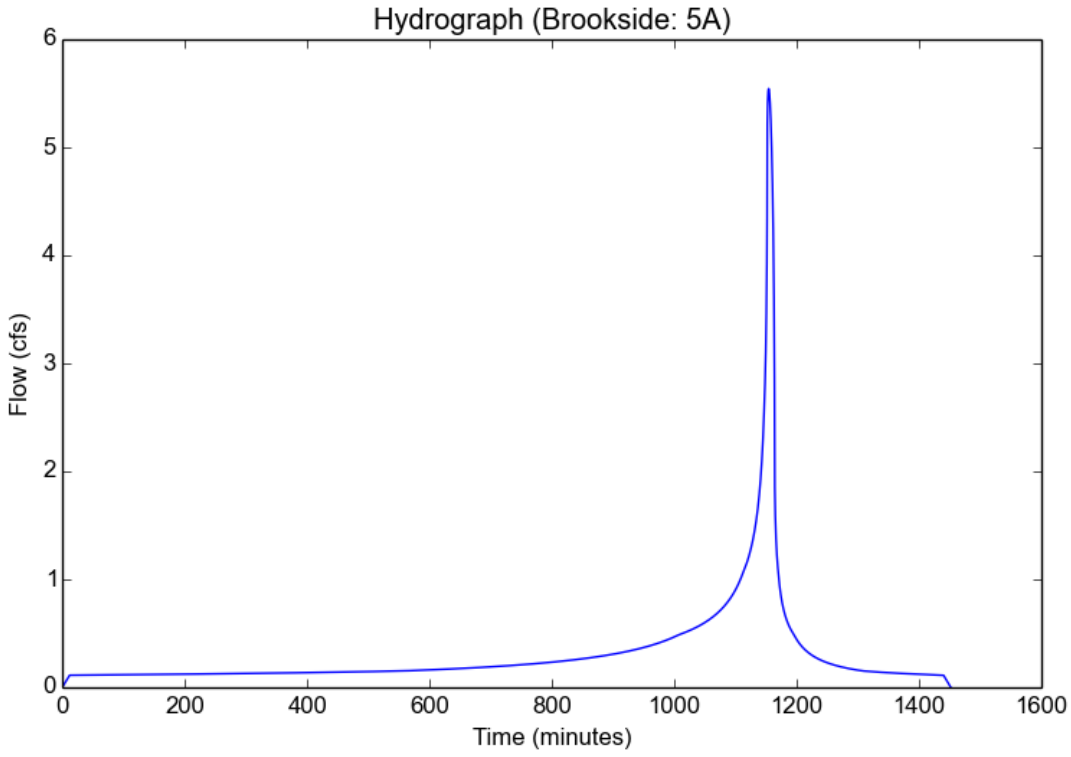
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/4-in Storm/Brookside - 5A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5A
Area (ac)	4.24
Flow Path Length (ft)	954.1
Flow Path Slope (vft/hft)	0.03354
85th Percentile Rainfall Depth (in)	4.0
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	4.0
Peak Intensity (in/hr)	1.5815
Undeveloped Runoff Coefficient (Cu)	0.8023
Developed Runoff Coefficient (Cd)	0.8267
Time of Concentration (min)	12.0
Clear Peak Flow Rate (cfs)	5.5437
Burned Peak Flow Rate (cfs)	5.5437
24-Hr Clear Runoff Volume (ac-ft)	0.626
24-Hr Clear Runoff Volume (cu-ft)	27266.885



Peak Flow Hydrologic Analysis

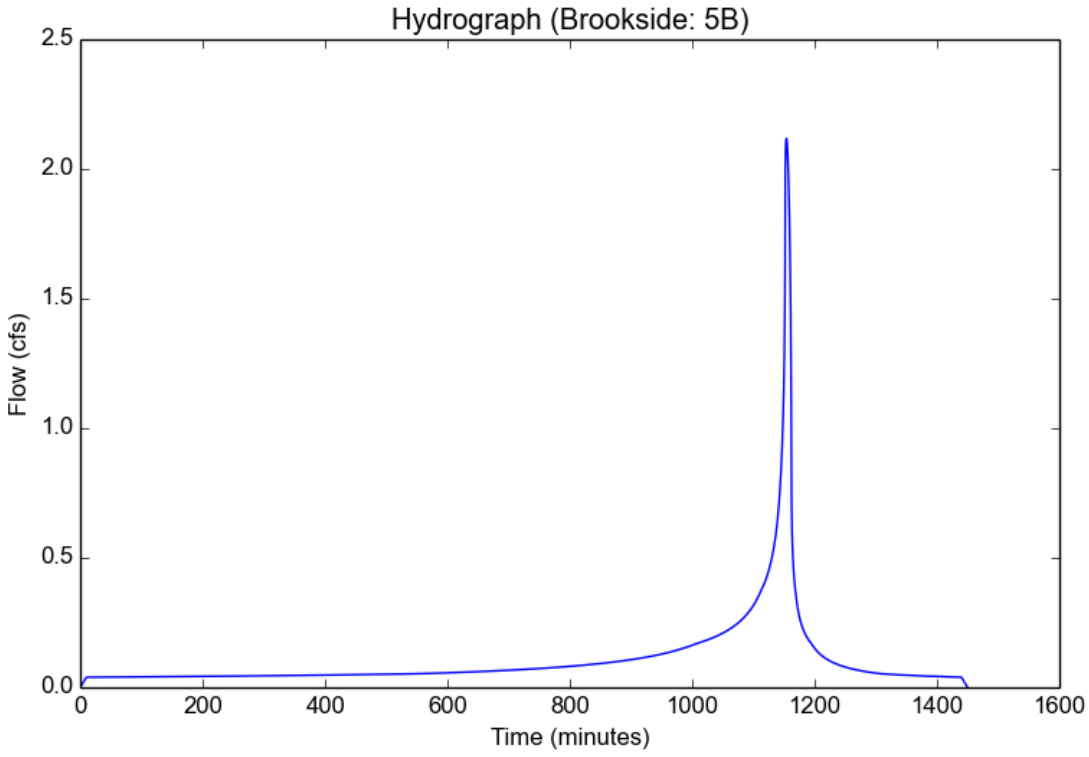
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/4-in Storm/Brookside - 5B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5B
Area (ac)	1.47
Flow Path Length (ft)	542.7
Flow Path Slope (vft/hft)	0.0129
85th Percentile Rainfall Depth (in)	4.0
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	4.0
Peak Intensity (in/hr)	1.723
Undeveloped Runoff Coefficient (Cu)	0.8149
Developed Runoff Coefficient (Cd)	0.8362
Time of Concentration (min)	10.0
Clear Peak Flow Rate (cfs)	2.1178
Burned Peak Flow Rate (cfs)	2.1178
24-Hr Clear Runoff Volume (ac-ft)	0.2171
24-Hr Clear Runoff Volume (cu-ft)	9456.3448



Peak Flow Hydrologic Analysis

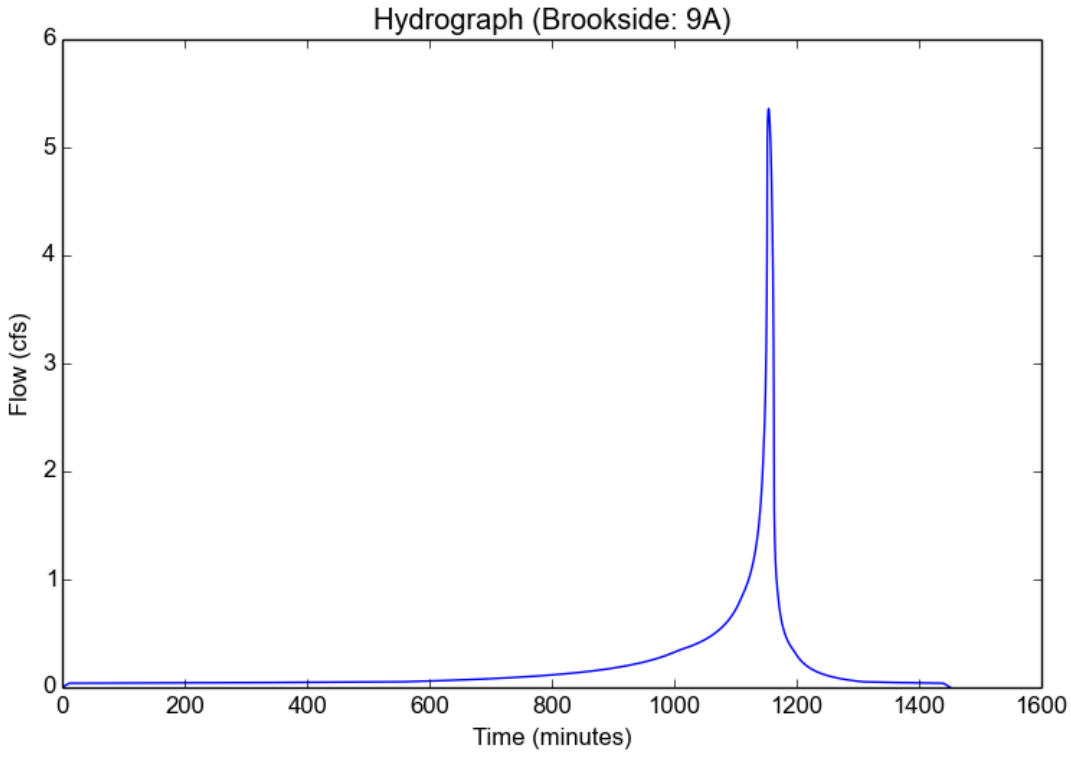
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/4-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	4.02
Flow Path Length (ft)	958.0
Flow Path Slope (vft/hft)	0.05323
85th Percentile Rainfall Depth (in)	4.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	4.0
Peak Intensity (in/hr)	1.6475
Undeveloped Runoff Coefficient (Cu)	0.8082
Developed Runoff Coefficient (Cd)	0.8091
Time of Concentration (min)	11.0
Clear Peak Flow Rate (cfs)	5.3586
Burned Peak Flow Rate (cfs)	5.3586
24-Hr Clear Runoff Volume (ac-ft)	0.4008
24-Hr Clear Runoff Volume (cu-ft)	17457.8584



Peak Flow Hydrologic Analysis

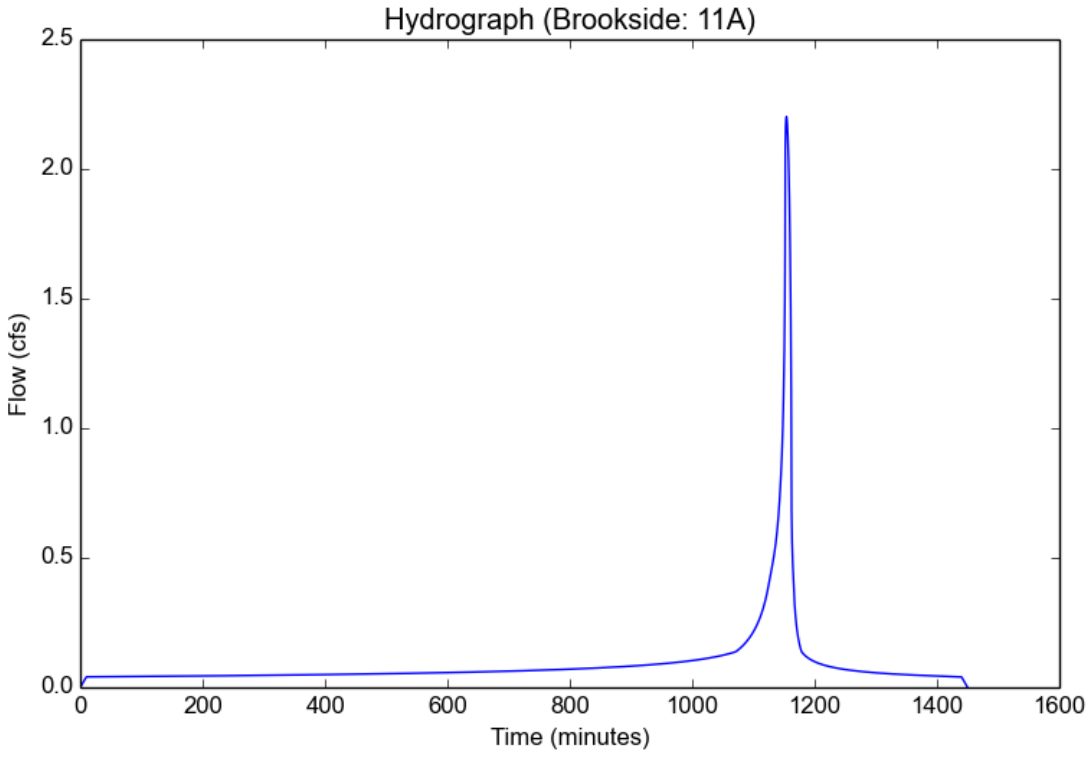
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/4-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	1.53
Flow Path Length (ft)	494.1
Flow Path Slope (vft/hft)	0.00607
85th Percentile Rainfall Depth (in)	4.0
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	4.0
Peak Intensity (in/hr)	1.723
Undeveloped Runoff Coefficient (Cu)	0.8136
Developed Runoff Coefficient (Cd)	0.8352
Time of Concentration (min)	10.0
Clear Peak Flow Rate (cfs)	2.2017
Burned Peak Flow Rate (cfs)	2.2017
24-Hr Clear Runoff Volume (ac-ft)	0.1894
24-Hr Clear Runoff Volume (cu-ft)	8251.7438



Peak Flow Hydrologic Analysis

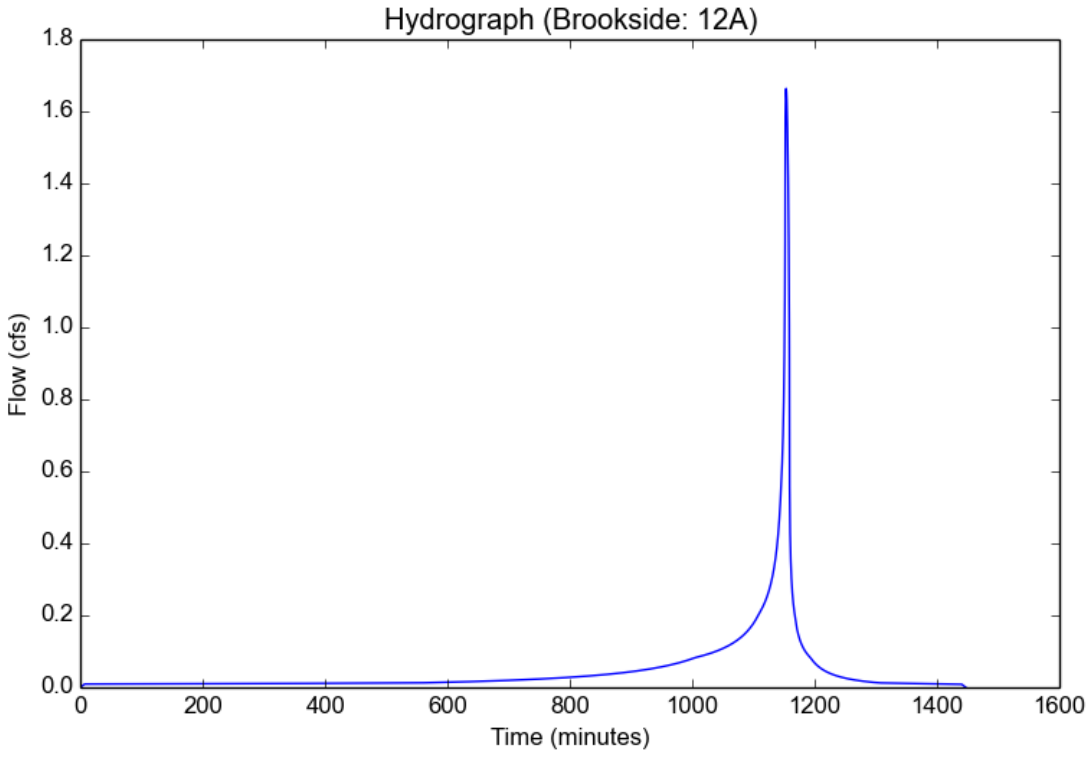
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/4-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.97
Flow Path Length (ft)	512.5
Flow Path Slope (vft/hft)	0.07414
85th Percentile Rainfall Depth (in)	4.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	4.0
Peak Intensity (in/hr)	2.0374
Undeveloped Runoff Coefficient (Cu)	0.8411
Developed Runoff Coefficient (Cd)	0.8417
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	1.6634
Burned Peak Flow Rate (cfs)	1.6634
24-Hr Clear Runoff Volume (ac-ft)	0.0969
24-Hr Clear Runoff Volume (cu-ft)	4220.074



Peak Flow Hydrologic Analysis

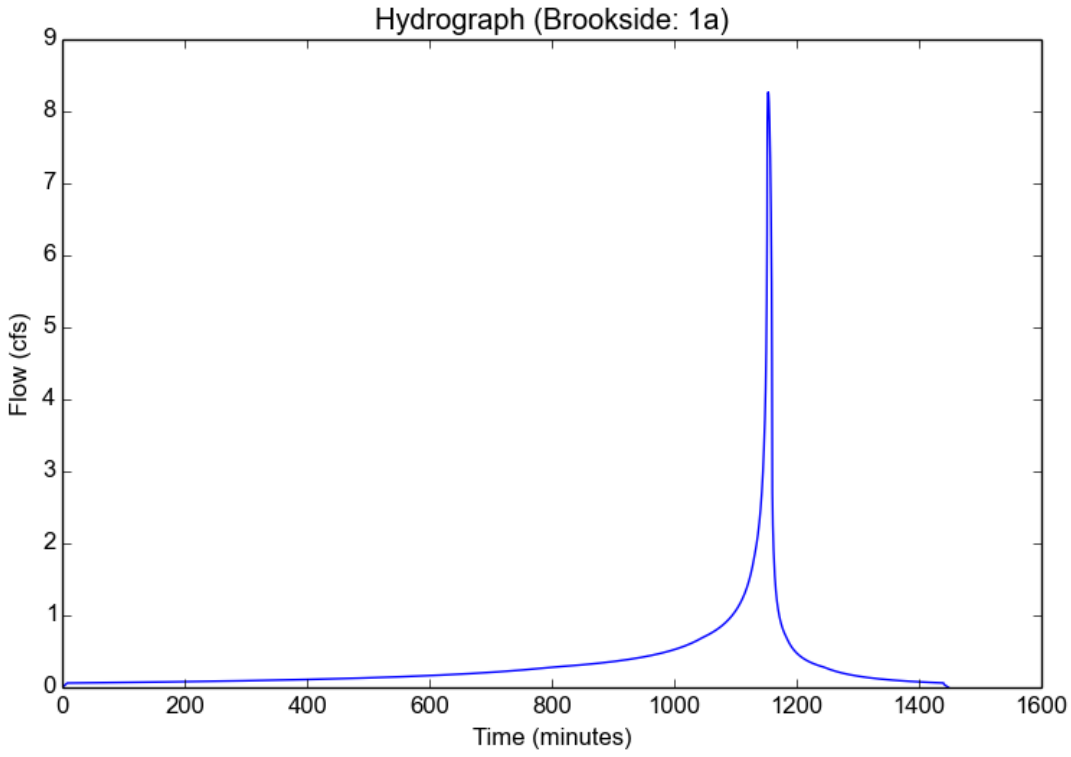
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/6-in Storm/Brookside - 1a.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1a
Area (ac)	3.28
Flow Path Length (ft)	866.7
Flow Path Slope (vft/hft)	0.04038
85th Percentile Rainfall Depth (in)	6.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	6.0
Peak Intensity (in/hr)	2.8702
Undeveloped Runoff Coefficient (Cu)	0.8779
Developed Runoff Coefficient (Cd)	0.8782
Time of Concentration (min)	8.0
Clear Peak Flow Rate (cfs)	8.2673
Burned Peak Flow Rate (cfs)	8.2673
24-Hr Clear Runoff Volume (ac-ft)	0.6724
24-Hr Clear Runoff Volume (cu-ft)	29288.5541



Peak Flow Hydrologic Analysis

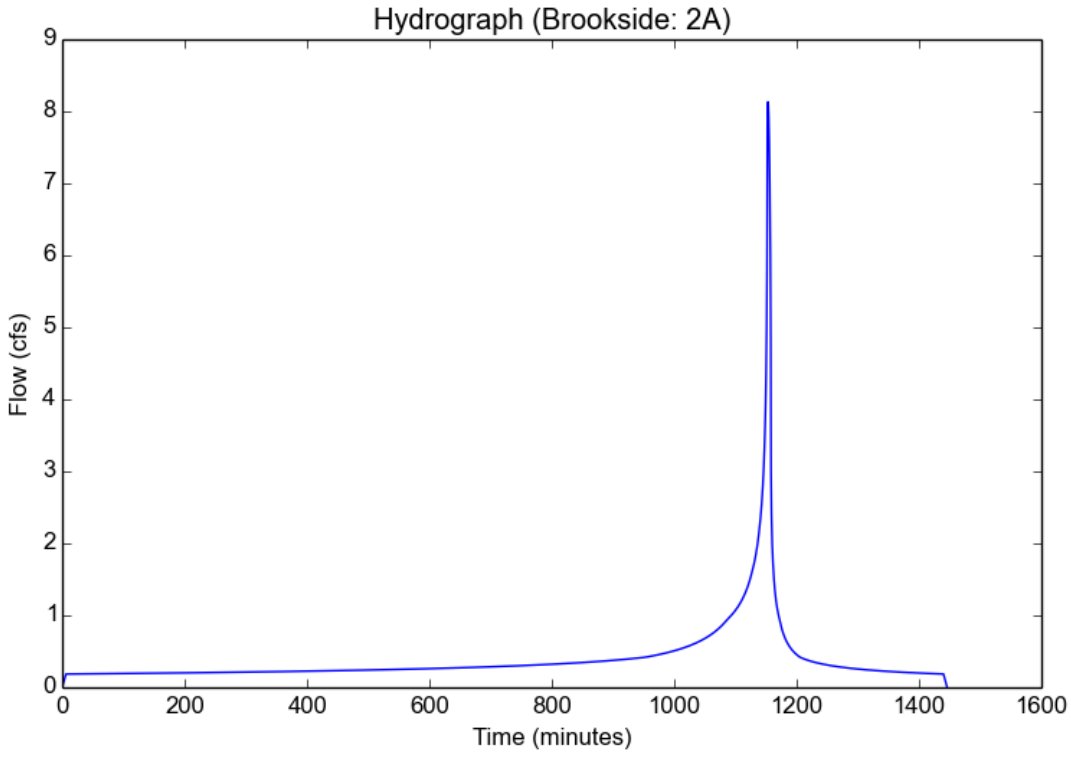
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/6-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	2.75
Flow Path Length (ft)	652.4
Flow Path Slope (vft/hft)	0.04599
85th Percentile Rainfall Depth (in)	6.0
Percent Impervious	0.509
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	6.0
Peak Intensity (in/hr)	3.2858
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	8.1323
Burned Peak Flow Rate (cfs)	8.1323
24-Hr Clear Runoff Volume (ac-ft)	0.7974
24-Hr Clear Runoff Volume (cu-ft)	34733.8734



Peak Flow Hydrologic Analysis

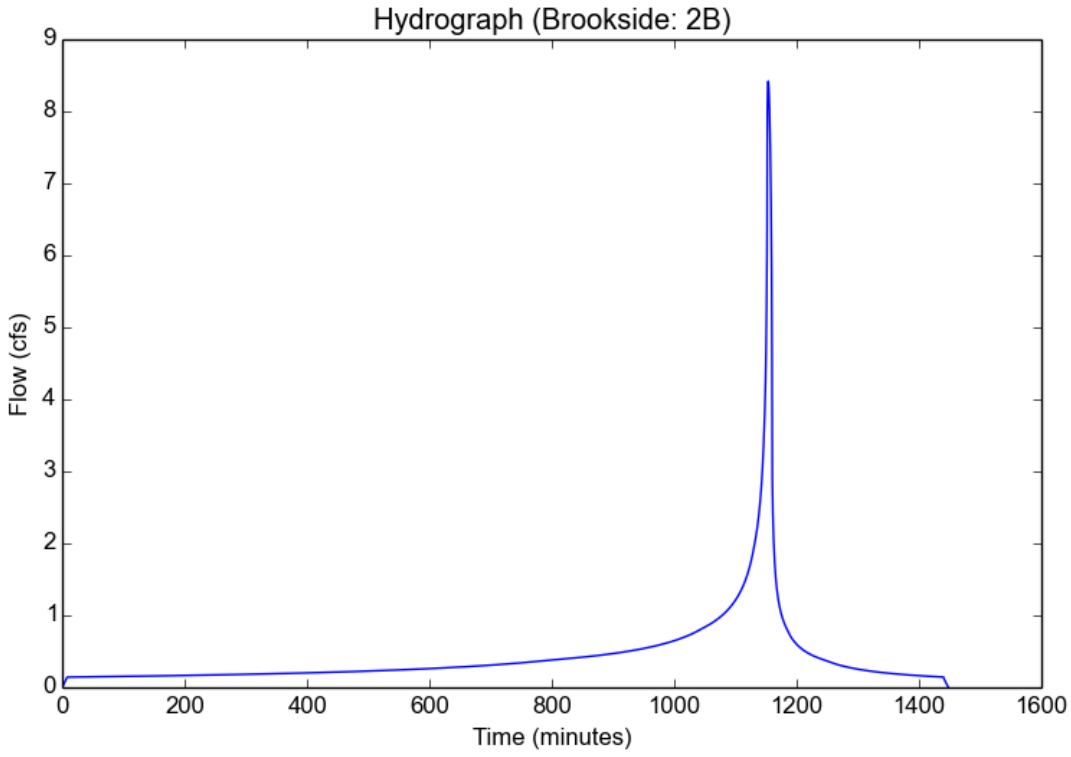
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/6-in Storm/Brookside - 2B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2B
Area (ac)	3.32
Flow Path Length (ft)	861.6
Flow Path Slope (vft/hft)	0.03714
85th Percentile Rainfall Depth (in)	6.0
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	6.0
Peak Intensity (in/hr)	2.8702
Undeveloped Runoff Coefficient (Cu)	0.8779
Developed Runoff Coefficient (Cd)	0.8834
Time of Concentration (min)	8.0
Clear Peak Flow Rate (cfs)	8.4186
Burned Peak Flow Rate (cfs)	8.4186
24-Hr Clear Runoff Volume (ac-ft)	0.8748
24-Hr Clear Runoff Volume (cu-ft)	38105.1547



Peak Flow Hydrologic Analysis

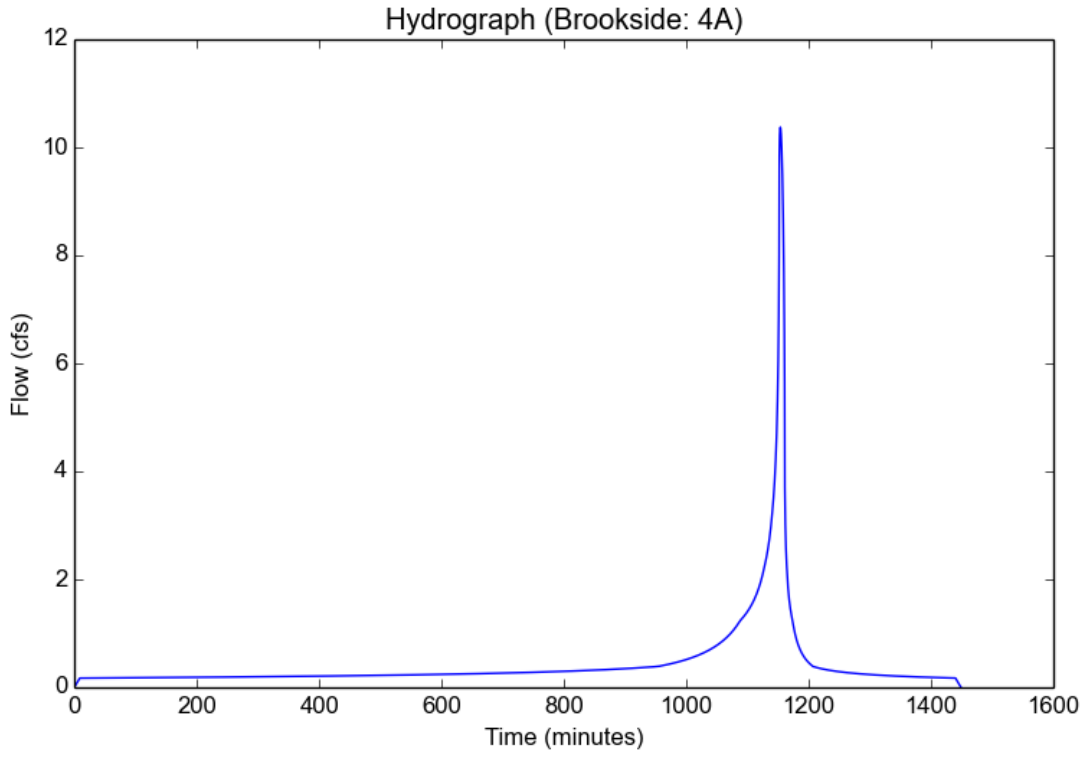
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/6-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	4.31
Flow Path Length (ft)	796.6
Flow Path Slope (vft/hft)	0.0113
85th Percentile Rainfall Depth (in)	6.0
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	6.0
Peak Intensity (in/hr)	2.7157
Undeveloped Runoff Coefficient (Cu)	0.8816
Developed Runoff Coefficient (Cd)	0.8862
Time of Concentration (min)	9.0
Clear Peak Flow Rate (cfs)	10.3729
Burned Peak Flow Rate (cfs)	10.3729
24-Hr Clear Runoff Volume (ac-ft)	0.8942
24-Hr Clear Runoff Volume (cu-ft)	38951.4359



Peak Flow Hydrologic Analysis

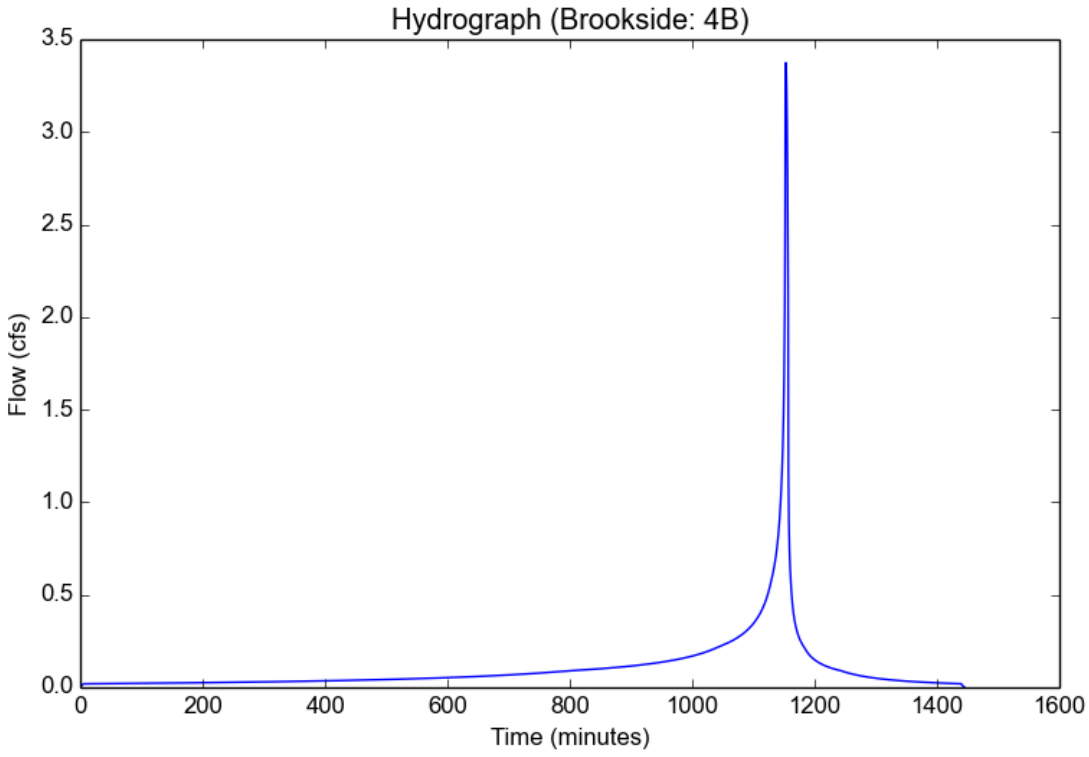
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/6-in Storm/Brookside - 4B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4B
Area (ac)	1.05
Flow Path Length (ft)	377.9
Flow Path Slope (vft/hft)	0.02646
85th Percentile Rainfall Depth (in)	6.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	6.0
Peak Intensity (in/hr)	3.5798
Undeveloped Runoff Coefficient (Cu)	0.8977
Developed Runoff Coefficient (Cd)	0.8977
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	3.3742
Burned Peak Flow Rate (cfs)	3.3742
24-Hr Clear Runoff Volume (ac-ft)	0.2154
24-Hr Clear Runoff Volume (cu-ft)	9381.2675



Peak Flow Hydrologic Analysis

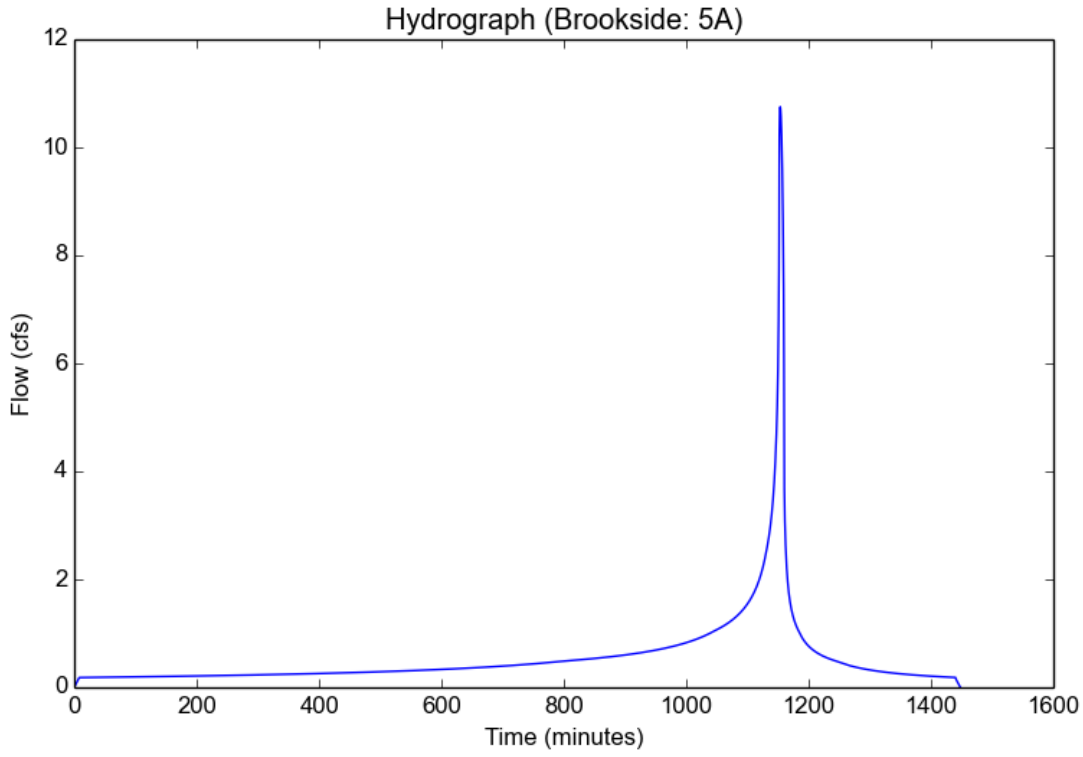
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/6-in Storm/Brookside - 5A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5A
Area (ac)	4.24
Flow Path Length (ft)	954.1
Flow Path Slope (vft/hft)	0.03354
85th Percentile Rainfall Depth (in)	6.0
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	6.0
Peak Intensity (in/hr)	2.8702
Undeveloped Runoff Coefficient (Cu)	0.8779
Developed Runoff Coefficient (Cd)	0.8834
Time of Concentration (min)	8.0
Clear Peak Flow Rate (cfs)	10.7514
Burned Peak Flow Rate (cfs)	10.7514
24-Hr Clear Runoff Volume (ac-ft)	1.1172
24-Hr Clear Runoff Volume (cu-ft)	48664.4145



Peak Flow Hydrologic Analysis

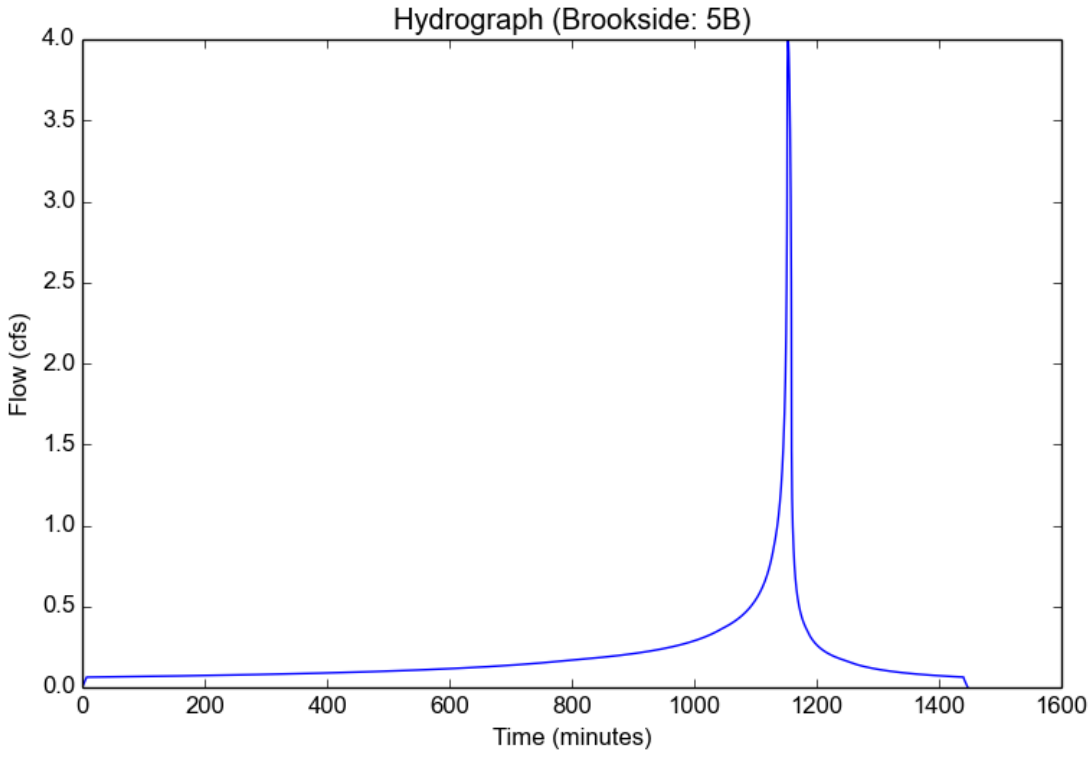
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/6-in Storm/Brookside - 5B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5B
Area (ac)	1.47
Flow Path Length (ft)	542.7
Flow Path Slope (vft/hft)	0.0129
85th Percentile Rainfall Depth (in)	6.0
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	6.0
Peak Intensity (in/hr)	3.0561
Undeveloped Runoff Coefficient (Cu)	0.885
Developed Runoff Coefficient (Cd)	0.8888
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	3.9928
Burned Peak Flow Rate (cfs)	3.9928
24-Hr Clear Runoff Volume (ac-ft)	0.3874
24-Hr Clear Runoff Volume (cu-ft)	16874.7742



Peak Flow Hydrologic Analysis

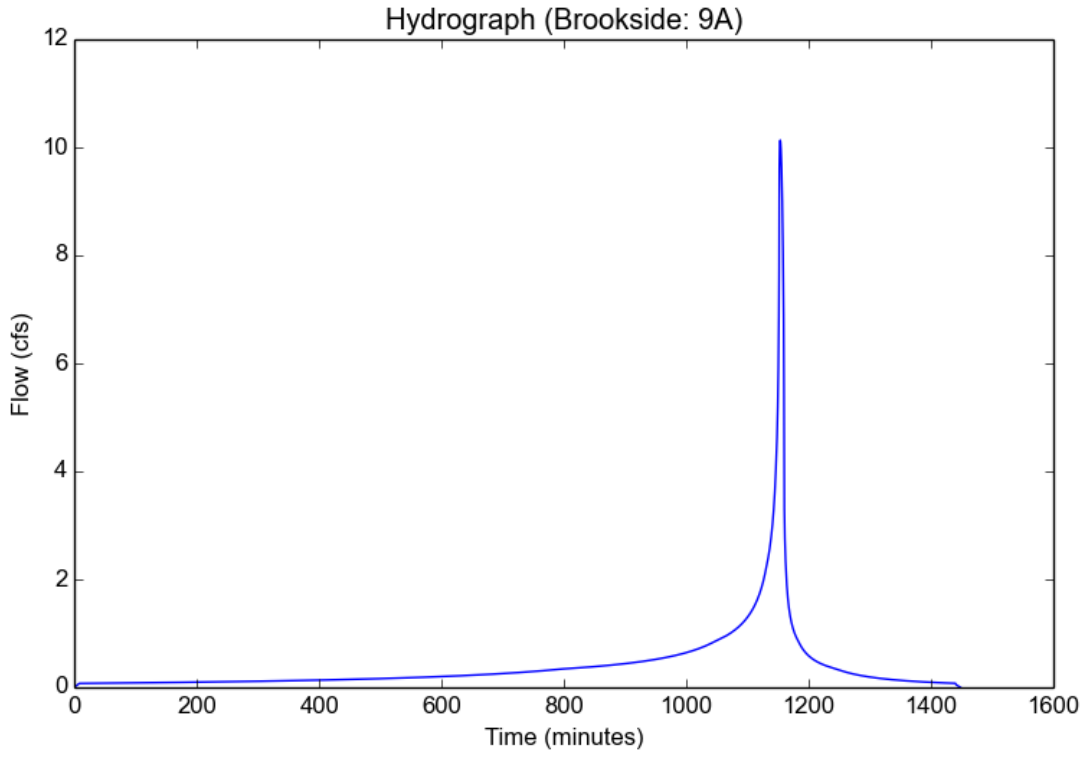
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/6-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	4.02
Flow Path Length (ft)	958.0
Flow Path Slope (vft/hft)	0.05323
85th Percentile Rainfall Depth (in)	6.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	6.0
Peak Intensity (in/hr)	2.8702
Undeveloped Runoff Coefficient (Cu)	0.8779
Developed Runoff Coefficient (Cd)	0.8782
Time of Concentration (min)	8.0
Clear Peak Flow Rate (cfs)	10.1324
Burned Peak Flow Rate (cfs)	10.1324
24-Hr Clear Runoff Volume (ac-ft)	0.8241
24-Hr Clear Runoff Volume (cu-ft)	35896.3377



Peak Flow Hydrologic Analysis

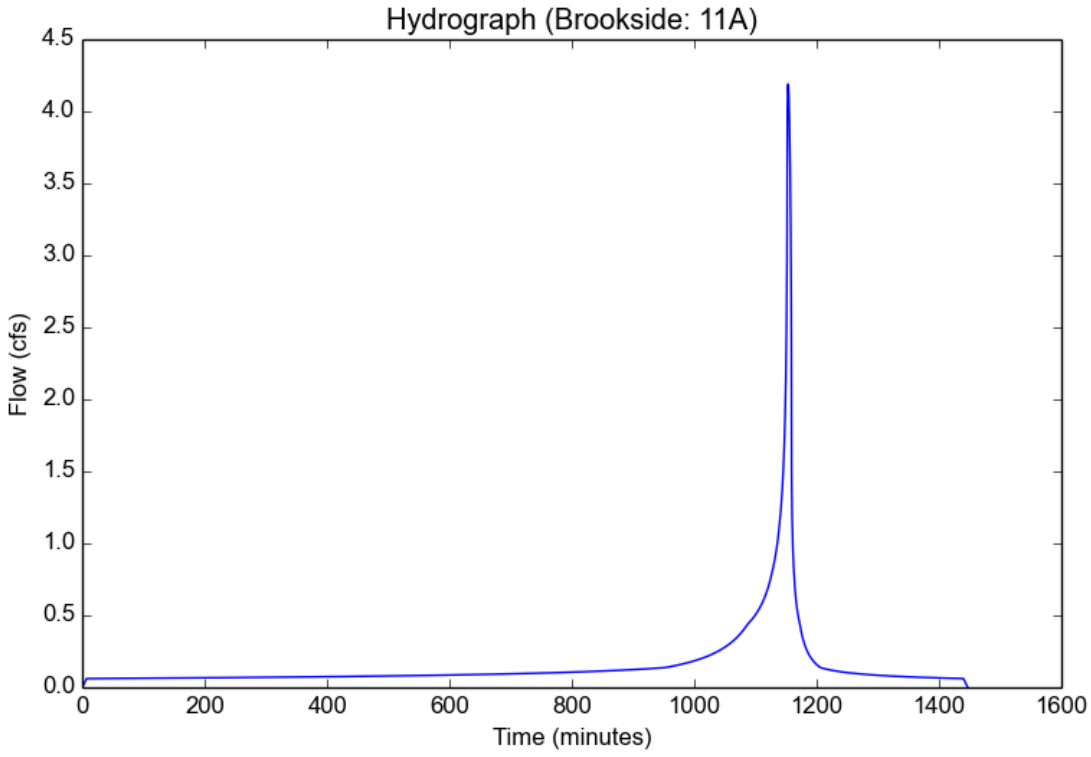
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/6-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	1.53
Flow Path Length (ft)	494.1
Flow Path Slope (vft/hft)	0.00607
85th Percentile Rainfall Depth (in)	6.0
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	6.0
Peak Intensity (in/hr)	3.0561
Undeveloped Runoff Coefficient (Cu)	0.8947
Developed Runoff Coefficient (Cd)	0.896
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	4.1897
Burned Peak Flow Rate (cfs)	4.1897
24-Hr Clear Runoff Volume (ac-ft)	0.3175
24-Hr Clear Runoff Volume (cu-ft)	13828.527



Peak Flow Hydrologic Analysis

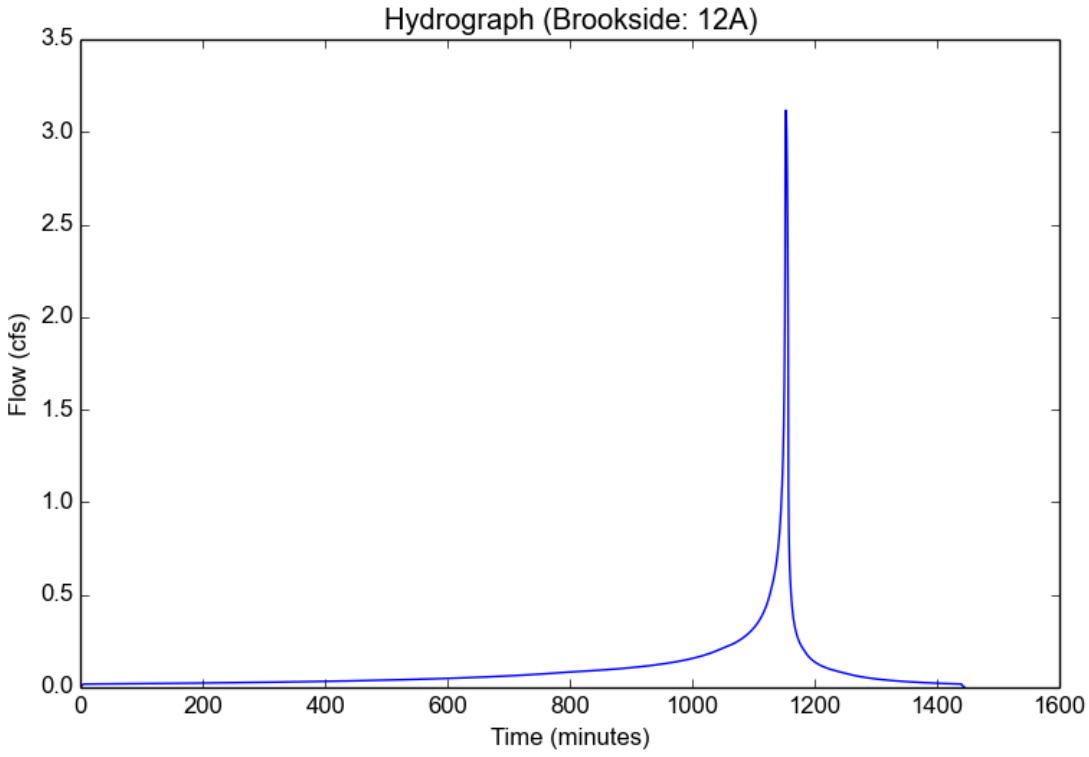
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/6-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.97
Flow Path Length (ft)	512.5
Flow Path Slope (vft/hft)	0.07414
85th Percentile Rainfall Depth (in)	6.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	6.0
Peak Intensity (in/hr)	3.5798
Undeveloped Runoff Coefficient (Cu)	0.8977
Developed Runoff Coefficient (Cd)	0.8977
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	3.1171
Burned Peak Flow Rate (cfs)	3.1171
24-Hr Clear Runoff Volume (ac-ft)	0.199
24-Hr Clear Runoff Volume (cu-ft)	8666.5043



Peak Flow Hydrologic Analysis

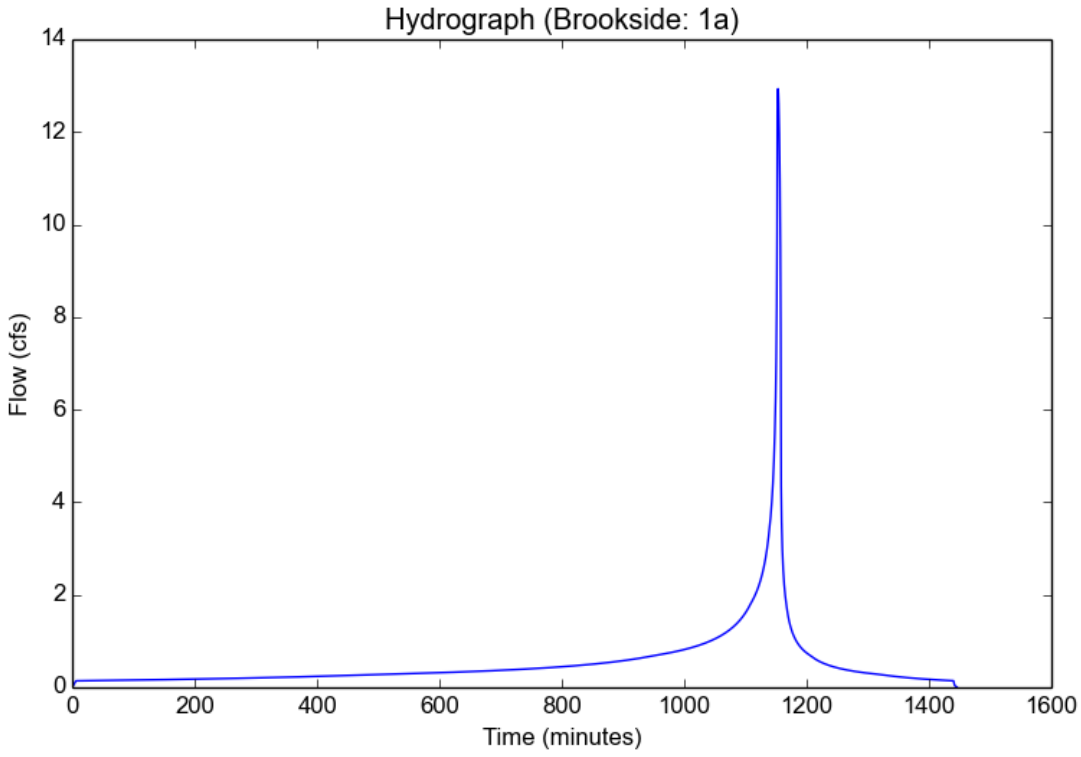
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/8-in Storm/Brookside - 1a.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1a
Area (ac)	3.28
Flow Path Length (ft)	866.7
Flow Path Slope (vft/hft)	0.04038
85th Percentile Rainfall Depth (in)	8.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	8.0
Peak Intensity (in/hr)	4.381
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	12.9329
Burned Peak Flow Rate (cfs)	12.9329
24-Hr Clear Runoff Volume (ac-ft)	1.0859
24-Hr Clear Runoff Volume (cu-ft)	47303.5666



Peak Flow Hydrologic Analysis

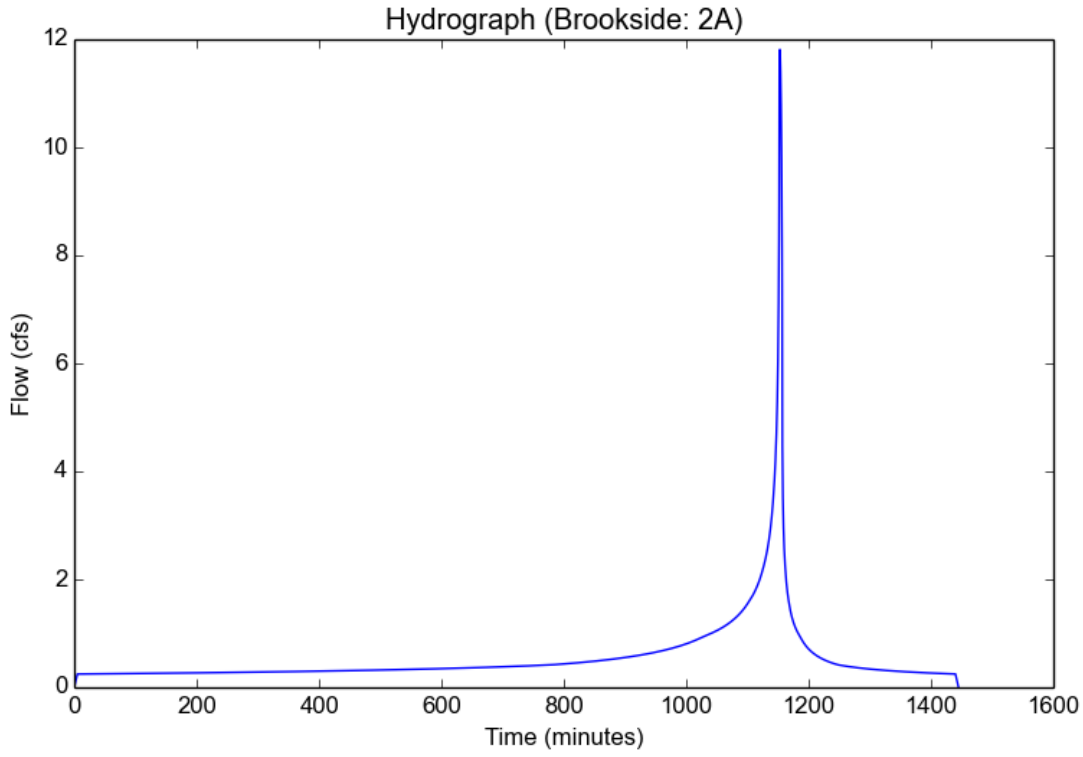
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/8-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	2.75
Flow Path Length (ft)	652.4
Flow Path Slope (vft/hft)	0.04599
85th Percentile Rainfall Depth (in)	8.0
Percent Impervious	0.509
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	8.0
Peak Intensity (in/hr)	4.773
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	11.8132
Burned Peak Flow Rate (cfs)	11.8132
24-Hr Clear Runoff Volume (ac-ft)	1.1163
24-Hr Clear Runoff Volume (cu-ft)	48625.1908



Peak Flow Hydrologic Analysis

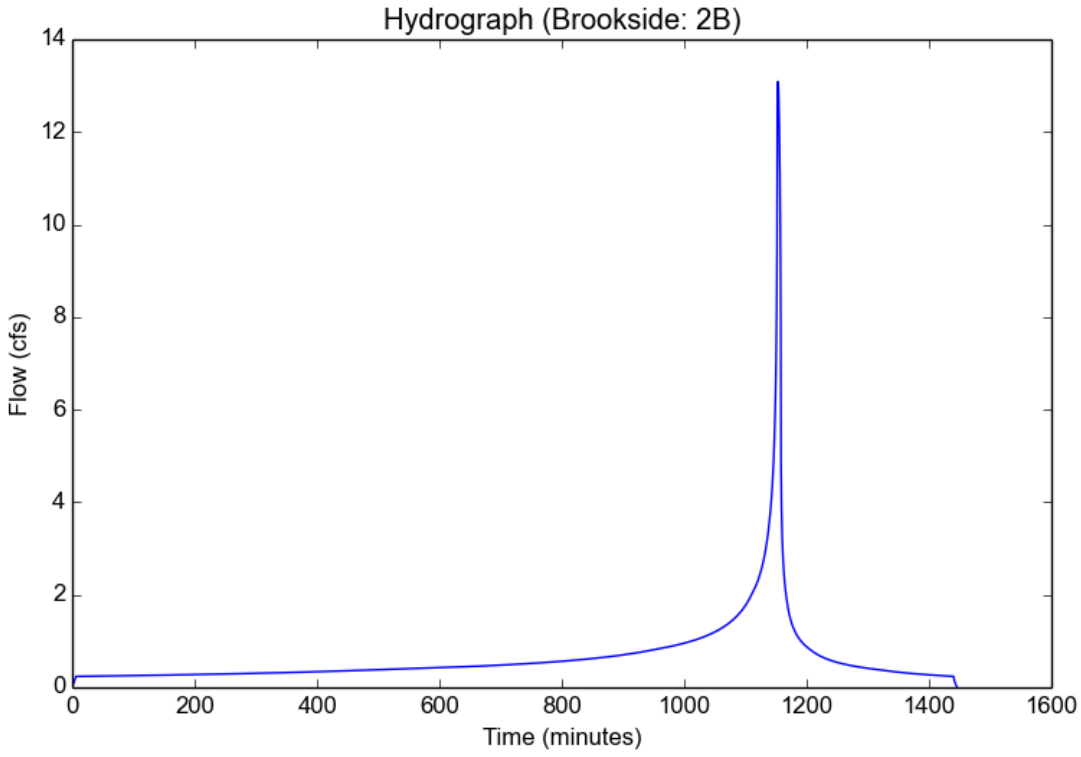
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/8-in Storm/Brookside - 2B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2B
Area (ac)	3.32
Flow Path Length (ft)	861.6
Flow Path Slope (vft/hft)	0.03714
85th Percentile Rainfall Depth (in)	8.0
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	8.0
Peak Intensity (in/hr)	4.381
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	13.0906
Burned Peak Flow Rate (cfs)	13.0906
24-Hr Clear Runoff Volume (ac-ft)	1.3116
24-Hr Clear Runoff Volume (cu-ft)	57134.7423



Peak Flow Hydrologic Analysis

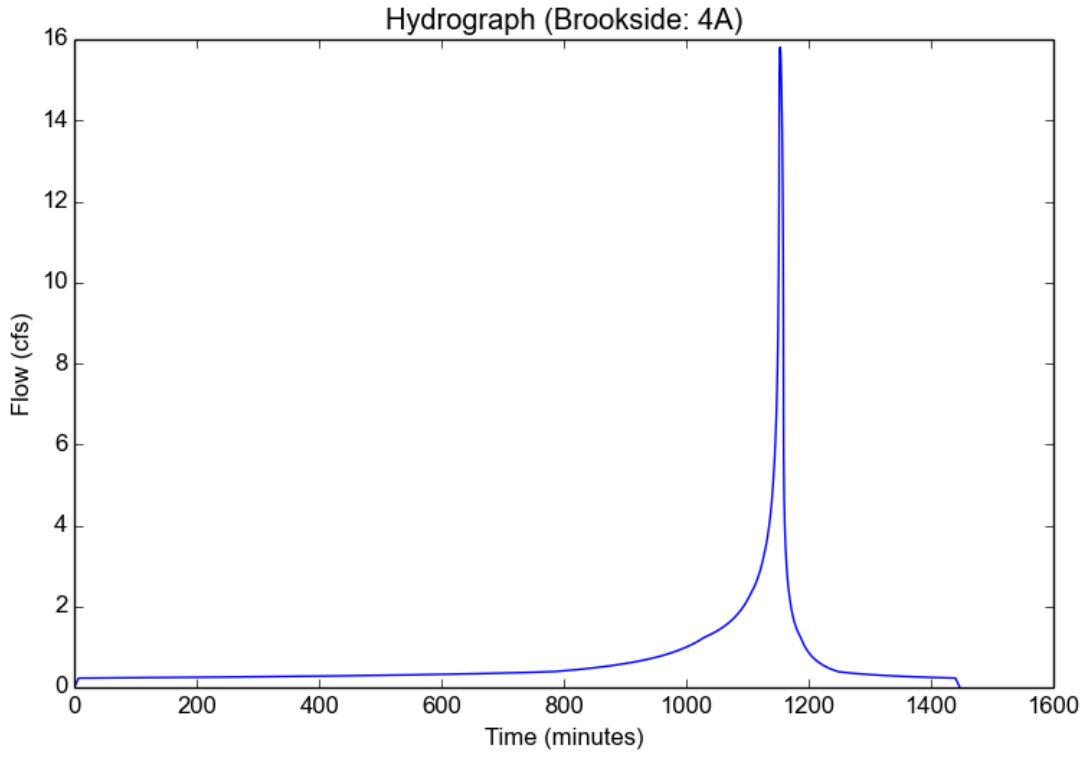
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/8-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	4.31
Flow Path Length (ft)	796.6
Flow Path Slope (vft/hft)	0.0113
85th Percentile Rainfall Depth (in)	8.0
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	8.0
Peak Intensity (in/hr)	4.0749
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	15.8064
Burned Peak Flow Rate (cfs)	15.8064
24-Hr Clear Runoff Volume (ac-ft)	1.3204
24-Hr Clear Runoff Volume (cu-ft)	57515.8421



Peak Flow Hydrologic Analysis

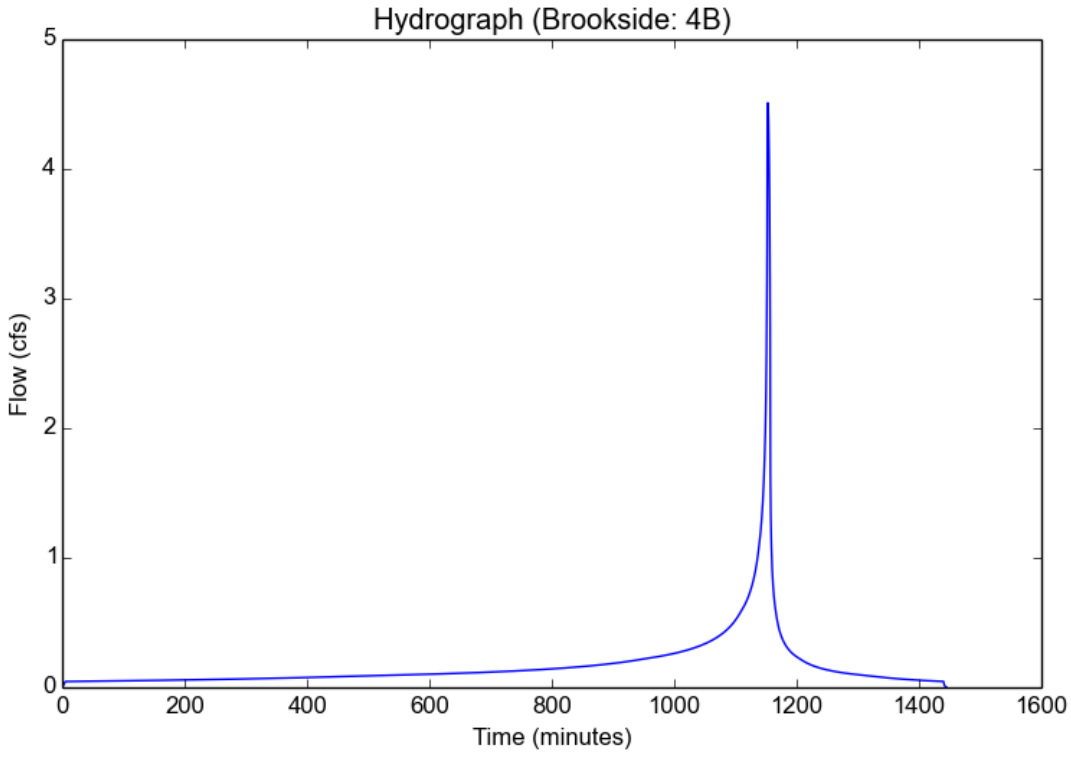
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/8-in Storm/Brookside - 4B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4B
Area (ac)	1.05
Flow Path Length (ft)	377.9
Flow Path Slope (vft/hft)	0.02646
85th Percentile Rainfall Depth (in)	8.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	8.0
Peak Intensity (in/hr)	4.773
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	4.5105
Burned Peak Flow Rate (cfs)	4.5105
24-Hr Clear Runoff Volume (ac-ft)	0.3475
24-Hr Clear Runoff Volume (cu-ft)	15138.798



Peak Flow Hydrologic Analysis

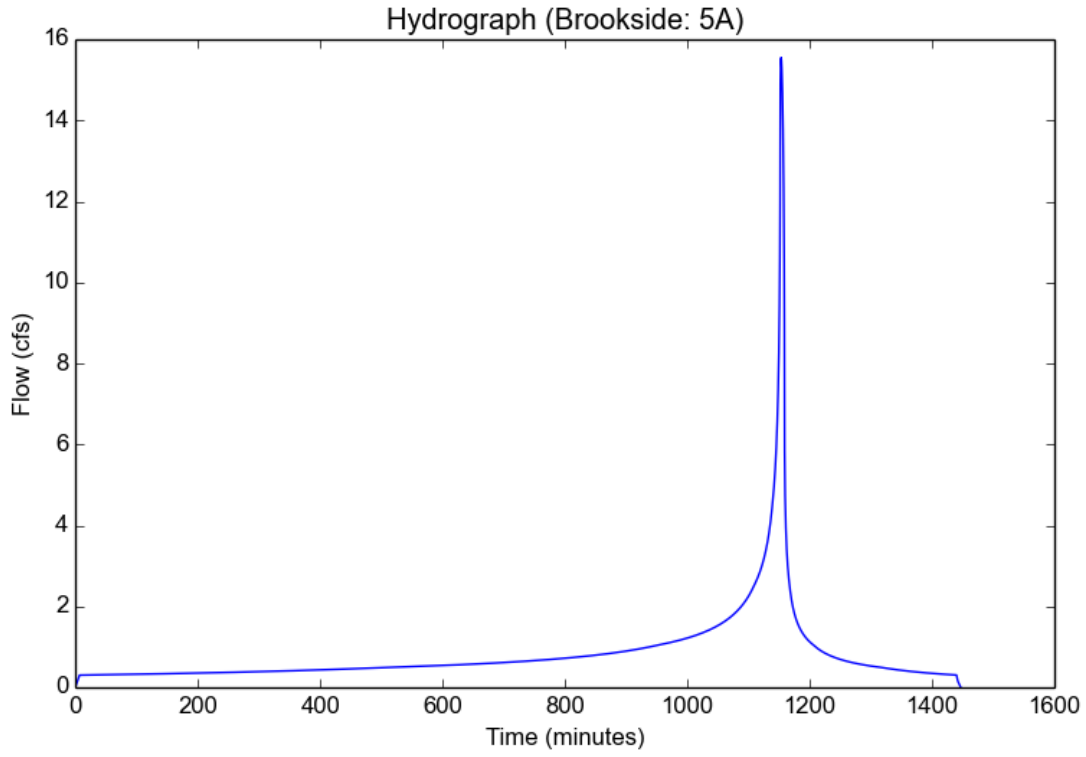
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/8-in Storm/Brookside - 5A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5A
Area (ac)	4.24
Flow Path Length (ft)	954.1
Flow Path Slope (vft/hft)	0.03354
85th Percentile Rainfall Depth (in)	8.0
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	8.0
Peak Intensity (in/hr)	4.0749
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	15.5497
Burned Peak Flow Rate (cfs)	15.5497
24-Hr Clear Runoff Volume (ac-ft)	1.6754
24-Hr Clear Runoff Volume (cu-ft)	72978.373



Peak Flow Hydrologic Analysis

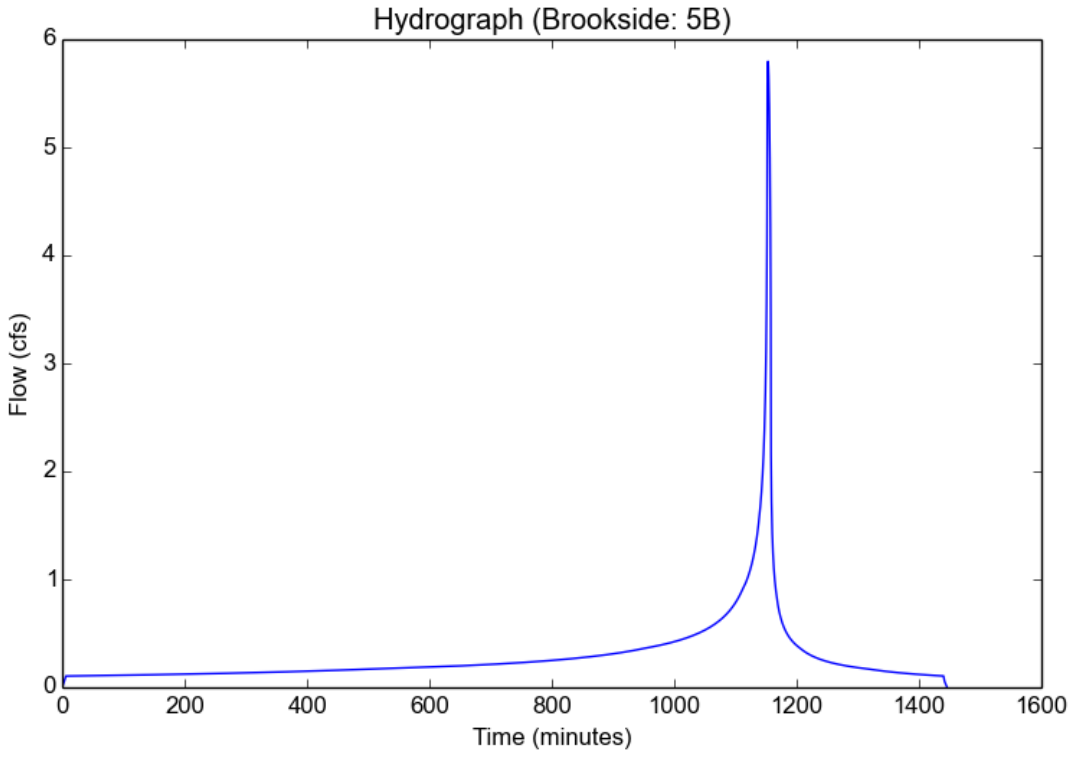
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/8-in Storm/Brookside - 5B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5B
Area (ac)	1.47
Flow Path Length (ft)	542.7
Flow Path Slope (vft/hft)	0.0129
85th Percentile Rainfall Depth (in)	8.0
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	8.0
Peak Intensity (in/hr)	4.381
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	5.7961
Burned Peak Flow Rate (cfs)	5.7961
24-Hr Clear Runoff Volume (ac-ft)	0.5808
24-Hr Clear Runoff Volume (cu-ft)	25297.6118



Peak Flow Hydrologic Analysis

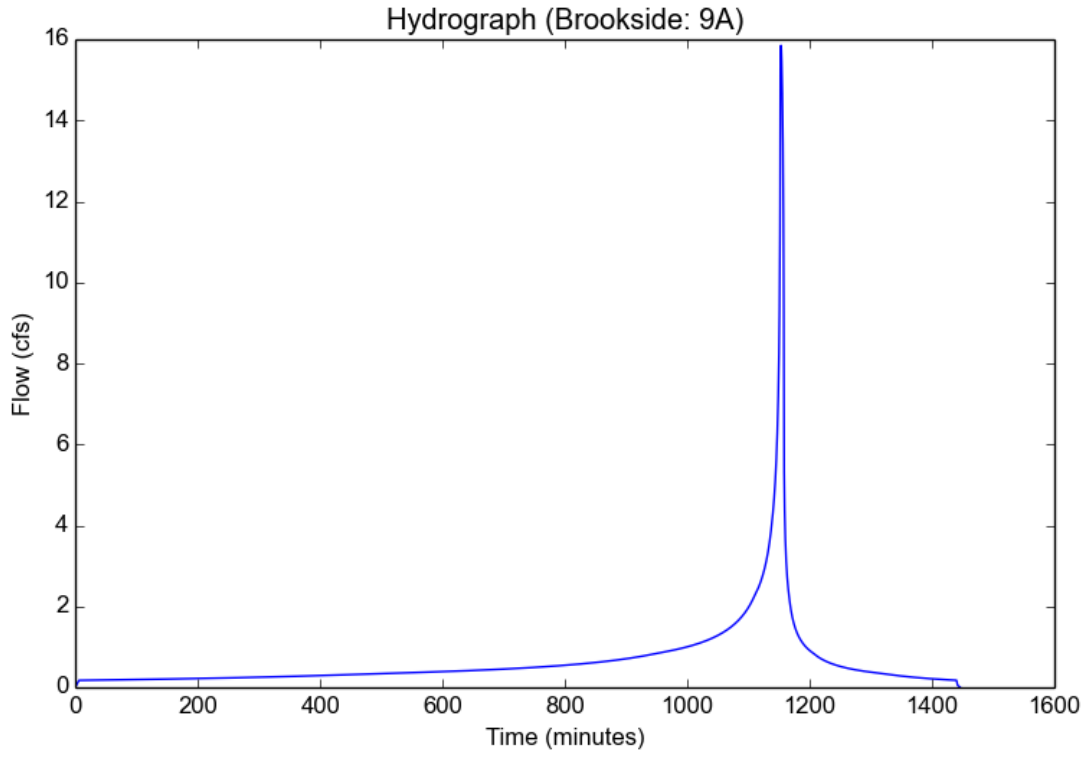
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/8-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	4.02
Flow Path Length (ft)	958.0
Flow Path Slope (vft/hft)	0.05323
85th Percentile Rainfall Depth (in)	8.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	8.0
Peak Intensity (in/hr)	4.381
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	15.8506
Burned Peak Flow Rate (cfs)	15.8506
24-Hr Clear Runoff Volume (ac-ft)	1.3309
24-Hr Clear Runoff Volume (cu-ft)	57975.7127



Peak Flow Hydrologic Analysis

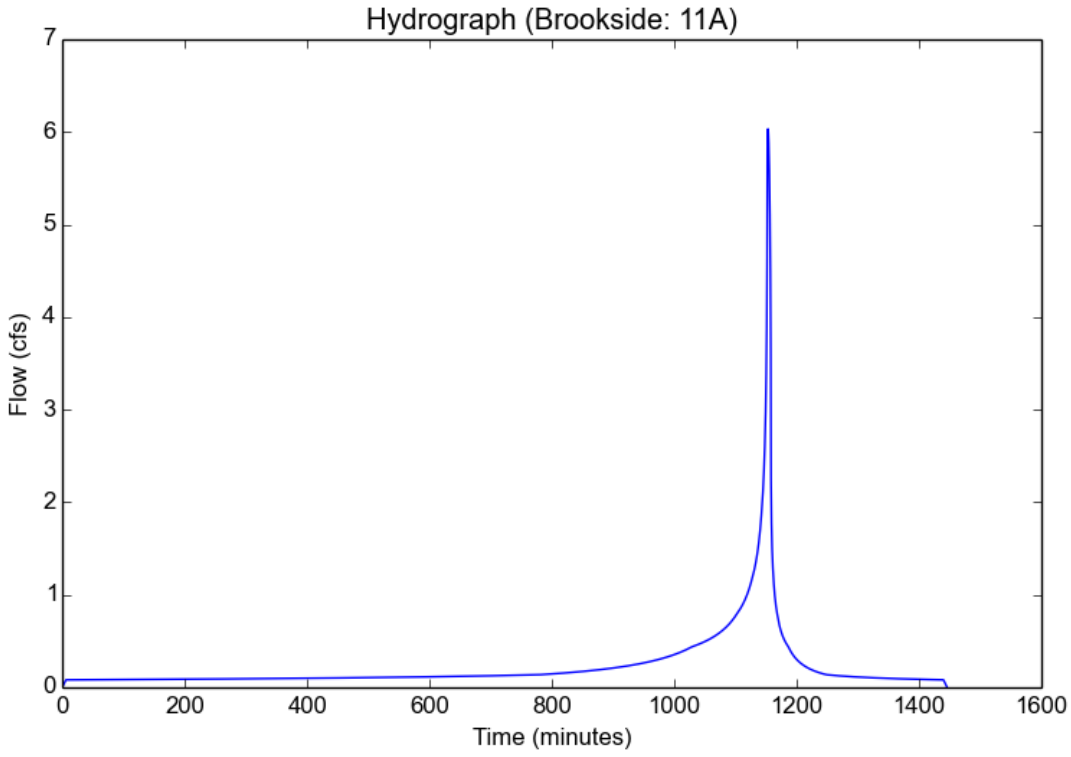
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/8-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	1.53
Flow Path Length (ft)	494.1
Flow Path Slope (vft/hft)	0.00607
85th Percentile Rainfall Depth (in)	8.0
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	8.0
Peak Intensity (in/hr)	4.381
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	6.0327
Burned Peak Flow Rate (cfs)	6.0327
24-Hr Clear Runoff Volume (ac-ft)	0.4686
24-Hr Clear Runoff Volume (cu-ft)	20411.009



Peak Flow Hydrologic Analysis

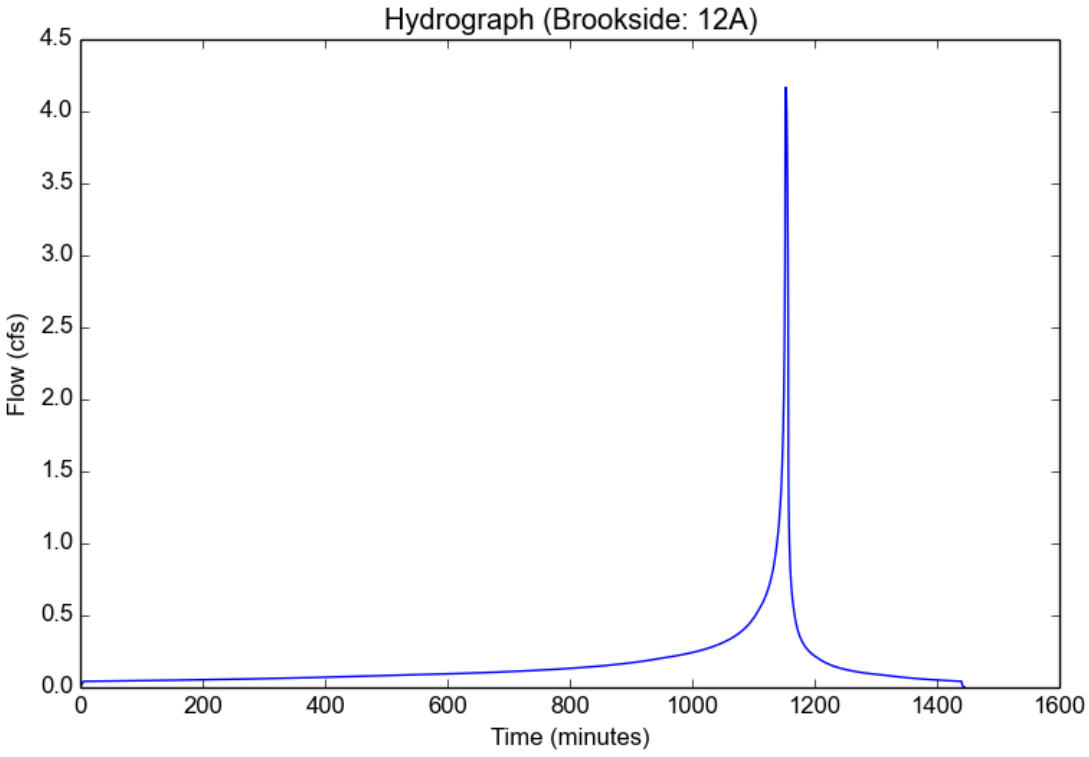
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/8-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.97
Flow Path Length (ft)	512.5
Flow Path Slope (vft/hft)	0.07414
85th Percentile Rainfall Depth (in)	8.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	8.0
Peak Intensity (in/hr)	4.773
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	4.1668
Burned Peak Flow Rate (cfs)	4.1668
24-Hr Clear Runoff Volume (ac-ft)	0.3211
24-Hr Clear Runoff Volume (cu-ft)	13985.3658



Peak Flow Hydrologic Analysis

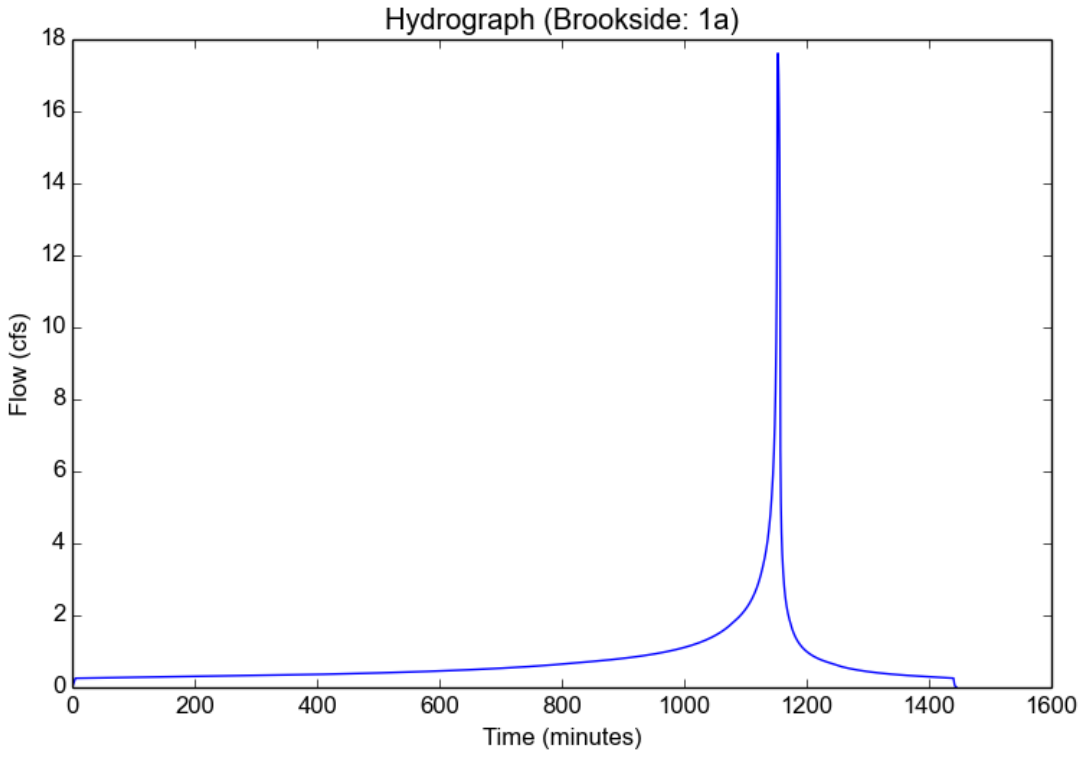
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/10-in Storm/Brookside - 1a.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1a
Area (ac)	3.28
Flow Path Length (ft)	866.7
Flow Path Slope (vft/hft)	0.04038
85th Percentile Rainfall Depth (in)	10.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	10.0
Peak Intensity (in/hr)	5.9663
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	17.6124
Burned Peak Flow Rate (cfs)	17.6124
24-Hr Clear Runoff Volume (ac-ft)	1.5174
24-Hr Clear Runoff Volume (cu-ft)	66095.9904



Peak Flow Hydrologic Analysis

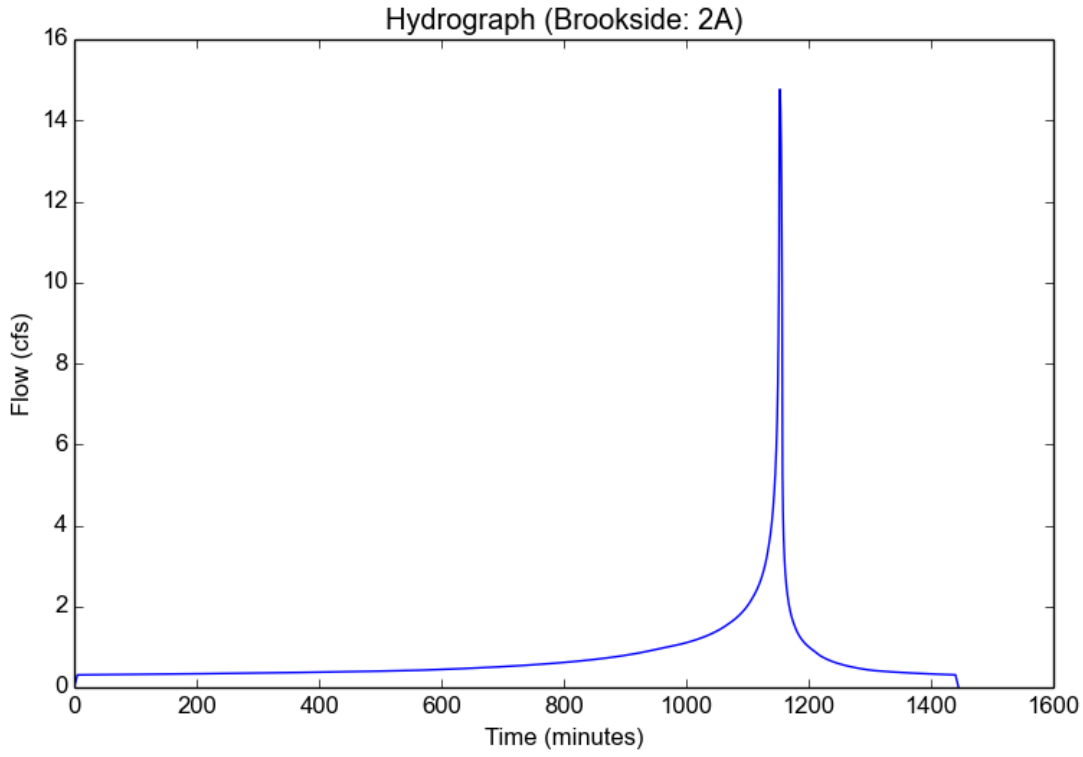
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/10-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	2.75
Flow Path Length (ft)	652.4
Flow Path Slope (vft/hft)	0.04599
85th Percentile Rainfall Depth (in)	10.0
Percent Impervious	0.509
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	10.0
Peak Intensity (in/hr)	5.9663
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	14.7665
Burned Peak Flow Rate (cfs)	14.7665
24-Hr Clear Runoff Volume (ac-ft)	1.4643
24-Hr Clear Runoff Volume (cu-ft)	63784.5605



Peak Flow Hydrologic Analysis

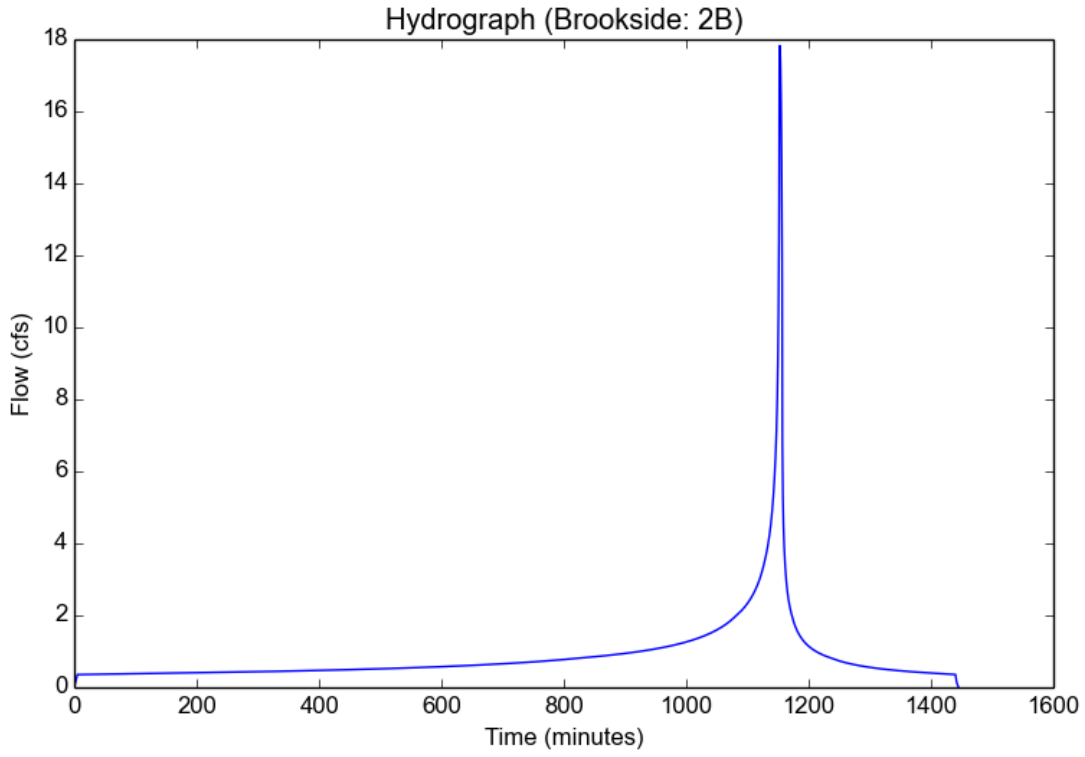
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/10-in Storm/Brookside - 2B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2B
Area (ac)	3.32
Flow Path Length (ft)	861.6
Flow Path Slope (vft/hft)	0.03714
85th Percentile Rainfall Depth (in)	10.0
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	10.0
Peak Intensity (in/hr)	5.9663
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	17.8272
Burned Peak Flow Rate (cfs)	17.8272
24-Hr Clear Runoff Volume (ac-ft)	1.7622
24-Hr Clear Runoff Volume (cu-ft)	76760.462



Peak Flow Hydrologic Analysis

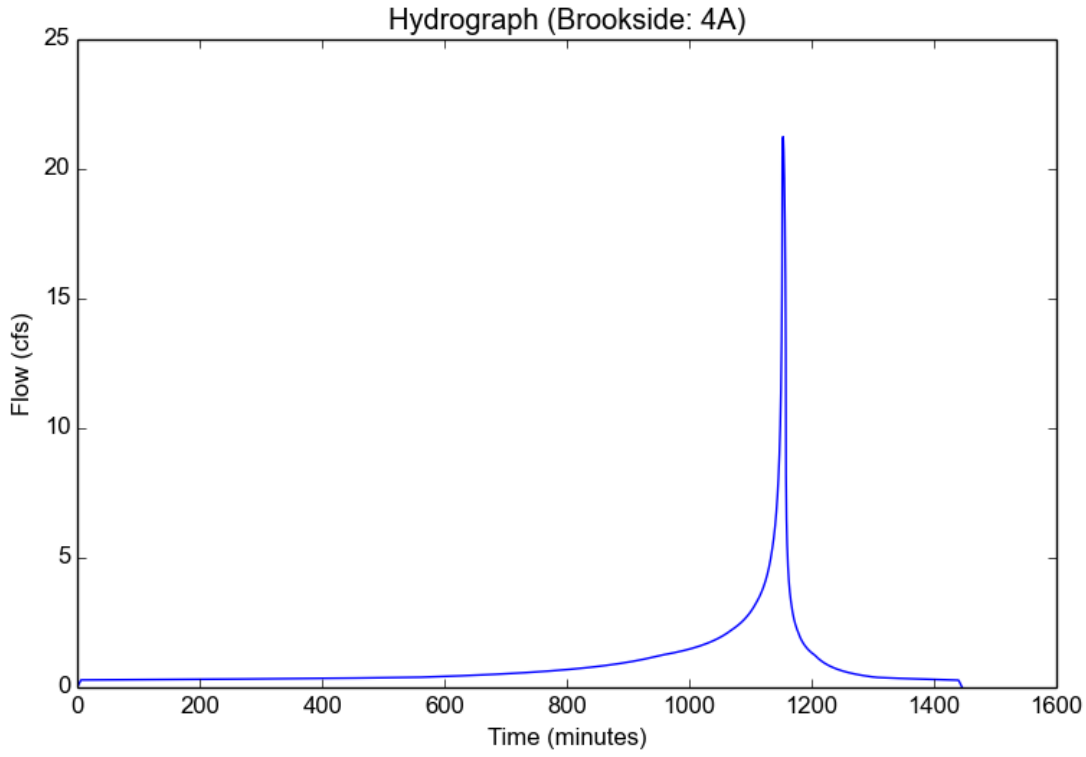
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/10-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	4.31
Flow Path Length (ft)	796.6
Flow Path Slope (vft/hft)	0.0113
85th Percentile Rainfall Depth (in)	10.0
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	10.0
Peak Intensity (in/hr)	5.4763
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	21.2426
Burned Peak Flow Rate (cfs)	21.2426
24-Hr Clear Runoff Volume (ac-ft)	1.8148
24-Hr Clear Runoff Volume (cu-ft)	79054.2146



Peak Flow Hydrologic Analysis

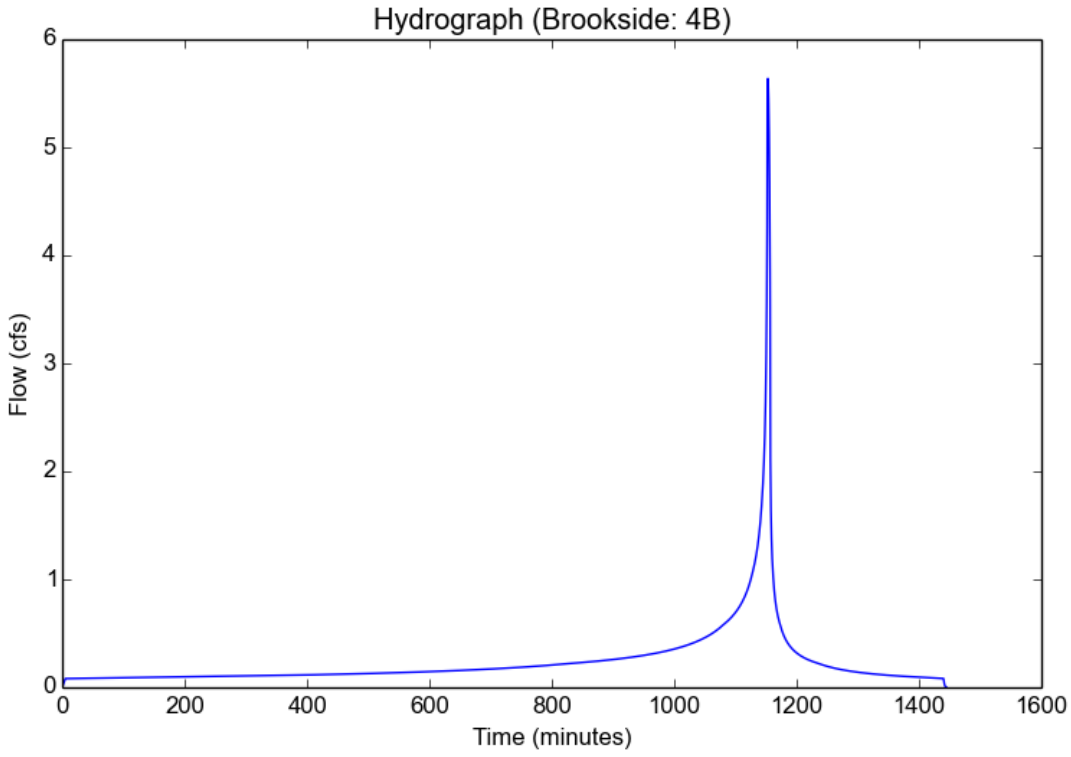
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/10-in Storm/Brookside - 4B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4B
Area (ac)	1.05
Flow Path Length (ft)	377.9
Flow Path Slope (vft/hft)	0.02646
85th Percentile Rainfall Depth (in)	10.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	10.0
Peak Intensity (in/hr)	5.9663
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	5.6381
Burned Peak Flow Rate (cfs)	5.6381
24-Hr Clear Runoff Volume (ac-ft)	0.4857
24-Hr Clear Runoff Volume (cu-ft)	21158.7774



Peak Flow Hydrologic Analysis

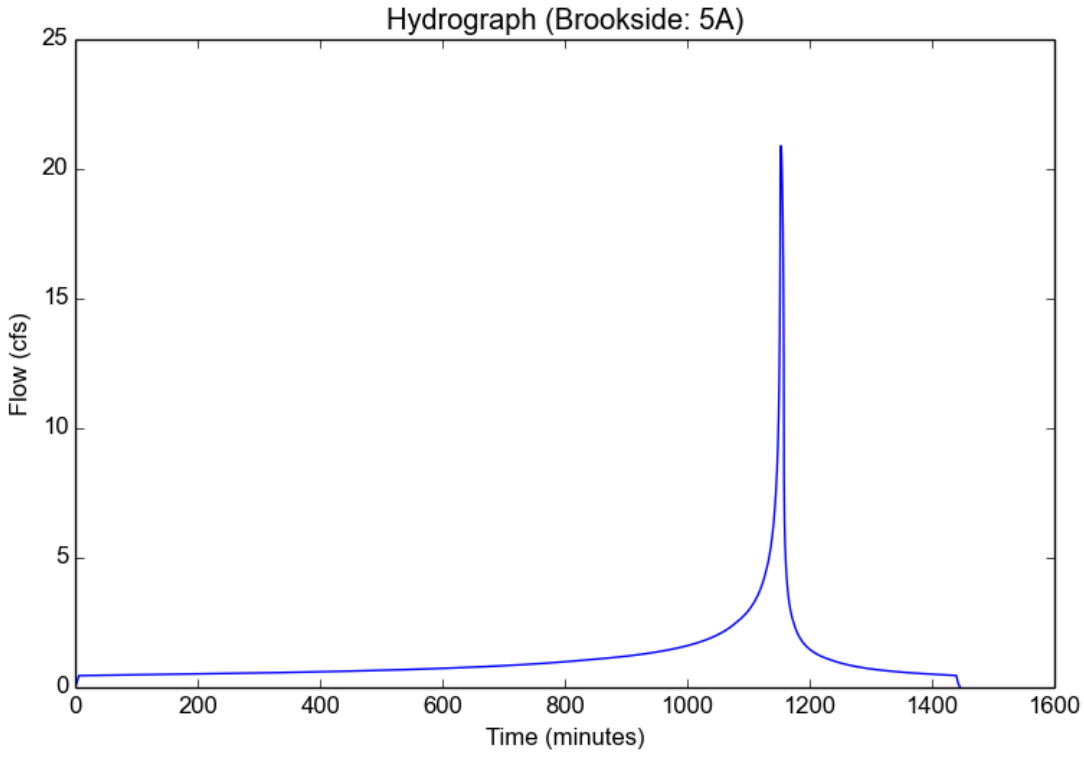
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/10-in Storm/Brookside - 5A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5A
Area (ac)	4.24
Flow Path Length (ft)	954.1
Flow Path Slope (vft/hft)	0.03354
85th Percentile Rainfall Depth (in)	10.0
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	10.0
Peak Intensity (in/hr)	5.4763
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	20.8976
Burned Peak Flow Rate (cfs)	20.8976
24-Hr Clear Runoff Volume (ac-ft)	2.2508
24-Hr Clear Runoff Volume (cu-ft)	98042.7751



Peak Flow Hydrologic Analysis

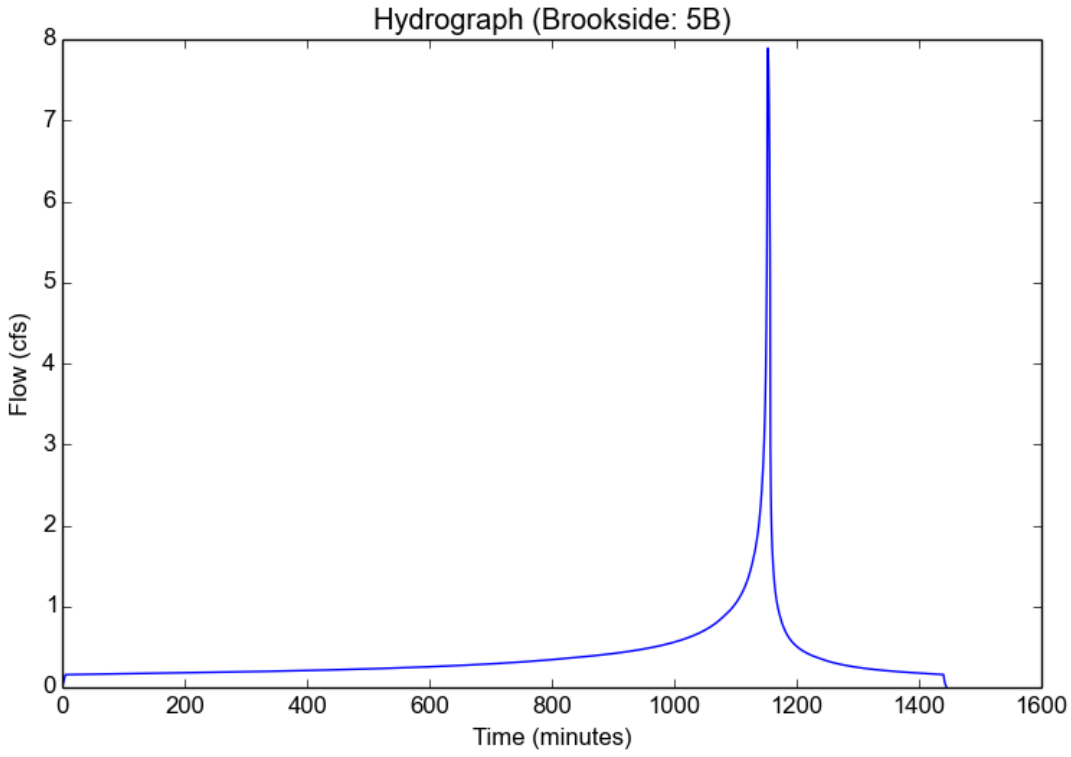
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/10-in Storm/Brookside - 5B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5B
Area (ac)	1.47
Flow Path Length (ft)	542.7
Flow Path Slope (vft/hft)	0.0129
85th Percentile Rainfall Depth (in)	10.0
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	10.0
Peak Intensity (in/hr)	5.9663
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	7.8934
Burned Peak Flow Rate (cfs)	7.8934
24-Hr Clear Runoff Volume (ac-ft)	0.7802
24-Hr Clear Runoff Volume (cu-ft)	33987.313



Peak Flow Hydrologic Analysis

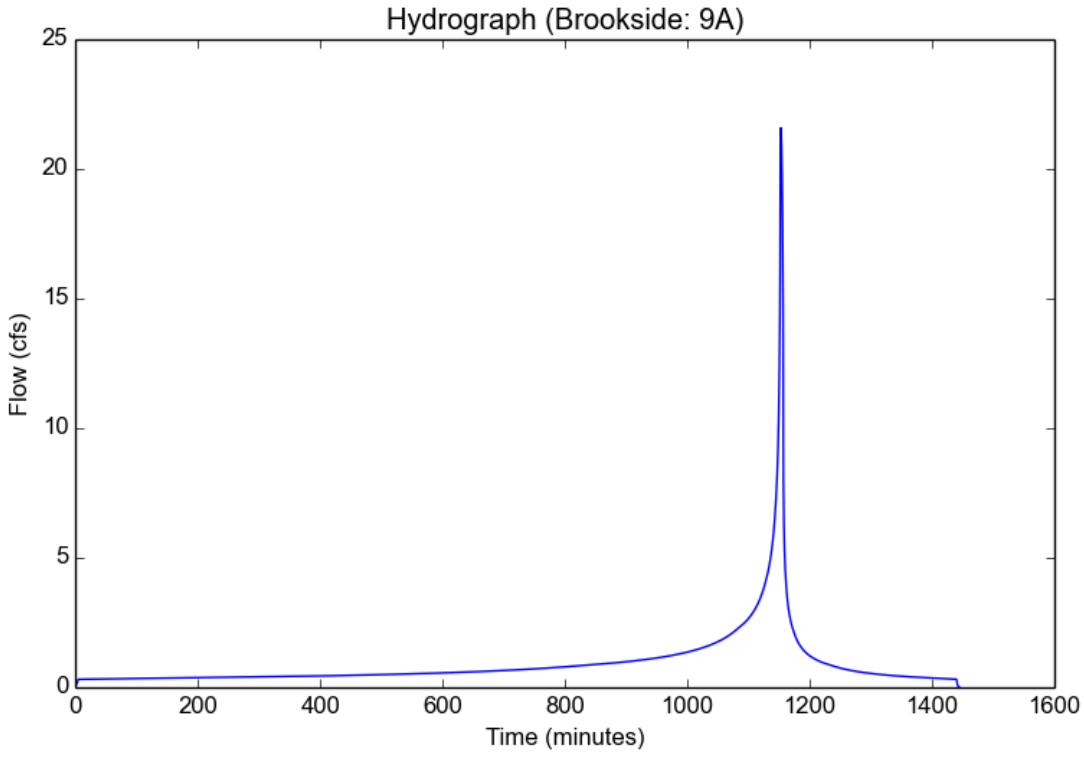
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/10-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	4.02
Flow Path Length (ft)	958.0
Flow Path Slope (vft/hft)	0.05323
85th Percentile Rainfall Depth (in)	10.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	10.0
Peak Intensity (in/hr)	5.9663
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	21.586
Burned Peak Flow Rate (cfs)	21.586
24-Hr Clear Runoff Volume (ac-ft)	1.8597
24-Hr Clear Runoff Volume (cu-ft)	81007.8907



Peak Flow Hydrologic Analysis

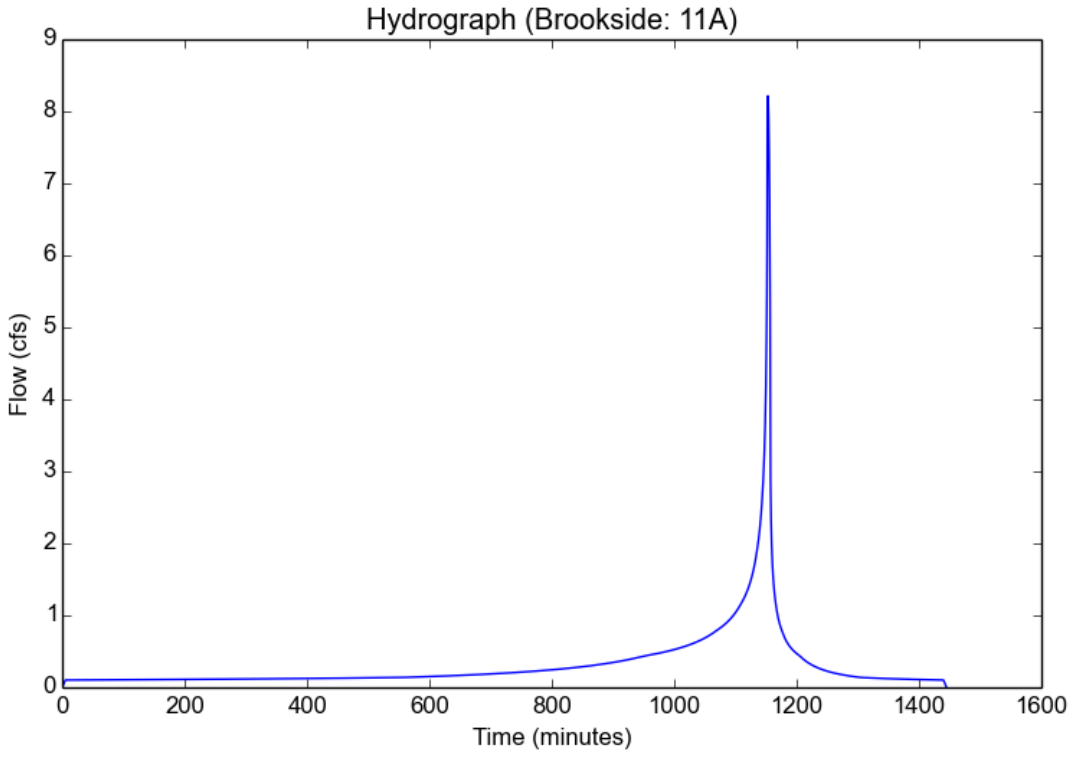
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/10-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	1.53
Flow Path Length (ft)	494.1
Flow Path Slope (vft/hft)	0.00607
85th Percentile Rainfall Depth (in)	10.0
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	10.0
Peak Intensity (in/hr)	5.9663
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	8.2156
Burned Peak Flow Rate (cfs)	8.2156
24-Hr Clear Runoff Volume (ac-ft)	0.6441
24-Hr Clear Runoff Volume (cu-ft)	28057.8523



Peak Flow Hydrologic Analysis

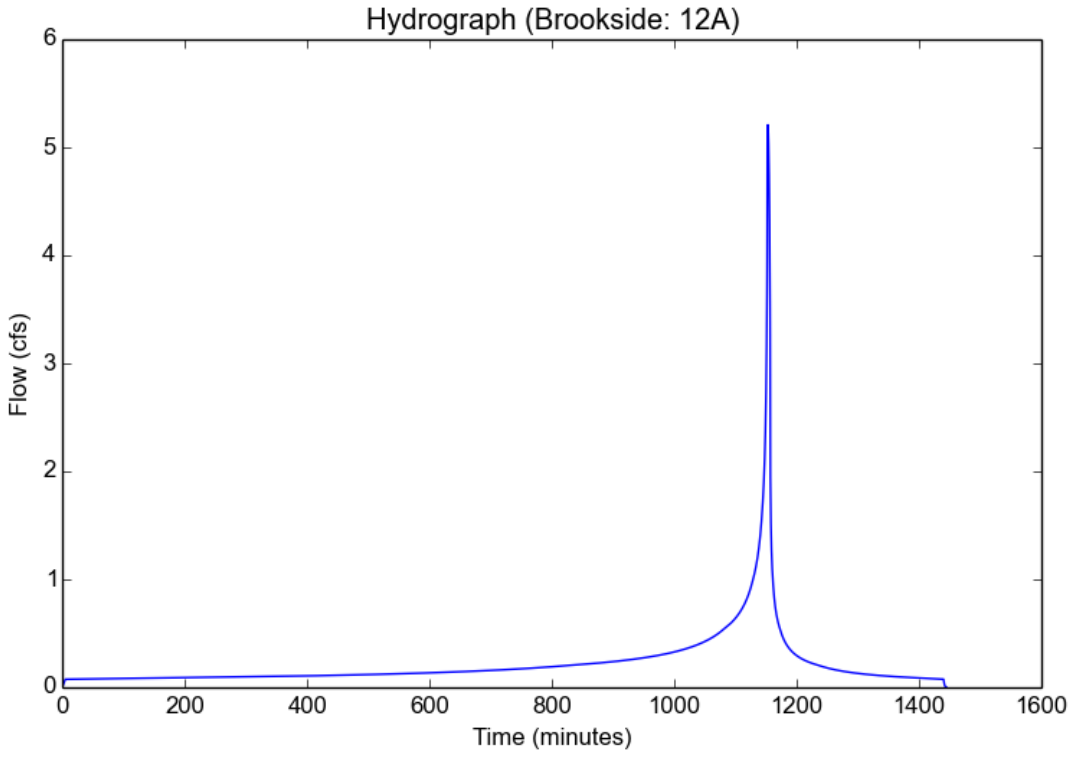
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/10-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.97
Flow Path Length (ft)	512.5
Flow Path Slope (vft/hft)	0.07414
85th Percentile Rainfall Depth (in)	10.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	10.0
Peak Intensity (in/hr)	5.9663
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	5.2086
Burned Peak Flow Rate (cfs)	5.2086
24-Hr Clear Runoff Volume (ac-ft)	0.4487
24-Hr Clear Runoff Volume (cu-ft)	19546.6801



Peak Flow Hydrologic Analysis

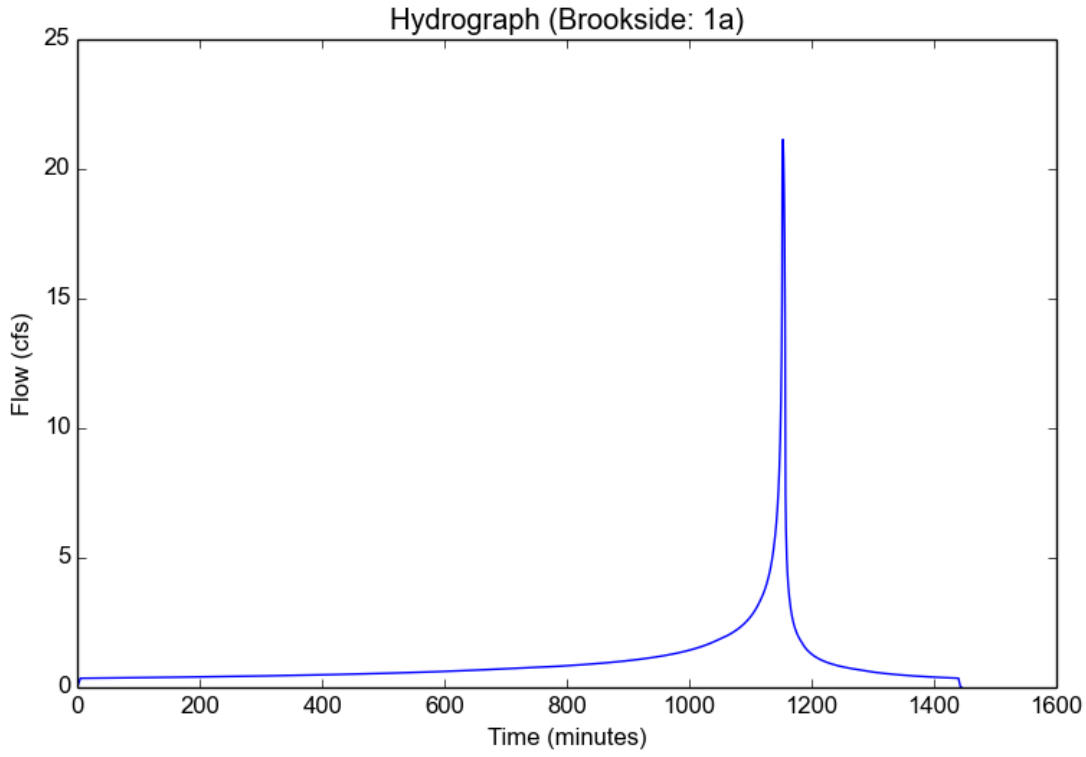
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/12-in Storm/Brookside - 1a.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1a
Area (ac)	3.28
Flow Path Length (ft)	866.7
Flow Path Slope (vft/hft)	0.04038
85th Percentile Rainfall Depth (in)	12.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	12.0
Peak Intensity (in/hr)	7.1595
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	21.1349
Burned Peak Flow Rate (cfs)	21.1349
24-Hr Clear Runoff Volume (ac-ft)	1.9533
24-Hr Clear Runoff Volume (cu-ft)	85087.6078



Peak Flow Hydrologic Analysis

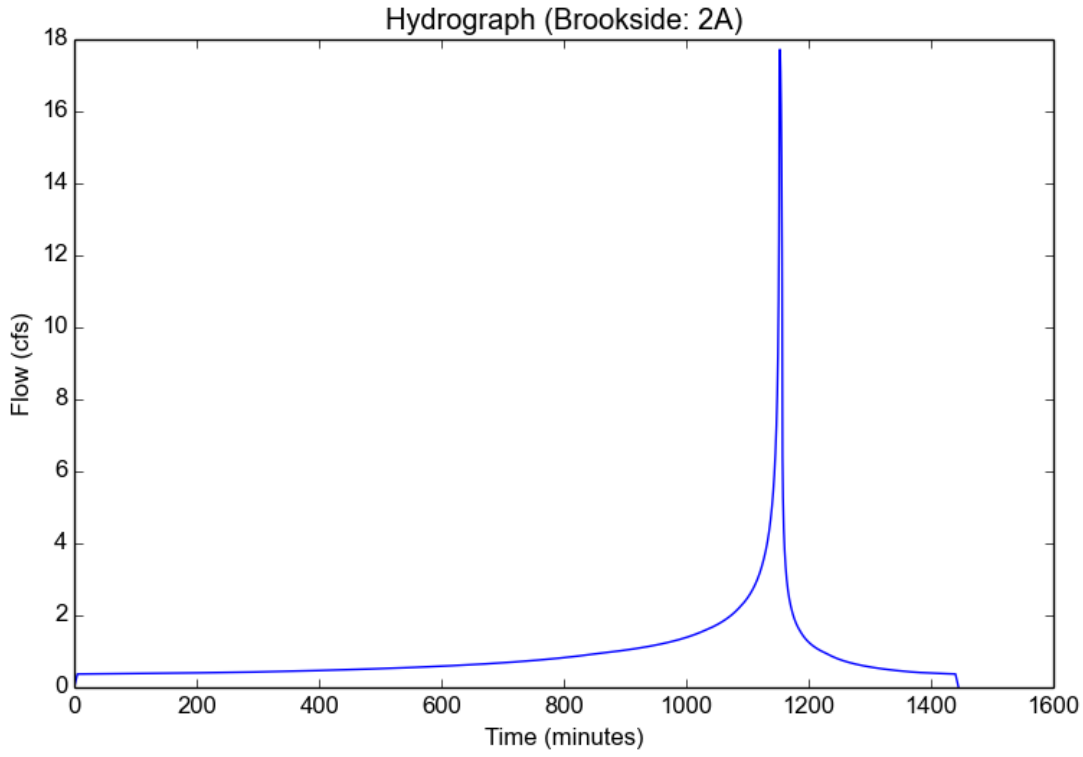
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/12-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	2.75
Flow Path Length (ft)	652.4
Flow Path Slope (vft/hft)	0.04599
85th Percentile Rainfall Depth (in)	12.0
Percent Impervious	0.509
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	12.0
Peak Intensity (in/hr)	7.1595
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	17.7198
Burned Peak Flow Rate (cfs)	17.7198
24-Hr Clear Runoff Volume (ac-ft)	1.8422
24-Hr Clear Runoff Volume (cu-ft)	80246.7394



Peak Flow Hydrologic Analysis

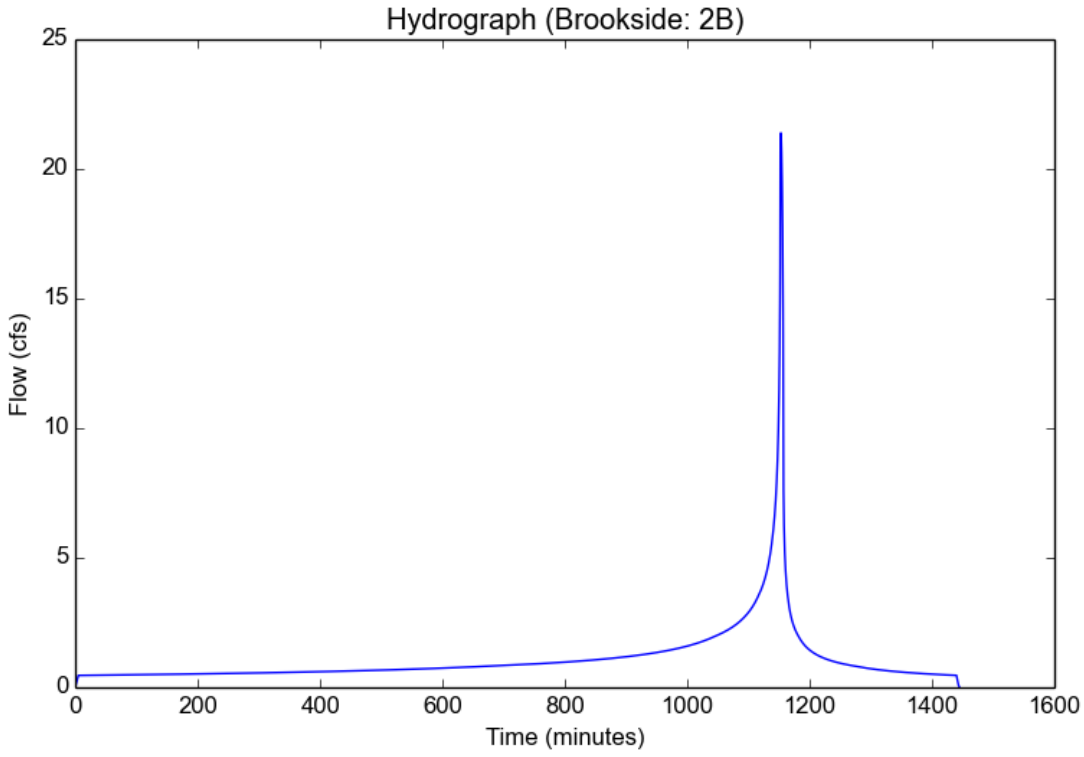
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/12-in Storm/Brookside - 2B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2B
Area (ac)	3.32
Flow Path Length (ft)	861.6
Flow Path Slope (vft/hft)	0.03714
85th Percentile Rainfall Depth (in)	12.0
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	12.0
Peak Intensity (in/hr)	7.1595
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	21.3927
Burned Peak Flow Rate (cfs)	21.3927
24-Hr Clear Runoff Volume (ac-ft)	2.2162
24-Hr Clear Runoff Volume (cu-ft)	96538.9291



Peak Flow Hydrologic Analysis

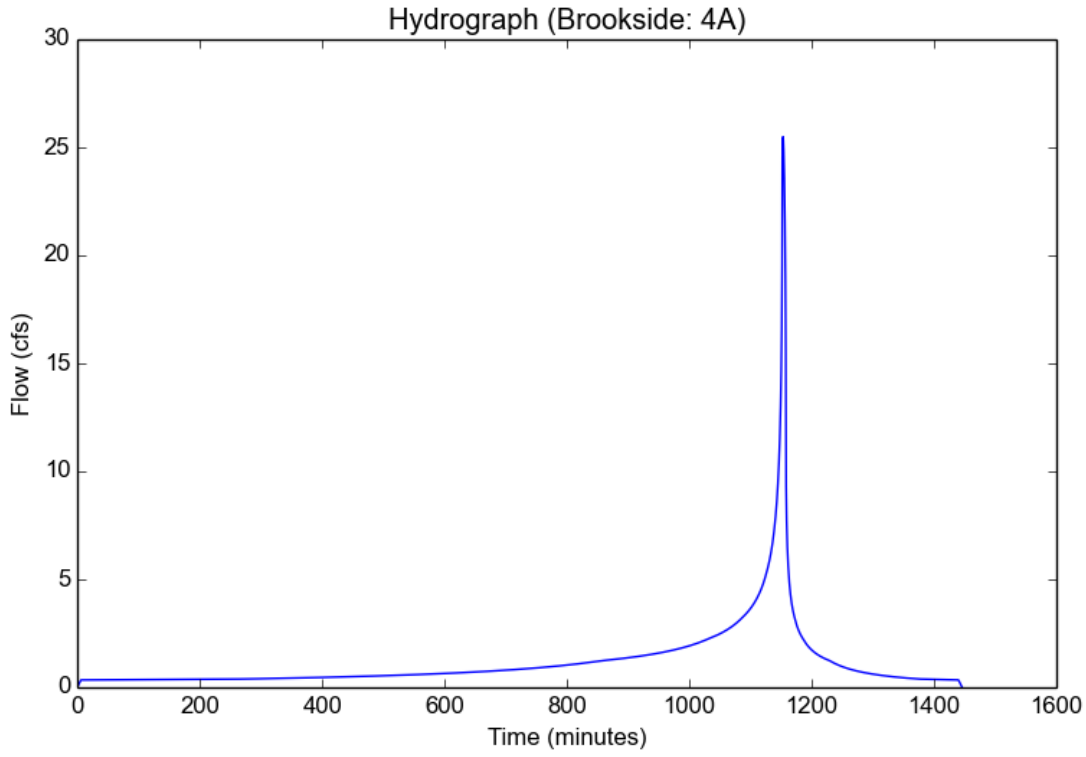
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/12-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	4.31
Flow Path Length (ft)	796.6
Flow Path Slope (vft/hft)	0.0113
85th Percentile Rainfall Depth (in)	12.0
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	12.0
Peak Intensity (in/hr)	6.5716
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	25.4911
Burned Peak Flow Rate (cfs)	25.4911
24-Hr Clear Runoff Volume (ac-ft)	2.3813
24-Hr Clear Runoff Volume (cu-ft)	103728.2895



Peak Flow Hydrologic Analysis

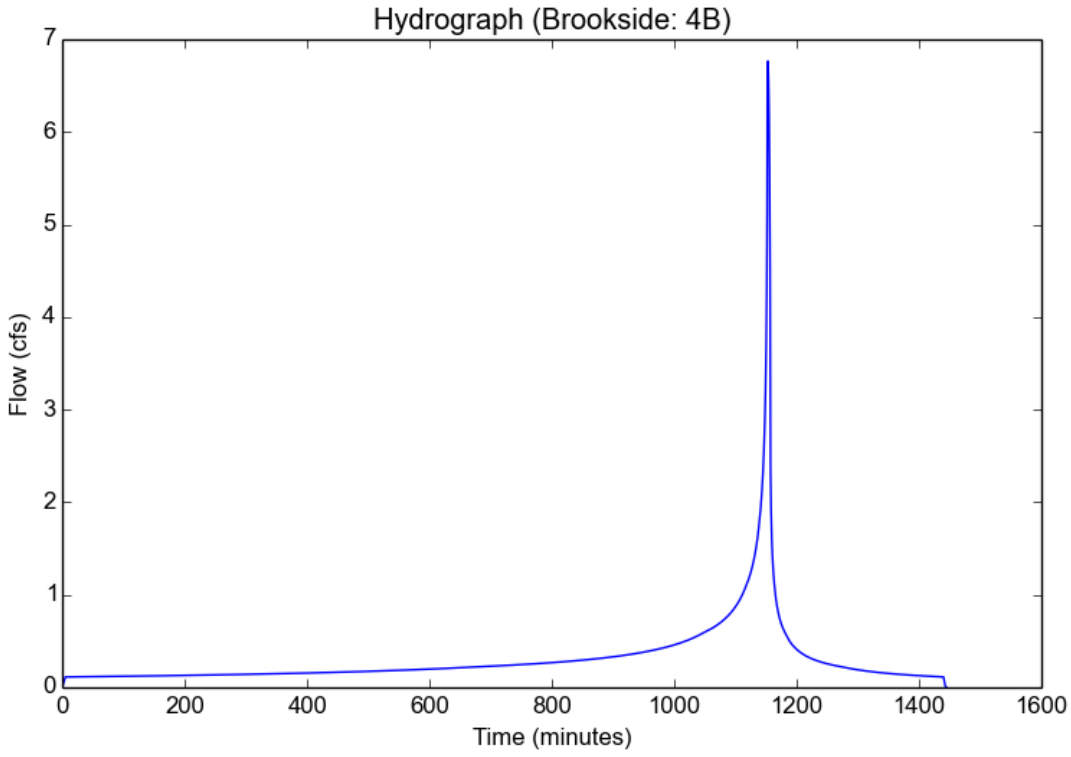
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/12-in Storm/Brookside - 4B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4B
Area (ac)	1.05
Flow Path Length (ft)	377.9
Flow Path Slope (vft/hft)	0.02646
85th Percentile Rainfall Depth (in)	12.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	12.0
Peak Intensity (in/hr)	7.1595
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	6.7658
Burned Peak Flow Rate (cfs)	6.7658
24-Hr Clear Runoff Volume (ac-ft)	0.6253
24-Hr Clear Runoff Volume (cu-ft)	27238.411



Peak Flow Hydrologic Analysis

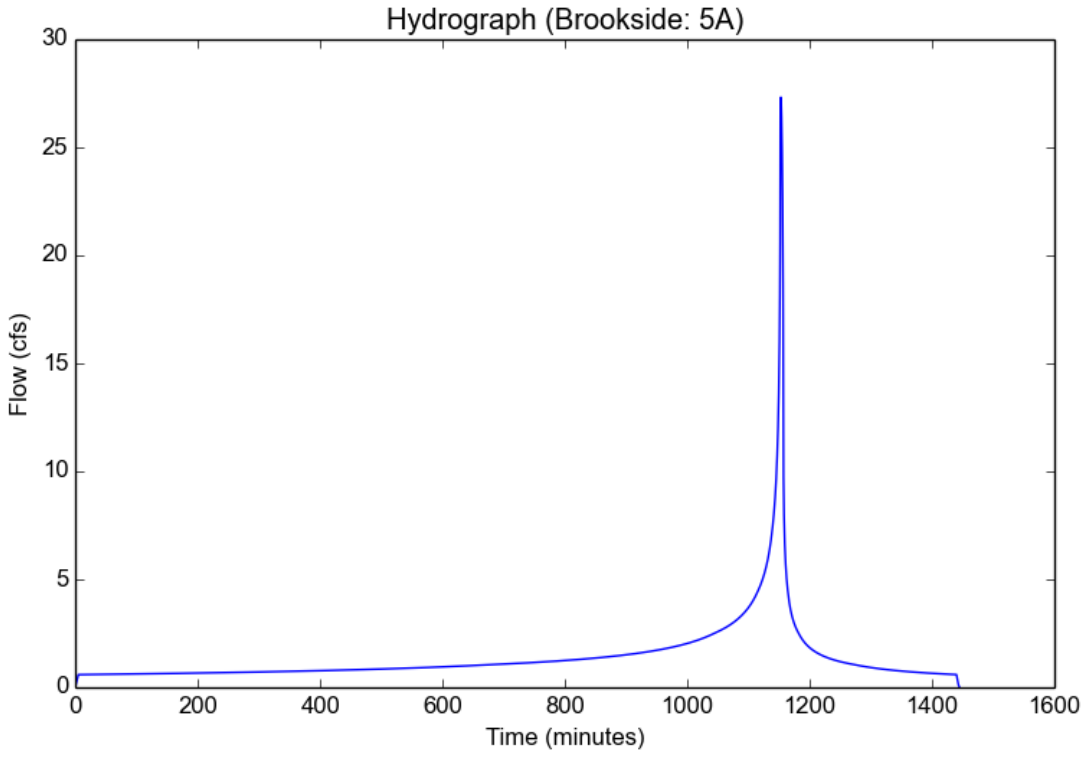
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/12-in Storm/Brookside - 5A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5A
Area (ac)	4.24
Flow Path Length (ft)	954.1
Flow Path Slope (vft/hft)	0.03354
85th Percentile Rainfall Depth (in)	12.0
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	12.0
Peak Intensity (in/hr)	7.1595
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	27.3208
Burned Peak Flow Rate (cfs)	27.3208
24-Hr Clear Runoff Volume (ac-ft)	2.8304
24-Hr Clear Runoff Volume (cu-ft)	123290.6806



Peak Flow Hydrologic Analysis

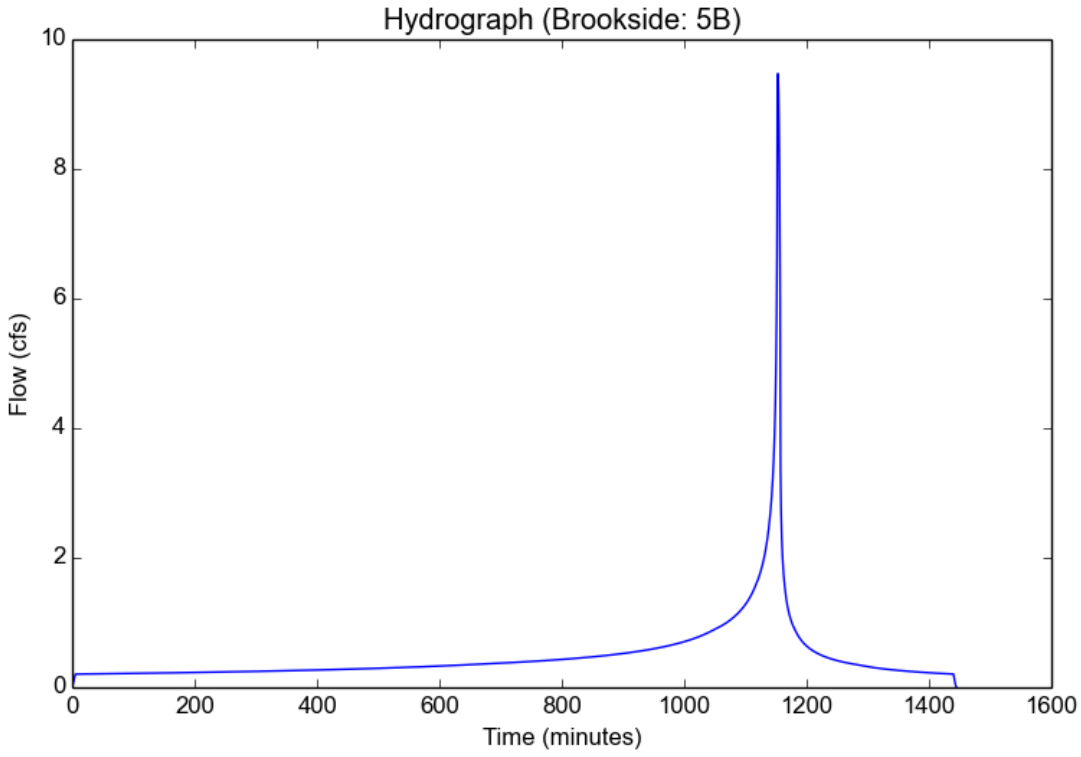
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/12-in Storm/Brookside - 5B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5B
Area (ac)	1.47
Flow Path Length (ft)	542.7
Flow Path Slope (vft/hft)	0.0129
85th Percentile Rainfall Depth (in)	12.0
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	12.0
Peak Intensity (in/hr)	7.1595
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	9.4721
Burned Peak Flow Rate (cfs)	9.4721
24-Hr Clear Runoff Volume (ac-ft)	0.9813
24-Hr Clear Runoff Volume (cu-ft)	42744.6463



Peak Flow Hydrologic Analysis

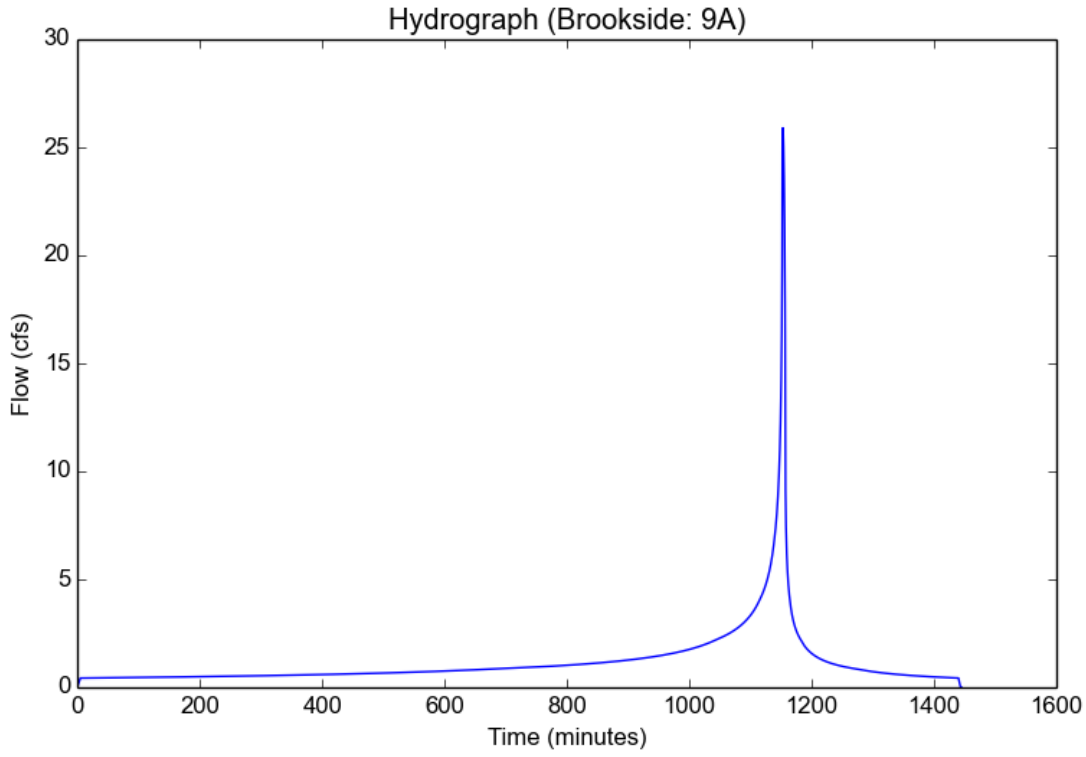
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/12-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	4.02
Flow Path Length (ft)	958.0
Flow Path Slope (vft/hft)	0.05323
85th Percentile Rainfall Depth (in)	12.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	12.0
Peak Intensity (in/hr)	7.1595
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	25.9032
Burned Peak Flow Rate (cfs)	25.9032
24-Hr Clear Runoff Volume (ac-ft)	2.394
24-Hr Clear Runoff Volume (cu-ft)	104284.2022



Peak Flow Hydrologic Analysis

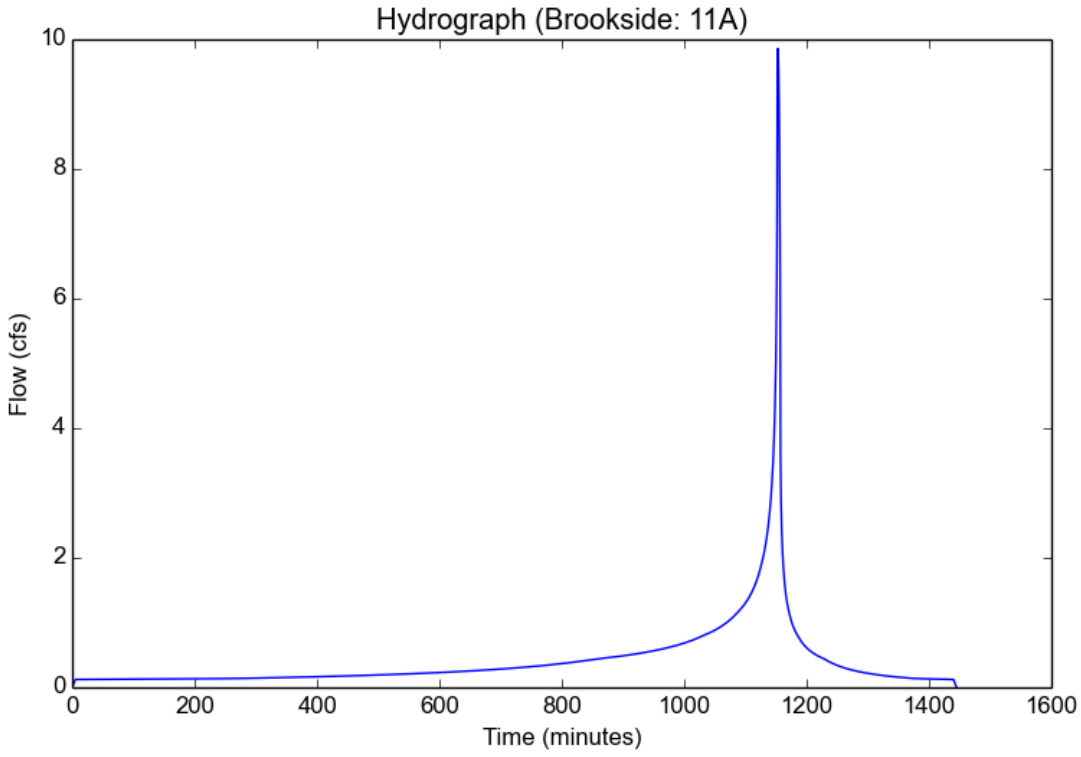
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/12-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	1.53
Flow Path Length (ft)	494.1
Flow Path Slope (vft/hft)	0.00607
85th Percentile Rainfall Depth (in)	12.0
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	12.0
Peak Intensity (in/hr)	7.1595
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	9.8587
Burned Peak Flow Rate (cfs)	9.8587
24-Hr Clear Runoff Volume (ac-ft)	0.8452
24-Hr Clear Runoff Volume (cu-ft)	36818.3164



Peak Flow Hydrologic Analysis

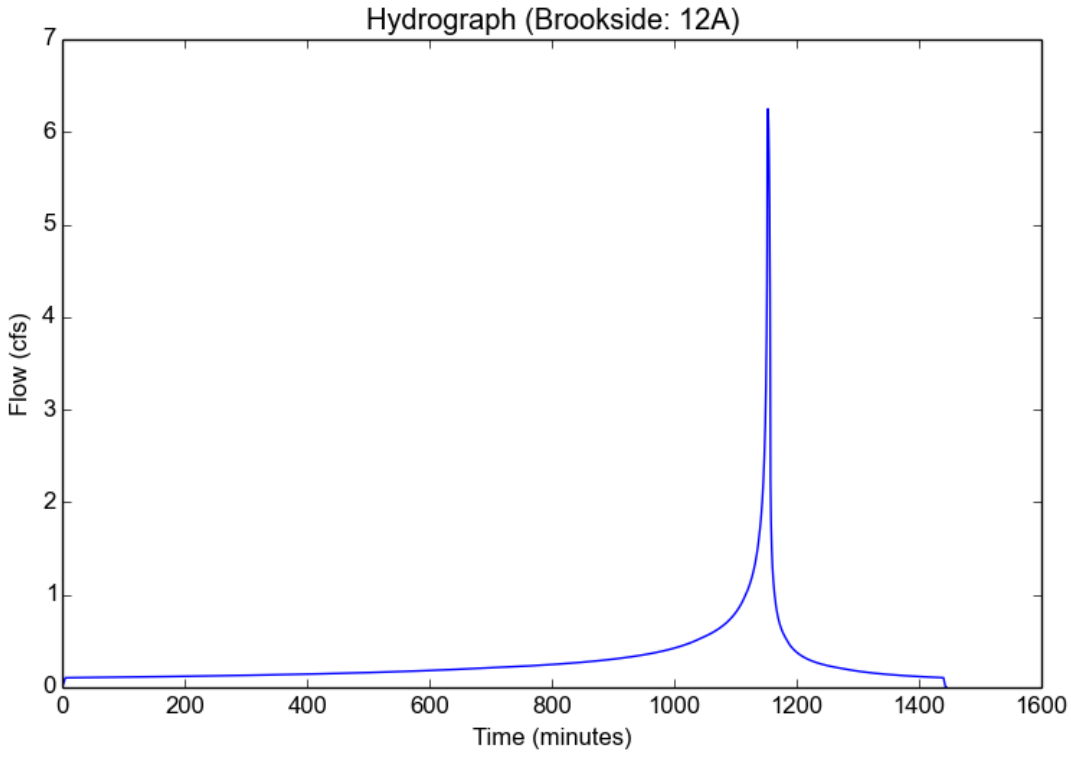
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/12-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	12A
Area (ac)	0.97
Flow Path Length (ft)	512.5
Flow Path Slope (vft/hft)	0.07414
85th Percentile Rainfall Depth (in)	12.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	12.0
Peak Intensity (in/hr)	7.1595
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	6.2503
Burned Peak Flow Rate (cfs)	6.2503
24-Hr Clear Runoff Volume (ac-ft)	0.5777
24-Hr Clear Runoff Volume (cu-ft)	25163.1035



Peak Flow Hydrologic Analysis

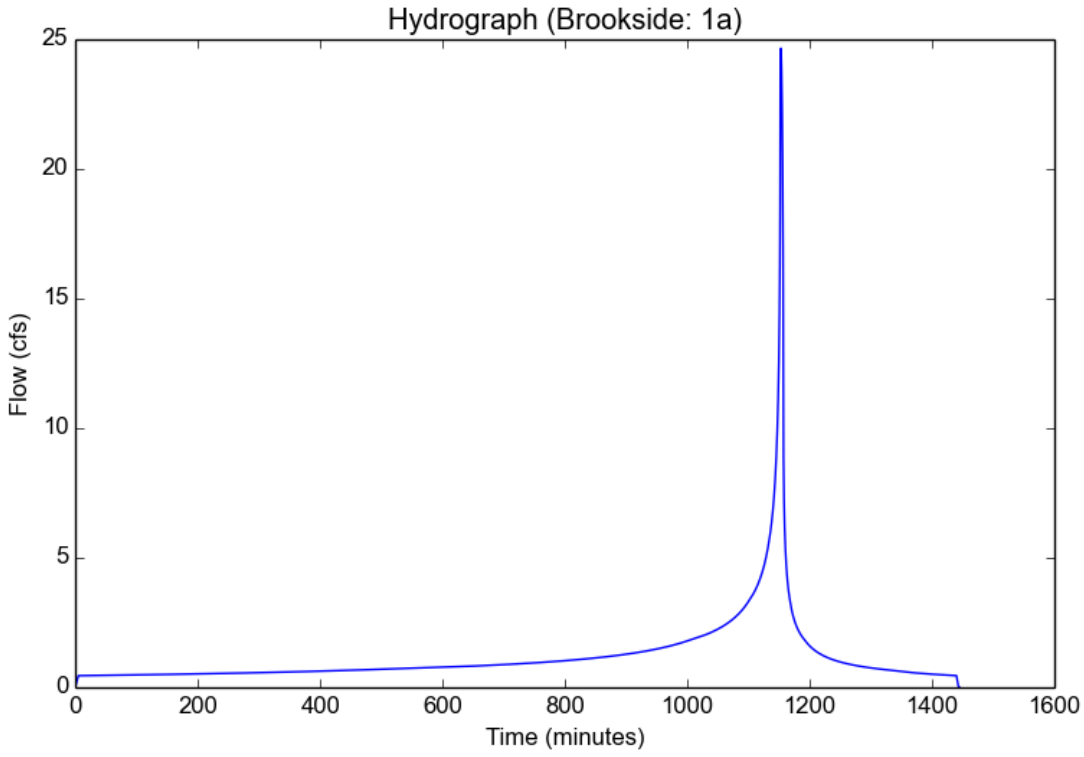
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/14-in Storm/Brookside - 1a.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	1a
Area (ac)	3.28
Flow Path Length (ft)	866.7
Flow Path Slope (vft/hft)	0.04038
85th Percentile Rainfall Depth (in)	14.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	14.0
Peak Intensity (in/hr)	8.3528
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	24.6574
Burned Peak Flow Rate (cfs)	24.6574
24-Hr Clear Runoff Volume (ac-ft)	2.4066
24-Hr Clear Runoff Volume (cu-ft)	104830.6197



Peak Flow Hydrologic Analysis

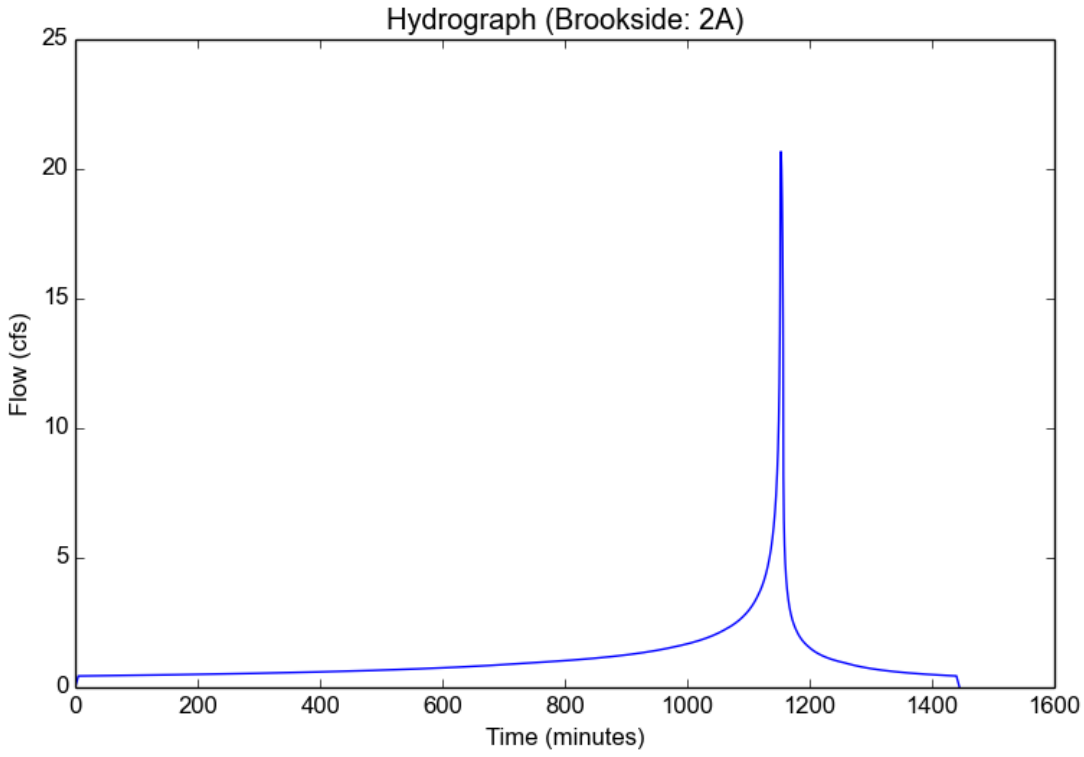
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/14-in Storm/Brookside - 2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2A
Area (ac)	2.75
Flow Path Length (ft)	652.4
Flow Path Slope (vft/hft)	0.04599
85th Percentile Rainfall Depth (in)	14.0
Percent Impervious	0.509
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	14.0
Peak Intensity (in/hr)	8.3528
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	20.6731
Burned Peak Flow Rate (cfs)	20.6731
24-Hr Clear Runoff Volume (ac-ft)	2.2503
24-Hr Clear Runoff Volume (cu-ft)	98021.3995



Peak Flow Hydrologic Analysis

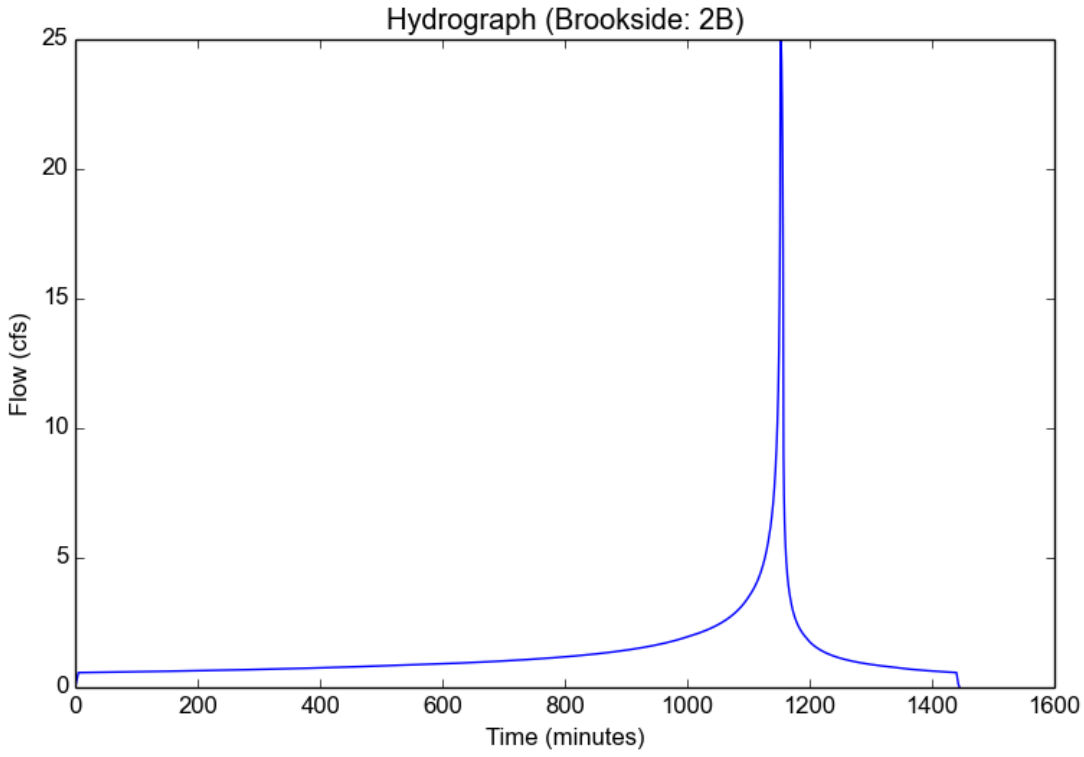
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/14-in Storm/Brookside - 2B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	2B
Area (ac)	3.32
Flow Path Length (ft)	861.6
Flow Path Slope (vft/hft)	0.03714
85th Percentile Rainfall Depth (in)	14.0
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	14.0
Peak Intensity (in/hr)	8.3528
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	24.9581
Burned Peak Flow Rate (cfs)	24.9581
24-Hr Clear Runoff Volume (ac-ft)	2.6835
24-Hr Clear Runoff Volume (cu-ft)	116893.5765



Peak Flow Hydrologic Analysis

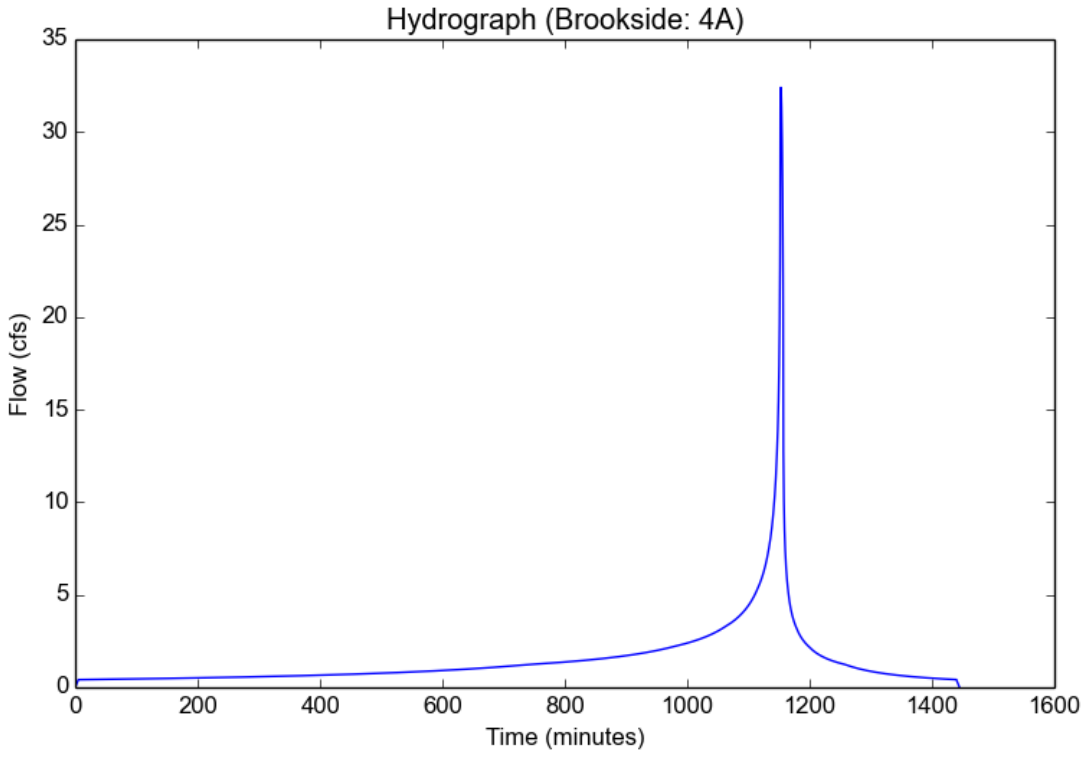
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/14-in Storm/Brookside - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4A
Area (ac)	4.31
Flow Path Length (ft)	796.6
Flow Path Slope (vft/hft)	0.0113
85th Percentile Rainfall Depth (in)	14.0
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	14.0
Peak Intensity (in/hr)	8.3528
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	32.4005
Burned Peak Flow Rate (cfs)	32.4005
24-Hr Clear Runoff Volume (ac-ft)	3.0197
24-Hr Clear Runoff Volume (cu-ft)	131537.2084



Peak Flow Hydrologic Analysis

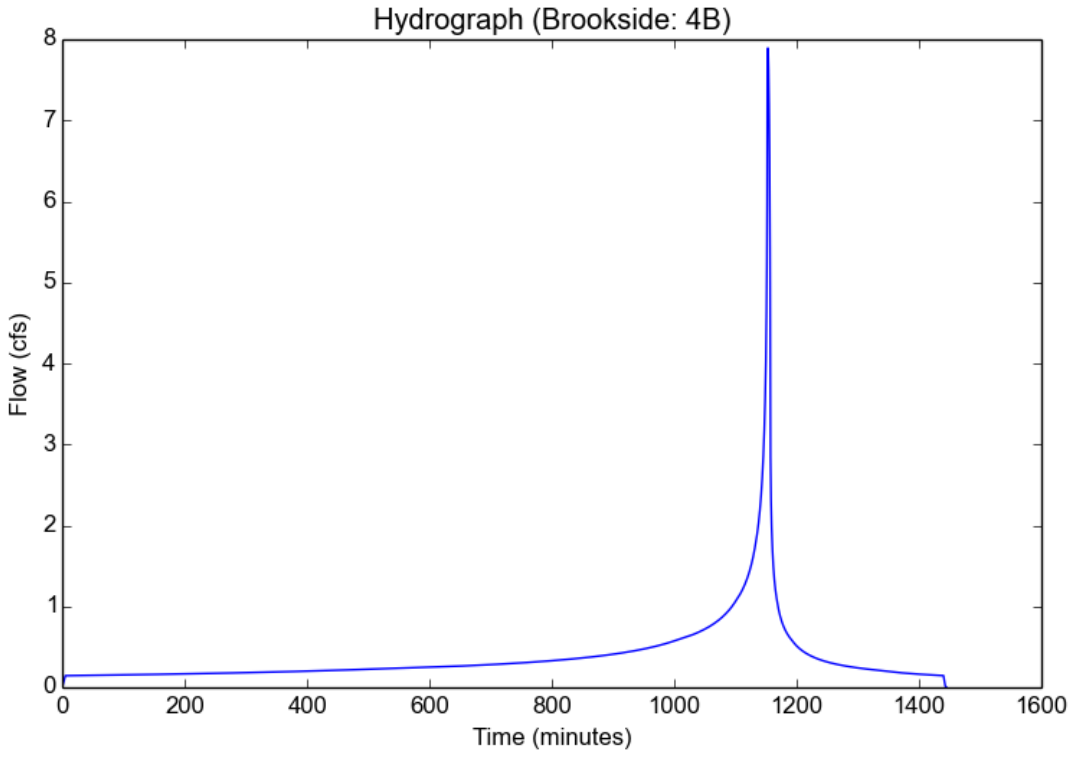
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/14-in Storm/Brookside - 4B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	4B
Area (ac)	1.05
Flow Path Length (ft)	377.9
Flow Path Slope (vft/hft)	0.02646
85th Percentile Rainfall Depth (in)	14.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	14.0
Peak Intensity (in/hr)	8.3528
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	7.8934
Burned Peak Flow Rate (cfs)	7.8934
24-Hr Clear Runoff Volume (ac-ft)	0.7704
24-Hr Clear Runoff Volume (cu-ft)	33558.5825



Peak Flow Hydrologic Analysis

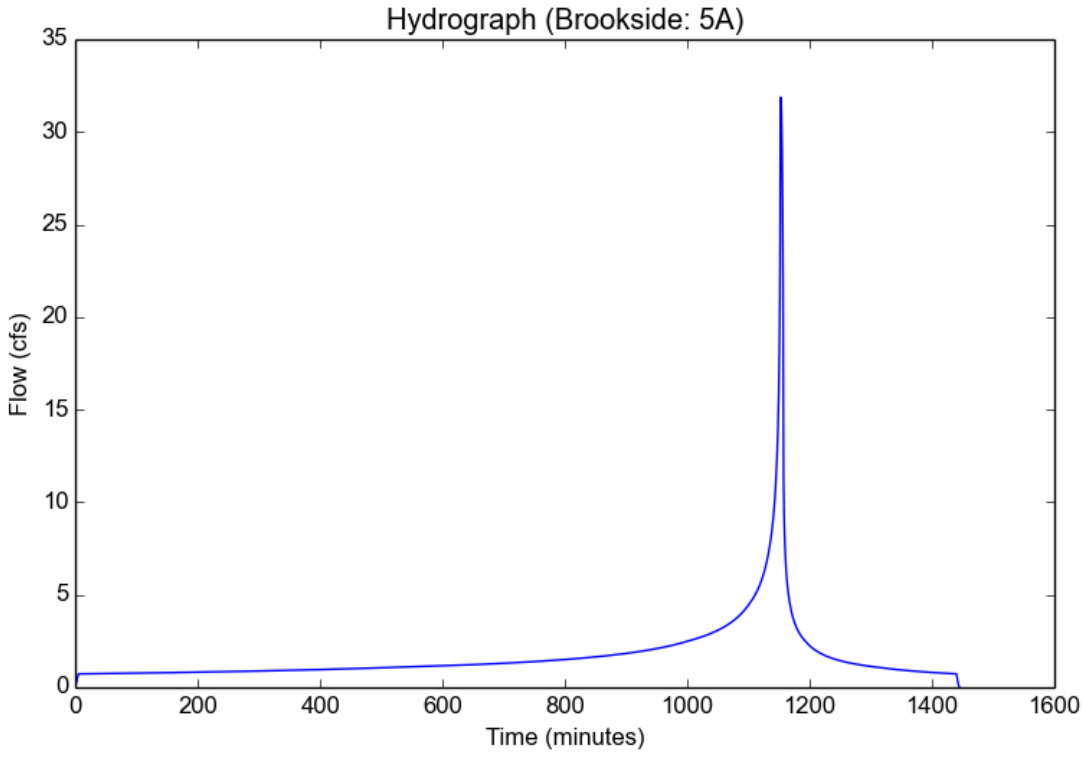
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/14-in Storm/Brookside - 5A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5A
Area (ac)	4.24
Flow Path Length (ft)	954.1
Flow Path Slope (vft/hft)	0.03354
85th Percentile Rainfall Depth (in)	14.0
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	14.0
Peak Intensity (in/hr)	8.3528
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	31.8742
Burned Peak Flow Rate (cfs)	31.8742
24-Hr Clear Runoff Volume (ac-ft)	3.4271
24-Hr Clear Runoff Volume (cu-ft)	149285.7724



Peak Flow Hydrologic Analysis

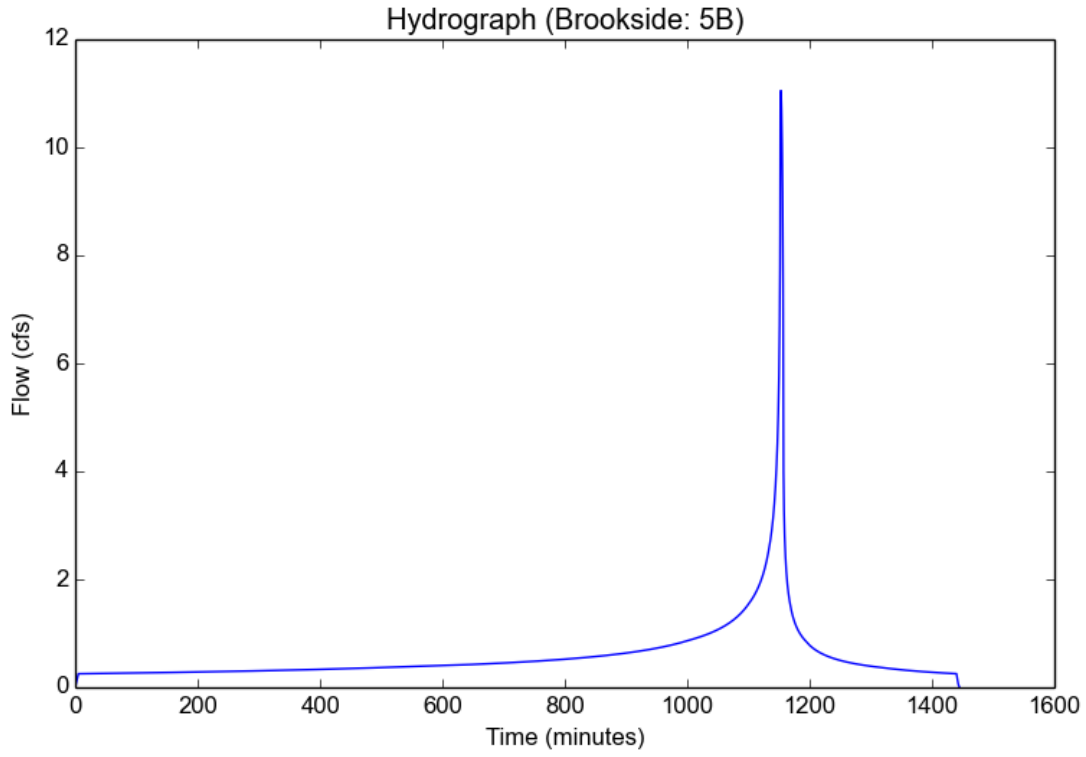
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/14-in Storm/Brookside - 5B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	5B
Area (ac)	1.47
Flow Path Length (ft)	542.7
Flow Path Slope (vft/hft)	0.0129
85th Percentile Rainfall Depth (in)	14.0
Percent Impervious	0.25
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	14.0
Peak Intensity (in/hr)	8.3528
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	11.0507
Burned Peak Flow Rate (cfs)	11.0507
24-Hr Clear Runoff Volume (ac-ft)	1.1882
24-Hr Clear Runoff Volume (cu-ft)	51757.0956



Peak Flow Hydrologic Analysis

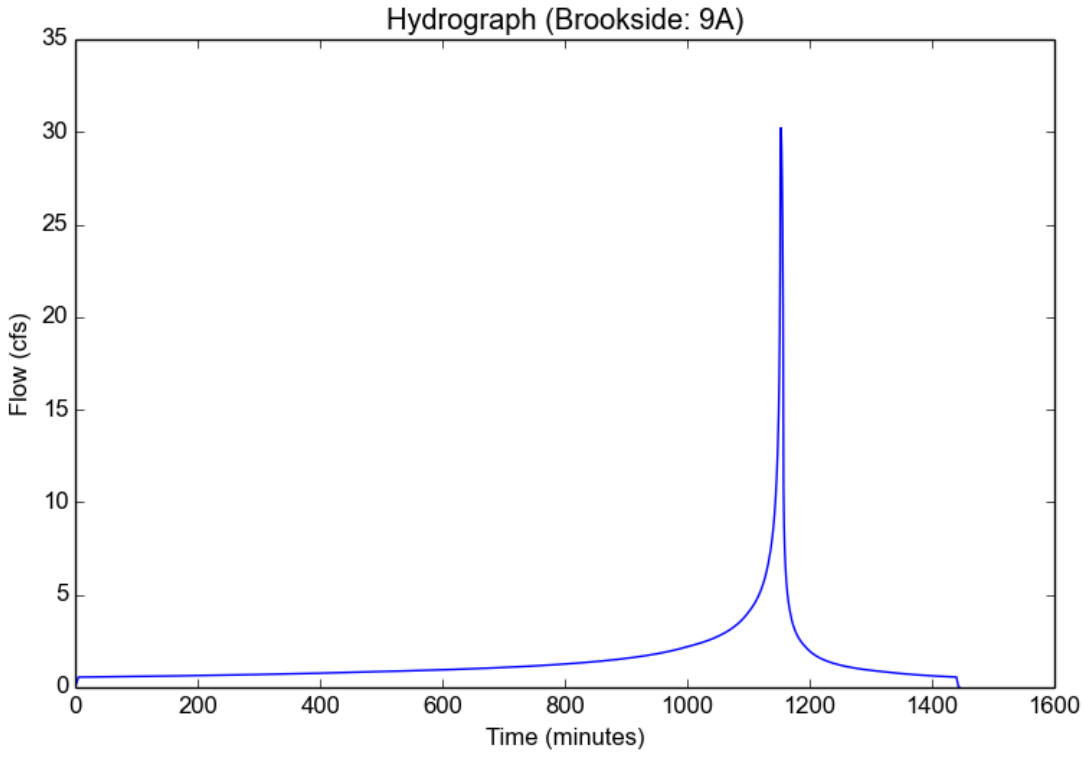
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/14-in Storm/Brookside - 9A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	9A
Area (ac)	4.02
Flow Path Length (ft)	958.0
Flow Path Slope (vft/hft)	0.05323
85th Percentile Rainfall Depth (in)	14.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	14.0
Peak Intensity (in/hr)	8.3528
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	30.2204
Burned Peak Flow Rate (cfs)	30.2204
24-Hr Clear Runoff Volume (ac-ft)	2.9495
24-Hr Clear Runoff Volume (cu-ft)	128481.4302



Peak Flow Hydrologic Analysis

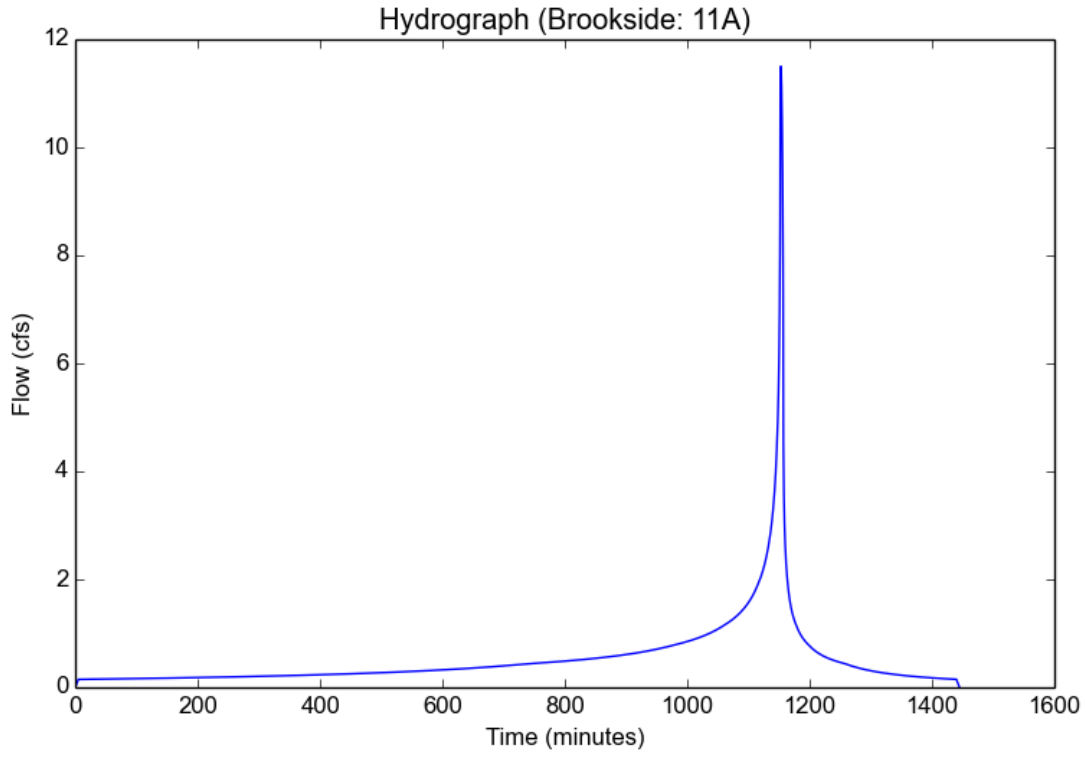
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/14-in Storm/Brookside - 11A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Brookside
Subarea ID	11A
Area (ac)	1.53
Flow Path Length (ft)	494.1
Flow Path Slope (vft/hft)	0.00607
85th Percentile Rainfall Depth (in)	14.0
Percent Impervious	0.25
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	14.0
Peak Intensity (in/hr)	8.3528
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	11.5018
Burned Peak Flow Rate (cfs)	11.5018
24-Hr Clear Runoff Volume (ac-ft)	1.072
24-Hr Clear Runoff Volume (cu-ft)	46694.183



Peak Flow Hydrologic Analysis

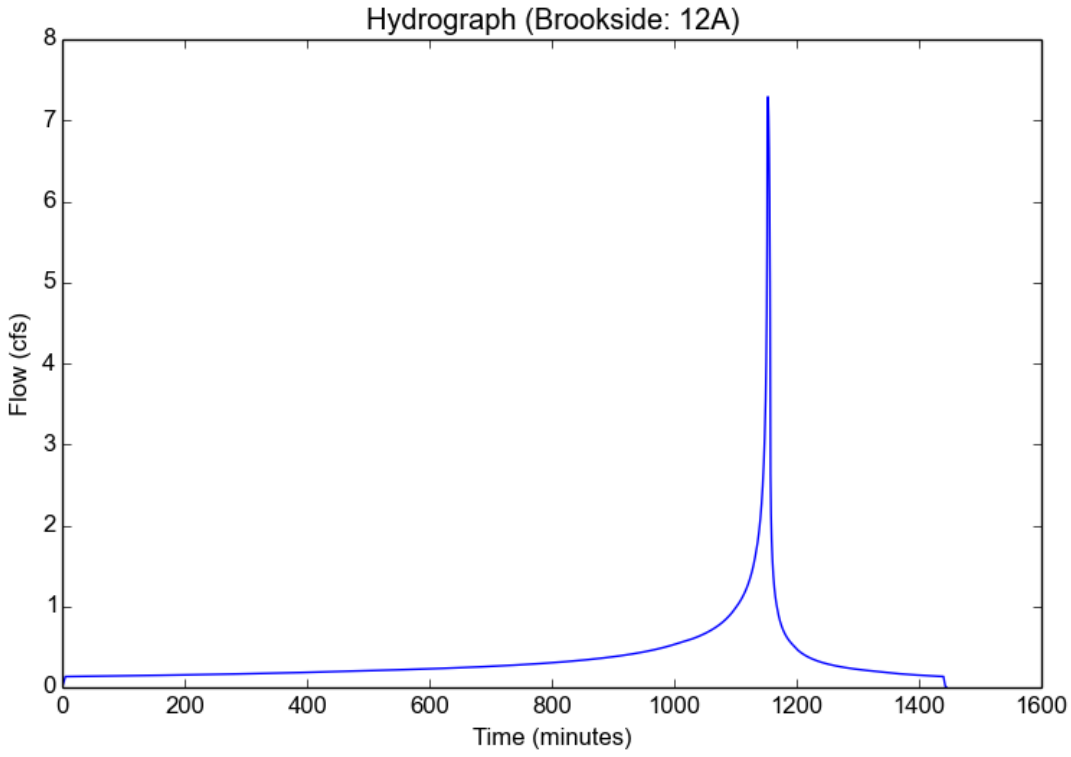
File location: P:/B852/Engineering/Calcs and Docs/Water Quality Calcs/WQ HydroCalc Analysis/PR/14-in Storm/Brookside - 12A.pdf
Version: HydroCalc 1.0.3

Input Parameters

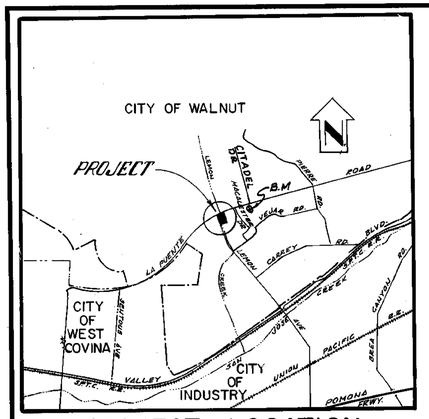
Project Name	Brookside
Subarea ID	12A
Area (ac)	0.97
Flow Path Length (ft)	512.5
Flow Path Slope (vft/hft)	0.07414
85th Percentile Rainfall Depth (in)	14.0
Percent Impervious	0.01
Soil Type	2
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	14.0
Peak Intensity (in/hr)	8.3528
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	7.292
Burned Peak Flow Rate (cfs)	7.292
24-Hr Clear Runoff Volume (ac-ft)	0.7117
24-Hr Clear Runoff Volume (cu-ft)	31001.7381



APPENDIX B - AS-BUILT PLANS



PROJECT LOCATION

STRUCTURAL NOTES.

GENERAL.

1. DIMENSIONS FROM FACE OF CONCRETE TO STEEL ARE TO CENTER OF BAR AND SHALL BE TWO INCHES UNLESS OTHERWISE SHOWN.
2. CONCRETE DIMENSIONS SHALL BE MEASURED HORIZONTALLY OR VERTICALLY ON THE PROFILE, AND PARALLEL TO OR AT RIGHT ANGLES (OR RADIALLY) TO CENTERLINE OF CONDUIT ON THE PLAN EXCEPT AS OTHERWISE SHOWN.
3. ALL BAR BENDS AND HOOK SHALL CONFORM TO THE AMERICAN CONCRETE INSTITUTE'S " BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE" SECTION 801.
4. PLACING OF REINFORCEMENT SHALL CONFORM TO THE AMERICAN CONCRETE INSTITUTE'S " BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE" SECTION 805.
5. TRANSVERSE CONSTRUCTION JOINTS SHALL NOT BE PLACED WITHIN 30 INCHES OF MANHOLE OR JUNCTION STRUCTURE OPENINGS.
6. TRANSVERSE CONSTRUCTION JOINTS IN WALLS AND SLABS SHALL BE IN THE SAME PLANE. NO STAGGERING OF JOINTS WILL BE PERMITTED. TRANSVERSE CONSTRACTION JOINTS SHALL BE NORMAL OR RADIAL TO THE CENTERLINE OF CONSTRUCTION.
7. THE TRANSVERSE REINFORCING STEEL SHALL TERMINATE ONE AND ONE-HALF INCHES FROM THE CONCRETE SURFACES UNLESS OTHERWISE SHOWN ON THE STRUCTURAL DETAILS.
8. EXPOSED EDGES OF CONCRETE MEMBERS SHALL BE ROUNDED OR BEVELED.
9. NO SPLICES IN TRANSVERSE STEEL REINFORCEMENT WILL BE PERMITTED OTHER THAN SHOWN ON THE DRAWING WITHOUT APPROVAL OF THE ENGINEER. NO MORE THAN TWO SPLICES WILL BE PERMITTED IN ANY LONGITUDINAL BAR BETWEEN TRANSVERSE JOINTS. SPLICES SHALL BE STAGGERED.
10. LONGITUDINAL AND TRANSVERSE STEEL SHALL BE LAPPED 30 BAR DIAMETERS AT SPLICES.
11. FIELD BENDING OF REINFORCING STEEL IS NOT PERMITTED.

CONSTRUCTION NOTES AND QUANTITY ESTIMATE.

(1)	CONSTRUCT DOUBLE 8'X7' REINFORCED CONCRETE BOX. SEE DETAILS PER SHT. NO 4.	771.49	L.F.
(2)	REMOVE EXIST. TRAP CHANNEL B=8', Z=1: H=7.5' AND CONSTRUCT R.C. TRANS. STRUCTURE PER SHT. NO.5	38.10	L.F.
(3)	CONSTRUCT MANHOLE NO.3 PER L.A. CO. F.C.D., NO.2 D 104	2	L.S.
(4)	CONSTRUCT FLOW EQUALIZING WINDOW PER L.A.CO. F.C.D, NO.2 D 205	2	L.S.
(5)	INSTALL PROTECTION BARRIER PER L.A. CO. F.C.D., NO.3 - D 261.1 THRU 261.3	1	L.S.
(6)	CONSTRUCT JUNCTION STRUCTURE NO. 5 PER L.A.CO. F.C.D., NO. 2-D191	1	L.S.
(7)	INSTALL 30" R.C.P. (1000-D) STUB & PLUG	8	L.F.
(8)	CONSTRUCT TRANSITION STRUCTURE(SEE DETAIL, SHEET 5 OR 6)	21.05	L.F.

BENCH MARK:
CG 3419 RDBM TAG 4' W/O BCR 32' S/O - 57' W/O & INT. LA PUENTE RD. AND CITADEL DR.

ELEV. 568.559. (COVINA 1975)

STORM DRAIN PLANS IN P.M.No. 14987 . No.

GENERAL NOTES (Cont'd)

24. A SOILS ENGINEER SHALL CERTIFY THAT ALL FILLS AND BACKFILLS OVER UNDERGROUND STORM DRAINS OUTSIDE OF ST. R/W HAVE BEEN COMPACTED OR CONSOLIDATED TO A 90% DENSITY. THIS CERTIFICATION SHALL BE SUBMITTED TO THE CITY ENGINEER PRIOR TO ACCEPTANCE OF THE WORK BY THE CITY.
25. THE CONTRACTOR'S ATTENTION IS DIRECTED TO SECTION 7-10. 4.1 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION IN REGARD TO SAFETY ORDERS. EVIDENCE OF COMPLIANCE AND A COPY OF PERMIT SHALL BE SUBMITTED TO CITY ENGINEER PRIOR TO ANY TRENCHING 5' OR DEEPER.
26. THE CONTRACTOR SHALL CONFORM TO THE "MINIMUM PUBLIC SAFETY REQUIREMENTS" AS SHOWN ON LOS ANGELES COUNTY ENGINEER STANDARD S-2.
27. ALL PIPE SHALL BE PLACED IN A TRENCH IN NATURAL GROUND AND/OR COMPACTED FILL THE GROUND LEVEL BEFORE THE TRENCHING SHALL BE AT LEAST 3 FEET ABOVE TOP OF PIPE ELEVATION, OR AT FINISH SURFACE ELEVATION, WHICHEVER IS LESS. ALL BACKFILL IN EASEMENTS SHALL BE COMPACTED TO THE DENSITY REQUIRED BY THE GRADING PLAN.
28. THE INSPECTOR MAY HAVE THE OPTION TO REQUIRE CONCRETE BACKFILL DURING CONSTRUCTION WHEN THE BOX OR PIPE HAS LESS THAN ONE FOOT OF COVER AND IS SUBJECTED TO HEAVY EQUIPMENT TRAFFIC. THE CONCRETE BACKFILL SHALL CONSIST OF 1:3:5 MIX CEMENT CONCRETE POURED FROM WALL TO WALL OF TRENCH AND FROM BOTTOM OF TRENCH TO A MINIMUM DEPTH OF 4 INCHES OVER TOP OF PIPE.

L.A. CO. FLOOD CONTROL STD. DWGS.

DWG. NO.	DETAIL DESCRIPTION
2-D 104	MANHOLE NO.3 (BOX OR ARCH)
2-D 191	JUNCTION STRUCTURE NO.3 (30"OR SMALLER SIDE INLET TO BOX)
2-D 205	WINDOW DETAILS FOR MULTIPLE BOX STRUCTURES.
2-D 261.1 TO .3	PROJECTION BARRIER
2-D 251	PROTECTION FOR SEWER CROSSING
2-D 260	TRANSITION STRUCTURE

BASIS OF BEARINGS:

THE BASIS OF BEARINGS FOR THESE PLANS IS THE CENTERLINE OF LA PUENTE ROAD BEING NORTH 18°08'40" EAST AS SHOWN ON TRACT NO. 30673, RECORDED IN BOOK 740, PAGES 96 TO 97, INCLUSIVE OF MAPS IN THE OFFICE OF THE COUNTY RECORDER OF THE COUNTY OF LOS ANGELES.

GENERAL NOTES:

1. ELEVATIONS ARE IN FEET ABOVE U.S.C. & G.S. MEAN SEA LEVEL DATUM OF 1929. ALL WORK SHALL BE IN ACCORDANCE WITH THE "STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION 1979 EDITION WITH 1980 & 1981 SUPLEMENTS AND SHALL BE PROSECUTED ONLY IN THE PRESENCE OF THE CITY ENGINEER.
2. APPROVAL OF THIS PLAN BY THE CITY OF *WALNUT* DOES NOT CONSTITUTE A REPRESENTATION AS TO THE ACCURACY OF THE LOCATION, OR THE EXISTENCE OR NON-EXISTENCE OF ANY UNDERGROUND UTILITY, PIPE OR STRUCTURE WITHIN THE LIMITS OF THIS PROJECT. THIS NOTE APPLIES TO ALL SHEETS.
3. THE CONTRATOR SHALL NOTIFY THE CONSTRUCTION SECTION OF THE CITY ENGR BY TELEPHONE, 595-2275 AT LEAST 48 HOURS BEFORE STARTING ANY WORK UNDER THIS CONTRACT.
4. ALL CONSTRUCTION JOINTS IN THE FOOTING OF SLABS AND WALLS SHALL BE IN THE SAME PLANE. NO STAGGERING OF JOINTS WILL BE PERMITTED.
5. NO CONCRETE SHALL BE PLACED UNTIL THE FORMS AND REINFORCING STEEL HAS BEEN PLACED, INSPECTED AND APPROVED.
6. TRANSVERSE REINFORCEMENT AND TRANSVERSE JOINTS SHALL BE PLACED AT RIGHT ANGLES (OR RADIAL) TO CONDUIT CENTERLINE EXCEPT AS OTHERWISE SHOWN ON THE DRAWINGS.
7. ALL CONCRETE SHALL BE PORTLAND CEMENT CONCRETE WITH AN ULTIMATE 28 DAYS COMPRESSIVE STRENGTH OF 4000 p.s.i. UNLESS OTHERWISE NOTED. *COMPRESSION TEST CYLINDERS ARE REQUIRED.*
8. ALL EXPOSED EDGES SHALL BE FINISHED WITH A 3/4" CHAMFER.
9. ALL STEEL ADJACENT TO FACE OF CONCRETE SHALL HAVE 2½" CLEARANCE UNLESS OTHERWISE SPECIFIED.
10. REINFORCEMENT SHALL BE DEFORMED BARS OF INTERMEDIATE GRADE STEEL AS PER A.S.T.M. A-615 GRADE 60.
11. ALL BAR BENDS AND HOOKS SHALL CONFORM TO THE AMERICAN CONCRETE INSTITUTE "MANUAL OF STANDARD PRACTICE".
12. DIMENSIONS FROM FACE OF CONCRETE TO STEEL ARE TO CENTERLINE OF STEEL UNLESS OTHERWISE NOTED.
13. ALL BACKFILLS AND FILLS TO BE USED AS SUBGRADE SHALL BE COMPACTED TO A RELATIVE DENSITY OF 90% UNLESS OTHERWISE SPECIFIED.
14. ALL STEEL THAT IS TO BE CONTINUOUS SHALL HAVE A MINIMUM LAP OF 30 BAR DIAMETERS OR 18", WHICHEVER IS GREATER.
15. ALL CATCH BASINS AND CONNECTOR PIPES BETWEEN CATCH BASINS TO BE INSPECTED BY THE CITY
16. PIPE SHALL BE EMBEDDED 8 INCHES INTO ALL STRUCTURES INCLUDING INLET & HEADWALLS, UNLESS OTHERWISE SPECIFIED.
17. WHERE PIPE IS TO BE PLACED IN FILL, THE FILL SHALL BE COMPACTED TO A MINIMUM DEPTH OF 3 FEET ABOVE THE TOP OF PIPE PRIOR TO TRENCHING.
18. ALL BACKFILL AND FILL AROUND CLOSED CONDUIT IN STREET RIGHTS OF WAY SHALL BE BROUGHT UP TO SUBGRADE OF THE ROAD OR TO 2 FEET ABOVE THE TOP OF THE CONDUIT, WHICHEVER IS LESS. THE CITY ENGINEER SHALL INSPECT ALL BACKFILL AND FILL ABOVE AFOREMENTIONED LIMITS.
19. ALL REINFORCED CONCRETE PIPE SHALL BE BEDDED IN ACCORDANCE WITH LOS ANGELES COUNTY ENGINEER CASE Ad BEDDING PER STANDARD DRAWING D-54, UNLESS OTHERWISE NOTED.
20. UNLESS OTHERWISE SHOWN, CONCRETE DIMENSIONS SHALL BE MEASURED VERTICALLY OR HORIZONTALLY AND PARALLEL OR AT RIGHT ANGLES (OR RADIAL) TO THE CENTER LINE OF CONSTRUCTION.
21. THIS STORM DRAIN WILL NOT BE ACCEPTED FOR MAINTENANCE UNTIL THE STREETS HAVE BEEN PAVED, MANHOLES BROUGHT TO GRADE, AND THE SYSTEM IS CLEANED TO THE SATISFACTION OF THE CITY ENGINEER.

PRIVATE ENGINEERS NOTICE TO CONTRACTORS

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A SEARCH OF THE AVAILABLE RECORDS. TO THE BEST OF OUR KNOWLEDGE THERE ARE NO EXISTING UTILITIES EXCEPT AS SHOWN ON THIS MAP.

THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITY LINES SHOWN AND ANY OTHER LINES NOT OF RECORD OR NOT SHOWN ON THIS DRAWING.

CONTRACTOR AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS; AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE OWNER AND THE ENGINEER HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE OWNER OR THE ENGINEER.

IF CONSTRUCTION OF IMPROVEMENTS SHOWN HEREON ARE NOT COMMENCED WITHIN 18 MONTHS OF APPROVAL DATE, THESE PLANS ARE SUBJECT TO REVIEW BY THE CITY.

NO.	REVISION	REVISED BY	APPROVED BY	DATE

APPROVED
CITY OF WALNUT

Ronald L. Kranzer
CITY ENGINEER - RON KRANZER
R.C.E. 18603 DATE 10-4-82

ANACAL ENGINEERING CO.
1900 E. LA PALMA AVE.
ANAHEIM, CALIF 92803-3668
PHONE: (714) 774-1763

DATE 8/31/82

SIGNATURE: Lamar H. Stewart R.C.E. NO. 29720
LAMAR H. STEWART

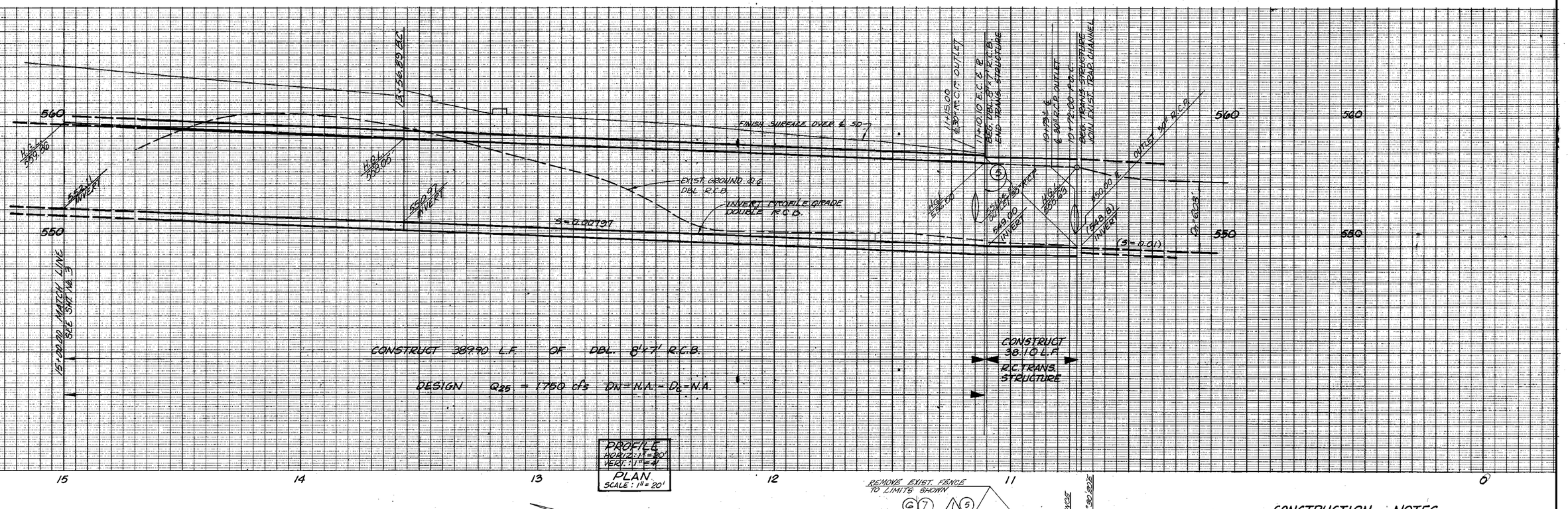
CITY OF WALNUT

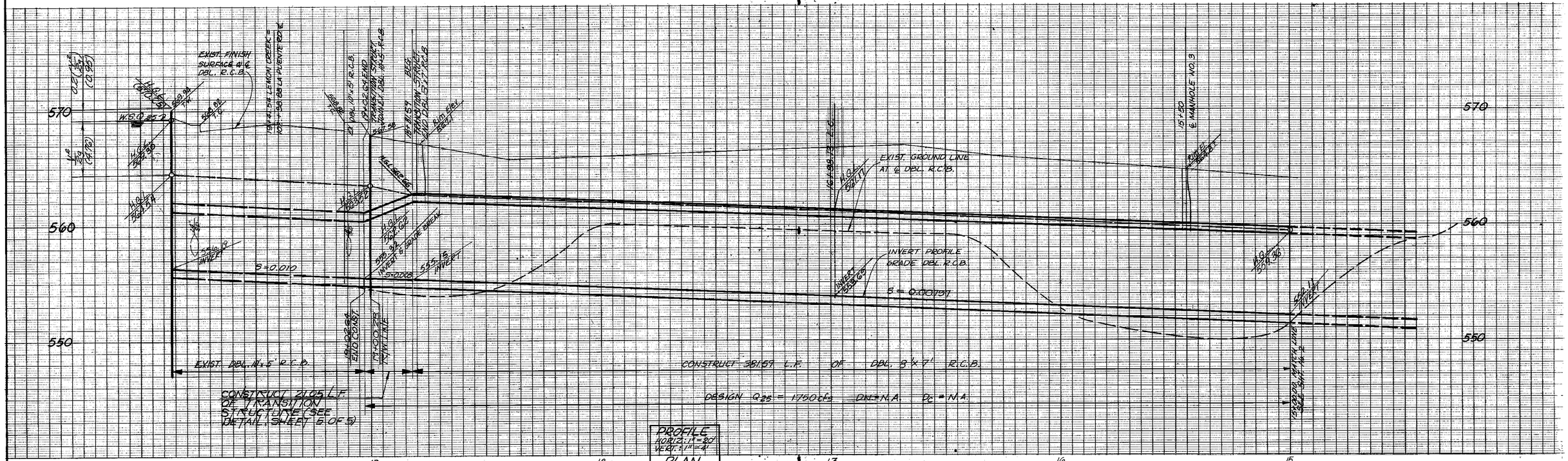
STORM DRAIN
for
P.M. 14987

SHT 1 OF 5 SHTS

SOUTHERN CALIFORNIA BLUEPRINT CO. P.D. SHEET NO. 1 DATE 10/76

09-709-04
133A


560
550
580
15+00.00 MATCH LINE SEE SHT. No. 3
15+20.00 MATCH LINE SEE SHT. No. 3
15
14
13
12
11
0
EXIST. GROUND @ ℄ DBL. R.C.B.
INVERT PROFILE GRADE DOUBLE R.C.B.
FINISH SURFACE OVER ℄ SD-7
S=0.00797
(S=0.01)
CONSTRUCT 38.10 L.F. R.C. TRANS. STRUCTURE
CONSTRUCT 389.90 L.F. OF DBL. 8'x7' R.C.B.
DESIGN Q25 = 1750 cfs DN = N.A. - DC = N.A.
PROFILE HOR. 1" = 20' VERT. 1" = 4'
PLAN SCALE: 1" = 20'
REMOVE EXIST. FENCE TO LIMITS SHOWN
REMOVE EXIST. FENCE TO LIMITS SHOWN; RELOCATE TO ℳL.
PARCEL 6
PARCEL 8
PARCEL 7
CITY OF WALNUT PROPOSED DRAINAGE EASEMENT.
6 R.C.B.
N74°46'09"W 246.79'
EXISTING STANDPIPE
PROP. C & G
R/W
PP5658O7E
EXIST. CHAIN LINK FENCE
EXIST. ACCESS ROAD
PP2133936
6" MAIN
PRESS. REG. ASSBLY
FUT. F.H.
EXIST. 30" R.C.P.
PP2062341
PP1565819E
LEMON AVENUE
AVENIDA AMIDAS
EXIST. C & G
C.B
18" R.C.P.
18" R.C.P.
18" R.C.P.
EXIST. 30" R.C.P.
EXIST. 42" R.C.P.
EXIST. TRAP CHANNEL
EXIST. TRANS. STRUCTURE
EXIST. 30" R.C.P. OUTLET
EXIST. 42" R.C.P. OUTLET
EXIST. 30" R.C.P. OUTLET
EXIST. 42" R.C.P. OUTLET
EXIST. 30" R.C.P. OUTLET
EXIST. 42" R.C.P. OUTLET
EXIST. TRAP CHANNEL
EXIST. TRANS. STRUCTURE

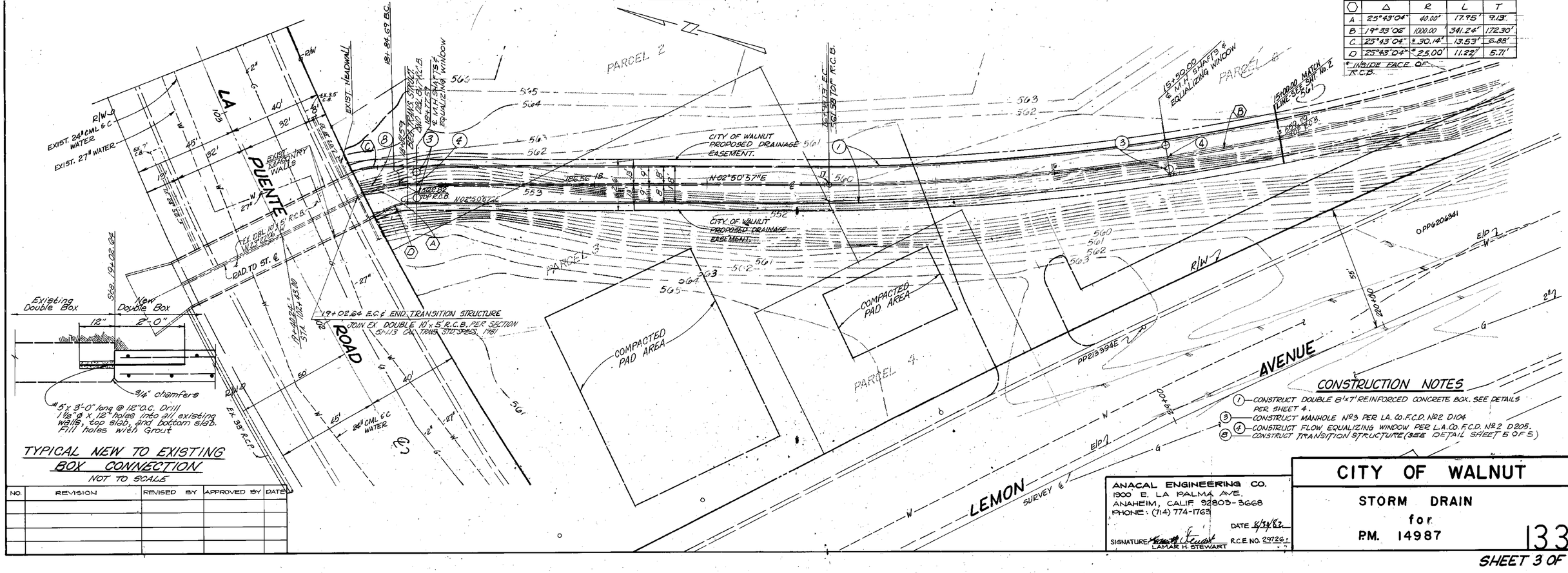


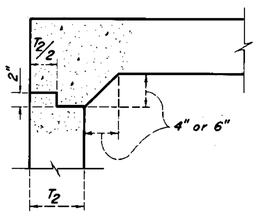
PROFILE
HORIZ: 1" = 20'
VERT: 1" = 4'

PLAN
SCALE: 1" = 20'

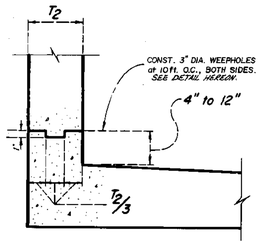
CURVE	DATA			
⬡	Δ	R	L	T
A	25°43'04"	40.00'	17.95'	9.13'
B	19°33'06"	1000.00	341.24'	172.30'
C	25°43'04"	*30.14'	13.53'	6.88'
D	25°43'04"	*25.00'	11.22'	5.71'

*INSIDE FACE OF R.C.B.

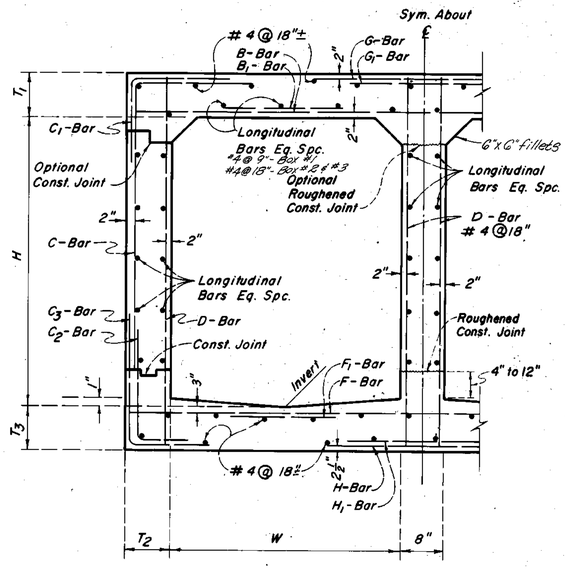




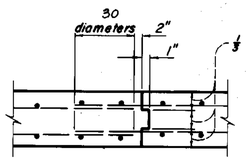
TOP OF WALL



BASE OF WALL



TYPICAL R.C. BOX SECTION
NOT TO SCALE



TRANSVERSE JOINT

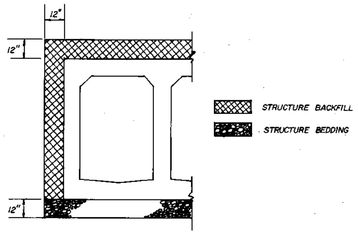
CONSTRUCTION JOINT DETAILS
NOT TO SCALE

DESIGN DATA

LIVE LOAD
H20-S16-44 unless otherwise noted

DEAD LOAD
Earth load per Marston's formula: w= 110 p.c.f.
Ku= Ku'=0.150
Bd= Outside width of box plus 3 feet
Side earth 37 p.s.f. per foot of depth
Internal water pressure: 62.4 p.s.f. per foot of depth
Weight of concrete: 150 p.c.f.

ALLOWABLE STRESSES
f'_c= 4000 p.s.i. at 28 days
f_c= 1800 p.s.i.
f_s= 24000 p.s.i.
n= 8
shear and bond stresses per A.C.I. 318-63



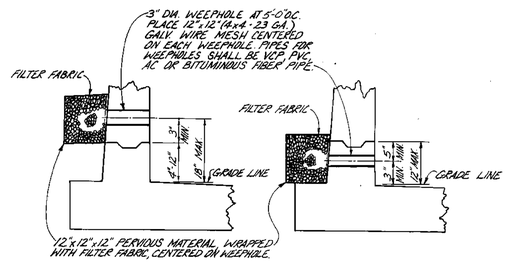
R.C.B. BACKFILL & BEDDING DETAIL
NOT TO SCALE

BOX SECTION NO.		1	2	3
Design Cover		0'-0"	6'-0"	7'-0"
Width	W	8'-0"	8'-0"	8'-0" TO 10'-0"
Height	H	7'-0"	7'-0"	7'-0" TO 5'-0"
Live Load		H-20	H-20	H-20
Top Slab Thickness	T_1	8.00"	8.00"	9.50"
Side Wall Thickness	T_2	8.00"	8.00"	8.00"
Bottom Slab Thickness	T_3	8.00"	8.00"	10.00"
B Bars	Bar No. & Spacing	#6@7"	#5@16"	#7@8"
	Length	17'-9"	17'-9"	Varies
B_1 Bars	Bar No. & Spacing	—	#5@16"	—
	Length	—	7'-7½"	—
C Bars	Bar No. & Spacing	#4@14"	#4@14"	#4@7" O.C.
	Horiz. Length	3'-8½"	3'-5"	4'-2½"
	Vert. Length	7'-1"	7'-1"	Varies
C_1 Bars	Bar No. & Spacing	#4@14"	#4@14"	—
	Horiz. Length	2'-1"	2'-1"	—
	Vert. Length	3'-2½"	2'-1"	—
C_2 Bars	Bar No. & Spacing	#4@14"	#5@14"	#4@7" O.C.
	Horiz. Length	3'-3"	4'-0"	4'-3"
	Vert. Length	2'-1"	2'-1"	2'-6"
C_3 Bars	Bar No. & Spacing	—	—	—
	Horiz. Length	—	—	—
	Vert. Length	—	—	—
D Bars	Bar No. & Spacing	#4@18"	#4@18"	#4@18" O.C.
	Length	8'-1"	8'-1"	Varies
F Bars	Bar No. & Spacing	#4@20"	#6@10"	#7@8" O.C.*
	Length	17'-9"	17'-9"	Varies
F_1 Bars	Bar No. & Spacing	#6@20"	—	—
	Length	7'-10½"	—	—
G Bars	Bar No. & Spacing	#5@12"	#4@9"	#5@10"*
	Length	12'-8"	6'-5½"	15'-8"
G_1 Bars	Bar No. & Spacing	#5@12"	#5@9"	#7@10"*
	Length	4'-8"	4'-8"	5'-0"
H Bars	Bar No. & Spacing	#4@11"	#5@11"	#5@10"*
	Length	7'-7"	13'-0"	15'-8"
H_1 Bars	Bar No. & Spacing	#5@11"	#7@11"	#7@10"
	Length	4'-0"	4'-6⅛"	5'-0"
NUMBER LONGITUDINAL REINFORCEMENT #4 BARS				
Top Slab (Includes Distrib.)		44	27	31
Ext. Walls		16	16	16
Int. Walls		8	8	8
Inv. Slab		28	26	31
TOTAL		96	77	86
QUANTITIES				
Concrete Cu. Yds./Lin. Ft.		1.45	1.45	1.65 Average
Steel Lbs./Lin. Ft.		184±	187±	265±

* Spacing as measured at center wall.

R. C. BOX LOCATION SCHEDULE

Box Sect.	Station From	Station To	Box Sect.	Station From	Station To
1	11+10.10	13+45.00			
2	13+45.00	18+81.59			
3	18+81.59	19+02.64			



ALTERNATE A — **WEEPHOLES** — ALTERNATE B

ADDITIONAL NOTES FOR BOX SECTIONS

1. LONGITUDINAL STEEL SHALL BE CONTINUOUS AND EXTEND THROUGH ALL CONSTRUCTION JOINTS.
2. UNLESS OTHERWISE SHOWN ON THE DRAWINGS, TRANSVERSE JOINT KEYWAYS (IN BOTH SLABS AND WALLS), AS DETAILED FOR LONGITUDINAL KEYWAYS AT THE BASE OF THE WALLS, SHALL BE PLACED AT THE END OF EACH POUR, BUT THE SPACING THEREOF SHALL NOT EXCEED 50 FEET OR BE LESS THAN 10 FEET. ALL CONSTRUCTION JOINTS IN BOTTOM SLAB, TOP SLAB, AND SIDE WALLS SHALL BE IN THE SAME PLANE. NO STAGGERING OF JOINTS WILL BE PERMITTED.
3. UNLESS OTHERWISE SHOWN ON THE DETAILS, IN CURVED SECTIONS TRANSVERSE BARS SHALL BE PLACED RADIALLY, STRAIGHT TRANSVERSE BARS IN TOP AND BOTTOM SLABS SHALL BE SPACED AS SHOWN ON THE TYPICAL SECTIONS: SPACING SHALL BE AT THE CENTERLINE OF THE BARREL ON THE OUTSIDE OF THE CURVE FOR DOUBLE BARREL BOXES. STRAIGHT BARS AND L-BARS IN WALLS SHALL BE SPACED AS SHOWN ON THE TYPICAL SECTIONS, WITH THE SPACING MEASURED BETWEEN THE VERTICAL LEGS OF BARS.
4. AT THE BEGINNING AND ENDING OF ALL POURS, A CURTAIN OF REINFORCEMENT COMPOSED OF B, C, C_2, D, F, G, AND H BARS SHALL BE PLACED THREE INCHES FROM THE TRANSVERSE CONSTRUCTION JOINT.
5. THE VERTICAL WALL STEEL IN INTERIOR WALLS AND IN THE INTERIOR FACE OF EXTERIOR WALLS MAY BE SPLICED AT THE CONSTRUCTION JOINT AT THE BASE OF THE WALL. THE SPLICES SHALL BE 30 BAR DIAMETERS IN LENGTH.
6. IN ALL SECTIONS LAP C AND C_2 BARS. THE VERTICAL LENGTH OF C AND C_2 BARS HAS BEEN CALCULATED FOR A FOUR-INCH STARTER WALL. IF THE HEIGHT OF THE STARTER WALL IS VARIED, THE VERTICAL LENGTH OF THE C AND C_2 BARS SHALL BE VARIED CORRESPONDINGLY SO AS TO MAINTAIN A 30 DIAMETER LAP BETWEEN THE TWO BARS. THE LAPS SHALL BE BASED ON THE SMALLER BAR.
7. CONCRETE QUANTITIES ARE BASED ON A SIX-BY-SIX INCH FILLET.
8. THE CONTRACTOR SHALL HAVE THE OPTION OF PLACING THE 3 INCH DIAMETER WEEPHOLES, INDICATED ON THE "BASE OF WALL" DETAIL, ABOVE OR BELOW THE CONSTRUCTION JOINT, IF THE BOTTOM OF THE CONSTRUCTION JOINT IS AT LEAST 6 INCHES ABOVE THE BOTTOM OF THE BOX.
9. THE STRUCTURE BACKFILL AND BEDDING SHALL CONFORM TO THE R.C.B. BACKFILL AND BEDDING DETAIL HEREON: AND SECTIONS 200 AND 300 - 7.4 OF THE *STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION*.

NO.	REVISION	REVISED BY	APPROVED BY	DATE

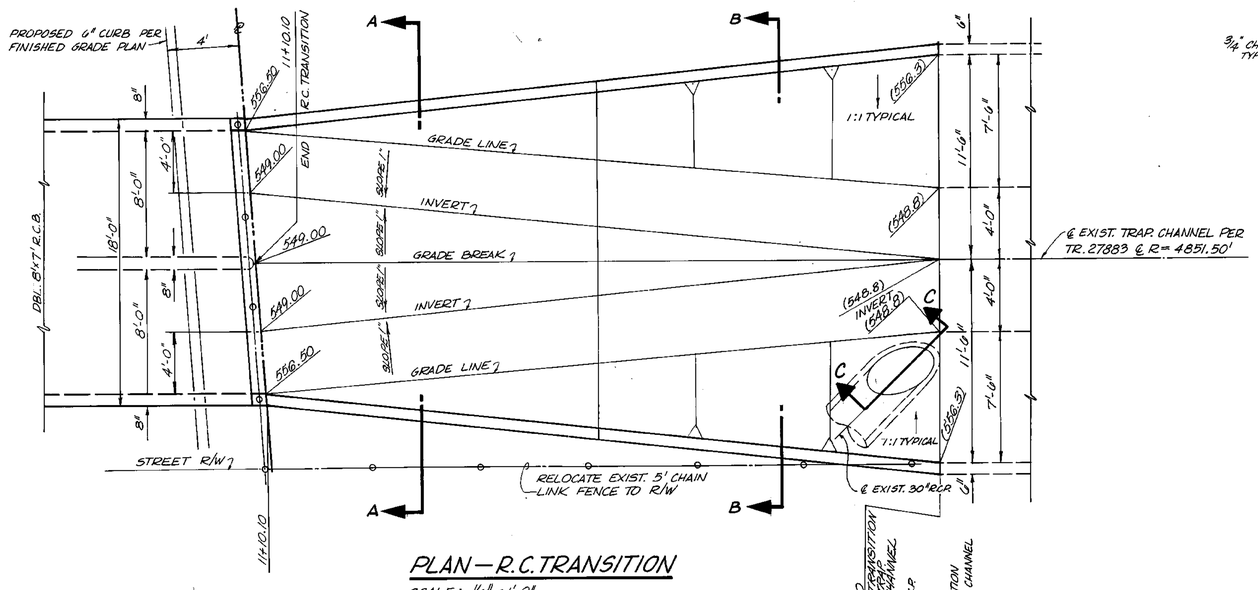
DOUBLE R.C.B. DETAILS

ANACAL ENGINEERING CO.
1900 E. LA PALMA AVE.
ANAHEIM, CALIF. 92803-3668
PHONE: (714) 774-1765

DATE 8/31/82
SIGNATURE: LAMAR H. STEWART R.C.E. NO. 29726

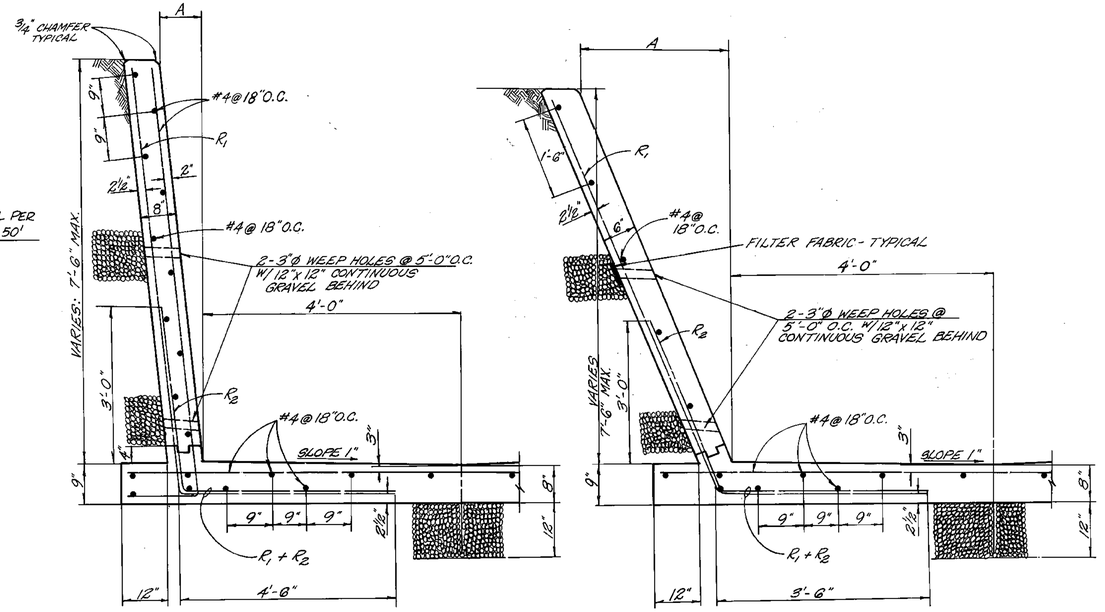
CITY OF WALNUT
STORM DRAIN
for
P.M. 14987

133D



PLAN — R.C. TRANSITION

SCALE: 1/4" = 1'-0"



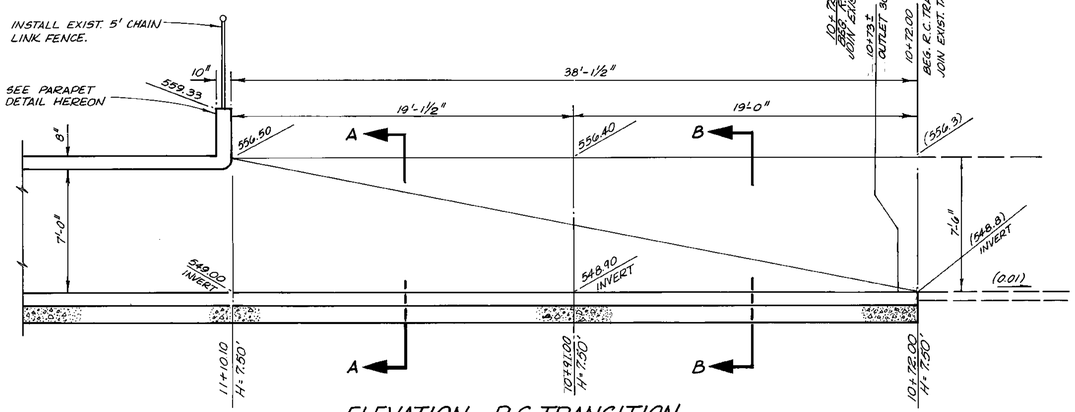
SECTION A-A

NOT TO SCALE

SECTION B-B

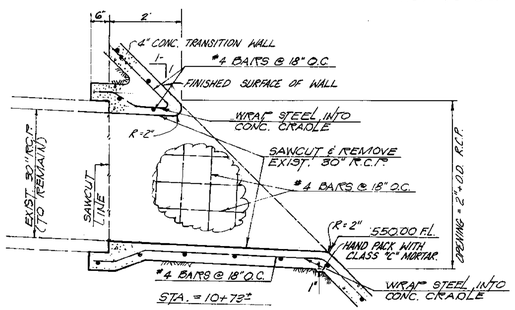
NOT TO SCALE

A		R_1	R_2
0' TO 3'-0"		#5@18"O.C.	#4@18"O.C.
> 3'-0"		#4@18"O.C.	OMIT



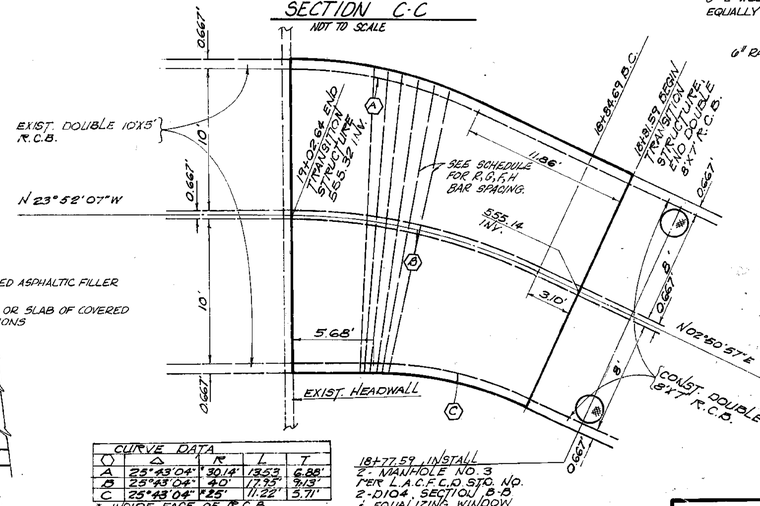
ELEVATION — R.C. TRANSITION

SCALE: 1/4" = 1'-0"



SECTION C-C

NOT TO SCALE



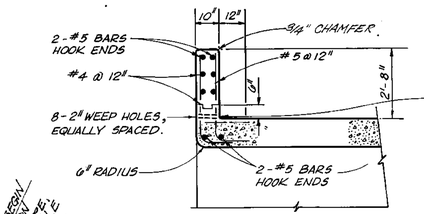
CURVE DATA				
	Δ	R	L	T
A	25°43'04"	30.14'	13.53'	6.88'
B	25°43'04"	40'	17.95'	9.13'
C	25°43'04"	*25'	11.22'	5.71'

* INSIDE FACE OF R.C.B.

18+77.59 INSTALL
2- MANHOLE NO. 3
PER L.A.C.F.C.D STD. NO.
2-D104, SECTION B-B
& EQUALIZING WINDOW
PER L.A.C.F.C.D. NO. 2-D-205

TRANSITION STRUCTURE DETAIL

NO SCALE



PARAPET DETAIL

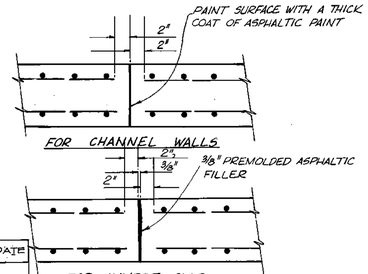
SCALE: 3/8" = 1'-0"

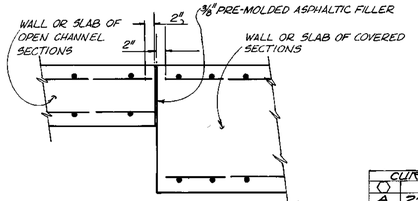
OPEN CHANNEL STRUCTURAL NOTES

1. LONGITUDINAL STEEL SHALL TERMINATE TWO INCHES FROM TRANSVERSE CONSTRUCTION JOINTS.
2. TRANSVERSE JOINTS SHALL BE SPACED NOT TO EXCEED 30 FEET NOR BE LESS THAN 10 FEET, MEASURED ALONG THE CENTERLINE OF CONSTRUCTION, EXCEPT AS OTHERWISE SHOWN ON THE DRAWINGS.
3. TRANSVERSE JOINTS SHALL BE PLACED AT THE JUNCTION OF RECTANGULAR OPEN CHANNEL SECTIONS WITH CLOSED CONDUIT SECTIONS.
4. ALL RECTANGULAR OPEN CHANNEL WALLS SHALL BE FENCED IN ACCORDANCE WITH STANDARD DRAWING 2-D180, EXCEPT AS OTHERWISE SHOWN ON THE DRAWINGS.
5. UNLESS OTHERWISE SHOWN ON THE DRAWINGS, IN CURVED SECTIONS THE MAXIMUM SPACING OF BARS SHALL NOT EXCEED THAT SHOWN ON THE TYPICAL SECTIONS. STEEL SHALL BE PLACED RADIALLY FROM THE MAXIMUM SPACING.
6. AT THE BEGINNING AND ENDING OF ALL POURS, A COMPLETE CURTAIN OF REINFORCEMENT COMPOSED OF B1, B3, AND B2 BARS SHALL BE PLACED THREE INCHES FROM THE TRANSVERSE CONSTRUCTION JOINT.
7. BAR LENGTHS INDICATED ARE MAXIMUM REQUIRED, AND VARY PER VERTICAL WALL HEIGHT.
8. SECTION "B-B", B1 BARS SHALL BE PLACED IN THE MIDDLE OF THE WALL AND SLAB SECTIONS.
9. ALL REINFORCING STEEL SHALL CONFORM TO A.S.T.M. A-615 GRADE 60. (NO FIELD BENDING)
10. ALL CONCRETE SHALL HAVE AN ULTIMATE COMPRESSIVE STRENGTH OF 4000 PSI @ 28 DAYS. COMPRESSION TEST CYLINDERS ARE REQUIRED.

DESIGN DATA

LOADS
EXTERNAL 62.5 P.S.F., E.F.P.
INTERNAL 40.0 P.S.F., E.F.P.
f_c' = 4000 p.s.i.
f_c = 1800 p.s.i.
f_s = 24,000 p.s.i.
n = 8





TRANSVERSE CONSTRUCTION JOINT DETAILS

NOT TO SCALE

NO.	REVISION	REVISED BY	APPROVED BY	DATE

ANACAL ENGINEERING CO.
1900 E. LA PALMA AVE.
ANAHEIM, CALIF. 92803-3668
PHONE: (714) 774-1763

DATE 8/31/82

SIGNATURE: LAMAR H. STEWART R.C.E. NO. 29726

CITY OF WALNUT

STORM DRAIN
for
P.M. 14987

133E

R.C. TRANSITION STRUCTURE DETAILS

SHEET 5 OF 5

APPENDIX C - STREAM STABILITY MEMO



Technical Memorandum

Date: June 24, 2023

To: Mr. Jack Su
Spring Meadows Homes LLC /
Meadow Pass Estates LLC
18517 Gale Avenue, Suite A
City of Industry, CA 91748

From: Mark Krebs, P.E., President
Andrew Ronnau, PhD, P.E., Vice President
Cherise Thompson, EIT, Design Engineer

CC: Scott Ashlock, Placeworks
Alex Reyes, Placeworks
Randy Jackson, Placeworks
Tim Paone, Cox Castle
Morgan Gallagher, Cox Castle
Scott Birkey, Cox Castle
Laer Pearce, Laer Pearce & Associates
Mishal Montgomery, Mishal Montgomery Strategies

Re: Lemon Creek Stream Stability Analysis at Proposed Brookside Development B852

Introduction

This technical memorandum presents the findings of an investigation into the level of stability of Lemon Creek, located between Istik Bridge and La Puente Avenue in the City of Walnut, California (See **Figure 1**). The results presented herein will inform the site developers on how to protect the proposed development from adverse impacts associated with the potential instability of the creek.

Potential migration of the creek was analyzed for (1) vertical and (2) horizontal components. Vertical migration of the creek would include changes in bed elevation and slopes. Horizontal migration of the creek would include lateral shifts in the alignment of the thalweg, top of bank, or side slopes. The methods used to calculate the horizontal and vertical components of creek migration are standard engineering procedures.

Project Background - General

The proposed project is situated on a 25-8-acre site that was formerly used as the Brookside Equestrian Center, which closed in 2014. The site is primarily open space, but contains various equestrian-related structures. The most recent version of the development plan (January 6, 2023) includes the removal of the equestrian-related structures and the construction of 27 residential housing lots with a minimum area of 28,500 square feet (See **Figure 2**). A summary of the proposed land use is provided in **Table 1**.

Figure 1: Portion of Lemon Creek Investigated



Figure 2: Site Development Plan

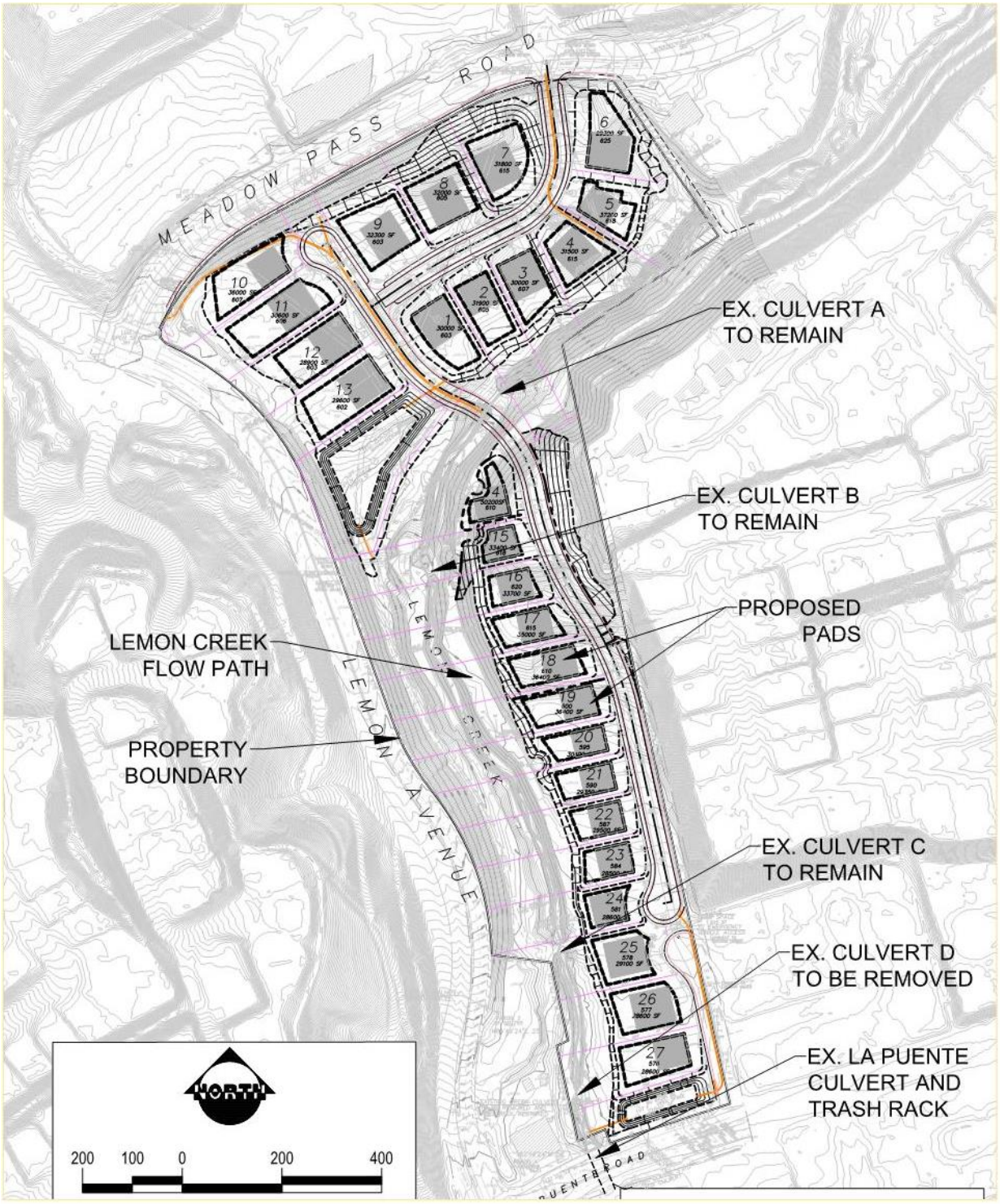


Table 1: Proposed Land Use Summary

Use	Acres	Unit	Residential Density
Single-Family Residential	19.95	27 Lots / 27 Dwelling Units	0.75 DU/AC*
Open Space	2.67	6 Lots	-
Public Streets (San Vicente Drive, A Street, B Street)	3.22	-	-
Total	**25.84**	**33 Lots / 27 Dwelling Units 6 Open Space Lots**	**0.75 DU/AC***

Existing Conditions

The existing site is primarily open space, but contains various equestrian-related structures, including two horse barns with stables, fenced riding rings, maintenance storage facilities, feed sheds, and a covered riding arena. The site is privately owned and not open to the public, although there is a trail network adjacent to the creek.

Lemon Creek runs through the middle of the site, traveling approximately 2,340 ft. The incised creek area is almost entirely vegetated, with some of the older trees and vegetation aged more than 15 years. The creek has a natural, trapezoidal shape with a low flow path created by a steady flow of water, which is present even in the summer months. Small portions of the creek are engineered, primarily at each of the four culvert locations. These culverts also provide a place for the trail network to criss-cross over the creek. The culvert locations and sizes are summarized in **Table 2**. At the downstream end of the property, Lemon Creek enters a double 10 ft.(w) x 5 ft.(h) box culvert beneath La Puente Road, maintained by the City of Walnut (P.M. 14987).

Table 2: Lemon Creek Existing Culverts

Creek Station	Culvert ID	Shape	Dimensions
29+34.17	SD Outlet 1	Circular	24-in. Dia.*
26+25.92	A	Circular	6.75 ft. Dia.* / 60 ft. Length
22+71	Lemon Ave. SD Outlet (SD Outlet 2)	Circular	81-in. Dia.*
22+30.01	B	Circular	6.0 ft. Dia.* / 22 ft. Length
14+12.68	C	Arch	13.5 ft.(w) x 10.25 ft.(h) / 16.5 ft. Length
11+16.46	D	Circular	6.0 ft. Dia.* / 19.5 ft. Length
10+00	La Puente Culvert	Double RCB	10'w x 5'h / 915 ft. Length

**Dia = diameter*

A site visit was performed by PACE on August 30th, 2021, during which a photo survey was performed to document the current conditions of the creek. Representative photos which characterize the creek are presented in **Figures 3** through **8**.

Figure 3: La Puente Culvert at Downstream End of Property



Figure 4: Downstream Face of 'Culvert D'



Figure 5: Dense Vegetation Within Lemon Creek



Figure 6: Upstream Face of 'Culvert C'



Figure 7: Downstream Face of 'Culvert B'



Figure 8: Downstream Face of 'Culvert A'



Proposed Developments

The 27 proposed dwelling units will be built in the overbank areas of the creek and will generally be elevated above existing ground in those areas. The construction of the pads will not impact the geometry of the main flow area of Lemon Creek, but is expected to alter the floodplain in the overbank areas during large flood events. In addition to the 27 proposed dwelling units, new roads will be created to provide access to the homes from Meadow Pass Road. Two water quality basins are proposed to be built to eliminate the increase in peak flow rate of runoff from the development. In order to eliminate trail connectivity to the east of the creek and in order to improve the hydraulic performance of the creek, 'Culvert D' will be removed.

The vegetation within the creek is under Army Corps of Engineers (ACOE) and California Department of Fish and Wildlife (CDFW) 'Waters of the U.S.' jurisdiction, therefore, impacts to the vegetation and improvements within the creek will be minimized as much as possible. The work being performed in the creek to remove the culvert will be subject to the approval of permits that the developers will apply for.

Potential for Vertical Migration

Historical USGS aerial photo comparisons from 1946 to present day (75 year period) were evaluated to determine the historical behavior of Lemon Creek and to identify any trends in lateral migration. The imagery analyzed show an unaltered flow path and consistently dense vegetation. **Figures 9** through **15** show the aerial photographs of Lemon Creek, with its current flow path overlaid. As can be seen from the photos, the flow path of Lemon Creek does not deviate over the 75 year period. This remains the case even through the rapid urbanization of the surrounding area, indicating that the anchoring mechanism provided by the vegetation is resilient to increases in runoff volume and peak flow rate.

In addition to the stabilizing effect of the vegetation, the four culverts in the creek operate as grade control structures, prohibiting the bed from degrading vertically at the upstream face of each culvert.

Taking these factors into account, it is unlikely that Lemon Creek will experience vertical migration in the future, as long as the vegetation and the anchoring mechanism provided by it do not change. The proposed development adjacent to Lemon Creek does not propose significant impacts within the Corps / CDFW jurisdiction areas, ensuring the vegetation will remain in place. Additionally, only one of the four culverts is proposed to be removed, Culvert D. However, this will not detract from the stabilizing effects of the other three culverts or vegetation.

Figure 9: 1946 Aerial Imagery

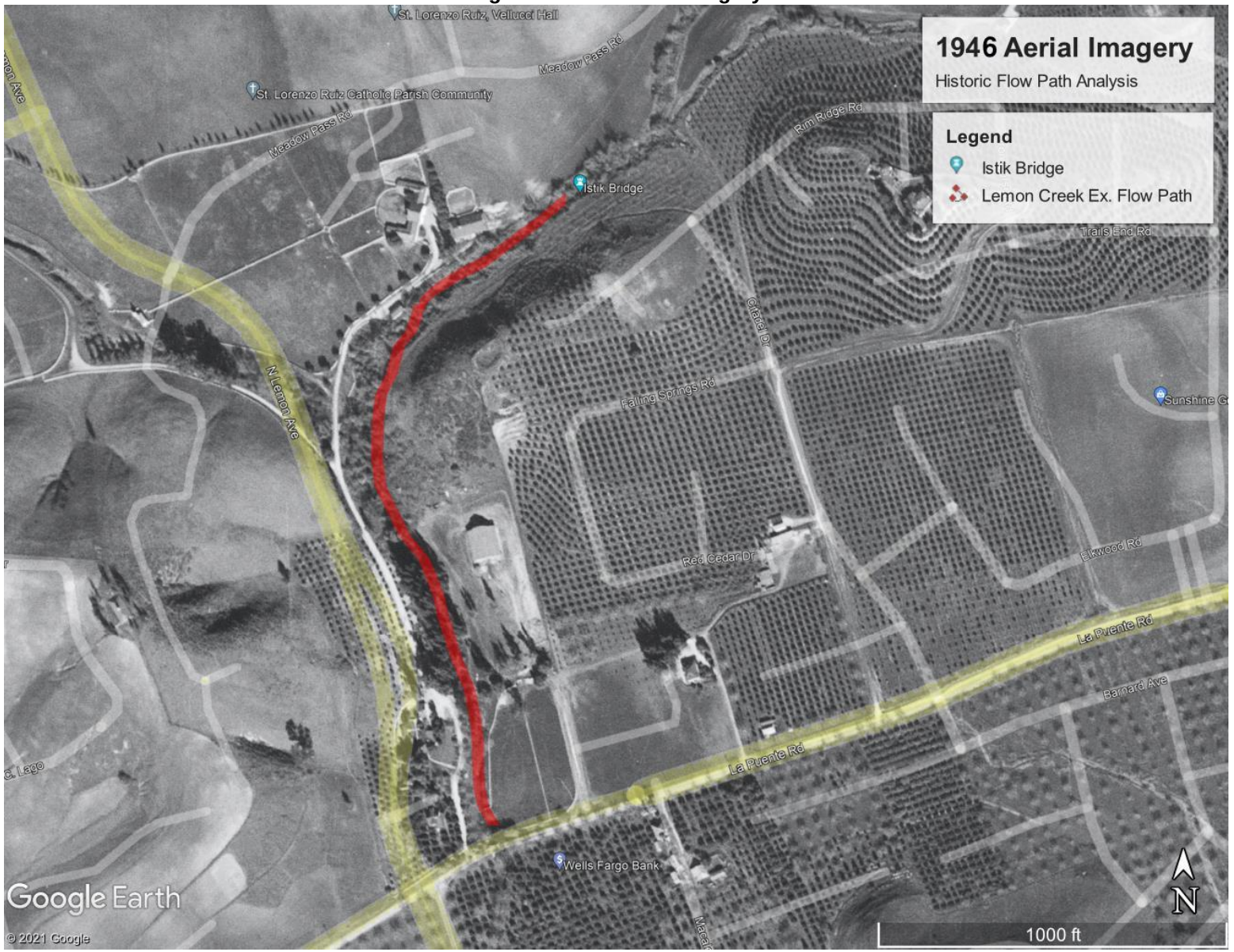


Figure 10: 1968 Aerial Imagery

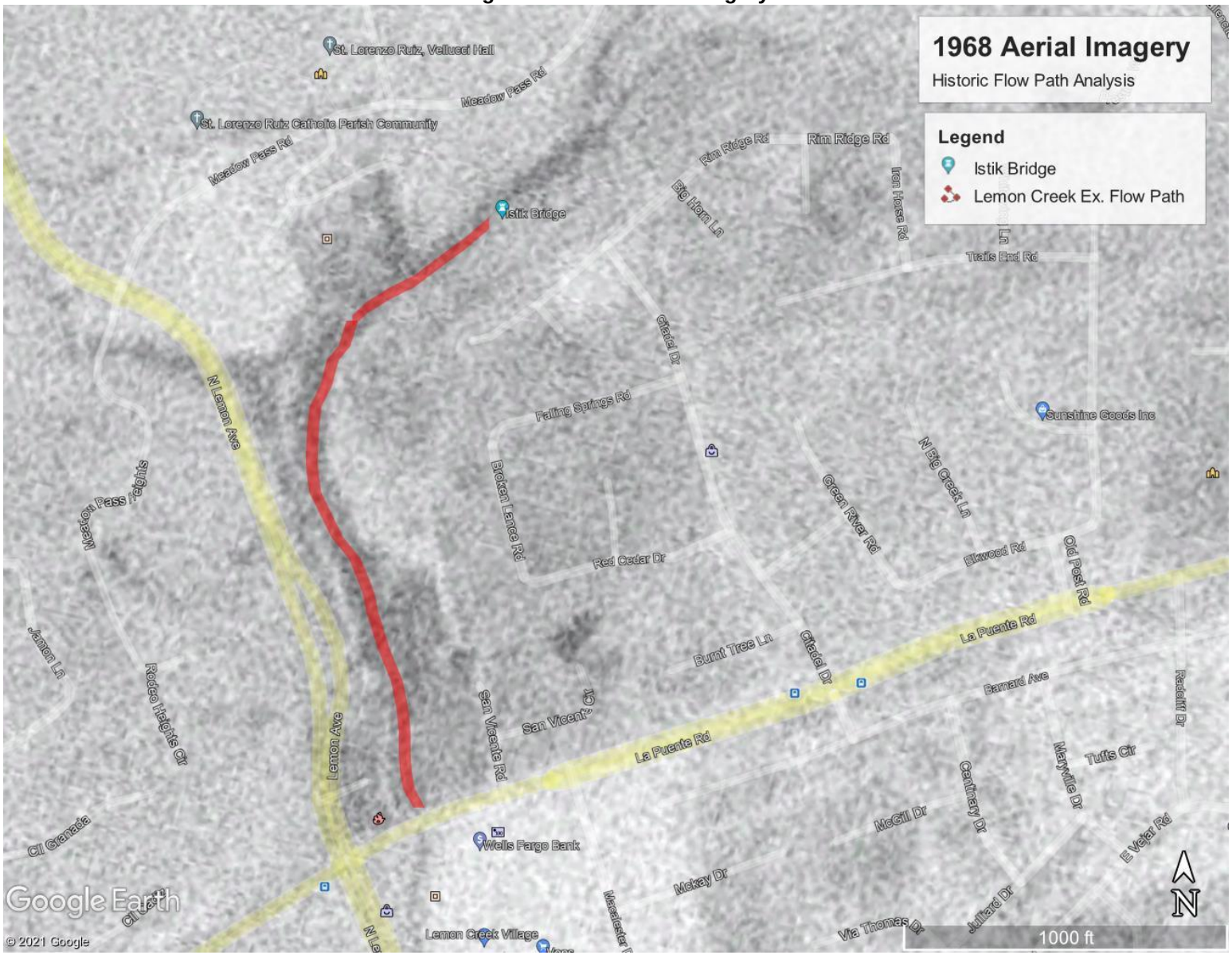


Figure 11: 1971 Aerial Imagery

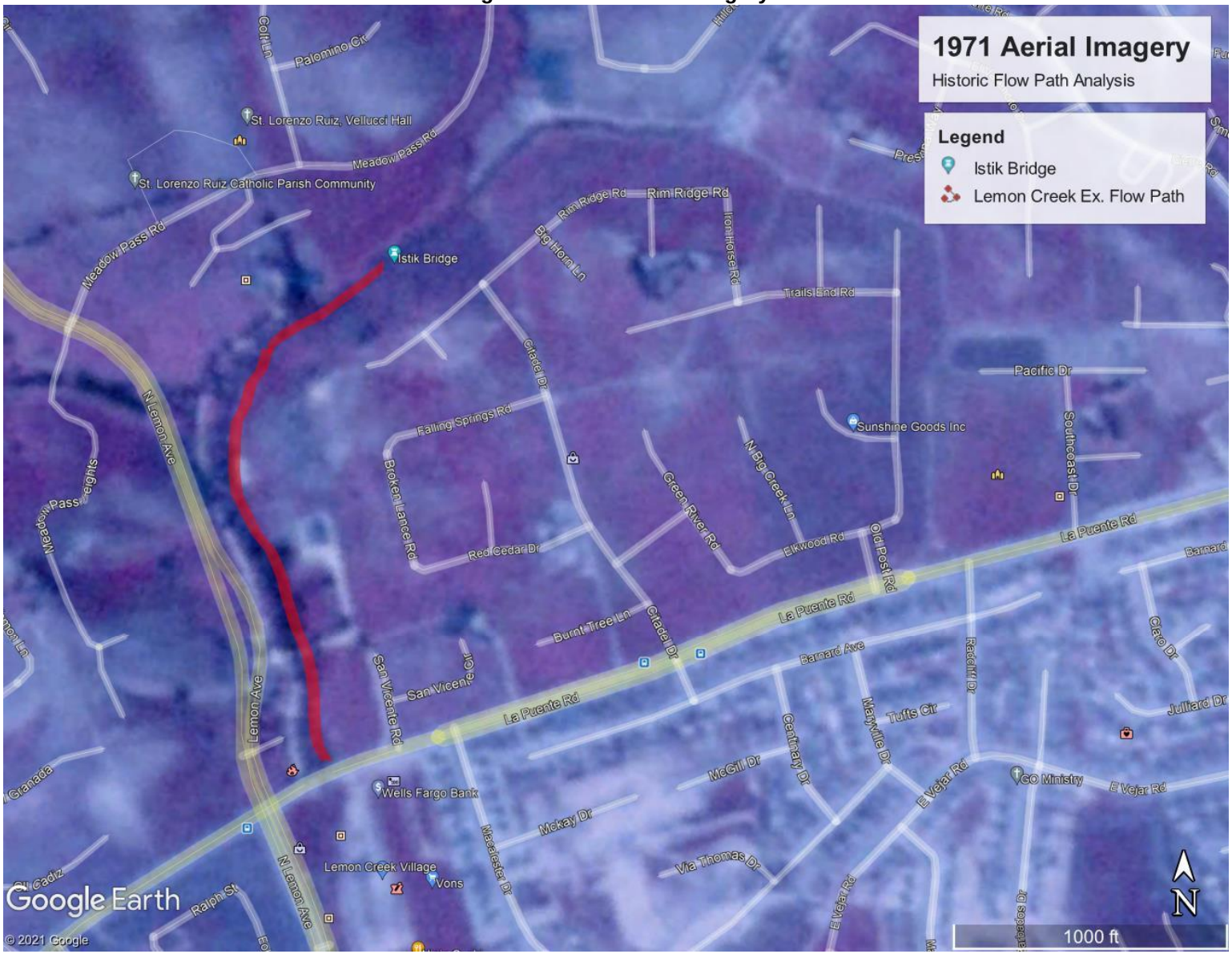


Figure 12: 1995 Aerial Imagery



Figure 13: 2002 Aerial Imagery



Figure 14: 2013 Aerial Imagery



Figure 15: 2021 Aerial Imagery



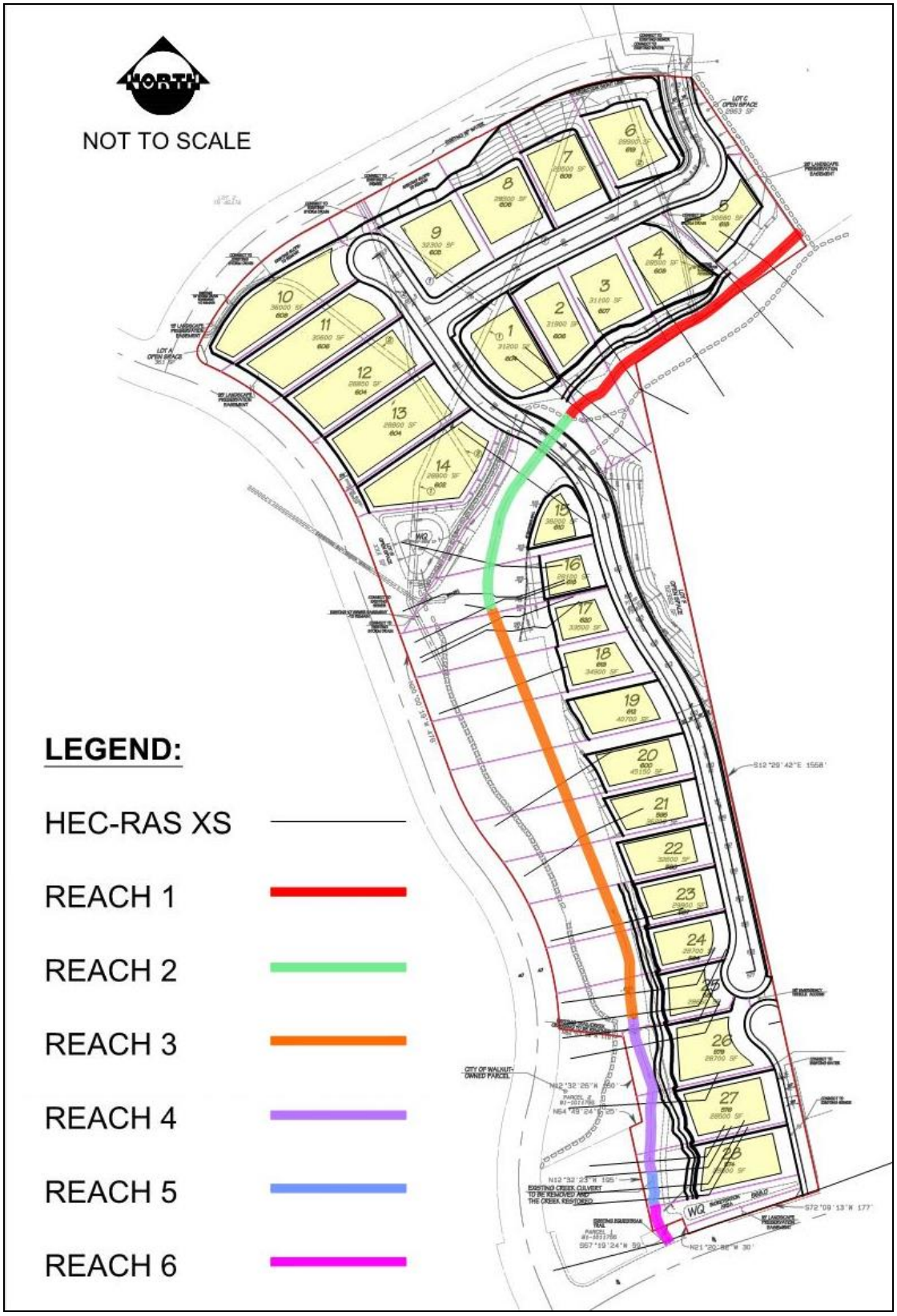
Potential for Horizontal Migration

For the present analysis, Lemon Creek was split into 6 reaches, separated into stretches of similar flow rates and geometry. In general, culvert locations present a natural boundary between reaches, due to the difference between average hydraulic parameters between their upstream and downstream sides. Averaging the stability calculation results across both upstream and downstream sides of a culvert would fall short of accurately characterizing either portion of the stream. For this reason, reaches were split at all culvert locations. **Table 3** and **Figure 16** show the reach delineations used for the lateral stability analysis.

Table 3: Lemon Creek Reach Delineations

RS	Q_{100}	Q_{50}	Q_2	Reach ID
3105.06	1738	1513	600.4	
3034.83	1738	1513	600.4	
2901.87	1738	1513	600.4	
2778.59	1738	1513	600.4	**1**
2685.9	1738	1513	600.4	
2660.9	1738	1513	600.4	
2625.92	Culvert A			
2590.9	1738	1513	600.4	
2565.9	1738	1513	600.4	
2502.39	1738	1513	600.4	**2**
2327.19	1738	1513	600.4	
2271	2803	2438	941	
2246	2803	2438	941	
2230.01	Culvert B			
2216.36	2803	2438	941	
2199	2803	2438	941	
2084.1	2803	2438	941	
1875.66	2803	2438	941	**3**
1770.29	2803	2438	941	
1593.83	2803	2438	941	
1465.87	2803	2438	941	
1425.92	2803	2438	941	
1412.68	Culvert C			
1399.42	2803	2438	941	
1367.97	2803	2438	941	
1257.87	2803	2438	941	**4**
1151.21	2803	2438	941	
1131.21	2803	2438	941	
1116.46	Culvert D			
1101.71	2803	2438	941	**5**
1081.52	2803	2438	941	
1000	2916	2533	985	**6**

Figure 16: Lemon Creek Reach Delineations



Method

Although the vegetation within Lemon Creek provides significant protection from erosion of the banks, various methods were applied to determine the potential limits of lateral migration. This can also be described as the top width of the creek in a stable condition. This represents what could happen in the event the vegetation were to be removed or reduced in some future condition.

Over the years, multiple equations have been developed from streams that have existed in a stable condition for long periods of time. These equations relate channel width, depth, and velocity to a specific discharge rate, such as the average annual flow, dominant discharge, or bankfull discharge. Many of these stable geometry equations were applied to Lemon Creek to predict the extent of future lateral migration.

- *Bray Equation #1:* Bray (1979) developed equations for the geometry of alluvial gravel-bed rivers based on the 2-year discharge

  $W = 2.38\ Q_2^{\ 0.527}$
  $d = 0.266\ Q_2^{\ 0.33}$
  $V_m = 8.0\ d^{0.6}\ S_o^{\ 0.29}$

  Where W = surface flow width (ft)

  Q_2 = 2-year discharge (cfs)
  d = flow depth (ft)
  V_m = mean channel velocity (ft/sec)
  S_o = channel slope (ft/ft)

- *Bray Equation #2:* Bray later modified his channel geometry relationships (Hey et. al., 1982) for gravel-bed rivers to include bankfull discharge and the bed material size.

  $W = 2.08\ Q_{bf}^{\ 0.528}\ D_{50}^{\ -0.07}$
  $d = 0.256\ Q_{bf}^{\ 0.331}\ D_{50}^{\ -0.025}$
  $V_m = 1.87\ Q_{bf}^{\ 0.14}\ D_{50}^{\ 0.095}$
  $S_o = 0.0965\ Q_{bf}^{\ -0.334}\ D_{50}^{\ 0.586}$

  Where W = surface flow width (ft.)

  Q_{bf} = Bankfull discharge (cfs)
  D_{50} = medium bed sediment diameter (ft)
  d = flow depth (ft)
  V_m = mean channel velocity (ft/sec)
  S_o = channel slope (ft/ft)

- *Hey Equation*: Hey (1982) developed regime equations for gravel bed rivers in England that relate stable channel geometry to bankfull discharge and bedload transport rate.

  $WP = 2.2\ Q_{bf}^{\ -0.54}\ D_{50}^{\ -0.05}$
  $R = 0.161\ Q_{bf}^{\ 0.41}\ D_{50}^{\ -0.15}$
  $d_{max} = 0.252\ Q_{bf}^{\ 0.38}\ D_{50}^{\ -0.16}$
  $S_o = 0.679\ Q_{bf}^{\ -0.53}\ Q_s^{\ -0.13}\ D_{50}^{\ 0.97}$

  Where WP = Wetted perimeter (m)

  Q_{bf} = Bankfull discharge (m)
  D_{50} = Median sediment diameter (m)
  R = Hydraulic radius (m)
  d_{max} = Maximum channel depth (m)
  S_o = Channel slope (m/m)
  Q_s = Bedload sediment discharge (%)

- *Ackers and Charlton Equation*: The Ackers and Charlton (1971) equations were based on data from flume studies that used sand bed materials.

  $W = K_{ac}\, Q^{0.42}$

  Where W = surface channel width (ft)

  Q = discharge (cfs)
  K_{ac} = a coefficient varying from 3.6 for straight channels to 7.2 for meandering channels

- *Lacey Equation*: The Lacey equation (1929) was developed to describe the geometry of silt-laden canals in India. However, Bray reported (1979) that in gravel rivers in Canada, the Lacey equation was as accurate for predicting velocity as the Manning's equation.

  $V = 0.8Q^{0.167}$

  Where V = mean channel velocity (ft/sec)

  Q = discharge (cfs)

- *Chang Equation*: Chang's (1988) gravel bed equations for channel geometry support the FLUVIAL-12 sediment transport model, which attempts to simulate channel change from sediment continuity data using minimum stream power concepts. Chang provides equations for channel width, depth, and slope.

  $S_o = 0.000442\, D_{50}^{1.15} / Q_b^{0.42}$
  $W = [1.905 + 0.249\{\ln(0.001065\, D_{50}^{1.15} / (S_o\, Q_{bf}^{0.42}))\}^2]\, Q_{bf}^{0.47}$
  $d = [0.2077 + 0.0418\ln(0.000442\, D_{50}^{1.15} / (S_o\, Q_{bf}^{0.42}))]Q_{bf}^{0.42}$

  Where S_o = channel slope (ft/ft)

  D_{50} = median sediment diameter (mm)
  Q_{bf} = bankfull discharge (cfs)
  W = channel width (ft)
  d = average channel depth (ft)

- *Kellerhals (1967) Equations*: Kellerhals developed equations for the equilibrium channel width and depth in gravel bed rivers. The Kellerhals equations use the dominant discharge, which is also referred to as the channel-forming or effective discharge.

  $W = 1.8\, Q_{dd}^{.5}$
  $d = 0.166\, Q_{dd}0.4\, K_n^{-0.12}$

  Where W = channel width (ft)

  Q_{dd} = dominant discharge (cfs)
  d = average channel depth (ft)
  K_n = Nikuradse's sand grain roughness coefficient

  Here, it is assumed that K_n is twice the mean sediment diameter.

- *AMAFCA Equations*: The AMAFCA (1994) equations for width and equilibrium slope were developed from empirical and theoretical data for application to the arroyo systems of northern New Mexico.

  $W = 0.5\, F^{0.6}\, Fr^{-0.4}\, Q^{0.4}$
  $S_o = 18.28\, n^2\, F^{0.133}\, Fr^{2.133}\, Q^{-0.133}$

  Where W = width of channel (ft)

  F = width/depth ratio
  Fr = main channel Froude number
  Q = discharge (cfs)
  S_o = channel slope (ft/ft)
  n = Manning's n value for channel

- *Moody and Odem Equations*: Moody and Odem (1999) recently completed an investigation of bankfull channel geometry relationships on a variety of stream types in Arizona using Rosgen channel classification methods.

  $Q_{bf} = 52.334\ DA^{0.5766}$
  $A = 11.428\ DA^{0.5291}$
  $TW = 12.301\ DA^{0.3756}$
  $d = 0.9455\ DA^{0.1506}$

  Where Q_{bf} = Bankfull discharge (cfs)

  DA = Watershed drainage area (mi^2)
  A = Section flow area at bankfull discharge (ft)
  TW = Flow width at bankfull discharge (ft)
  d = Average flow depth at bankfull discharge (ft)

Inputs

Where necessary, results were extracted from an existing conditions HEC-RAS hydraulic model for inputs to the equations listed above. For equations requiring sediment particle size data, sediment samples were taken by PACE on September 13, 2021 at two locations within the creek (See **Figure 17**) and used to determine 50th and 90th "percent finer" measurements (D_{50} and D_{90}). The results of the grain size distribution analysis performed on those samples are shown in **Tables 4** & **5**, and **Figure 18**.

Table 4: Sample Point 1 – Grain Size Distribution Results

Sieve Size	Dia.* (mm)	Soil Mass (kg)	Percent Finer (%)
4	4.750	0.000	100.0
10	2.000	0.020	96.1
20	0.850	0.045	87.3
40	0.425	0.045	78.4
100	0.150	0.190	41.2
200	0.075	0.150	11.8
Fine	0.038	0.060	0.0

*Dia = diameter

Table 5: Sample Point 2 – Grain Size Distribution Results

Sieve Size	Dia.* (mm)	Soil Mass (kg)	Percent Finer (%)
4	4.750	0.010	98.0
10	2.000	0.060	86.3
20	0.850	0.080	70.6
40	0.425	0.065	57.8
100	0.150	0.180	22.5
200	0.075	0.085	5.9
Fine	0.038	0.030	0.0

*Dia = diameter

Figure 17: Sediment Sampling Locations

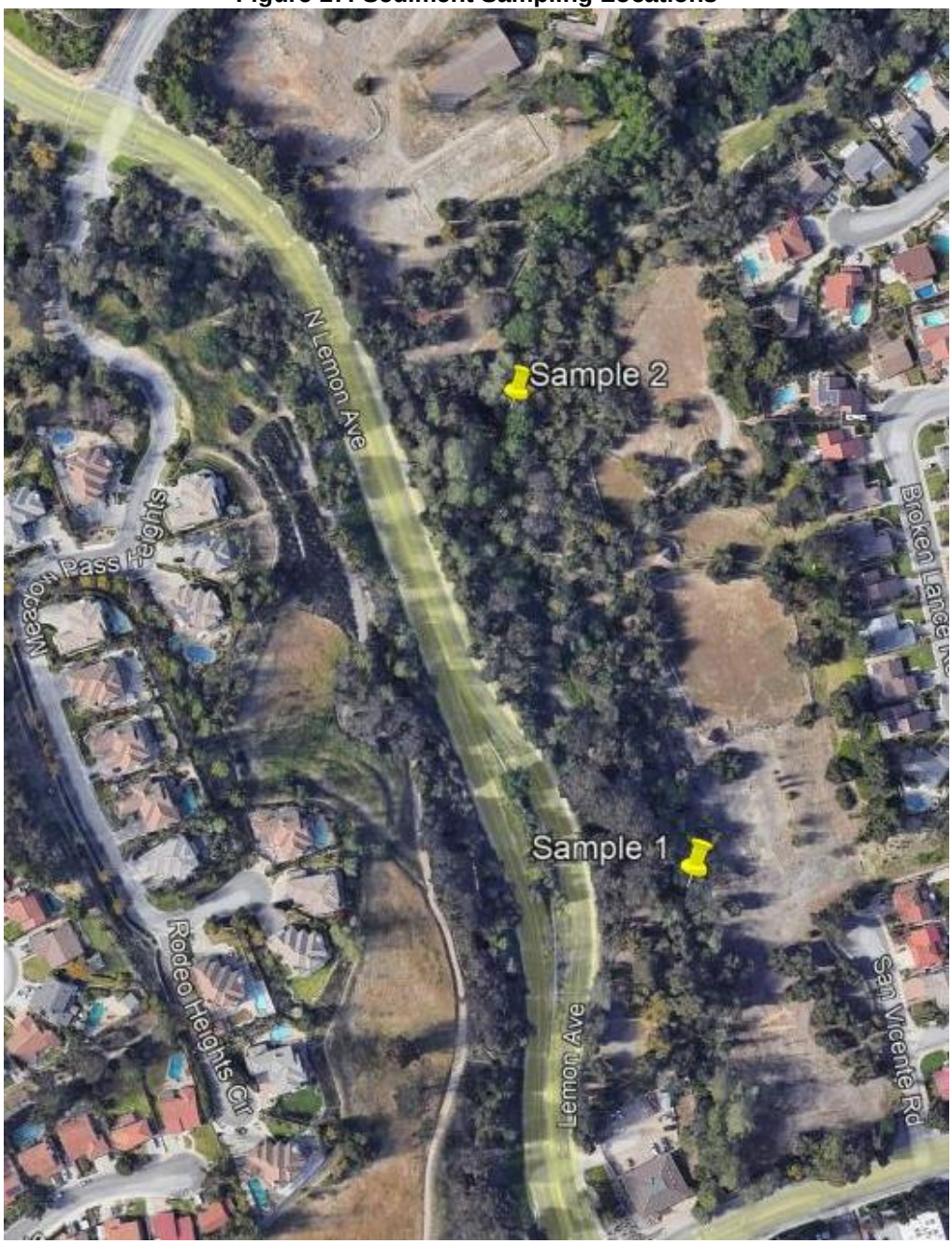
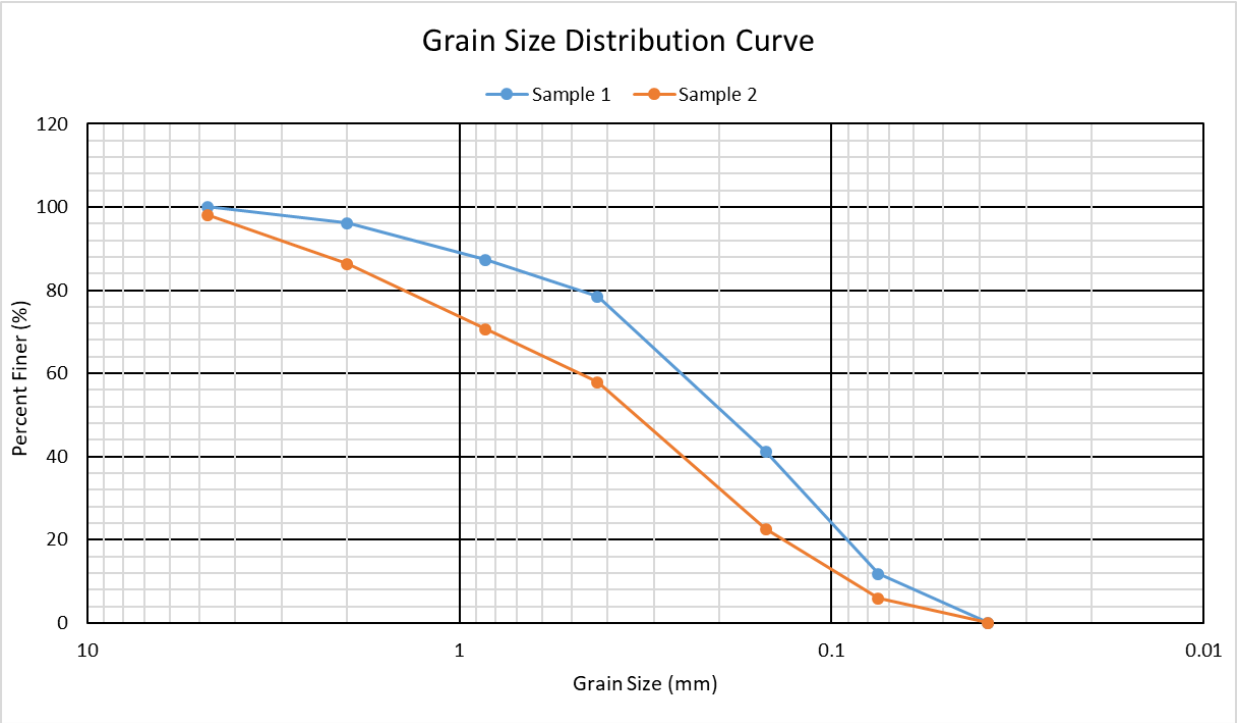


Figure 18: Sample Point 1 & 2 – Grain Size Distribution Curves



The D_{50} and D_{90} measurements were found through interpolation. Sample Point 1 D_{50} was found to be 0.192 mm and D_{90} was 1.109mm. Sample Point 2 D_{50} was found to be 0.337 mm and D_{90} was 2.630 mm. **The soil sizes from Sample Point 1 were used for the analysis** since they were the smaller of the two, producing more conservative results in the creek stability calculations.

Because the predicted creek parameters represent the stable channel condition, the inputs are not dependent on interim channel conditions. In other words, the results describe the future creek configuration, regardless of if the site were to be developed or undeveloped. The results of the various equations were averaged to obtain a reasonable prediction of stable creek parameters[1].

Results

The results of applying the channel geometry equations to Lemon Creek are shown in **Tables 6** through **11**. The 2-, 10-, and 100-year discharges were substituted for the discharge variable used in the original channel geometry equations to examine the trend of potential adjustments at each flow rate. Predicted values of widths, depths, slopes and velocities from the equations were compared to the measured values obtained from topographic mapping and the existing condition HEC-RAS model. The differences were interpreted as follows:

- Width: Where the predicted creek width is greater than the HEC-RAS modeled creek width, the creek is expected to erode its banks to achieve the greater width during future floods. Where the predicted creek width is less than the HEC-RAS modeled creek width, the creek is assumed to have low potential for lateral movement due to channel widening, and is likely to experience deposition along

[1] Out of the eight stable geometry equations used, the AMAFCA method is the only one that utilizes hydraulic inputs from the HEC-RAS model. As such, the stable top width results for the AMAFCA method do vary between existing and proposed conditions. A sensitivity analysis was performed to determine if the existing / proposed condition results from the AMAFCA equation significantly affected the averaged stable geometry equation results. It was determined that the change to the average was very minor, indicating that the effects of changes to the creek hydraulics can be disregarded when looking at the stable channel geometry results.

the banks, at least at the flow rates considered.

- Depth: Where the predicted creek depth is greater than the HEC-RAS modeled creek depth, the creek is expected to erode its bed (degrade) to achieve the equilibrium depth during future floods. Where predicted creek depth is less than the HEC-RAS modeled creek depth, the creek is expected to aggrade (deposit sediment) to reach the equilibrium state.
- Slope: Where the predicted slope is less than the existing slope, the creek is expected to decrease its slope (scour) to achieve a more stable form.
- Velocity: Where the predicted velocity is less than the HEC-RAS modeled velocity, floods will be more erosive than predicted by the creek geometry equations.

Table 6: Stable Geometry Equation Results – Reach 1

Reach 1												
Equation/ Parameter	Channel Width (ft)			Flow Depth (ft)			Slope (ft/ft)			Velocity (ft/s)		
	Q_{100}	Q_{50}	Q_2	Q_{100}	Q_{50}	Q_2	Q_{100}	Q_{50}	Q_2	Q_{100}	Q_{50}	Q_2
Bray - 1	121.4	112.8	69.3	3.1	3.0	2.2	-	-	-	-	-	-
Bray - 2	179.0	166.3	102.1	3.6	3.5	2.6	0.00011	0.00011	0.00015	2.6	2.6	2.3
Hey	-	-	-	13.9	13.2	9.3	1.29127E-05	1.39E-05	2.27E-05	-	-	-
A&C / Lacey*	137.7	129.9	88.1	-	-	-	-	-	-	2.8	2.7	2.3
Chang	-	-	-	-	-	-	1.39843E-08	1.48E-08	2.19E-08	-	-	-
Kellerhals	75.0	70.0	44.1	7.3	6.9	4.8	-	-	-	-	-	-
AMAFCA	31.5	28.4	18.5	-	-	-	0.00316	0.00378	0.00446	-	-	-
M&O	-	-	17.1	-	-	1.1	-	-	-	-	-	4.8
Average	108.9	101.5	56.5	7.0	6.7	4.0	0.00082	0.00098	0.00116	2.7	2.7	3.1
HEC-RAS	56.7	52.4	34.3	14.5	13.9	10.5	0.02470	0.02470	0.02470	6.4	6.0	4.3

Table 7: Stable Geometry Equation Results – Reach 2

Reach 2												
Equation/ Parameter	Channel Width (ft)			Flow Depth (ft)			Slope (ft/ft)			Velocity (ft/s)		
	Q_{100}	Q_{50}	Q_2	Q_{100}	Q_{50}	Q_2	Q_{100}	Q_{50}	Q_2	Q_{100}	Q_{50}	Q_2
Bray - 1	121.4	112.8	69.3	3.1	3.0	2.2	-	-	-	-	-	-
Bray - 2	179.0	166.3	102.1	3.6	3.5	2.6	0.00011	0.00011	0.00015	2.6	2.6	2.3
Hey	-	-	-	13.9	13.2	9.3	1.29127E-05	1.39E-05	2.27E-05	-	-	-
A&C / Lacey*	137.7	129.9	88.1	-	-	-	-	-	-	2.8	2.7	2.3
Chang	-	-	-	-	-	-	1.39843E-08	1.48E-08	2.19E-08	-	-	-
Kellerhals	75.0	70.0	44.1	7.3	6.9	4.8	-	-	-	-	-	-
AMAFCA	39.7	37.6	24.4	-	-	-	0.00455	0.00446	0.00525	-	-	-
M&O	-	-	17.1	-	-	1.1	-	-	-	-	-	4.8
Average	110.6	103.3	57.5	7.0	6.7	4.0	0.00117	0.00115	0.00136	2.7	2.7	3.1
HEC-RAS	72.6	69.1	48.0	11.4	10.9	8.1	0.01160	0.01160	0.02470	6.6	6.2	5.8

Table 8: Stable Geometry Equation Results – Reach 3

Reach 3												
Equation/ Parameter	Channel Width (ft)			Flow Depth (ft)			Slope (ft/ft)			Velocity (ft/s)		
	Q_{100}	Q_{50}	Q_2	Q_{100}	Q_{50}	Q_2	Q_{100}	Q_{50}	Q_2	Q_{100}	Q_{50}	Q_2
Bray - 1	156.1	145.1	87.8	3.7	3.5	2.5	-	-	-	-	-	-
Bray - 2	230.3	214.0	129.4	4.3	4.1	3.0	0.00009	0.00010	0.00013	2.8	2.8	2.4
Hey	-	-	-	16.7	15.9	11.0	1.00231E-05	1.08E-05	1.79E-05	-	-	-
A&C = Lacey*	168.3	158.7	106.4	-	-	-	-	-	-	3.0	2.9	2.5
Chang	-	-	-	-	-	-	1.14409E-08	1.21E-08	1.81E-08	-	-	-
Kellerhals	95.3	88.9	55.2	8.9	8.4	5.7	-	-	-	-	-	-
AMAFCA	47.3	52.3	26.1	-	-	-	0.00826	0.00383	0.00369	-	-	-
M&O	-	-	17.1	-	-	1.1	-	-	-	-	-	4.8
Average	139.5	131.8	70.4	8.4	7.9	4.7	0.00209	0.00099	0.00096	2.9	2.9	3.2
HEC-RAS	111.4	111.3	37.2	14.1	13.9	8.6	0.00948	0.00948	0.00948	7.1	6.9	6.2

Table 9: Stable Geometry Equation Results – Reach 4

Reach 4												
Equation/ Parameter	Channel Width (ft)			Flow Depth (ft)			Slope (ft/ft)			Velocity (ft/s)		
	Q_{100}	Q_{50}	Q_2	Q_{100}	Q_{50}	Q_2	Q_{100}	Q_{50}	Q_2	Q_{100}	Q_{50}	Q_2
Bray - 1	156.1	145.1	87.8	3.7	3.5	2.5	-	-	-	-	-	-
Bray - 2	230.3	214.0	129.4	4.3	4.1	3.0	0.00009	0.00010	0.00013	2.8	2.8	2.4
Hey	-	-	-	16.7	15.9	11.0	1.00231E-05	1.08E-05	1.79E-05	-	-	-
A&C / Lacey*	168.3	158.7	106.4	-	-	-	-	-	-	3.0	2.9	2.5
Chang	-	-	-	-	-	-	1.14409E-08	1.21E-08	1.81E-08	-	-	-
Kellerhals	95.3	88.9	55.2	8.9	8.4	5.7	-	-	-	-	-	-
AMAFCA	64.8	55.1	27.8	-	-	-	0.00220	0.00359	0.00510	-	-	-
M&O	-	-	17.1	-	-	1.1	-	-	-	-	-	4.8
Average	143.0	132.3	70.6	8.4	7.9	4.7	0.00058	0.00092	0.00131	2.9	2.9	3.2
HEC-RAS	115.9	111.1	56.0	11.6	11.5	9.1	0.01275	0.01275	0.01275	8.4	7.3	4.8

Table 10: Stable Geometry Equation Results – Reach 5

Reach 5												
Equation/ Parameter	Channel Width (ft)			Flow Depth (ft)			Slope (ft/ft)			Velocity (ft/s)		
	Q_{100}	Q_{50}	Q_2	Q_{100}	Q_{50}	Q_2	Q_{100}	Q_{50}	Q_2	Q_{100}	Q_{50}	Q_2
Bray - 1	156.1	145.1	87.8	3.7	3.5	2.5	-	-	-	-	-	-
Bray - 2	230.3	214.0	129.4	4.3	4.1	3.0	0.00009	0.00010	0.00013	2.8	2.8	2.4
Hey	-	-	-	16.7	15.9	11.0	1.00231E-05	1.08E-05	1.79E-05	-	-	-
A&C / Lacey*	168.3	158.7	106.4	-	-	-	-	-	-	3.0	2.9	2.5
Chang	-	-	-	-	-	-	1.14409E-08	1.21E-08	1.81E-08	-	-	-
Kellerhals	95.3	88.9	55.2	8.9	8.4	5.7	-	-	-	-	-	-
AMAFCA	56.2	98.1	31.5	-	-	-	0.03878	0.00142	0.00182	-	-	-
M&O	-	-	17.1	-	-	1.1	-	-	-	-	-	4.8
Average	141.3	140.9	71.3	8.4	7.9	4.7	0.00972	0.00038	0.00049	2.9	2.9	3.2
HEC-RAS	246.7	241.0	38.5	13.8	13.8	8.2	0.01180	0.01180	0.01180	4.9	4.3	7.7

Table 11: Stable Geometry Equation Results – Reach 6

Reach 6												
Equation/ Parameter	Channel Width (ft)			Flow Depth (ft)			Slope (ft/ft)			Velocity (ft/s)		
	Q_{100}	Q_{50}	Q_2	Q_{100}	Q_{50}	Q_2	Q_{100}	Q_{50}	Q_2	Q_{100}	Q_{50}	Q_2
Bray - 1	159.4	148.0	90.0	3.7	3.5	2.6	-	-	-	-	-	-
Bray - 2	235.2	218.4	132.6	4.3	4.1	3.0	0.00009	0.00009	0.00013	2.8	2.8	2.4
Hey	-	-	-	17.0	16.1	11.2	9.81532E-06	1.06E-05	1.74E-05	-	-	-
A&C / Lacey*	171.1	161.3	108.5	-	-	-	-	-	-	3.0	3.0	2.5
Chang	-	-	-	-	-	-	1.12525E-08	1.19E-08	1.78E-08	-	-	-
Kellerhals	97.2	90.6	56.5	9.0	8.5	5.8	-	-	-	-	-	-
AMAFCA	164.2	167.7	28.0	-	-	-	0.00175	0.00102	0.00107	-	-	-
M&O	-	-	17.1	-	-	1.1	-	-	-	-	-	4.8
Average	165.4	157.2	72.1	8.5	8.1	4.7	0.00046	0.00028	0.00030	2.9	2.9	3.2
HEC-RAS	555.3	527.9	28.8	14.6	14.5	7.8	0.00290	0.00290	0.00290	2.5	2.2	5.1

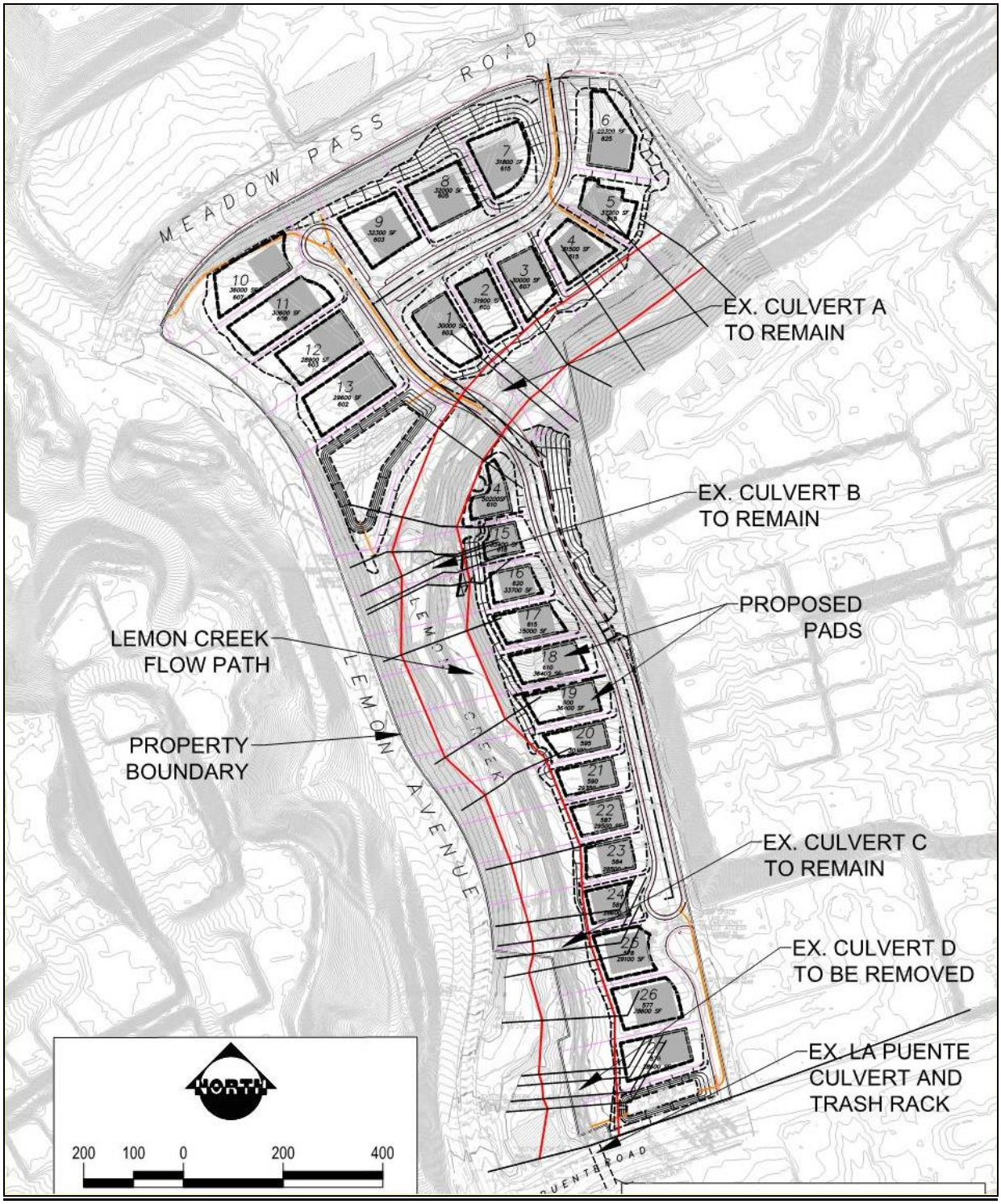
In general, the channel geometry analysis indicates that Lemon Creek will trend toward a greater width and shallower depth than the present channel geometry. The predicted velocities are mostly lower than the velocities computed by HEC-RAS; therefore, sediment scour and long-term degradation is predicted for most events. The calculated invert slopes indicate that the channel will tend to degrade (scour) as it approaches stable conditions. These calculations do not account for the protective function of the vegetation in the creek, thereby presenting a worst-case-scenario if vegetation were to be removed or reduced.

Conclusions / Recommendations

The combined results of the vertical and lateral migration analyses indicate that Lemon Creek has not achieved a stable condition and would need to degrade in order to achieve it. However, the lateral migration analysis does not take into account the protective nature of the mature, dense vegetation that exists in the creek. Historical analysis shows that dense vegetation has thrived in Lemon Creek for a long time and that the horizontal alignment of the creek has not changed, even through periods of rapid urbanization. Because this vegetation is not proposed to be removed or reduced as part of the planned development, the creek will likely not experience degradation. Additionally, the three remaining culverts, which act as grade stabilizing structures, will continue to prevent the creek bed from scouring. For the one culvert that is proposed to be removed, the overall stabilization of the creek will not be affected, as Culvert D is a mere 90-100 LF upstream of the next invert control point (La Puente Culvert).

Despite the fact that vertical and horizontal migration of the creek is not anticipated, the proposed development should be designed for the condition where lateral migration of the creek does occur, in the event that the vegetative cover were to ever be removed or reduced. In order to protect the development in this condition, it is recommended that the proposed residential structure footprints be placed outside the limits of the stable channel width. The average stable channel widths shown in **Tables 6** through **11** were transferred to the January 6, 2023 development plan and superimposed over the proposed lot lines / structure footprints. It is recommended that any proposed grading leading from the creek to the lots has a top of slope at or outside of the stable channel width boundary. Additionally, any structures proposed to be constructed on the lots adjacent to Lemon Creek should be offset from the stable channel width boundary by a minimum of 10 ft. **Figure 19** shows the January 6, 2023 development plan with the stable channel top width overlaid.

Figure 19: Proposed Site Plan with Stable Channel Width Overlay



References

Chang, H.H., Fluvial Processes in River Engineering, John Wiley & Sons, February 1988.

Chang, H.H., Fluvial 12 Mathematical Model for Erodible Channels Users Manual, June 1998.

Chow, V. T., Open-Channel Hydraulics. McGraw Hill, New York 1959.

Federal Highway Administration (FHWA), Hydraulic Engineering Circular Number 18. May 2001.

US Army Corps of Engineers (USACOE), HEC-RAS River Analysis System, version 6.0

Statement of Facts and Findings for the Brookside Project Final Environmental Impact Report, SCH No. 2016051030, May 2021

Attachments

A. HEC-RAS Model Results (PDF)
    a. Existing Conditions (100-yr)
    b. Existing Conditions (50-yr)
    c. Existing Conditions (2-yr)
    d. Existing Conditions (Bankfull Discharge)
    e. Proposed Conditions (100-yr)
    f. Proposed Conditions (50-yr)
    g. Proposed Conditions (2-yr)
    h. Proposed Conditions (Bankfull Discharge)
B. HEC-RAS Modeling Files (On Disc)
C. Stable Channel Parameter Calculations (PDF)

APPENDIX D - TRASH RACK MEMO



Technical Memorandum

Date: June 24, 2023

To: David Gilbertson, City Engineer
City of Walnut, Community Development Department
21201 La Puente Rd.
Walnut, CA 91789

From: Mark Krebs, P.E., President
Cherise Thompson, EIT, Design Engineer

CC: Jack Su, Spring Meadows Homes LLC / Meadow Pass Estates LLC
Scott Ashlock, Placeworks
Tim Paone, Cox Castle
Scott Birkey, Cox Castle
Laer Pearce, Laer Pearce & Associates
Joelle Guerra, City of Walnut, Community Development

Re: Trash Rack Concept Design at Face of La Puente Culvert, City of Walnut B852

---

1 - Introduction / Purpose

This technical memorandum presents a conceptual design of a proposed trash rack at the upstream face of the La Puente Rd. culvert, which is part of the flow path of Lemon Creek in the City of Walnut, California. The analysis and conceptual design result from a request by the City that the proposed Brookside development address debris flowing from upstream areas of Lemon Creek to the culvert. Past observations have shown that debris reaching the La Puente culvert obstructs the amount of flow that is able to pass through the culvert, causing flooding over the roadway and adjacent properties.

As part of this analysis, the following items were addressed: (1) an evaluation of the stability of Lemon Creek and how this could impact the culvert, (2) an evaluation of an in-line debris basin to reduce debris flowing to the culvert, and (3) an evaluation of a revised trash rack design at the face of the culvert.

2 - Project Background - General

The proposed project is situated on a 25.8-acre site at the intersection of Lemon Ave. and La Puente Rd. The site was formerly used as the Brookside Equestrian Center, which closed in 2014. The site is primarily open space, but contains various equestrian-related structures. The proposed development plan (April 27, 2022) includes the removal of the equestrian-related structures and the construction of 27 residential housing lots with a minimum area of 28,500 square feet. **Figure 3** shows the layout of the proposed development.

Lemon Creek runs through the middle of the site, traveling approximately 2,300 ft. The incised creek area is mostly vegetated, with some of the older trees and vegetation aged more than 15 years. The creek has a natural, trapezoidal shape with a low flow path created by a steady flow of water, which is present even in summer months. Small portions of the creek are engineered, primarily at each of the four culvert locations. These culverts also provide places for the existing trail network to cross over the creek. At the downstream end of the property, Lemon Creek enters a double 10 ft.(w) x 5 ft.(h) box culvert beneath La Puente Road, maintained by the City of Walnut (LA County as-built plan P.M. 14987, included in **Attachment D**).

A site visit was performed by PACE on August 30th, 2021, during which a photo survey was performed to document the current conditions of the creek. **Figures 1** and **2** show the current conditions of the culvert face and trash rack at La Puente Road.

3 - Flooding at La Puente Culvert

Based on discussions with the City of Walnut, the La Puente culvert was originally constructed without a trash rack; however, during numerous storm events after the culvert's construction, flooding was observed at this location, overtopping the roadway and nearby banks. The culvert was designed for a 25-yr storm event (per LACFCD storm drain improvement plan for P.M. 14987), which would be responsible for flooding during higher storm events. Water surface elevations at the upstream face of the La Puente culvert are shown in **Table 1** for various storm events.

Table 1: Water Surface Elevations at La Puente Culvert Headwall

Storm Event	Flow Rate (cfs)	WSE (ft)	Depth Above Creek Invert (ft)	Min. Roadway Elev. at Headwall (ft)	Depth Above Roadway (ft)
2-yr	985	565.8	7.2	570	N/A
50-yr	2,533	572.1	13.5	570	2.1
100-yr	2,916	572.3	13.7	570	2.3

However, even for storms less than a 25-yr return period, flooding has been observed at the culvert face, which is due to debris flowing from the naturalized area upstream, such as branches, logs, cardboard, plastic bags, etc., which would get caught at the culvert entrance and restrict the flow. In order to prevent the debris from getting lodged in the culvert a trash rack was installed, which, as can be seen in **Figure 2**, is flush with the face of the culvert. The trash rack retrofit is shown in the plan set included in **Attachment C**. Due to the fact that the trash rack is flush with the culvert face, debris reaching the culvert gets trapped on the grate and continues to obstruct flow from entering the culvert, providing little to no flooding relief. After multiple flooding events were observed at La Puente Road, even after the trash rack installation, a second retrofit was introduced, involving the stand pipe, which can also be seen in **Figure 2**. Once water at the culvert face reaches the top of the stand pipe, water is able to flow unobstructed to the culvert, which has helped to somewhat alleviate the flooding issues. However, the stand pipe provides limited relief, especially during larger storm events, and the City could stand to benefit from an improved design.

Although the portion of Lemon Creek containing the culvert, transition structure, and trash rack are not part of the Brookside property, the project proponents have offered to assist the City in developing a solution to the flooding problem, both in order to address the concerns of City reviewers and in order to positively impact nearby property owners. The Brookside development itself will not contribute to the debris flowing to the culvert entrance, since developing an undeveloped area typically results in a reduction of natural debris production (i.e. sediment, branches, logs, etc.). Debris associated with development, such as cardboard, plastic bags, and other trash, will be addressed with water quality basins on-site, and will not contribute to debris and flooding issues at the La Puente Culvert.

In terms of the type of debris that negatively impacts flooding at the culvert, it is primarily branches, logs, cardboard, plastic bags, and other trash. Sediment does not make up a large portion of the debris accumulating at the culvert entrance, primarily due to the fact that a majority of the Lemon Creek watershed is developed, which does not provide much opportunity for sediment production. A hydrology analysis performed by PACE in August 2022 determined that the Lemon Creek watershed is approximately 80% developed, and 40% impervious (*Brookside Development Project – Lemon Creek Hydrology and Hydraulics*, June 2023). The project site makes up approximately 2% of the total watershed area (1,541 ac).

Additionally, preliminary calculations were performed to estimate sediment transport capacity for various sub-reaches of Lemon Creek located within the project boundary. The results, shown in **Table 2**, indicate that the culvert itself has a high capacity for transporting sediment, relative to upstream reaches, which

makes aggradation of sediment in the culvert extremely unlikely, even if significant amounts of sediment were able to be transported from further upstream.

Table 2: Lemon Creek Reach Capacity Comparison

Reach Description	Flow in Creek[1] (cfs)	Return Period	Flow in Culvert[2] (cfs)	Average Depth[3] (ft)	Average Velocity[3] (ft/s)
Immediately U/S of La Puente Culvert	985	2-yr	985	7.8	5.1
	2,533	50-yr	1,448	14.5	2.4
	2,916	100-yr	1,629	14.6	2.5
La Puente Culvert (Double 10'w x 5'h RCB)	985	2-yr	985	5.0	9.9
	2,533	50-yr	1,448	5.0	14.5
	2,916	100-yr	1,629	5.0	16.3

Notes:
1 - Flows listed are clearwater flows from PACE regional hydrology analysis, described in *Brookside Development Project - Lemon Creek Hydrology & Hydraulics* report, dated June 2023
2 - Flow in culvert is less than creek for 50- and 100-yr conditions because flow overtops La Puente culvert and roadway
3 - Depth and Velocity shown are from proposed conditions model, described in same report mentioned in Note 1.

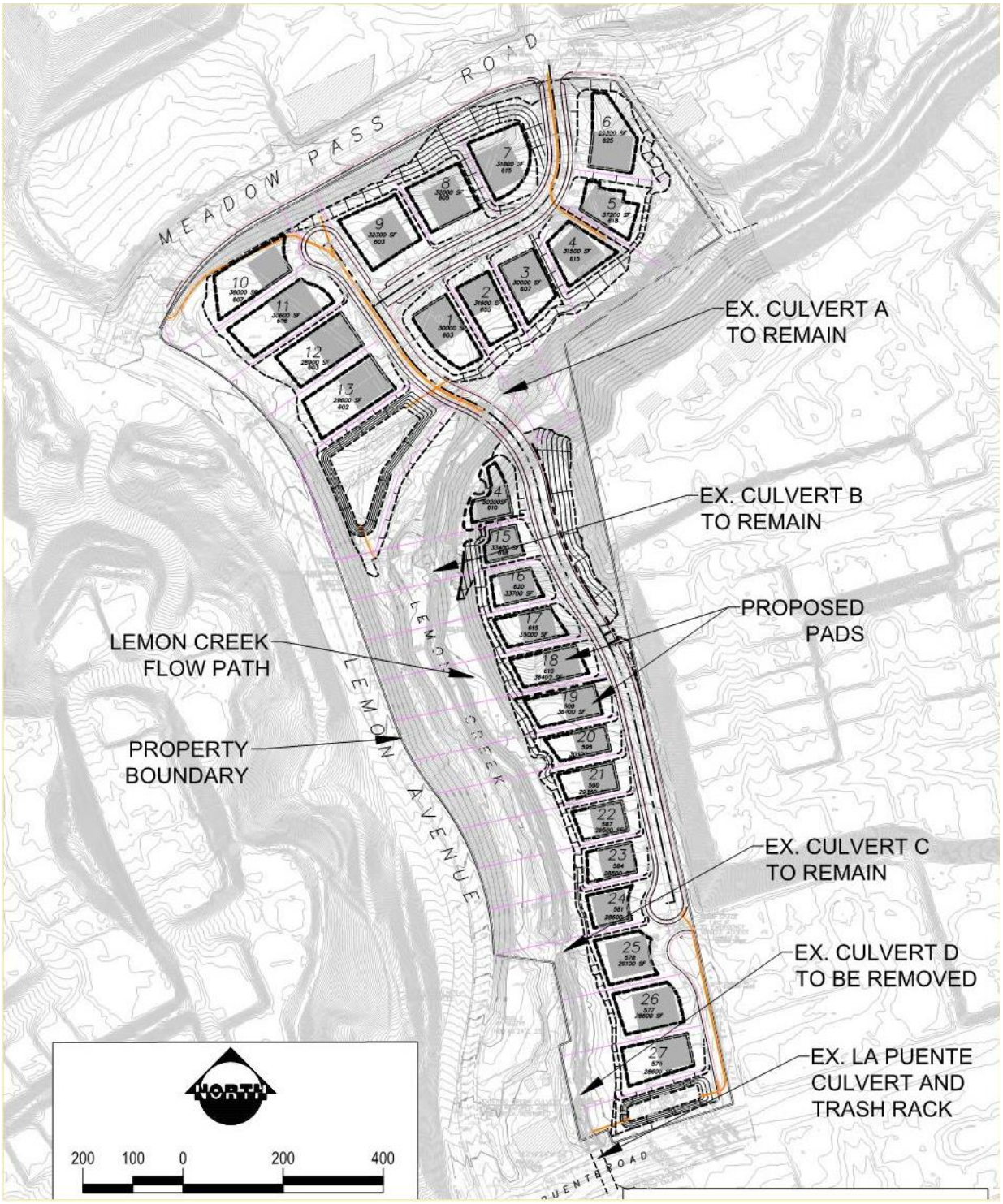
Figure 1: Site Photo - Upstream Face of La Puente Rd. Culvert



Figure 2: Site Photo – Stand Pipe and Trash Rack



Figure 3: Brookside Development Proposed Layout



4 - Summary of PACE Stream Stability Analysis and Recommendation

In June 2023, PACE prepared a technical memorandum titled *Lemon Creek Stream Stability Analysis at Proposed Brookside Development* (provided in **Attachment E**). The analysis evaluated historical imagery, site photographs, and empirical equations for stable channel dimensions to determine Lemon Creek's potential to migrate vertically and horizontally over time. The analysis concluded that the stability observed within Lemon Creek stems from the protection provided by the dense vegetation and the existing culverts, which act as invert control points. In order to protect the proposed development, it was recommended that (1) minimal vegetation be removed from the creek during construction and (2) the proposed residential structure footprints be placed a minimum of 10 ft. outside the limits of the calculated average stable channel widths. The current plan complies with both of these recommendations.

As described in **Section 3**, the capacity of the La Puente culvert to transport sediment is relatively larger than the naturalized reaches upstream; therefore, accumulation of sediment within the culvert is not expected, even in a condition where the project reach were to generate more sediment than occurs in existing conditions.

5 - Evaluation of In-line Debris Basin Implementation

In initial discussions with the City of Walnut, an in-line debris basin was considered to reduce the amount of debris reaching the La Puente culvert, in order to alleviate flooding. However, after further evaluation of this application, an in-line debris basin is not recommended, based on the following factors:

A. Type of Debris: The debris accumulating on the trash rack and obstructing flow through the La Puente culvert is mostly trash and vegetation (branches, logs, leaves etc.). This type of debris tends to float and would not settle out in a debris basin. The floating debris would continue downstream before becoming trapped on the trash grate, as occurs in existing conditions. Debris basins are more aptly suited to trap sediment; however, as discussed in prior sections, sediment does not make up a significant part of the debris carried by the flows in Lemon Creek and is not the cause of flooding at La Puente Road.

B. Spatial Constraints: The flow path of Lemon Creek is narrow and incised, with steep banks. In order to size a basin that could capture all of the debris flowing from upstream areas (both on- and off-site), a significant expansion and re-grading of the creek would need to occur, which would exceed the available area on-site. The total watershed draining to the La Puente culvert is 1,541 acres, while the site itself only makes up about 2% of this.

6 - Evaluation of Trash Rack Implementation

Instead of an in-line debris basin, a revised trash rack design would be best suited to alleviate the debris and flooding issues at the La Puente culvert. The vertical trash rack design that is flush with the culvert face is problematic in that the debris captured by the grate remains stuck in front of the opening, thereby blocking the culvert entrance and reducing the hydraulic flow capacity of the culvert. Los Angeles County Standard Plans for Public Works Construction (SPPWC Green Book) contains standard drawings for trash racks that are inclined at a 2:1 slope (**Attachment B**: Standard Plan 361-2). This effectively causes floating debris at the grate to slide up the sloping grate as the water level rises, preventing it from being pushed up against and trapped on the grate. The top of the grate would sit 2-3 ft. above the roof of the culvert so that, when the culvert is flowing full during large storm events, the accumulated debris is pushed against the headwall above the culvert, which does not impede flow from entering the culvert. Conceptual design drawings have been developed, which help illustrate this configuration (see **Figures 4** through **7**). The sections are also shown on **Attachment A**.

It should be noted that the standard drawing referenced from SPPWC Green Book will need to be modified for final design. The standard drawing applies to grates with a maximum length of 10 ft, while the proposed grate is 16.5 ft. Additionally, because the existing transition structure wingwalls are warped and the base width of the channel expands in the direction of flow, additional modifications will need to be made to the standard shape of the trash rack. It should also be noted that an as-built plan was not found

for the La Puente culvert's transition structure, which is necessary to determine the actual slope, height, and length of the wingwalls. For the purposes of this analysis, satellite imagery and standard drawings for transition structures were evaluated in order to estimate the size and configuration of the proposed trash rack. For final design, a site survey will need to take place in order to identify exact elevations, tie-in points, and dimensions.

Figure 4: Concept Design Trash Rack – Plan View

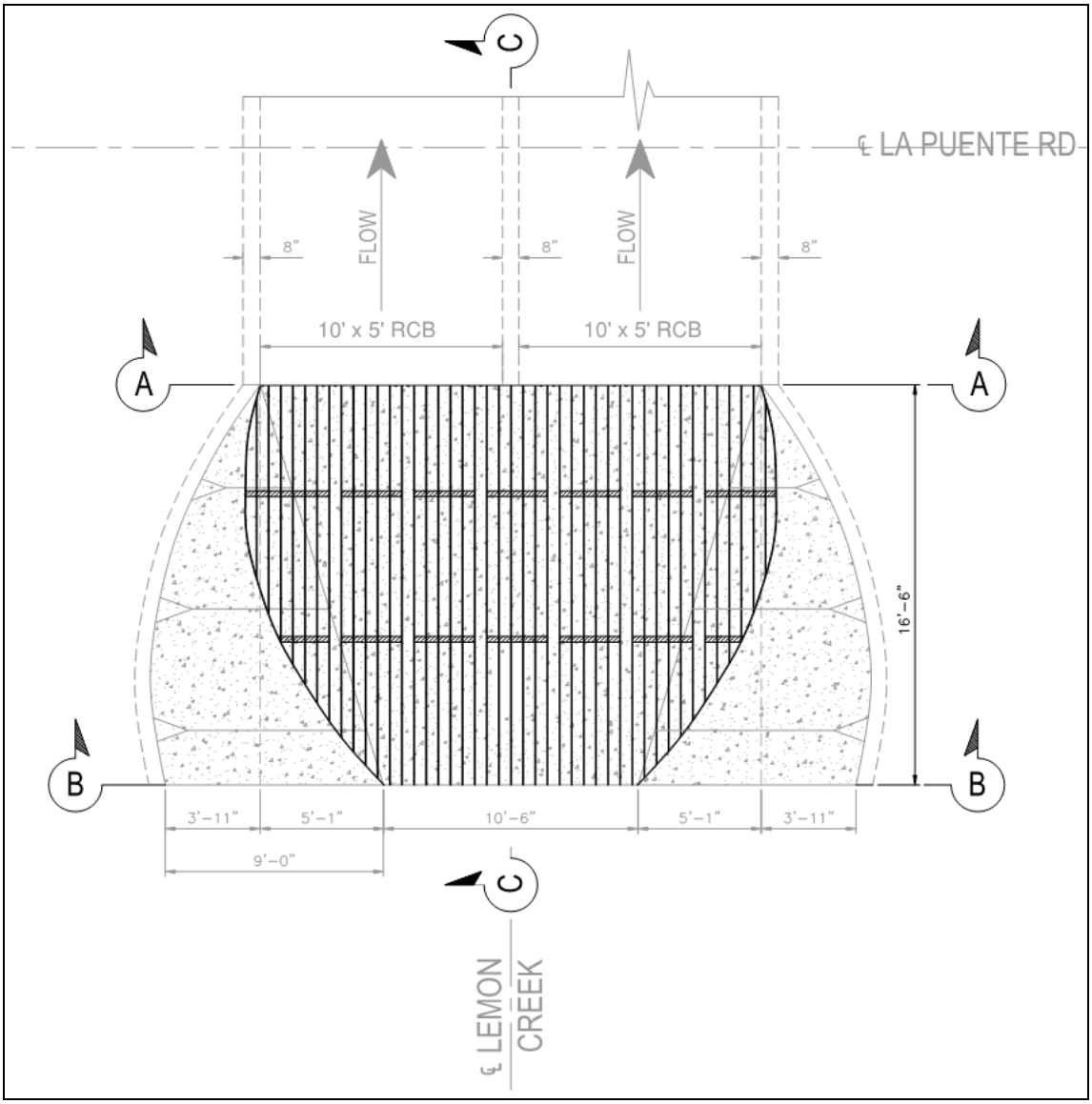


Figure 5 – Concept Design Trash Rack – Section A

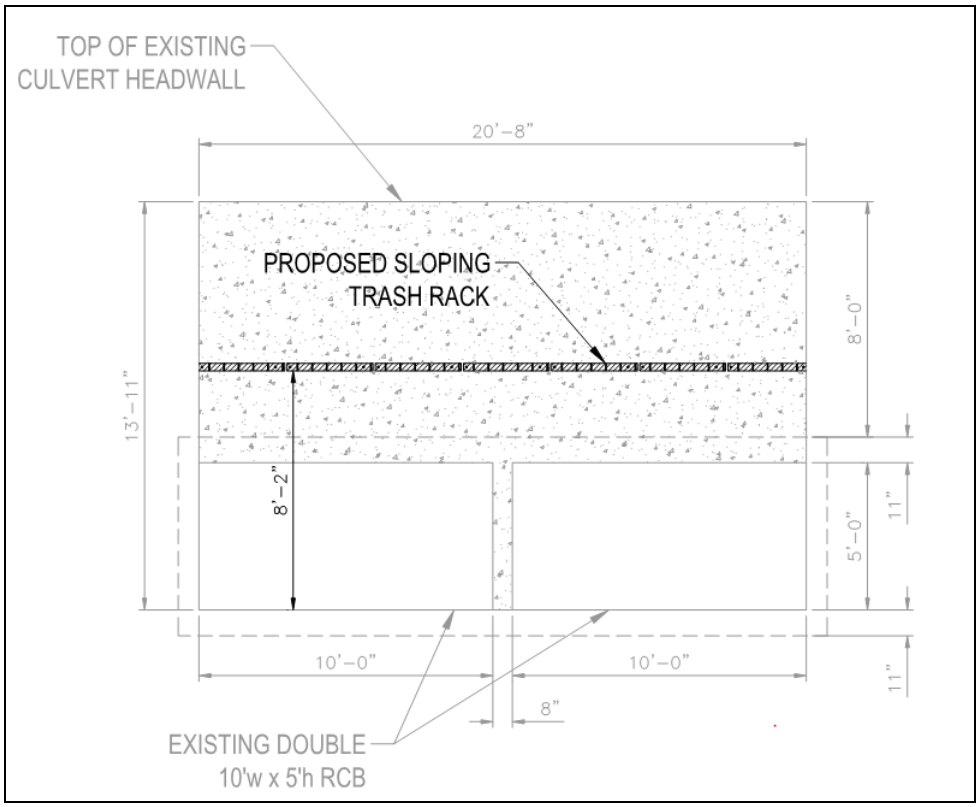


Figure 6 – Concept Design Trash Rack – Section B – Elevation View

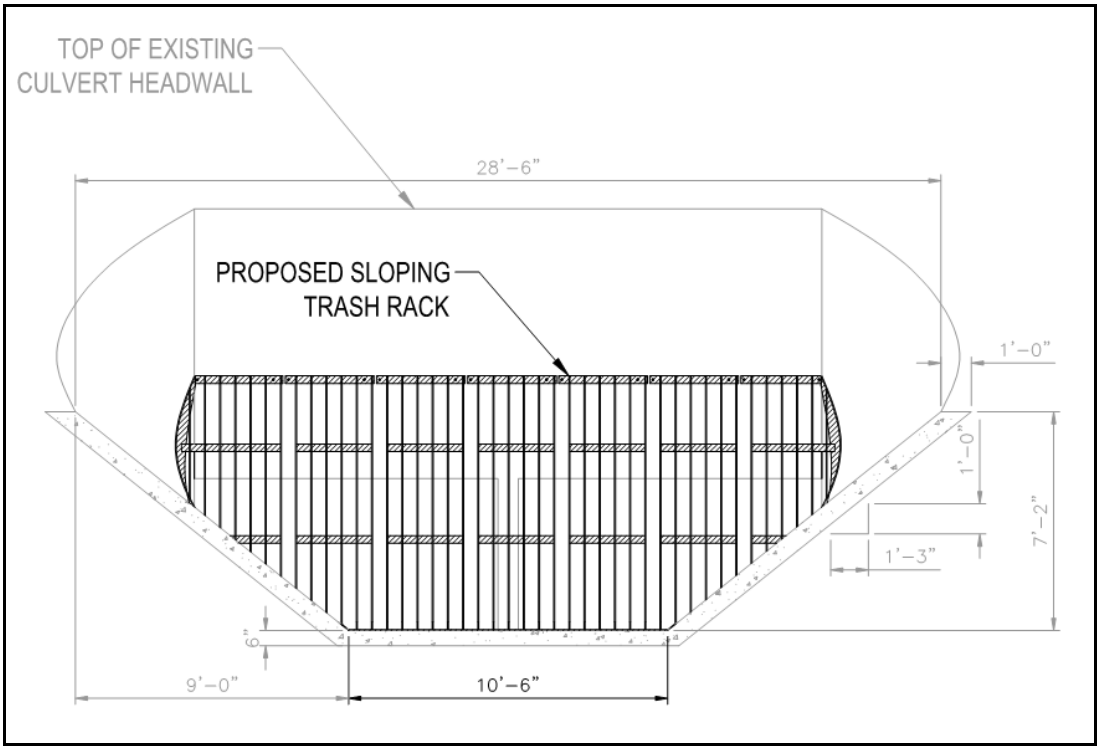
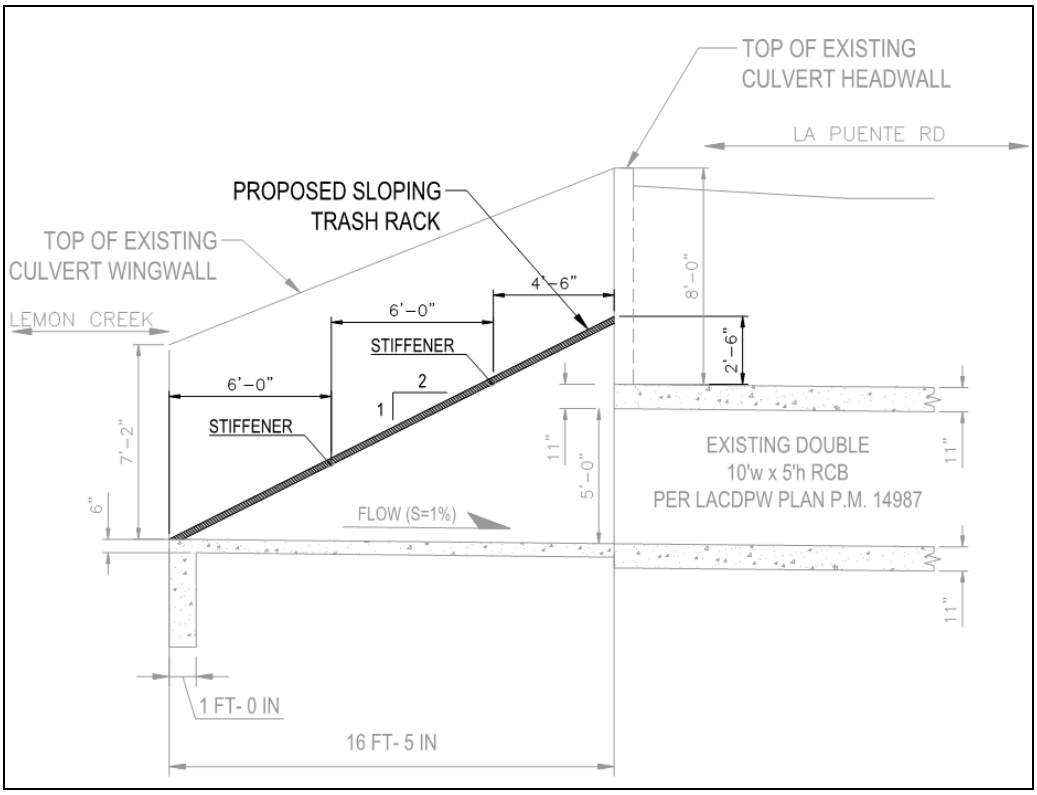


Figure 7 – Concept Design Trash Rack – Section C



7 – Conclusion

The culvert face at La Puente Rd., located at the downstream end of the proposed Brookside development, has experienced flooding in the past due to debris becoming lodged in the culvert and, after the construction of a trash rack, on the grate at the culvert entrance. While the culvert is not situated on the Brookside property and the proposed project will not contribute to the debris/flooding problem, the project proponents would like to propose a revised trash rack design to the City in order to alleviate these issues.

The proposed trash rack would be sloped at 2:1, which is a more favorable design than either the existing trash rack, which is flush with the culvert face, or an in-line debris basin. The current trash rack is flush with the culvert face, which means that any debris that travels to this point gets pushed up against the grate and is trapped there, resulting in diminished flow capacity in the culvert. An in-line debris basin would also not be suitable for capturing the floating debris that has been observed in Lemon Creek (i.e. branches, logs, cardboard, trash bags, etc.), as these would not settle out. Additionally, spatial constraints at the project site would make the construction of a basin extremely difficult and costly.

The sloped trash rack design causes debris that reaches the gate to slide up the inclined grate as the water level rises. As the culvert becomes full, the captured debris floats at the top of the grate, above the culvert opening, thereby allowing flow to travel unimpeded through the culvert.

We believe this revised trash rack design will help alleviate the flooding issues at La Puente Rd. and will require less operations and maintenance activities than the current grate. The maintenance activities that will need to take place, such as removing the accumulated trash/debris at the grate before/after storm events, will occur much as it does in existing conditions. The grate is within close proximity to La Puente Rd., allowing maintenance crews to easily inspect and access the grate.

7 - References

Pacific Advanced Civil Engineering Inc. (PACE), Lemon Creek Stream Stability Analysis at Proposed Brookside Development, June 2023.

Pacific Advanced Civil Engineering Inc. (PACE), Brookside Development Project – Lemon Creek Hydrology & Hydraulics, June 2023.

Attachments

Attachment A – La Puente Proposed Trash Rack Concept Design Drawings

Attachment B – SPPWC 361-2 Trash Rack Standard Drawing

Attachment C – La Puente Existing Trash Rack As-Built Drawing

Attachment D – La Puente Existing Culvert As-Built Drawing

Attachment E – PACE Lemon Creek Stream Stability Analysis at Proposed Brookside Development, June 2023

APPENDIX E - LACFCD HYDROLOGY INFO REQUEST SUMMARY

WATER RESOURCES DIVISION
HYDROLOGY SECTION

Q-2301

INFORMATION REQUEST SUMMARY

Date: 4/07/2014

Project Name: Lemon Creek

Project Location: Lemon Creek between Meadow Pass Rd and La Puente Rd | T.G. Page: 639 | Grid: E7

Project Engineer: Martin Araiza

Technical Review by: Martin Araiza MA

Information Requested: flow rates

Information Requested By: Daniela Malott of RBF

Information To Be Used: planning purposes

Will Information Be Used In Any Litigation? ☐ *Yes* ☒ *No*

Information Provided:

Location	Subarea A (acres)	Subarea Q (cfs)	Total A (acres)	Total Q (cfs)
127B	53	135	890	2,021
128B	22	79	912	2,030
138C	62	137	436	1,013
139C	55	154	491	1,153
140C	8	35	499	1,153
141BC	-	-	1,411	3,182
142B	30	84	1,441	3,236
143B	25	98	1,466	3,255

See attached comprehensive hydrology map.

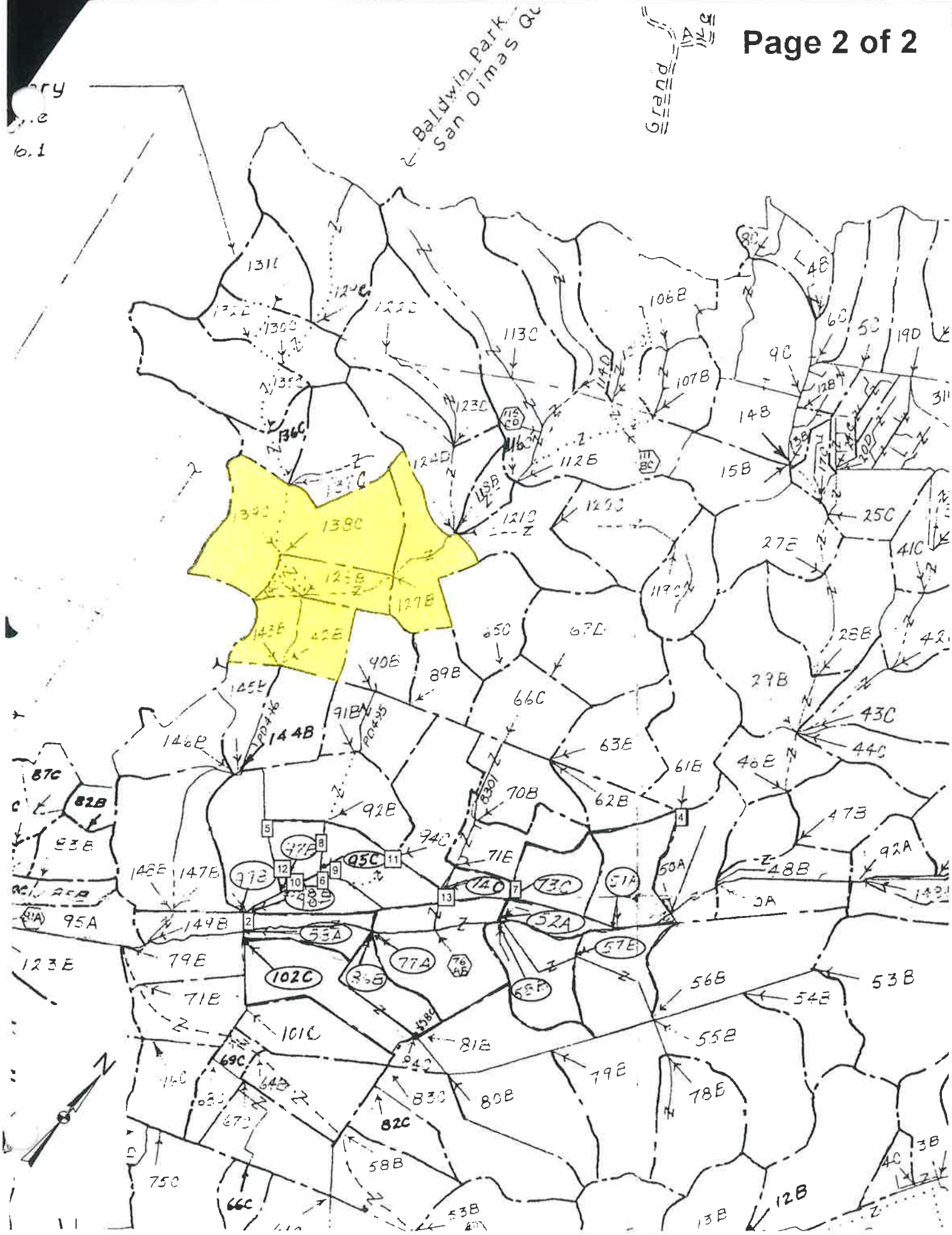
Date Provided: 4/07/2014 via e-mail (Daniela.Malott@rbf.com)

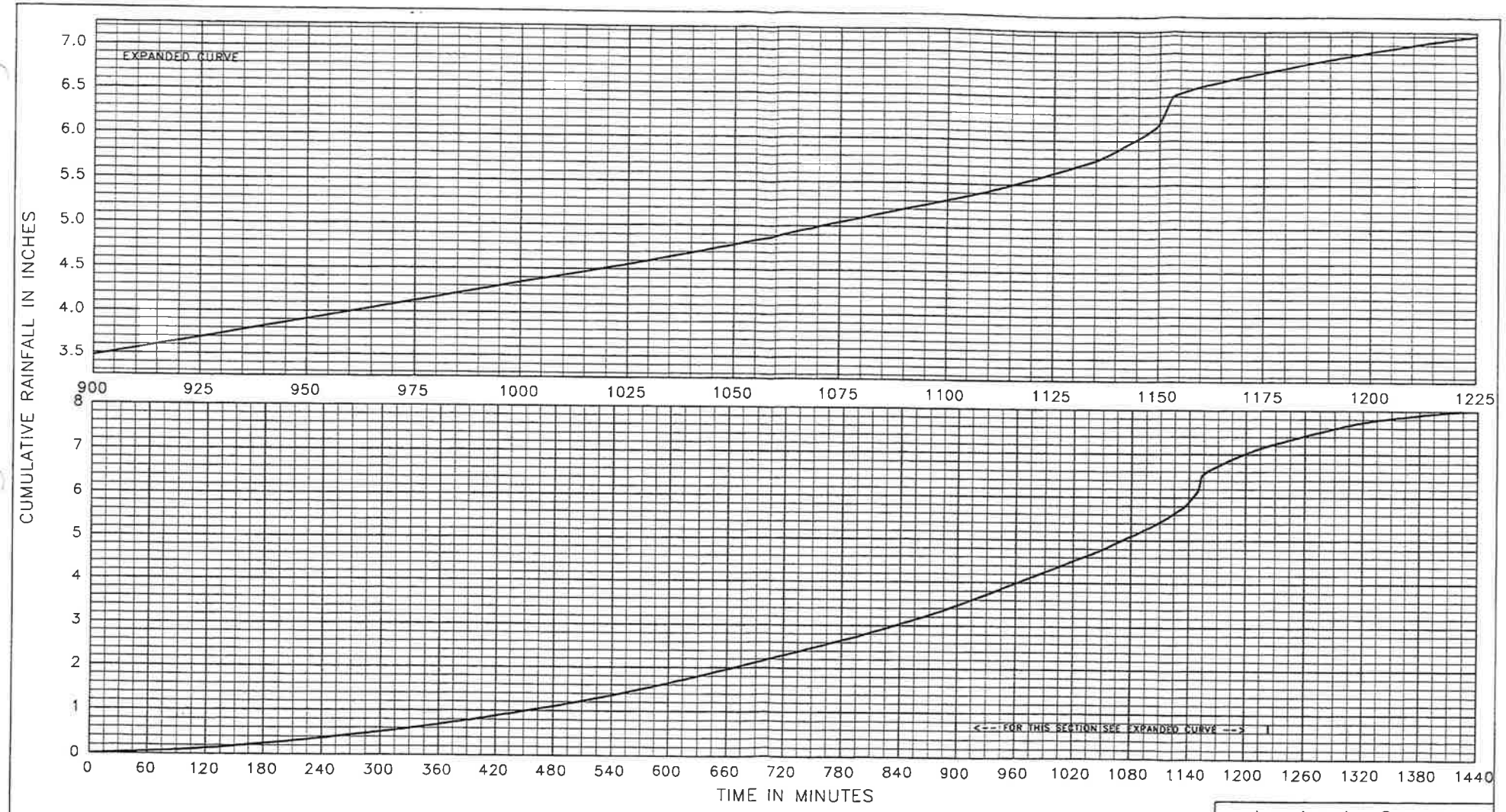
References:

- *San Jose Creek Hydrology Study dated 1972*

Calculations, Comments, Etc...

The flow rates provided were calculated based on Zone Method and a 50-year frequency rainfall event. Current landuse and drainage conditions may differ than those used/assumed in the 1972 study. Our Department has since revised our hydrology method. Refer to the 2006 Hydrology Manual. Be advised that flow rates calculated using this revised method and current landuse and drainage conditions may be different from those listed herein. The information provided should be used for planning purposes.


Baldwin Park
San Dimas Qu
Grand
131C
122C
123C
113C
106B
107B
148
15B
112B
125C
27E
41C
28B
29B
43C
44C
40E
63E
61B
62B
47B
48B
92A
50A
52A
57E
53B
54B
56B
55B
79E
78E
80B
81B
83C
82C
58B
75C
66C
67C
89B
91B
92E
94C
71E
70B
95C
97B
99B
102C
101C
69C
64B
147B
148B
149B
95A
123E
87C
82B
93B
146E
145E
144B
138C
139C
127B
143E
42E
40E
89B
66C
67C
91B
92E
94C
71E
70B
95C
97B
99B
102C
101C
69C
64B
147B
148B
149B
95A
123E
79E
71E
87C
82B
93B
146E
145E
144B
138C
139C
127B
143E
42E



Los Angeles County
Department of Public Works

RAINFALL MASS CURVE
K ZONE—50 YEAR
FREQUENCY

25 SS.SPG

Appendix F – Water Quality Analysis

Pollutant Runoff Concentrations:

Pollutant	Constituent	Concentrations Open Space & Recreation (Vacant)	Concentrations Open Space and Recreation (Horse)	Concentrations Low Density Residential
Bacteria	Indicator Bacteria			
	Total Coliform (MPN/100mL)[2]	9,187[3]	3,000,000[1]	92,300[1]
Minerals	Total Dissolved Solids (TDS) (mg/L)	237[3]	237[3]	58[4]
	Total Suspended Solids (TSS) (mg/L)	186.0[3]	530.7[1]	22.0[1]
Nutrients	Total Phosphorus (mg/L)	0.16[3]	4.76[5]	0.39[4]
	Total Nitrogen (mg/L)[6]	**1.89[3]**	27.39[5]	**3.86[4]**
	Nitrate	*1.05[3]*	-	*0.86[4]*
	Nitrite	*0.05[3]*	-	*0.10[4]*
	TKN	*0.79[3]*	-	*2.90[4]*
Metals	Total Copper (mg/L)	0.015[3]	0.038[1]	0.017[1]

Notes:

1 - Southern California Coastal Water Research Project (SCCWRP) Technical Report 510, "Sources, Patterns, and Mechanisms of Storm Water Pollutant Loading From Watersheds and Land Uses of the Greater Los Angeles Area, California, USA" (March 2007) - Appendix B. 'Recreational (Horse)' Land Use

2 - MPN/100mL is "Most Probable Number of Bacteria per 100 milliliters"

3 - "Los Angeles County 1994-2000 Integrated Receiving Water Impacts Report". 'Vacant' Land Use

4 - "Los Angeles County 1994-2000 Integrated Receiving Water Impacts Report". 'High Density Single Family Residential' Land Use

5 - "Contamination of Surface Run-off Water and Soil in Two Horse Paddocks" by S. Airaksinen, M.-L. Heiskanen, & H. Heinonen-Tanski, July 4, 2006

6 - Total Nitrogen taken to be the sum of Nitrate, Nitrite, and TKN (Total Kjeldahl Nitrogen).

Pre-Project Equestrian Use Pollutant Loadings to Lemon Creek:

Discharge Point	Existing Land Use	Runoff Volume[1] (AF)	Runoff Total Coliform[2] (MPN/ 100 ml)	Runoff TDS (mg/L)	Runoff TSS (mg/L)	Runoff Total P (mg/L)	Runoff Total N (mg/L)	Runoff Total Cu (mg/L)
Lemon Creek	Open Space (Vacant)	4.10	9,187	237	186.0	0.16	1.89	0.015
	Open Space (Equestrian)[3]	1.75	3,000,000	237	530.7	4.76	27.39	0.038
	Total Pollutant Runoff Load to Lemon Creek (lbs)		**65,047**	**3,771**	**4,013.9**	**16.62**	**108.06**	**0.309**

Notes:

1 - Runoff volume calculated using annual average rainfall

2 - Total Coliform load reported in billions of MPN

3 - Equestrian Use areas identified from satellite imagery as fenced areas for horses, stables, feeding areas, corrals, trails, etc. Trails identified from site visits and topography. Although the entire site would have been used for horse recreation / care, this provides a conservative estimate using only areas that had higher traffic / residence time of horses.

Post-Project Pollutant Loadings to Lemon Creek (*Before BMP Treatment*):

Discharge Point	Proposed Land Use	Runoff Volume[1] (AF)	Runoff Total Coliform[2] (MPN/ 100 ml)	Runoff TDS (mg/L)	Runoff TSS (mg/L)	Runoff Total P (mg/L)	Runoff Total N (mg/L)	Runoff Total Cu (mg/L)
Basin No.1	Single Family Residential	6.36	92,300	58	22	0.39	3.86	0.0171
	Pollutant Runoff Load to Basin No.1 (lbs)		**7,238**	**1003**	**381**	**6.75**	**66.77**	**0.30**
Basin No.2	Single Family Residential	2.78	92,300	58	22	0.39	3.86	0.0171
	Pollutant Runoff Load to Basin No.2 (lbs)		**3,164**	**439**	**166**	**2.95**	**29.19**	**0.13**
Lemon Creek	Open Space (Vacant)	1.91	9,187	237	186	0.16	1.89	0.015
	Pollutant Runoff Load to Lemon Creek (lbs)		**216**	**1229**	**964**	**0.83**	**9.80**	**0.08**
Lemon Creek	Open Space (Equestrian)[3]	0.12	3,000,000	237	530.7	4.76	27.39	0.038
	Pollutant Runoff Load to Lemon Creek (lbs)		**4,579**	**1,229**	**2,752**	**24.69**	**142.00**	**0.20**

Notes:

1 - Runoff volume calculated using annual average rainfall

2 - Total Coliform load reported in billions of MPN

3 – Equestrian areas considered to be all proposed trail space in post-project condition

Post-Project BMP Pollutant Removal Efficiencies – Low Density Residential Areas:

Pollutant	Bioretention Removal Rate (90% of Volume)	Detention Basin Removal Rate (10% of Volume)
Total Coliform	90	60
Total TDS	0	0
Total TSS	80	40
Total P	60	20
Total N	40	33
Total Cu	65	40

Notes:

Data from a combination of (1) Massachusetts Department of Environmental Protection – BMP Factsheets ('Bioretention Areas & Rain Gardens / 'Dry Detention Basin') and (2) International Stormwater BMP Database - 2020 Urban BMP Database Performance Summary Report ('Detention Basin' and 'Bioretention').

Post-Project BMP Pollutant Removal Efficiencies – Open Space (Equestrian) Areas:

Pollutant	Vegetated (Wet) Swale Removal Rate (85% of Volume)	Remaining (15% of Volume)
Total Coliform	71	0
Total TDS	66	0
Total TSS	59	0
Total P	55	0
Total N	50	0
Total Cu	43	0

Notes:
Data from (1) Massachusetts Department of Environmental Protection – BMP Factsheets ('Water Quality Swale') and (2) International Stormwater BMP Database - 2020 Urban BMP Database Performance Summary Report ('Grass Swale').

Pre- vs. Post-Development Pollutant Discharges to Lemon Creek:

Site Conditions	Volume of Water Discharged[1] (AF)	Total Coliform Discharged[2] (MPN)	TDS Discharged (lbs)	TSS Discharged (lbs)	Total P Discharged (lbs)	Total N Discharged (lbs)	Total Cu Discharged (lbs)
Pre-Project Conditions (Equestrian)	6	65,047	3771	4014	17	108	0.3
Pre-Project Conditions (Vacant)	6	663	3771	2960	3	30	0.2
Post-Project Conditions	11	3,250	2920	883	8	58	0.2
Percent Change Pre (Equestrian) vs Post		-95%	-23%	-78%	-53%	-46%	-33%

Notes:

1 – Runoff volume calculated using annual average rainfall

2 - Total Coliform load reported in billions of MPN