The following are CPJ's responses to questions posed by the Chair of the Stream Committee of the Town of University Park, Mr. Dana Shea, sent on March 24, 2015 by e-mail.

CPJ Responses to questions are in red.

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1. At issue here is the combined flow from multiple sources. For simplicity's sake, the County has discussed them with the Town as the water flowing through Wells Run from upstream of the Town and the water coming from the Cafritz discharge pipe entering downstream of Route 1. The argument put forth in the developer's paper and apparently recounted by the County is that the flow of water coming off of the Cafritz site at the time of maximum flow coming from upstream is lower without the holding tank than with the holding tank. The Cafritz flow is diagrammed in Figure 2 on p. 7 of the Soltesz report. I have several questions on this topic.

    1. I understand the calculations performed to be for a 1, 10, and 100 year storm of 24 hour duration. Given that to be the case, I don't understand how the peak flow can be so narrow in time. Is this easily explainable?

        - As is standard practice, all three storm events use the same rainfall distribution (SCS type II rainfall distribution), but with different rainfall depths (2-year = 3.3 inches; 10-year = 5.3 inches; 100-year = 7.4 inches). Please see "NRCS_TR55_1986Manual_AppendixB.pdf" attached for a more thorough discussion on synthetic rainfall distributions and depths). The SCS type II rainfall distribution is a short, intense rainfall distribution where a large portion of the total storm rainfall occurs during a relatively small period of time due to the overall rainfall event. Given the short times of concentrations for the Cafritz property, the peak flow timing very closely aligns with the peak intensities of the storm itself. Figure B-1 below shows the Type II rainfall distribution. Figure B-2 below shows that the Type II rainfall distribution applies to a majority of the continental United States, including the State of Maryland.

Figure B-1 SCS 24-hour rainfall distributions

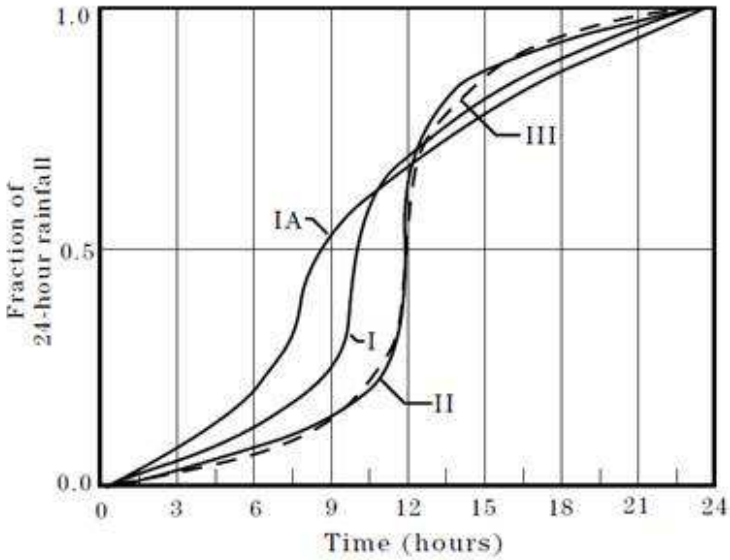
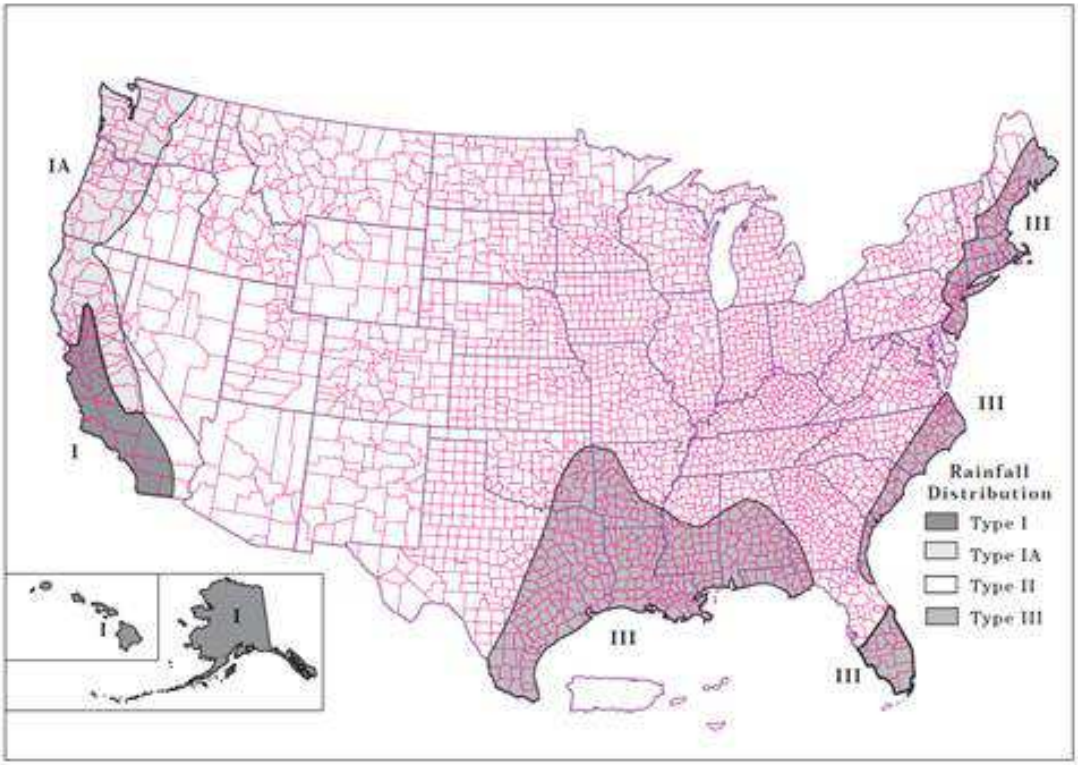


Figure B-2 Approximate geographic boundaries for NRCS (SCS) rainfall distributions

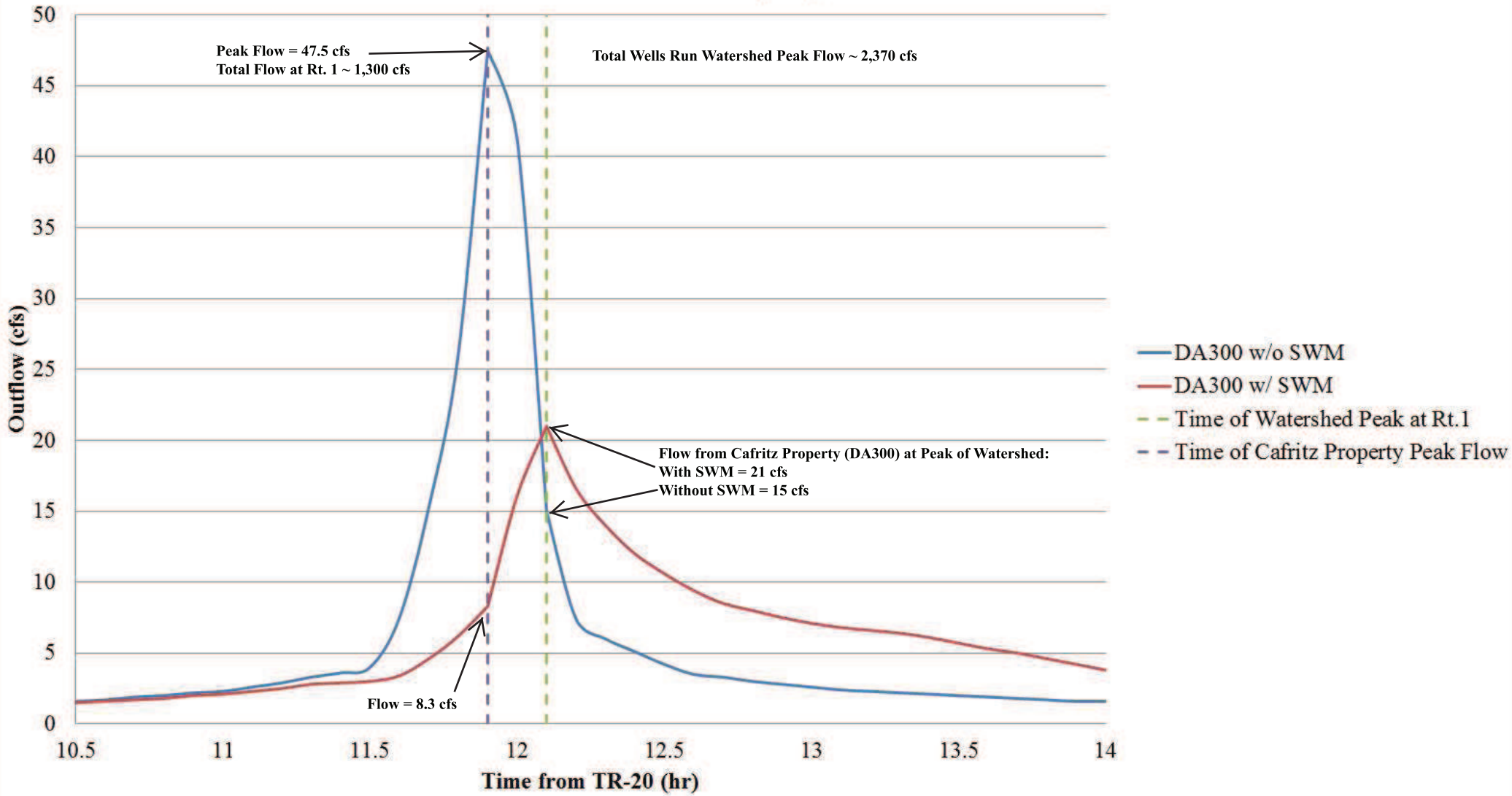


2. Figure 2 on p. 7 also shows that the Cafritz site peak flow occurs several minutes before the peak flow from upstream. At no point in the documents I've seen is the flow from upstream at this time point being calculated. While the Soltesz report describes summing the flows in the model as a function of time, I was unable to find this flow/time data in the report. In order to accurately assess the impact of the presence or absence of the holding tank, I would expect to be comparing two times for each case: the combination of the peak flow from Cafritz and non-peak flow at that time from upstream and the combination of the peak flow from upstream and non-peak flow from Cafritz at that time. Can this data be calculated (or extracted from the report) and presented for both the holding tank and no holding tank case?

    - The TR-20 model is the proper place to find this information. The summary table presented in the TR-20 section of the report is a quick reference that summarizes the contents of the TR-20 model. Expanding the TR-20 run can be done, but generally increases report length by a great deal (in this case close to 50 pages), which is why you couldn't find the information to perform the comparison mentioned. I have attached the expanded TR-20 sections for your reference.

      As you can see from Figure 1-A below, which charts the outflows from the Cafritz Property (DA300) with and without stormwater management (str300) of the 100-year storm event, the facility would effectively cut the peak outflow from the Cafritz property, but would increase the flow thereafter by utilizing storage to slowly release the water. [The effect of this, due to the location of the Cafritz property relative to the entire Wells Run drainage area, is to increase the release rate from the Cafritz property at the time of the peak flow of the entire drainage area (and after)]. In the report, see page E-6, rch19b (the flow of Wells Run at Route 1) shows the peak flow and timing of that flow to be at 12.10 hrs (2373.81 cfs). If you refer to the TR-20 schematic on E-1, you can see that rch300 combines with rch19a and DA360 to become rch19b (Wells Run at Route 1) in the report. In effect, the TR-20 model already performs the comparison that you would like to see, and the end result is that the resultant flow at Route 1 is at its peak after the peak from the Cafritz Property occurs. Figure 1-B below shows the same information as Figure 1-A, but includes the overall flow to Route 1. To illustrate, the entire drainage area to Route 1 at the Cafritz peak flow time (11.9 hrs) is 1321.3 cfs, while the peak flow to Route 1 at any time (12.1 hrs) is ~2370 cfs (depending on which scenario is used).

Figure 1-A: **Flow vs Time From Cafritz Property With and Without SWM**



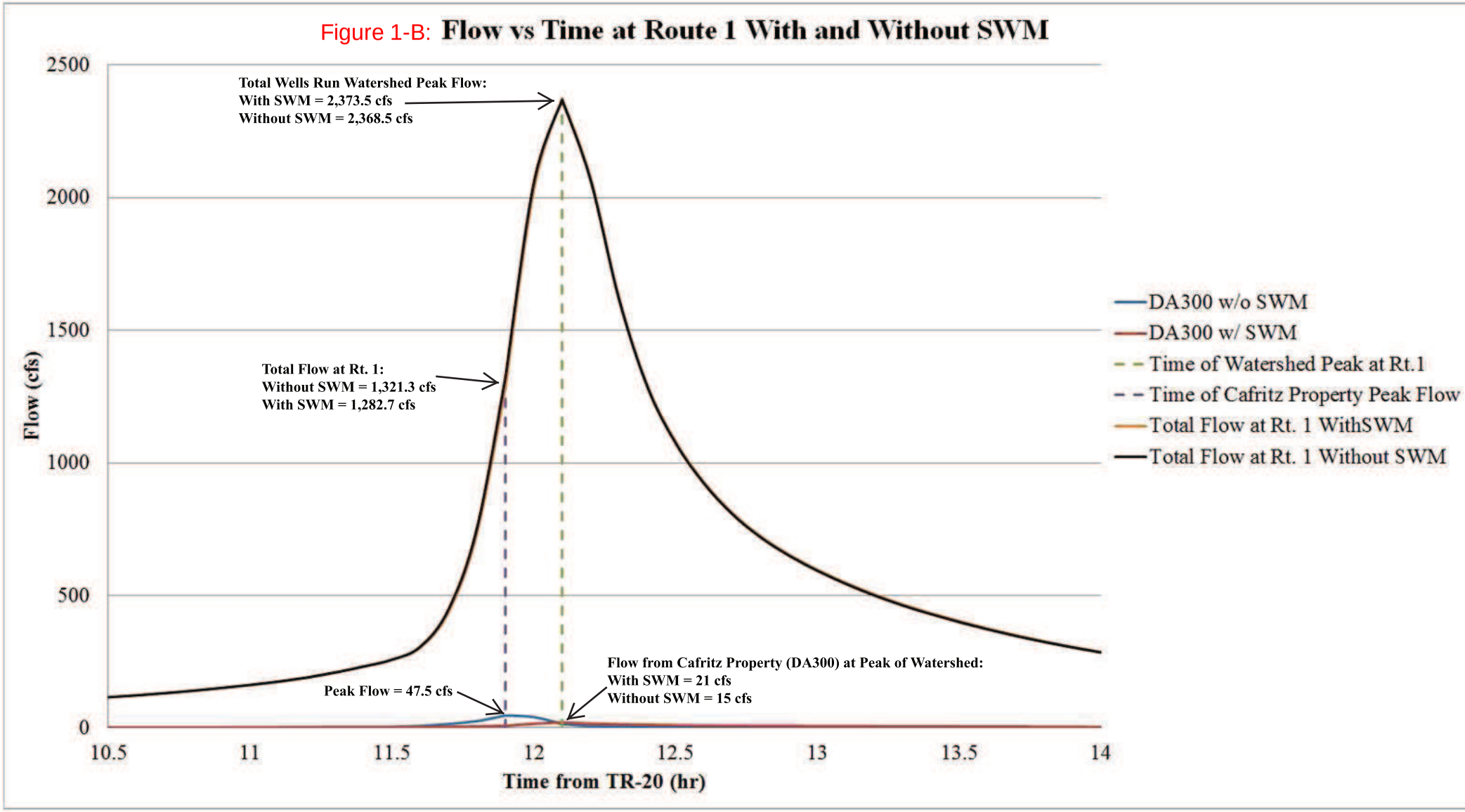
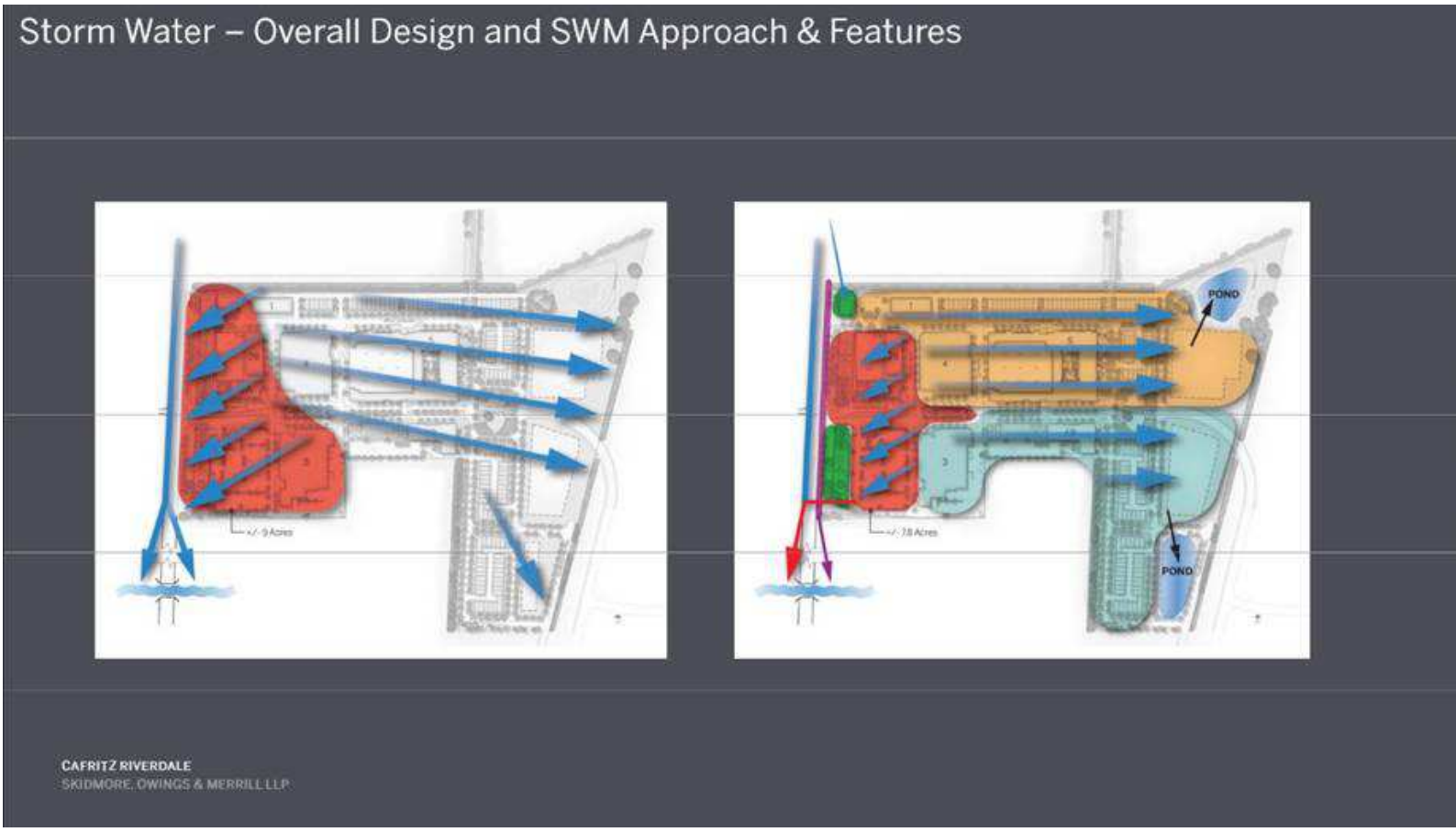


Figure 1-B: Flow vs Time at Route 1 With and Without SWM
Total Wells Run Watershed Peak Flow:
With SWM = 2,373.5 cfs
Without SWM = 2,368.5 cfs
Total Flow at Rt. 1:
Without SWM = 1,321.3 cfs
With SWM = 1,282.7 cfs
Peak Flow = 47.5 cfs
Flow from Cafritz Property (DA300) at Peak of Watershed:
With SWM = 21 cfs
Without SWM = 15 cfs
Flow (cfs)
2500
2000
1500
1000
500
0
10.5
11
11.5
12
12.5
13
13.5
14
Time from TR-20 (hr)
DA300 w/o SWM
DA300 w/ SWM
Time of Watershed Peak at Rt.1
Time of Cafritz Property Peak Flow
Total Flow at Rt. 1 WithSWM
Total Flow at Rt. 1 Without SWM

2. When I reviewed Table 4 and Table 5, I was struck that the drainage area for section 300 has lost area from 8.31 to 7.57 acres. The report is unclear on how this occurs. Can this be easily explained?

    1. The original site drainage divide is governed by how it lies on virgin ground. When the site is fully developed, the drainage area will be slightly altered, following rooftops, curb and gutter, sidewalks, etc. The net difference is incorporated within the other two on-site drainage areas. The following figure (Figure 2) demonstrates (not exactly) how the difference occurs between pre-existing and post-developed conditions (taken from http://www.upmd.org/docs/11-749-1414001765.pdf) .

Figure 2: Drainage Divide changes from Pre-Existing Conditions to Post-Developed Conditions



3. The model described on p. B-4 appears to not use the correct data for total Q as a function of elevation. What effect would this have on the model outputs and the conclusions drawn?

    1. As it relates to the overall effect on the 100-year floodplain, not at all. The timing issue is the biggest issue. Two of the elevations vs. outflows are slightly different than the computations on the previous page, but this will have little to no effect on the total Q on the overall Q at Rt. 1 at Peak flow (if so, a matter of several tenths of a cfs).

4. Finally, the HEC-RAS data contains some interesting column headings, such as Top Width (ft), which I believe corresponds to the width of water running in Wells Run. I read the 93.53 ft there on p. H-1 to indicate a flood condition occurring at the 44th Street bridge and the 66.49 ft also on p. H-1 to indicate a flood condition occurring at Route 1 during a 2 year storm. Is this correct?

    1. The cross-section immediately upstream of Wells Run is the next cross-section (Top Width = 43.54 ft), and immediately upstream of Rt. 1 is 66.49 ft. The top widths that you refer to are referencing the cross-sections immediately upstream of the road, not necessarily the road.