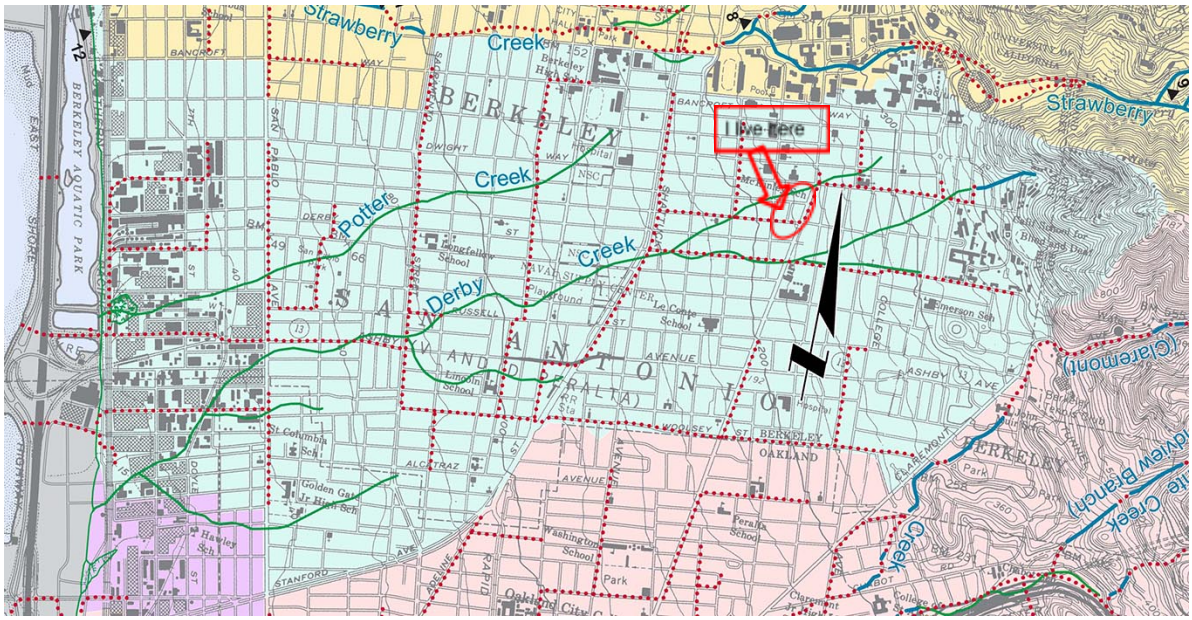
Mason McBride

LA12 Fall 2022:
Environmental Science for Sustainable Development
Lab Week 4:
Urban Streams: Strawberry Creek Tour
Post Lab Assignment

Urbanization and the Hydrograph

• What is your local watershed? Explore the Oakland Museum of California watershed maps to find the drainage basin where you live. Link, Google Earth Link

• Attach a screenshot of the map **[1 pt]**



• What is the name of the creek drainage that you live in? **[1 pt]**

Derby Creek

• Where does it originate, where does it ultimately drain to? **[1 pt]**

Derby Creek originates in the canyon at the head of Dwight Way and from a spring a block away from the southwest entrance of Clark Kerr campus. Ultimately, it flows down into the bay.

• Characterize the stream channel, approximately what percent is day-lit natural stream, engineered channel, or underground culvert? What kinds of environments does it flow through? (1-2 sentences) **[1 pt]**

The stream channel has been culverted since 1901 (approx. 2.5% day-lit) except for a small section at the head of the Creek in Clark Kerr. It flows through mostly urban environments, specifically through Southside which is where the majority of undergraduate students live and where most restaurants and other university-supporting infrastructure reside adjacent to Berkeley.

• In lecture, you learned that a hydrograph is a plot of streamflow against time. The reference Streams and Floods (in bCourses) explains hydrographs (Fig 10.31, p.247). Explain Figure 1: what does the solid line portray. What is represented by the dashed and solid lines? What does the dashed line portray? **[2 pt]**

The solid line represents the flow of flood runoff and the dashed line represents the rainfall the stream experienced. The stream's flow is delayed from the actual time of precipitation but quickly increases its flow of water and then settles back down once the rainfall is over.

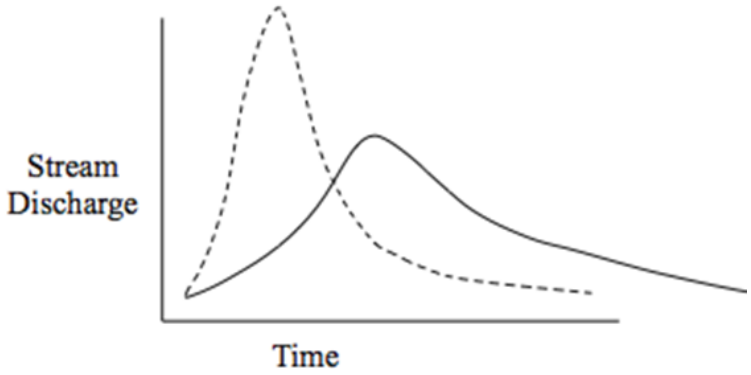


Figure 1. Conceptual hydrograph in response to precipitation

• Using your knowledge of the current and historical characteristics of the Strawberry Creek stream to substantiate your answer, explain how this graph applies to the Strawberry Creek system before 1880 and currently. **[2 pt]**

This graph could represent what would happen to the Strawberry Creek system during a rainfall event. Based on the storm that went through Berkeley last weekend, Strawberry Creek experiences a much larger flow through its stream channel and then settles down. Historically, the stream did not have structures in place (like check dams) that reduce the power of the rainfall

flow that would incise the stream. The graph above is much more like Strawberry Creeks current situation.

• What is 'urban slobber'? Where did we see it in the creek? **[2 pt]**

Urban slobber is "small flow" streams that come from over-irrigation of landscapes, people washing cars, leaking sewer, and leaking water pipes. We saw urban slobber enter Strawberry Creek at Site 3. There are pipes that lead runoff from Upper Sproul into the Creek under the bridge.

• How do the dimensions of Strawberry Ck below the confluence (site 6) compare with its dimensions below the Big Inch Culvert outlet (Site 2), and below the Little Inch Culvert Outlet (Site 1)? How can you explain these differences? Compare those cross sections as well in terms of your additional observations such as bed material, degree of incision, vegetation, etc **[3 pt]**

Starting from the head of the creek, Site 2 was measured to have a cross section of 6ft x 17ft, and Site 6 a cross section of 8ft x 35ft. So the creek actually gets wider and deeper as it flows downstream. Site 6's deeper depth and wider channel are also supported by comparing its bed material with Site 2. Site 6's bed is made of much finer sediments (eg. gravel, sand, etc.) and contains flatter and smaller rocks in its bed. This supports Site 6's deeper incision because the material of the creek has experienced much more erosion. In terms of the head of both of Site 2 and 6, Site 1 contains very low flow and low energy to suggest that Site 2 does not experience much incision. Contributing to that, the vegetation at Site 2 demonstrates not much gets washed away and the large boulders mitigate any energy that is there as well. This suggests very clearly that Site 6 experiences greater incision that is not caused by Site 1 and 2, so even though it is further downstream, its larger depth and width are adequately casually explained.

• What is the function of check dams? **[2 pt]**

The function of check dams is to slow down stream flow by concentrating most of the energy into small vertical waterfalls. This is to prevent stream incision, as well as flooding and streambank undercutting.

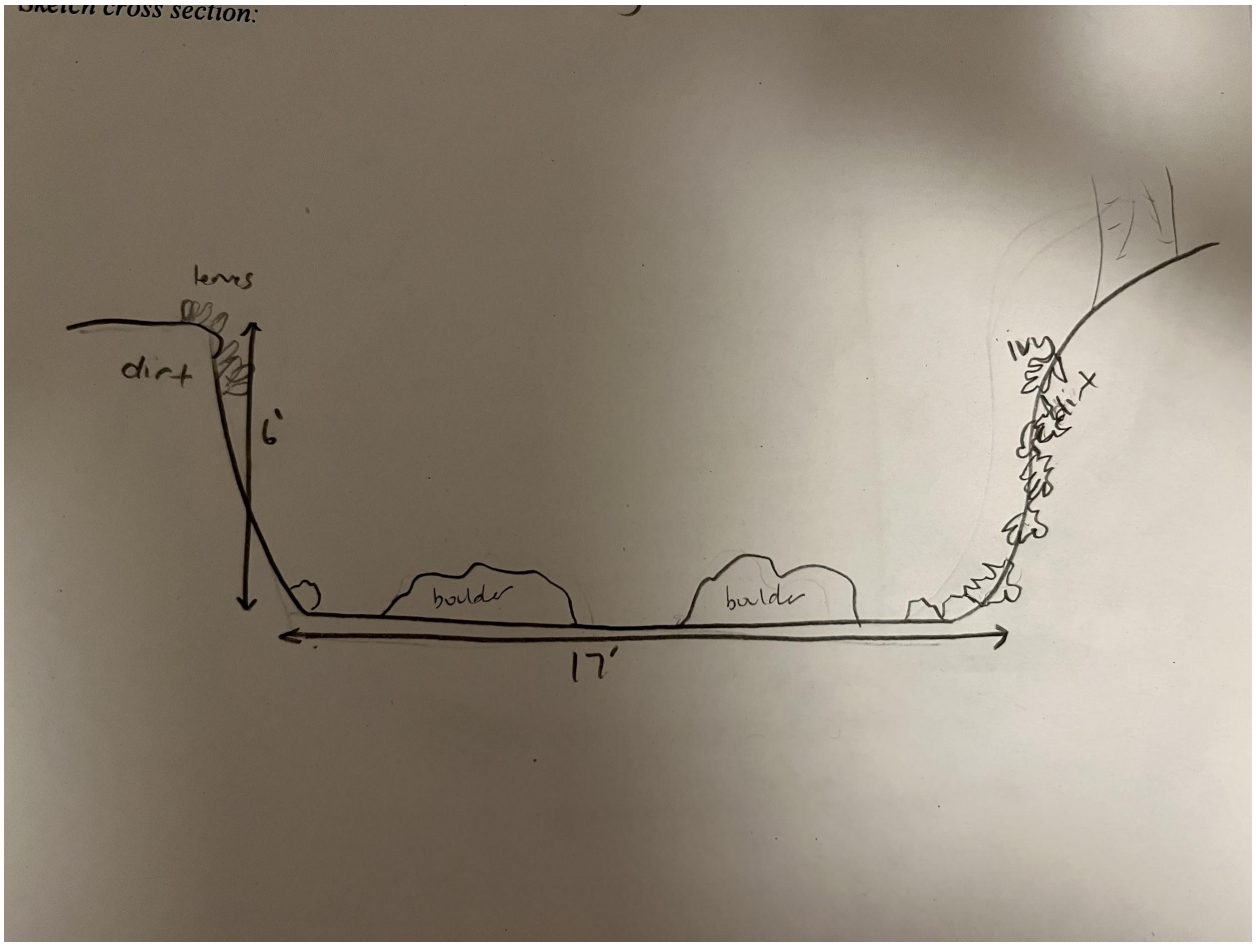
• Flow measurement
    • Summarize results of your flow measurement at Site 6 [5pt]:

Variable	
Width of flowing water (ft)	1.75 ft
Depth (ft)	0.17 ft
Velocity (ft/sec)	1.0 ft/s
Cross Sectional Area (ft2)	1.75ft * 0.17ft = 2.975ft ^2 = 2.98ft^2
Flow (ft3/sec)	2.975ft^2 * 1.0ft/s = 2.975ft^3/s = 2.98ft^2

~~• How does the flow you measured here compare with the flow measured by your instructor upstream? How can you explain differences in flow? [2 pt]~~

8. Cross Section Below "Big Inch" Culvert (Site 2) [4 points]
Measure the channel depth and width, then draw a cross section roughly to scale (using your measurements) and annotate it by labeling features such as bed material boulders, concrete blocks, cobble, gravel, sand), bank material (natural/reinforced, gradual/steep, type of vegetation). Feel free to add other notes from your observations as you wish.

Channel depth (ft): 6 ft
Channel width (ft): 17 ft
Bed material: Sand, gravel, algae, round rocks, big boulders
Bank material: Dirt, coated with ivy
Sketch cross section:



9. Below confluence N&S Forks (Site 6) [4 points]

Measure the channel depth and width, then draw a cross section roughly to scale (using your measurements) and annotate it by labeling features such as bed material boulders, concrete blocks, cobble, gravel, sand), bank material (natural/reinforced, gradual/steep, type of vegetation). Feel free to add other notes from your observations as you wish.

Channel depth (ft): 8 ft

Channel width (ft): 35 ft

Bed material: Finer sediment, gravel, sand, smooth rocks

Bank material: Dirt, large tree branches

Sketch cross section: