Baxter Creek Gateway Park Restoration

A Post-project appraisal

University of California, Berkeley

LD ARCH 227 - Restoration of Rivers and Streams

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Abstract

This paper is seeking to evaluate the results of the Baxter Creek Gateway Restoration Project located in an urbanized section of Baxter Creek, northern El Cerrito, California, and figure out how the channel transforms and how it impacts the site and its surroundings. We appraisal the project by the condition of the creek bed and bank, vegetation, water management and public accessibility. Making a comparison of 2006 and 2019 status of the creek to figure out how the stream performed and transformed in the last 13 years. Moreover, depending on the analysis of the water catchment area, planting evolvement, space quality to study the impact of the project for the surrounding area. In the end, we devote to discuss the possibilities of improvement of the site by studying other similar precedents, trying to explore the future design directions of river restoration projects.

1. Introduction

1.1 Site location & History

Baxter Creek Gateway Restoration project is located in El Cerrito (Figure 1.1.1). The site is located on 1.6 acres of land and is 700 feet long, consisting of a branch of one of the three tributaries of Baxter Creek (Figures 1.1.2 and 1.1.3). [1]

The City of El Cerrito hired Hanford Applied Restoration Conservation contractors in 2005 to restore the creek and construct a new civic gathering area facing San Pablo Ave. The park construction was completed in the spring of 2006. A formal ribbon-cutting ceremony was held in September 2006. [2]

On Aug. 11, 2004, there was a Community Workshop of the Baxter Creek Gateway Restoration, during which the residents offered ideas on how the creek should be like in the future.

Later, the Restoration Design Group/Far West Restoration Engineering created a schematic restoration plan based on the information and opinions they collected, since both companies gained the opportunity to develop the park design and construction, including a period time of maintenance and plans for the park management. Now the Baxter Creek Gateway project is being managed by the City, Watershed Project, National Park Service, and Friends of Baxter Creek. [3]

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1. Judd Goodman, Kevin B Lunde, Theresa Zaro, "Baxter Creek Gateway Park: Assessment Of An Urban Stream Restoration Project," December 19, 2006, https://escholarship.org/uc/item/95j1z0vv
2. "History of Baxter Creek Gateway Park," https://web.archive.org/web/20061207063515/http://www.creativedifferences.com:80/baxtercreek/creekhistory.html#park%20history
3. "Baxter Creek Gateway Schematic Plan," https://web.archive.org/web/20061207063607/http://www.creativedifferences.com/baxtercreek/Gateway.html#Gateway

1.2 Restoration project objectives and description

The goal of the creek restoration project may vary during different time period, basically the aims could be concluded as followed:

1) Ecological aspect: restoring the ecosystem of the channel, including water quality, native species and bank stability etc.;

2) Social aspect: providing more public access to the creek and civic space for gathering activities; "Pursuing art and educational elements that are part of a multi-purpose approach to site design might be the best way to proceed." [4]

In order to achieve those goals illustrated above, the rehabilitation program includes the following activities: reconfiguring the creek channel plan to introduce curvature; importing gravel and pebbles to reproduce sedimentation and erosion processes; grading outside the river to create an active floodplain to enhance the season flooding; planting local riparian vegetation to promote habitat and control erosion; expanding multi-purpose pedestrian walkways to allow public access to creeks; and creating educational signs and plans to encourage management and community awareness. [5][6]

1.3 Research objectives

The principal objective was to assess the current condition of the Baxter creek restoration project and compare it with the report in 2006 by Judd Goodman et al. 2006, analyze the dynamic movement of the creek, and its impact on the context.

4. "Baxter Creek Gateway Project Working Group Meeting Summary," Restoration Design Group, July 28, 2004.

5. (EOA) Eisenberg, Olivieri, and Associates. 2005. Draft Project Assessment and Evaluation Plan, Baxter Creek Gateway Restoration Project.

6. (EOA) Eisenberg, Olivieri, and Associates. 2006. Baxter Creek Restoration Project Monitoring and Assessment Plan.

Another issue we were concerned about is the user experience, aesthetic and space quality of the Baxter creek park. We study the relationship between user and creek by analyzing the longitude accessibility and vertical accessibility of the creek park, and space ratio variations. Moreover, we also compare the Baxter park with other successful creek restoration project to explore the future design directions for river restoration projects.

2 Method and approach

2.1 Creek bed quality assessment

Baxter Creek Gateway Park is located in the middle part of the Baxter creek watershed. The sediment of the creek bed is mostly sand and silt, and there is also a small amount of gravel. According to observation and record to value the healthiness of the Baxter Creek bed, such as if the creek bed contains rock and clean gravel of various size, if the creek has the system of riffle and pools presenting of both slow pools and fast water running through the channel. And the absence of natural debris such as branches, boulders, and dead vegetation from a creek can provide habitat for fish and wildlife.[7]

7 City of El Cerrito Friends of Baxter Creek the Watershed Project Urban Creeks Council Restoration Design Group,2006, Baxter Creek Maintenance & Management Guide.

2.2 Creek bank quality assessment

The Baxter Creek watershed profile has the typical feature of fluvial channel, showed from former cross-section done by Goodman. (Figure 2.3.1). The project is located below the foothills as shown by the slope cut, at the upstream end of the alluvial fan (deposition area)[8] The approach we try to use is to make comparisons between the 2006 cross-section and the current condition of the creek bank, thus we could have broader view about how the creek bank transformed in the last 13 years and analyze what factors contributed to the current situation and how it might influence the site.

2.3 Vegetation assessment

We conducted transect vegetation research according to the "Watershed Project," which turned out that the coverage of native grass and Forb at this site has increased, but is still less than the coverage of non-native grass and Forb.[9] Later, we tried to conclude the categories of native vegetation and invasive vegetation and how they survive in a mixed area. Based on those information, we selected one piece of the Park randomly to check how similar existing plants are to the designed vegetations. (Figure 2.4.1) Besides, we tried to gather all sorts of information about whether the native vegetations were healthily growing between 2006-2007 to see if the designed vegetations were functioning well as desired and figured out how the plants and shading evolved alongside the creek using the Google Earth images.

8. Judd Goodman, "Baxter Creek Gateway Park."

9. Owens-Viani L. 2004. The *Baxter Creek Watershed: a cultural and natural history*. The Watershed Project, CA.

2.4 Stormwater management capability assessment

The river restoration project has not only ecological value, social value, but also contribute to the value of rainwater management. To a certain extent, creek parks are a green surface that has the capacity of storing stormwater and reduce the pressure of the urban pipe system during the rainy season. To get a better understanding of how much water was actually draining into Baxter Creek, we conducted GIS analysis using files from USGS, get the topography dataset， national Hydrography Dataset， watershed Boundary Dataset etc， drawing the edge line and watersheds, calculate the water catchment area, analyze the role of Baxter Creek Gateway Park in stormwater management.

2.5 Public accessibility assessment

Social value is also one of the criteria for evaluating the success of a river restoration project. We visit the site and observe the activities of users related to the creek. By analyzing the relationship between the channel, path, and the experience of the user along the riverbank to evaluate the longitude accessibility of the creek. The way we tried to appraise the lateral connection of Baxter Creek is depending on how people get access to the water and how the nodes of the creek interact with the channel. Moreover, we will also draw the section of the park to show the ratio between the viewer’s distance from a spatial boundary and that between the point of sight and the height of the boundary, thus evaluate the quality of the park's public space subjectively.

3 Results

3.1 Creek bed quality

We had our field study in the different season of Bay area, before the rain season(Nov 24th) and during the rain season(Dec 3rd)， we observed the different conditions of creek bed in different seasons.

During the dry season, the midstream and downstream of the channel was dried out (figure 3.1.3), only the part of upstream have still water but most of which are covered by aquatic vegetation. Some parts of the creek bed are higher and intended to create the lateral connection (Figure 2.4.1). But as a result, these engineered weirs stop water flowing and create a small pond in the dry season (Figure 3.1.4).

During the wet season, the whole channel has running water, but the water depth is quite shallow, and it is easy to see the bed material through water. The upstream of the channel is covered by two different aquatic plants, the plants with long leave are dominating the area close to the outlet culvert, and the small leave plants are dominating the rest part of the upstream channel (figure 3.1.7)

The material of the channel contains silt, cobbles, gravel and boulders, and they have different composition in different segments initially (Figure 3.1.6). In the bed material from 13 years later, we still can see the different size of the bed material in the channel (Figure 3.1.5), but the materials are not distributed regularly as the boulders were expected to be.

3.2 Creek bank quality

Overall, the creek bank is shifting， the down-stream creek bank suffers more erosion than upper-stream, **as we can see** more changes in Section 1&2 (Figure 3.2.1) when compared to Section 3&4 (all sections looking downstream). The east bank of Cross Section 1 moved downward and eastward with 3 feet difference and the west bank became slightly higher and flatter**,** mov**ing** 0.5 feet Northward. The creek bed of Cross Section 2 moved downward about 1.5 feet and the west bank increased 2 feet higher than before and the east bank moved a little lower. The movement of the creek bank in section 3 is different than our expectation because the bank there seemed not to obey the rule of how creeks deposit and scour in meandering shapes. The creek bed and bank moved eastward in the last 13 years. Cross Section 4 is the relatively least changing one, as the east bank moved eastward a little while the south bank kept almost the same.

3.3 Vegetation

Plant shading space evolvement:

We drew a plant shading diagram according to Google Earth images starting from 2006, trying to match the plant edge as much as possible and calculated the Shading Area Ratio (referred to as SAR) of the site. In 2006, the SAR was 5%, and the most densified area was the eastern side of the creek, while the middle part was almost bare. Significant changes started from 2009 when the plants began to cover all along the creekside and SAR was 24%. In 2012, the shading began to spread from the creekside to the roadside and kept growing with 36%
SAR. From 2016, the plants expanded and shaded the road with 58% SAR. The majority of the site has been covered by shading nowadays, since the image in 2018 showed the plants reached

almost every corner of the site. It is quite evident that the plants have been increasing steadily as time goes by and the growing speed is terrific. (Figure 3.4.1)

Plant species evolvement:

The trees shown in the planting plan (Figure 3.3.1) have some are in good condition, and some ~~are~~ not. The Oak grows in good shape, but the Alder and big leave maple are hard to recognize, most of them are dead and not functional anymore (Figure 3.3.2). Moreover, the "container stock" bushes were hard to discover in the selected area, where there was just bare soil and some covered with grass. According to species studies, we found several invasive species in our chosen field, such as Mustard Species, which grows along the road, and Broom Species, which grow flourishingly in our site. Another significant issue is the expansion of willows, which take over space and shading large amounts of area, thus competing for the sun and nutrition with other riparian plants and blocked the creek view.

3.4 Stormwater management capability

Figure 3.5.1 shows the area of Watershed Boundary 1/12 subbasin HUC 12-F80500020904，Baxter Creek Gateway park located in the southwest of the watershed catchment basin. The west of the catchment basin is the mountain**s** and the east of the basin is the California bay, north edge of the basin in the city of Richmond, and south edge of the basin in the town of Piedmont. The catchment basin also includes Berkeley, EI Cerrito, etc. The general water flow direction is towards the west to the Bay.

Figure 3.5.2, compared with other catchment basins, the HUC 12-F80500020904 catchment basi**n,** is relatively fla**t.** And there are Baxter Creek, Cerrito Creek, Codornices Creek, Strawberry Creek, Claremont Creek and Temescal Creek**,** six watersheds from north to south**,** to collect water and bring it to the Bay.

Figure 3.5.3, the watershed catchment basin HUC 12-F80500020904 is divided into smaller basins. The border**s** of Baxter Creek watershed are filled by the green hatch, which is around 3.4 square mile**s.** Most parts of the Baxter Creek channel are buried underground. There are seven sections of open channels in the seven parks. Mari Vista Park, Poinsett Park, Canyon Trail Park, these three channels in these parks belong to the upstream channel. The channels in the Baxter Creek Gateway Park, Jr. Park has the character of the midstream channel, and the channel in the marshland shows the typical downstream feature.

Figure 3.5.4, the average monthly rainfall of the area is 3.5 inch in the rainy season. The volume of water catchment of the Baxter Creek watershed is 300,000,000 cubic feet.

Figure 3.5.4, the blue line is flow line, the red line is ridgeline, the creeks in the mountain area overlapped with the flow line. The stormwater in the mountain area will be collected and detained by the Mari Vista Park, Poinsett Park, and Upper Canyon Trail Park. The stormwater catchments of these three parks are marked by the blue hatch surface, which are 130 acres, 120 acres and 175 acres for each of the parks. The flowline in the flat area runs directly towards the Bay first, and then gradually union into the downstream. The water catchment area for the Baxter Creek Gateway Park, marked by the purple hatch, is 36 acres. So the flow that comes off this drainage area will be 470,000 cubic feet. The cross-sectional area of the channel is around 20 square feet, the cross-sectional area of the creek is about 100 square feet, and the length of the channel is approximately 800ft. Therefore, the water storage capacity of the circuit is 16,000 cubic feet, and the maximin water storage capacity of the park is 80,000 cubic feet.

3.5 Public accessibility

For the public accessibility, the channel is on the north part of the site and there is a path parallel to the channel generally, the riverbank sometimes close to the trail and sometimes far away by its channel meandering. There are two landscape spots on both ends of the channel work as the attraction and providing some sitting objects for people to stay (Figure 3.5.1)

For the longitudinal accessibility, there are many activities, such as walking, biking, running, walking the dog, etc. The space experience is changing along the path via the distance from the channel and the topography changes. The crown of trees frame the edge of the space, from the photo and section, we can see there are three typical space ratio, 1:1, 1:2, 1:3, so when people walking through the park, the feeling of space are changing, bring people a good experience (Figure 3.5.2).

For the lateral accessibility, there are some engineer**ed** weirs designed for people crossing the channel (Figure 3.5.1, green arrow). We can see the lateral path from the google map in 2008 (Figure 3.5.8), but they are all covered by grass and hard to observe right now, and we had a lot of troubles to pass the channel when we do the measurement in the wet season. In the dry season, because most of the channel is dried out, people can cross the channel at any point. The willow trunks and branches are quite dense, and they block the view of people to see the water and see through the park.

We also found that there are not so many people staying in the park. Even though there are some people attracted by the creek or read the information boards, there are few people choosing to sit in the park and spending longer time there. The park has a lack of sitting elements, there are only two chairs placed in the entrance of the park (figure 3.5.6), but when I sit on the chair, I can only see the crown of the trees but not the channel. On the other end of the park, some stones are providing sitting possibilities, but the height of rocks is not comfortable to sit on it （Figure 3.5.7）

4 Discussion

4.1 Channel condition appraisal

From the observation during dry and wet season on the site, we can see the water flow volume for the Baxter Creek park is quite small, it almost dried during the dry season and has constantly but shallow current during the wet season. Some part of the channel are covered by aquatic plants, compare with the composition of the material of the channel(Figure 3.1.6) and the creek bed condition (Figure 3.1.2), we can concluded that the growth of aquatic plants is not directly related to the material of the riverbed when the size of bed material smaller than gravels (the area close to boulder have fewer aquatic plants). The still and shallow water is the main reason to create living condition for these plants. Aquatic plants growing in the channel will bring the positive effects and negative effects. For the positive side, these plants can reduce the soil erosion for the upstream, create habitats for small animal. For the negative effects, aquatic plants will cause the channel narrower, speed up the water current, as the result, it will cause channel erosion in other part of the channel (Figure 3.1.8). Moreover, these plants also not good for the aesthetics of the site. Therefore, in the situation of creeks have small flow volume, keeps the water flowing is the important issue to avoid aquatic plants. Or changing the bed material not suitable for aquatic plants growth can be another strategy. For bringing the benefit of aquatic plants, we can make some backwater zones to create area for aquatic plants and small animals.

The different water velocity might be the main factor that causes the movement of the bank to change differently in the upstream and downstream, where bank erosion was much more severe with higher flow speed. The aquatic plants in the upper stream work as the buffer to slow down the water velocity. The reasons why Section 3 didn't obey the creek deposit and erosion rules we come up with two assumptions. First, the soil of the surrounded mounds is washed into the channel by stormwater, which alters the movement of the channel. Under this circumstance, human activities could be a factor that causes the creek bed and bank shifting. The second assumption, the section we measure this time does not match which did in 2006, so there was an error in the measurement.

4.2 Ecological condition appraisal

According to the former post-project analysis, arroyo willows are the major forces of native plants. Regardless of the blindness of sight, the gradual expansion of the shading area is a good sign of aquatic and wetland vegetation, which could further supply habitats for animals. During our first field trip survey, we paid particular attention to the plant and took pictures of some portions of them. Comparing the former project proposals and current vegetation situations, we discovered that the proposed plants are not growing well except for Oaks since Arroyo Willows are dominating the site and taking over other plants' growing space. Besides, we found out that several certain kinds of plants, especially shrubs and grasses, dominated the channel and caused severe ecological issues. It turns out that the original planting plan was not functioning as expected, which might be resulted from a lack of management of plants. We consider it a necessary move to emphasize riparian vegetation and channel dredging to bring the creek back to life.

What we found out during our 2nd survey was that where there is a big rock, there are lower chances to get undesired aquatic vegetations. Thus, we assumed that keeping supplies of cobbles and boulders into the creek bed could avoid the channel being blocked.

4.3 Stormwater management capability appraisal

Analyzing the data from the GIS dataset and water catchment basin diagram, we can conclude that Baxter Creek watershed plays a vital role in the water management of the Baxter Creek catchment basin. Parks have bigger sizes like Canyon Tail Park, Jr. Park, marshland have a significant effect on retaining stormwater. Three mountain parks collect the rainwater from the mountain and control the volume of flow. For the Baxter Creek Gateway Park, instead of placing the park East-West like these three mountain parks, the orientation of the park is South-North (Figure 3.5.3), and the shape of the channel has meandered**.** In this way, the Baxter Creek Park slows down the water flow and retains the water. Moreover, the size of the park is small compared with other parks, and the water catchment area is also small. Therefore, Baxter Creek Gate Park has a molecular function of stormwater management for the region while plays a role in restoring ecology to the area and provided a place for recreational use.

4.4 public accessibility appraisal

The Baxter Creek Gateway Park provides people a green space to have different activities. Generally speaking, the place have a good longitudinal connection, people have a pleasant experience while they are walking through the park, there are various activities happens on the path, like walking, cycling, running, walking the dog, reading interpretation boards, etc. But for the west end of the trail, the way intersects with the channel, but nothing happens there, I think it will be much more helpful if putting a deck or steps into the water. For the lateral accessibility, the proposed small path has already covered by vegetation, and engineered weirs are also flooded by water during the wet season, make people hard to cross the channel. And the weir stop water flowing during the dry season, cause the water stagnant, lead to the channel covered by the aquatic plants. And the place also lacks water activities. The park doesn't have a place for people to play with water or access to water. Moreover, the park has not enough place for people to sit and lean, which also explains why there have few people stay in the site for a more extended period.

5 Project Study

Project Name: La Rosa Reserve Stream Daylighting
Client: Auckland Council Stormwater, Tom Mansell
Lead Design Consultant: Boffa Miskell
Project Dates: 2012 – 2014

Creek bed and bank: The material of the stream channel is gravel, boulders, and debris of woodchucks and branches, and the upper bank material is clay and silt covered by vegetation (Figure 5.3). Boulders and debris create step pools not only slow down the speed of water flow, create habitat for water creatures but also provide users a place to rest (Figure 5.3, Figure 5.4).

Vegetation: For the planting design, the project didn't plant so many trees in the channel, some parts of the channel are in the shading area and some parts are not shaded (Figure 5.5). Most of the trees grow in the floodplain and upland (Figure 5.1, Figure 5.2). The area of the upper channel is planted by wet plants (Figure 5.2).

Public accessibility: From the point of longitude accessibility, the project using wood piers as the pathway along the creek, not only has an aesthetic value and not blocking the water flow on the surface. The path sometimes far away from the channel and sometimes close to the channel and sometimes cross through the channel by bridges (Figure 5.1, Figure5.2), create a variable walking experience for the users. For the lateral connections, the open channel area encourages people to contact to the water, the boulders and debris also create a possibility to cross the channel and can be used as sitting elements for users (Figure5.5 figure 5.3, Figure 5.4).

Thinking： This daylighting project creates a space for the water detention, restore the ecological system for the area, and create a space for people recreation through the design. Comparing with the Baxter Creek Gateway Park project, I think there are a lot of improvements that I can learn from this project. Firstly, instead of a meandering channel in the Baxter Creek park, I think the Boulder and gravel channel with steep pools will be a better solution. Secondly, the relationship between the path and channel should have more varieties. Third, the channel should not all covered by vegetations. We should create some parts of unshaded channels to have water activities. If conditions permit, we can use wood paths instead of the concrete one, which performs a better function for directing the water flow.

6 Conclusion

Generally speaking, the project of Baxter Park converted the small drainage to a green park, provides people a green area for leisure and entertainment. The growth of the plants is quite good here, creating a large shading area for the site, increasing the diversity of plants and animals. However, we also find some problems through this post-project appraisal. As designers, we should analyze why the site has these problems and how to avoid these problems through design initially.

1. The park has a small catchment area, and the channel always dried out during the dry season. Maintaining the landscape aesthetics and people activities during the dry season should be an essential issue for our designer to think about. I think altering the material of the channel bed could be a solution, making the channel become a landscape element during the dry season.

2.Vegetation is one of the most critical elements of the site, which increases the site's aesthetics and enhances the biodiversity of the area. However, they also will make some trouble such as plants dominate channel and dense willows and bushes blocking views and creating places for crimes. As designers, we should carefully pick the species and place them reasonably.

3. For the social accessibility of the site, making lateral connections is a challenge for the designers. Using engineered weirs, for this project, seems not a good solution, and the trails of this project should be covered by vegetation, leading to the loss of lateral connections. I think using boulders, stepping stones, or chuck bridges could be a solution, which needs low maintenance and won't stop water flowing during the dry season. Moreover, designers should provide users more places to stay, and think carefully about the position of sitting spaces. Sometimes debris (boulders and big branches) can be substituted for benches, not just providing animal habitats, also creating some sitting opportunities for people.

7 References Cited

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Project of La Rosa Reserve Stream Daylighting http://landezine.com/index.php/2016/09/la-rosa-reserve-stream-daylighting-by-boffa-miskell/

8 Figure Captions

Figure 1.1.1: Map of San Francisco Bay Area

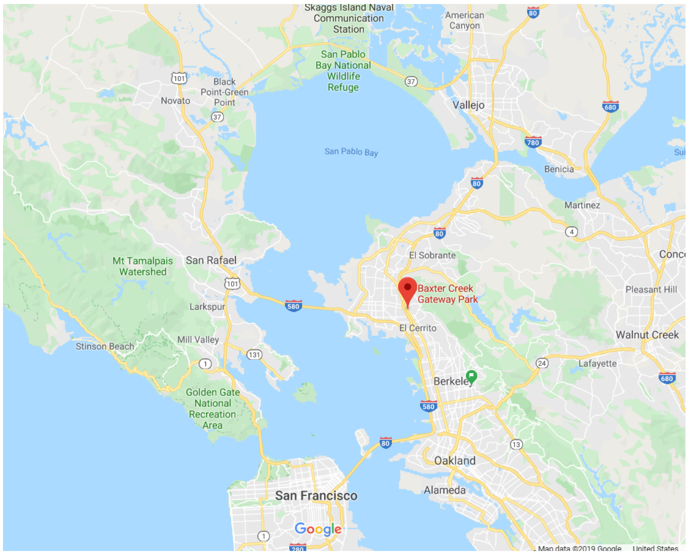


Figure 1.1.2: Map of site vicinity in El Cerrito.

Figure 1.1.3: Map of the Baxter Creek Watershed including the site of the Gateway project noted as Albertson's site (red circle).

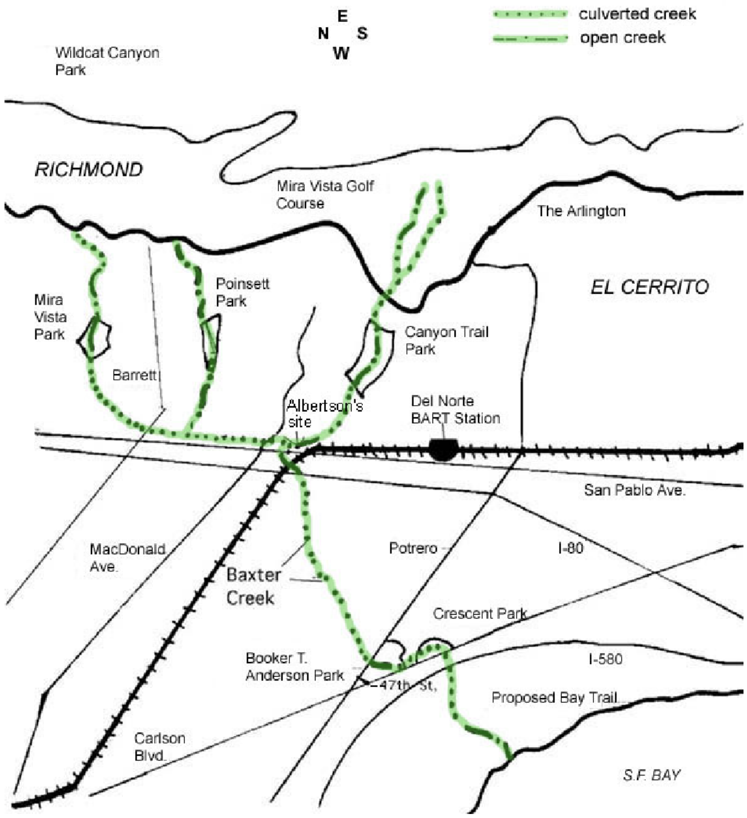


Figure 2.1.1: Upper Canyon Trail Park (Photo from first field trip)

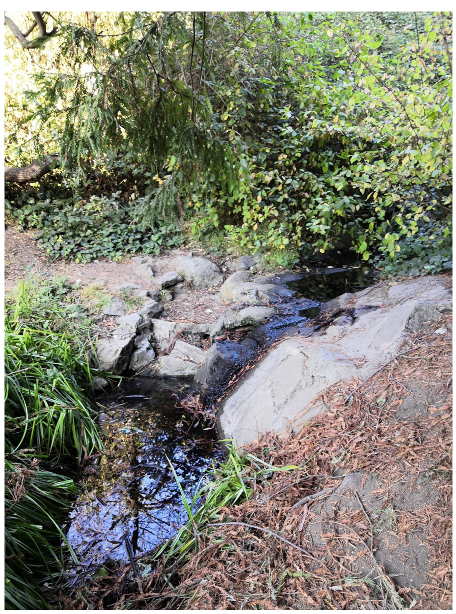


Figure 2.4.1: Baxter Creek Site Reference Map

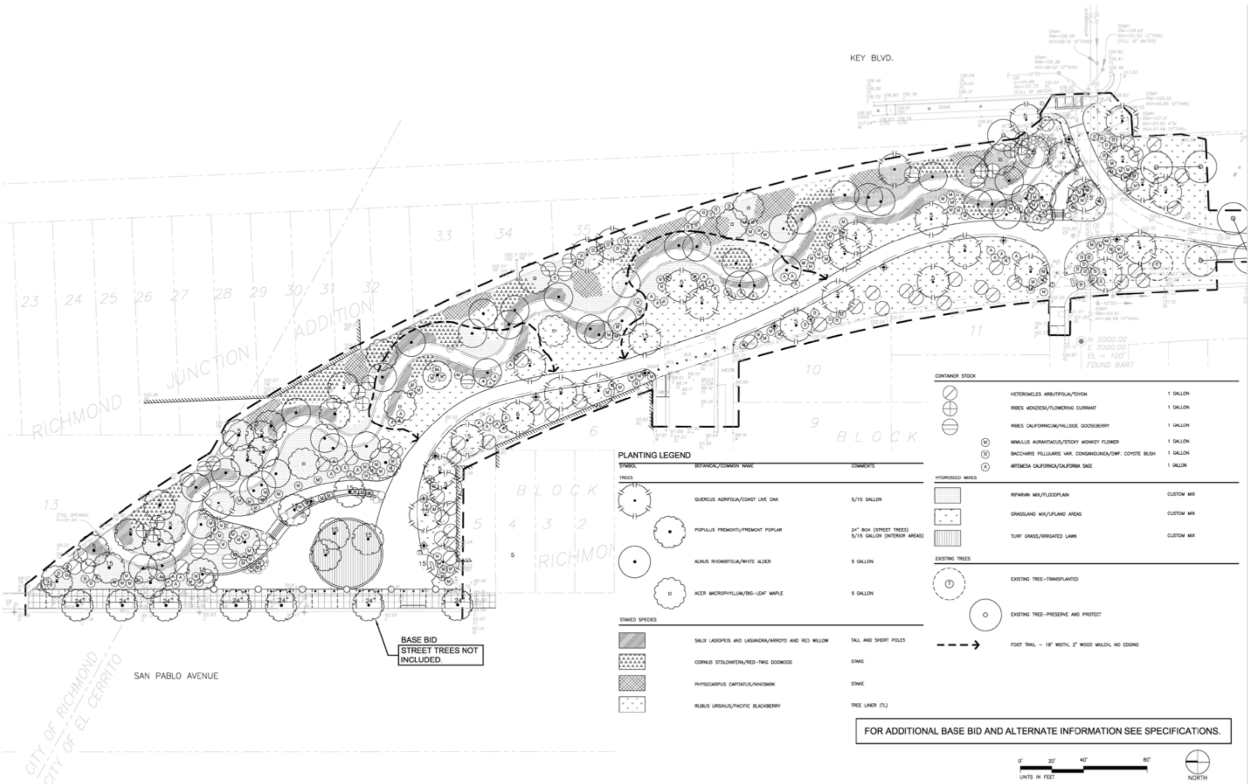


Figure 3.1.1 Creek bed condition in dry season (base on the field visit on Nov.24th)

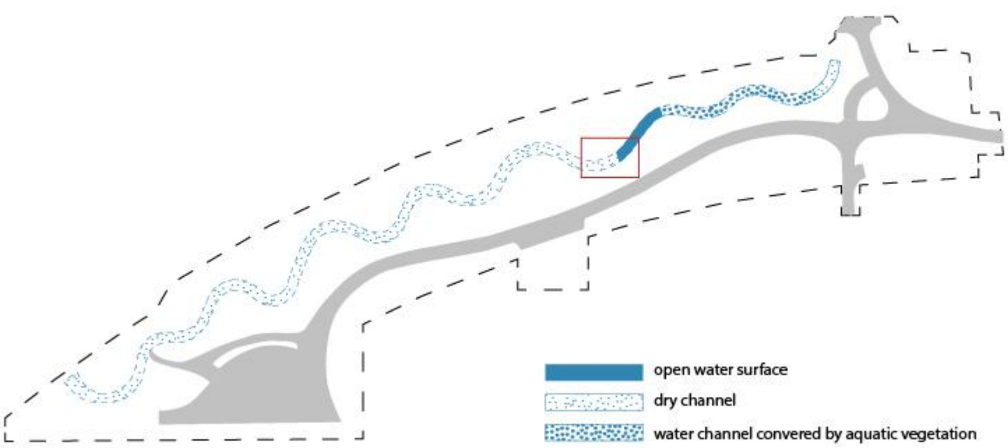


Figure 3.1.2 Creek bed condition in wet season (base on the field visit on Dec.3rd)

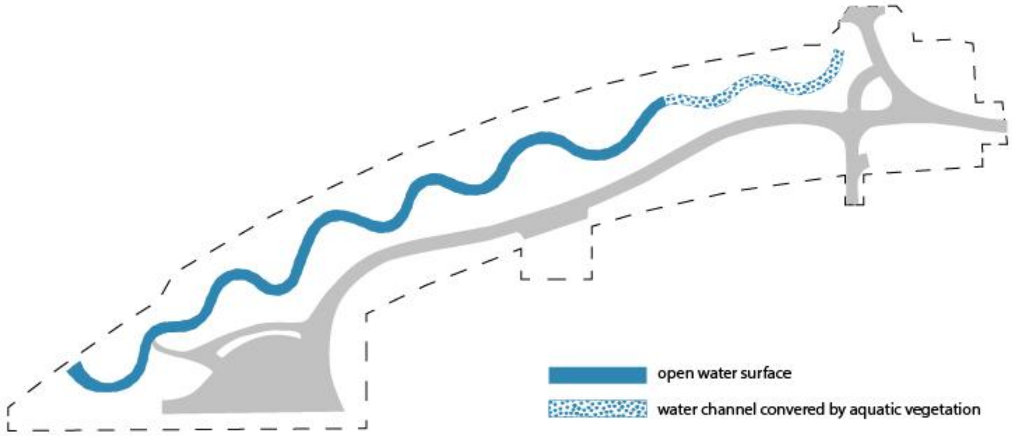


Figure 3.1.3 channel dry out in dry season (base on the field visit on Nov.24th)

Figure 3.1.4 different level of creek bed create a small pond in dry season (base on the field visit on Nov.24th)

Figure 3.1.5 different creek bed material (base on the field visit on Dec.3rd)

Figure 3.1.6 Creek bed material (resource: 2006 Baxter Creek Gateway Park: Assessment of An Urban Stream Restoration Project, Judd Goodman, Kevin B Lunde, Theresa Zaro.)

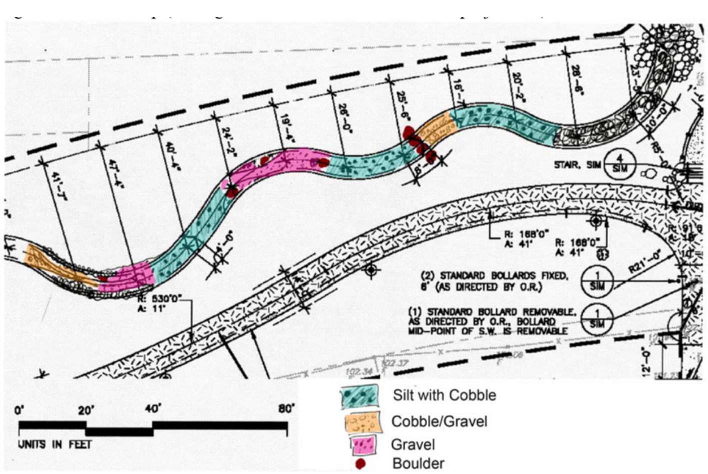
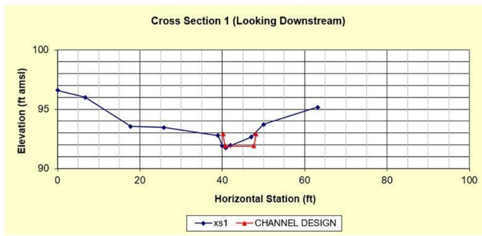
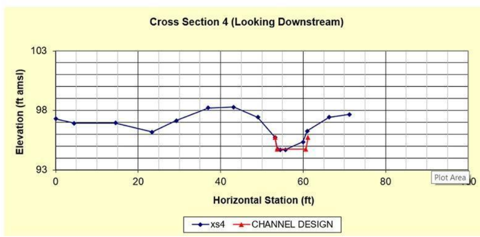


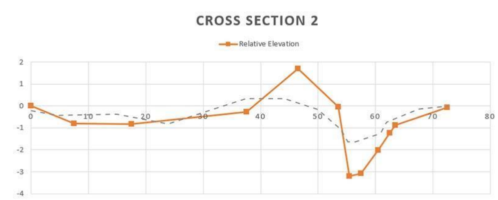
Figure 3.1.7 Creek bed covered by aquatic plants

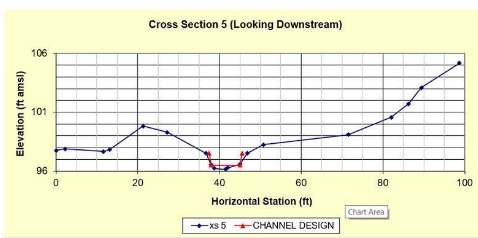
Figure 3.1.8 Growing aquatic plants narrow the channel width

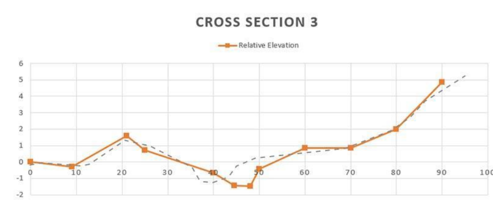
Figure 3.1.8 Cross-section maps

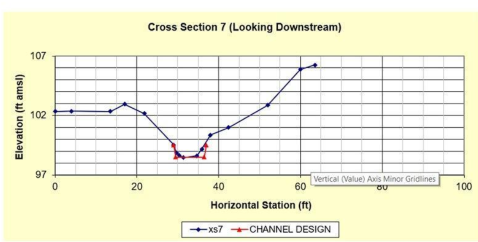


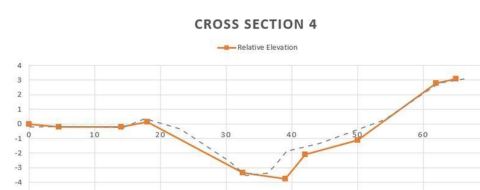


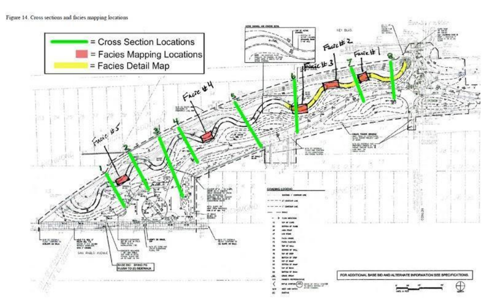












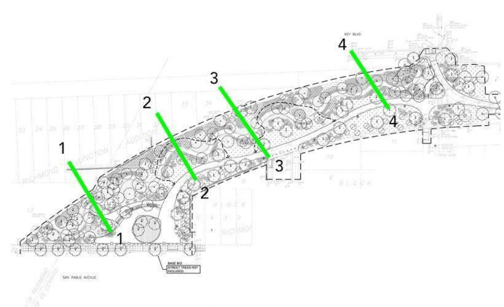


Figure 3.3.1: Plant species evolvement

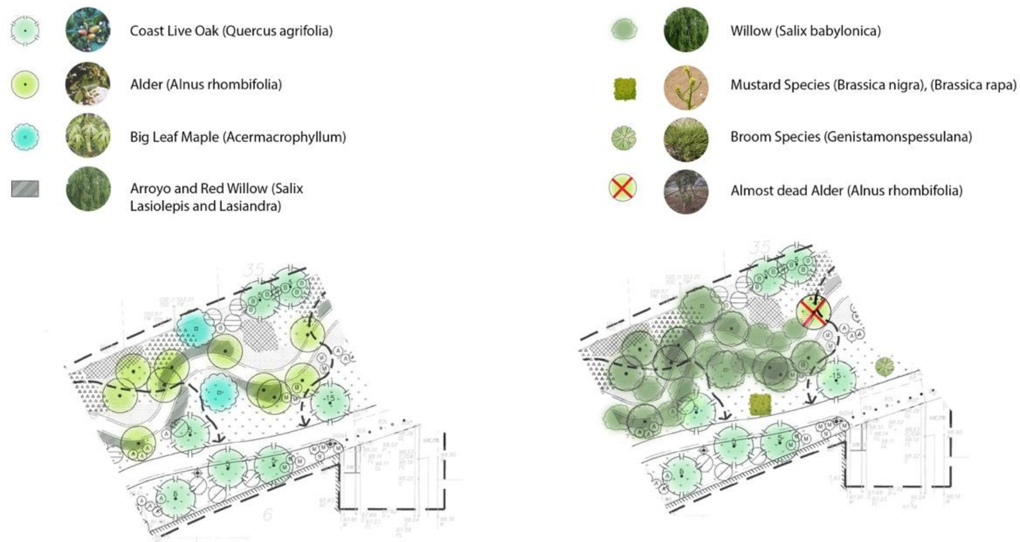


Figure 3.3.2 A most dead Alder

Figure 3.3.3 The invasive plants

Figure 3.4.1: Plant shading space evolvement

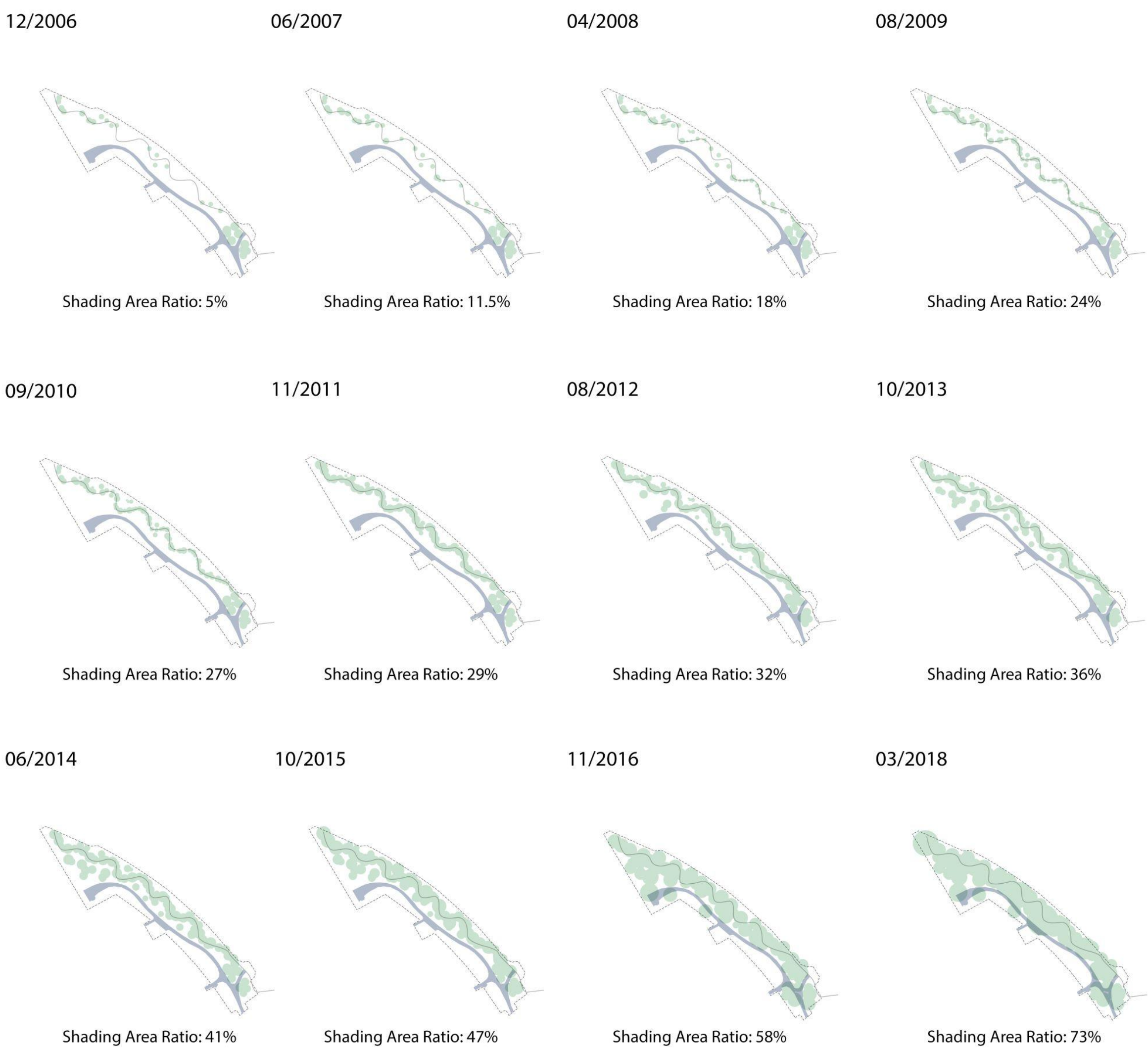


Figure 3.5.1 Watershed Boundary Dataset (WBD) https://viewer.nationalmap.gov/basic/

Figure 3.5.2, National Hydrography Dataset (NHD),

Data resource: USGS National Hydrography Dataset Best Resolution (NHD) for Hydrologic Unit (HU) 8 - 18050002 (published 20191106)

USGS Watershed Boundary Dataset (WBD) for 2-digit Hydrologic Unit - 18 (published 20191031)

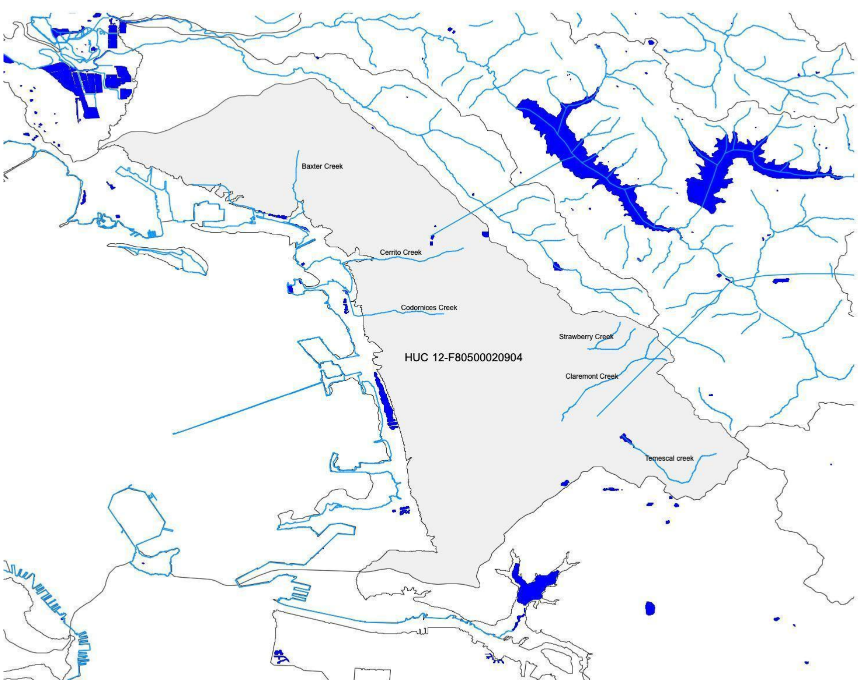


Figure 3.5.3,Catchment of Baxter Creek watershed.

Data resource:USGS National Hydrography Dataset Plus High Resolution (NHDPlus HR) for 4-digit Hydrologic Unit - 1805 (published 20190913)

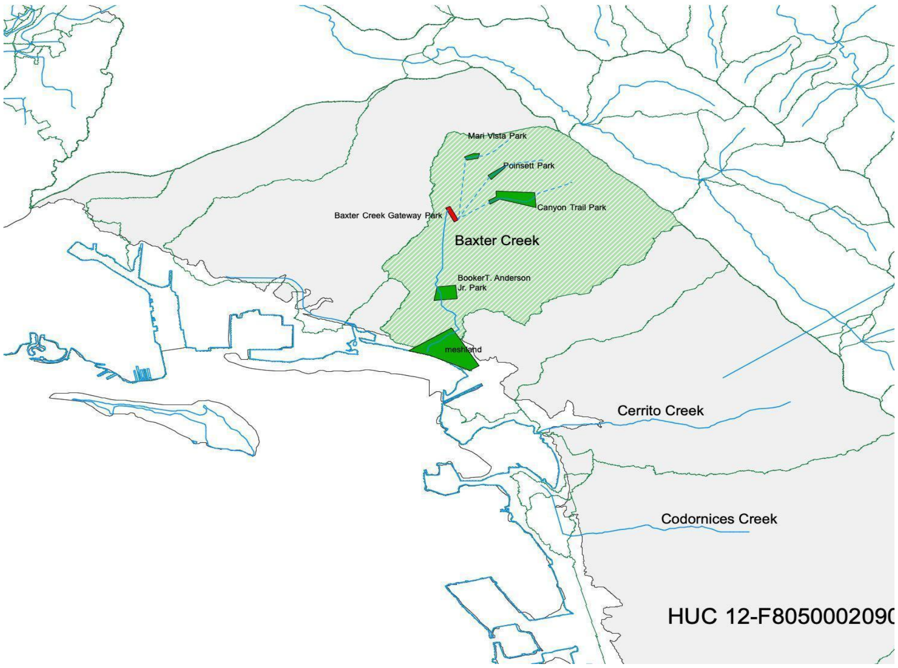


Figure 3.5.4

Photo resource: https://weatherspark.com/y/508/Average-Weather-in-El-Cerrito-California-United-States-Year-Round

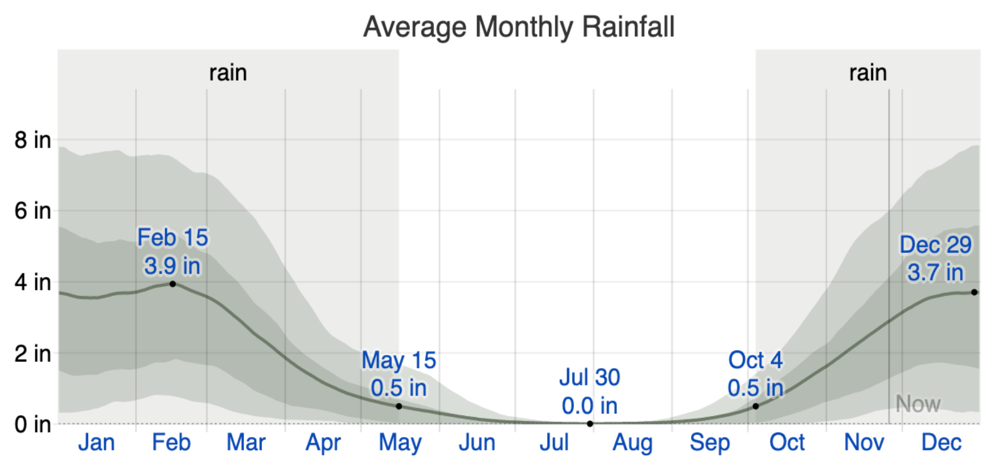


Figure 3.5.5, Catchment of parks.

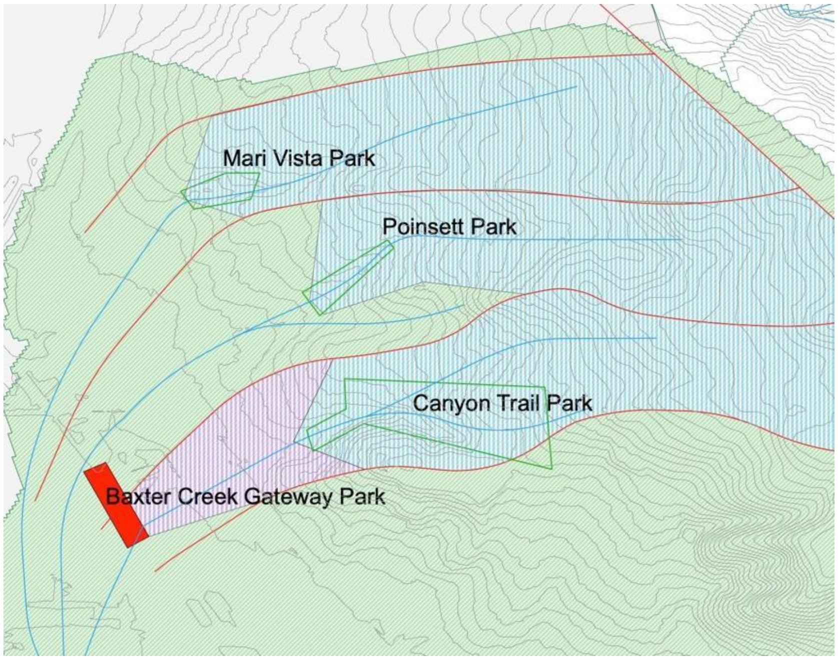


Figure 3.5.1 Public accessibility

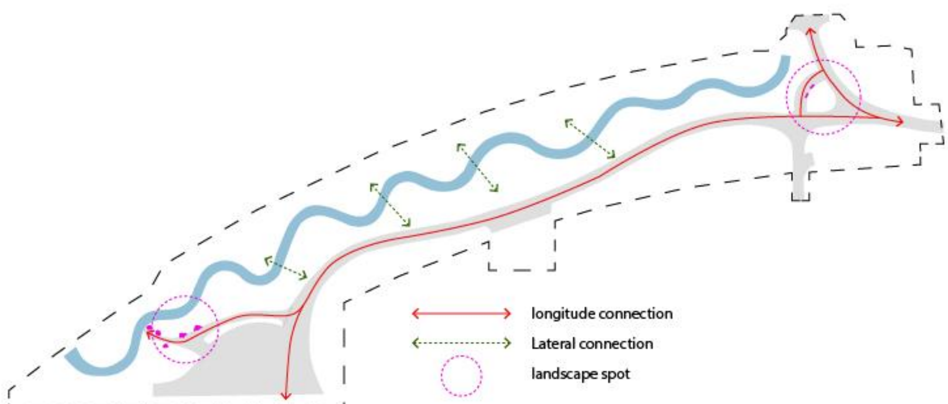
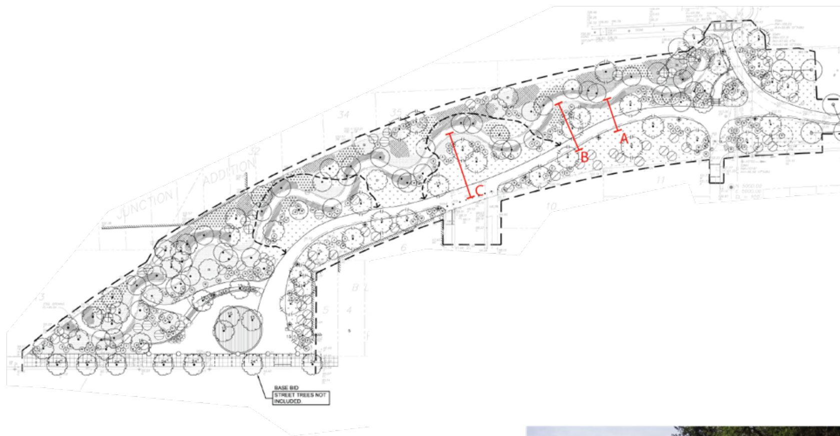
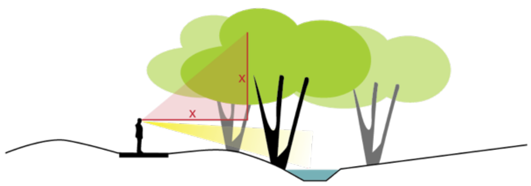
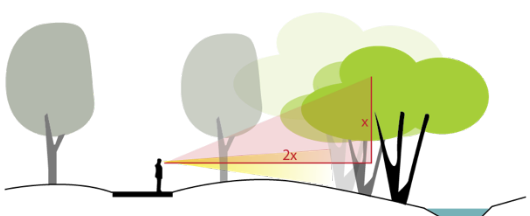


Figure 3.5.2 Section and space





sction A



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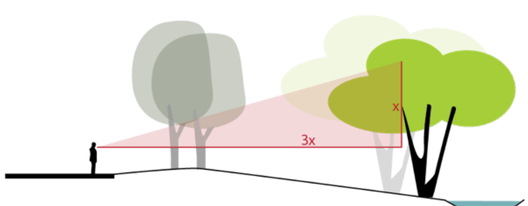


sction C

Figure 3.5.3

Figure 3.5.4 A kid play water

Figure 3.5.5 A man read the board.

Figure 3.5.6 sitting chair of the park

Figure 3.5.7

Figure 3.5.8 Site map in 2008

Figure 5.1

Photo resource: http://landezine.com/index.php/2016/09/la-rosa-reserve-stream-daylighting-by-boffa-miskell/

Figure 5.2

Photo resource: http://landezine.com/index.php/2016/09/la-rosa-reserve-stream-daylighting-by-boffa-miskell/

Figure 5.3

Photo resource: http://landezine.com/index.php/2016/09/la-rosa-reserve-stream-daylighting-by-boffa-miskell/

Figure 5.4

Photo resource: http://landezine.com/index.php/2016/09/la-rosa-reserve-stream-daylighting-by-boffa-miskell/

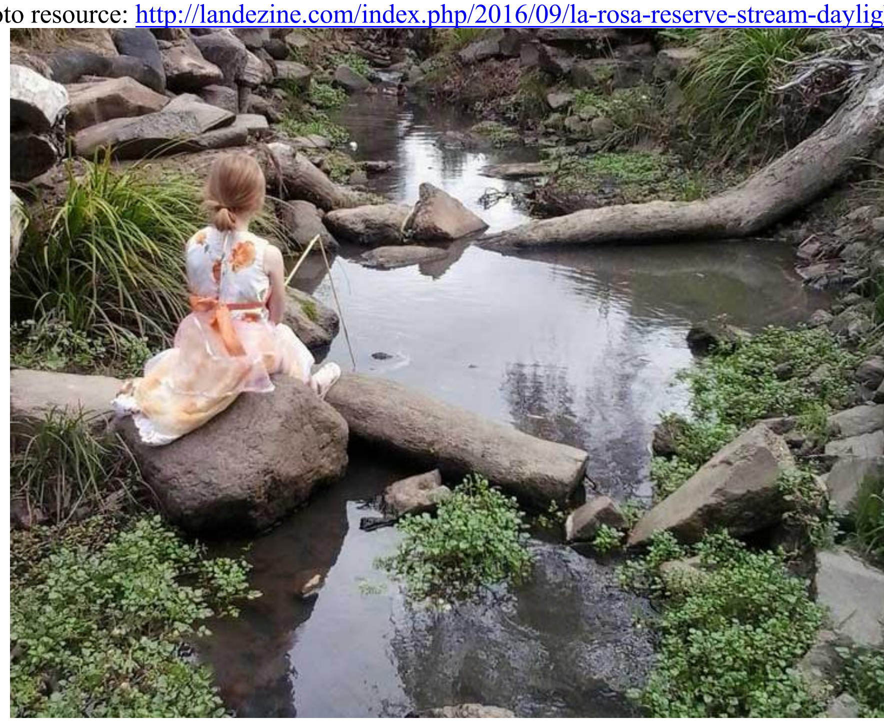


Figure 5.5

Photo resource: http://landezine.com/index.php/2016/09/la-rosa-reserve-stream-daylighting-by-boffa-miskell/

9 Appendix

Cross Section data:

Cross Section 1 (Looking Downstream)

Horizontal Station (ft)	0	10	20	30	40	44	49.5	53	55.5	60	68
Relative Elevation	0	-0.73	-1.65	-2.67	-2.93	-2.77	-4.19	-4.17	-2.72	-1.83	-0.94
Elevation to Station	2.03	2.76	3.68	4.7	4.96	4.8	6.22	6.2	4.75	3.86	2.97

Cross Section 2 (Looking Downstream)

Horizontal Station (ft)	0	7.5	17.5	37.5	46.5	53.5	55.5	57.5	60.5	62.5	63.5	72.5
Relative Elevation	0	-0.8	-0.82	-0.28	1.7	-0.05	-3.2	-3.08	-2.02	-1.24	-0.89	-0.06
Elevation to Station	4.9	5.7	5.72	4.62	3.2	4.95	8.1	7.98	6.92	6.14	5.79	4.96

Cross Section 3 (Looking Downstream)

Horizontal Station (ft)	0	9	21	25	40	44.5	48	50	60	70	80	90
Relative Elevation	0	-0.3	1.6	0.72	-0.68	-1.44	-1.48	-0.42	0.86	0.84	1.98	4.86
Elevation to Station	4.98	5.28	3.38	4.26	5.66	6.42	6.46	5.4	4.12	4.14	3	0.12

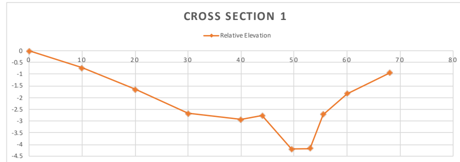
Cross Section 4 (Looking Downstream)

Horizontal Station (ft)	0	4.5	14	18	32.5	39	42	50	62	65
Relative Elevation	0	-0.22	-0.2	0.12	-3.36	-3.75	-2.08	-1.1	2.8	3.1
Elevation to Station	4.6	4.82	4.8	4.48	7.96	8.35	6.68	5.7	1.8	1.5

Appendix A - Cross Section Data and Plots

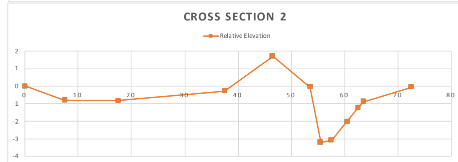
Cross Section 1 (Looking Downstream)

Horizontal Station (ft)	0	10	20	30	40	44	49.5	53	55.5	60	68
Relative Elevation	0	-0.73	-1.65	-2.67	-2.93	-2.77	-4.19	-4.17	-2.72	-1.83	-0.94
Elevation to Station	2.03	2.76	3.68	4.7	4.96	4.8	6.22	6.2	4.75	3.86	2.97



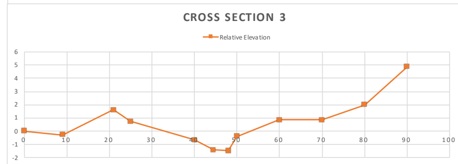
Cross Section 2 (Looking Downstream)

Horizontal Station (ft)	0	7.5	17.5	37.5	46.5	53.5	55.5	57.5	60.5	62.5	63.5	72.5
Relative Elevation	0	-0.8	-0.82	-0.28	1.7	-0.05	-3.2	-3.08	-2.02	-1.24	-0.89	-0.06
Elevation to Station	4.9	5.7	5.72	4.62	3.2	4.95	8.1	7.98	6.92	6.14	5.79	4.96



Cross Section 3 (Looking Downstream)

Horizontal Station (ft)	0	9	21	25	40	44.5	48	50	60	70	80	90
Relative Elevation	0	-0.3	1.6	0.72	-0.68	-1.44	-1.48	-0.42	0.86	0.84	1.98	4.86
Elevation to Station	4.98	5.28	3.38	4.26	5.66	6.42	6.46	5.4	4.12	4.14	3	0.12



Cross Section 4 (Looking Downstream)

Horizontal Station (ft)	0	4.5	14	18	32.5	39	42	50	62	65
Relative Elevation	0	-0.22	-0.2	0.12	-3.36	-3.75	-2.08	-1.1	2.8	3.1
Elevation to Station	4.6	4.82	4.8	4.48	7.96	8.35	6.68	5.7	1.8	1.5