Lawns to Habitat Program

Final Report & Lessons Learned

Prepared by
Liz Platte-Bermeo
Programs Coordinator, Daily Acts

For
Coastal Conservancy

Executive Summary

In 2017, Conservation Corps North Bay (CCNB) applied for a grant for Prop 1 funding from the Coastal Conservancy. The funding received was $81,690 to be used for converting 25,000 square feet of irrigated lawn to habitat gardens, as an effort to reduce water usage and enhance habitat and ecosystem health. In collaboration with CCNB, the Sonoma County Water Agency (SCWA) and Daily Acts (DAO), four schools in Sonoma County were identified, and over the course of 6 months their landscapes were transformed with the help of CCNB crew members and Daily Acts staff. The scope of the model sites went beyond lawn replacement, and included landscape design, water-wise planting, green infrastructure, and drip irrigation installation.

High-Level Facts

- 4 School Lawns Transformed
- 4 Amazing Model Sites
- 2 Educational Field Trips
- 26,128 Total Square Feet Replaced
- 326,600 Gallons/Year of Water Saved
- 1,068 Plants Installed
- 238 Cubic Yards of Arbor Mulch Moved
- 71 Cubic Yards of Clean Green Compost Spread
- 39 6' Cardboard Rolls
- 43 Crew Members Educated

CCNB crews rotated regularly and differed between each site on a day to day basis. To create self-sufficiency with each new crew, Daily Acts staff provided training on all aspects of the installation process, including sheet mulching, plant layout and installation, rain garden excavation, rain tank connection and drip irrigation. With crews rotating frequently, it was also important for CCNB supervisors to re-train if necessary and to check on quality control of new members for various tasks. Over the duration of the timeframe, crews worked to transform 9 sections of lawn, for a total of 26,128 square feet.

The four (4) model sites that were installed were located at the Santa Rosa Junior College campus, El Molino High School, Guerneville School and McDowell Elementary. Each transformation occurred during the school year, within school hours, in the main lawn area of the campus. This meant that students of all ages were able to walk by, ask questions, and watch the transformation occur. In many cases, students and teachers both expressed gratitude and interest in what was being installed. Final steps of this program included creation of maintenance plans and educational plant pamphlets, further allowing the school to engage in their new landscape.

Program Partners and Roles

Conservation Corps North Bay: Conservation Corps North Bay is the oldest youth conservation corps in the country. Serving Marin and Sonoma Counties since 1982, CCNB has helped more than 12,000 young men and women break the cycle of poverty through education and job skills, while serving the environment and community.

- Provided labor, tools and crew supervision for each installation
- Participated in site visits
- Grant management

Daily Acts: Enriching lives by inspiring positive actions. Petaluma based nonprofit and leader in water sustainability action and education. Provided project management, crew and community education, and quality assurance.

- Conducted site visits, took measurements, and created design for each site
- Developed materials list, plant selection, and sourced and scheduled delivery of all items
- Trained crew and crew supervisor on tasks and implementation
- Developed report, maintenance plan and educational resources

Sonoma County Water Agency: The County's water wholesaler serving 600,000 customers. The mission of the Sonoma County Water Agency is to effectively manage the water resources in our care for the benefit of people and the environment through resource and environmental stewardship, technical innovation, and responsible fiscal management.

- Provided public education via signage design and content
- Provided matching funds
- Participated in site visits

School Partners: The following schools provided matching funds to support the transformations at their sites. Specific details about additional contributions are listed below.

Santa Rosa Junior College (SRJC): Nearly 100 years old, this beloved community institution enrolls approximately 28,000 students each semester. SRJC is dedicated to making higher education accessible to all and removing barriers to students' success.

- Maintenance staff support for irrigation valve installation
- Provided staff and machinery for rain garden excavation
- Supplied $10,000 in matching funds

El Molino High School: Located at 7050 Covey Road in Forestville, the High School campus serves a large geographic area extending from Sebastopol to Fort Ross, from Santa Rosa to the Pacific Ocean.

- Maintenance staff provided irrigation valve access and support for sprinkler conversion
- Supplied $10,000 in matching funds

Guerneville School: Located at 14630 Armstrong Woods Rd, Guerneville School has the Russian River tributary running alongside the campus.

- Provided collaboration on the design related to rain catchment
- Maintenance lead supported irrigation installation and water connection
- Supplied $8,500 in matching funds

McDowell Elementary: Located at 421 S McDowell Blvd, Petaluma, McDowell is a title 1 school whose "*community supports bi-literacy, compassion, critical thinking, academic achievement, and contribution to our global society.*"

- Provided engagement with students through assemblies and curriculum

City of Petaluma:

- Provided $2,300 matching funds through Mulch Madness program

Sebastian Bertsch: independent contractor specializing in water system capture and design.

- Designed rainwater catchment system and developed parts list for Guerneville School
- Provided instruction and crew supervision on installation of rain tanks, gutter system and platform

Educational Components:

- Daily Acts staff provided a leadership role in training the crew on different landscape concepts, providing oversight and empowering crew supervisors to provide quality control.
- On the first few days at each site, Daily Acts staff worked to set context by describing the steps that it would take to complete the project and the benefits that follow. These first two days were also used to lead hands on training of site prep and the sheet mulching process: edging, capping sprinklers, spreading compost, cardboard and mulch in an appropriate manner.
- Following sheet mulching, DAO would return with the landscape design and discuss the plant selection and layout with the crew. Members would then help place plants according to the design, learning how to translate measurement from paper to landscape.
- DAO then led a planting demonstration highlighting some of the do's and don'ts for installing plants in sheet mulching. Once the first few plants were installed crew members were encouraged to call out for "plant check". This helped to ensure that plants were

properly in the ground, and allowed for trial and error to happen in the beginning as a learning opportunity.

- Crew members also gained hands-on experience with sprinkler conversion and drip irrigation system components and installation. While an irrigation plan was developed prior to install, crew members and DAO staff did have the opportunity to amend the layout based on where plants were actually placed. Crew members received demonstrations on the different types of irrigation that could be employed to supply adequate water for each plant, i.e. inline tubing, point source, and emitter flow rates.
- Crew members who worked on the SRJC and McDowell garden sites, also learned design principals of capturing rain in ground through the installation of rain gardens.
- Participants in the Guerneville transformation helped install a rain catchment systems which included two tanks that will supply water for the nearby raised beds designed by Avalow.
- Those who worked at McDowell learned about the solarization process to eliminate weeds such as Bermuda grass.
- In addition to these hands-on skills, several crews were able to visit recently completed sheet mulch projects highlighting the various components such as solarization and rain gardens at the Petaluma Library and food forests and permaculture design at the SRJC Petaluma campus.
- To provide schools with on-going education and engagement opportunities with the new habitat gardens, maintenance plans and plant pamphlets were created for school use. These resources highlight sustainable landscaping practices, plant specific information on seasonal use and care along with an irrigation schematic and planting plan for reference. *See Attachments D-F.*

Materials Procurement/ Vendor Assessment

- **WYATT Irrigation:** All materials were sourced by WYATT Irrigation Inc. Helpful staff assisted with purchases, design review and system trouble-shooting. In addition, an existing good working relationship provided understanding for project related issues such as returns, billing information and account establishment.
- **Harmony Farm Supply:** Provided rain tanks and components for the catchment system installed at Guerneville School. Due to site concerns raised by the Superintendent, several iterations of tanks were purchased and returned, along with changes to design and platform. The employees at Harmony Farm were incredibly helpful and generous, and cut down delivery costs for the benefit of the project.
- **Grab N' Grow Soil Products:** All sheet mulching material including compost, cardboard and mulch, was purchased at Grab N' Grow. Deliveries were punctual, and drivers made every effort to drop materials in close proximity to the work site.

- **California Flora Nursery:** This nursery is an excellent source for California native plants, providing a solid foundation for each of the new habitat gardens installed. Knowledgeable staff provided tips for what varieties of plants would thrive at certain sites in regard to soil type and exposure. Communication with the staff was always efficient, and they were happy to pull plants ahead of time in order to facilitate quick and efficient pick-ups by Daily Acts.
- **Emerisa Gardens:** A wholesale nursery, specializing in smaller plants, Emerisa staff worked with Daily Acts to revise plant selection based on what was in stock, pull orders ahead of time, and hold plants for pick-up. An existing relationship allowed for billing to be completed by SCWA over the phone.

Scheduling:

Scheduling for the program was determined by the school's proposed scope of work and the amount of matching funds provided. Each site was designated a certain number of weeks for project completion based on the total square footage for conversion and any additional design elements such as rain gardens and tanks. The original budget for CCNB anticipated more crew members working on each site, however, due to smaller numbers, additional hours were available allowing for the inclusion of a fourth school.

Santa Rosa Junior College Project Summary

Project Metrics	
Crew Members	**12**
Square feet of lawn converted	**9,650**
Number of gallons saved per year	**120,625**
Number of yards compost	**30**
Number of yards mulch	**89**
Number of cardboard rolls	**15**
Number of plants installed	**434**
Number of weeks to complete	**3**

Beginning October 17th 2017 Daily Acts worked with CCNB supervisor, Arthur Stringham, and 6-8 crew members for three weeks at the Santa Rosa Junior College. The area of focus was a 9,650sq ft. section, which was a portion of the campus's large front lawn off of Mendocino Avenue. Prior to beginning work, Daily Acts and SRJC staff conducted site visits to determine the potential for the site. It was obvious that there was natural topography and low spots on the landscape that could feed into a rain garden, ultimately helping to keep water away from the buildings where it was previously being directed. In addition, the location of Bermuda grass in certain sections resulted in the need for extra layers of cardboard to suppress this weed. Lastly, the many existing trees guided the plant selection to species that would tolerate frequent shade and build out the oak woodland ecology.

Crew members spent about a full week prepping the site, edging for sheet mulching and digging out the large rain garden. On the 6th day of digging out the rain garden, SRJC staff joined the crew with an efficient

backhoe that was able to scrape out excess land and shape the berms around the rain garden. Once sheet mulching of area was complete, the crew had some time to become familiar with the design of the site, learn

more about the plant selection and placement. Trainings for planting and drip irrigation install took up the remaining time at this site, and ultimately there were still tasks to complete without crew support. It is unclear whether this was an issue of communication, scheduling or quality control.

This project was scheduled to begin one week after the fires in Sonoma County began. Daily Acts staff made the decision to push back the start date of the project in hopes that air quality would improve a bit. However, it was apparent that conditions were not going to improve and scheduling conflicts with SRJC required that the work get started. Daily Acts provided N95 masks to lessen exposure and insisted on a slower pace and frequent breaks to maintain a healthy crew. Due to largeness of the site and the desired design elements, in addition to miscommunications between SRJC, CCNB and Daily Acts, all of the work was not completed within the timeframe. SRJC staff continued to weed and irrigate the landscape until Daily Acts staff was available to return and complete the drip irrigation, test the system, and bury the lines.

El Molino Project Summary

Project Metrics	
Crew Members Participating	**14**
Square feet of lawn converted	**11,116**
Number of gallons saved per year	**138,950**
Number of yards compost	**36**
Number of yards mulch	**100**
Number of cardboard rolls	**15**
Number of plants installed	**368**
Number of weeks to complete	**4**

On November 6th, 2017 Daily Acts and CCNB set forth on a four week transformation at El Molino High School, where the crew worked to transform a total of 6 areas on the campus, totaling to 11,116 square feet of lawn converted. The first two weeks were support by CCNB supervisor, Matt Wissler, and about 7 crew

members where we focused on the quad in front of the office, and three smaller sections between the classrooms. Prep work included cutting down existing shrubs and ivy that were blocking the line of site from the office, edging the zones, and capping sprinklers, followed by a sheet mulch demonstration. Attention to detail was essential in the three smaller sections to ensure that existing vegetation did not get damaged by the cardboard or lead to die back when placed close to the crown of the plants. Once sheet mulching and planting were complete, the crew installed a sprinkler conversion kit to hook up drip irrigation to the larger quad area. The first crew worked efficiently, completing the first 4 sections in just under two weeks which allowed them to prep the next area along the front entrance of the school. These next sections were straight forward, with minimal existing plants and boulders that needed to be cut around during sheet mulching.

Each sheet mulch section had its own design considerations which Daily Acts staff addressed while blending plant selections across the site to match the rest of the campus. Additionally, plants were selected to handle both heavy gopher predation and Bermuda grass invasion, the latter of which was primarily found in the front sections. The three smaller sections located in the quad also had the challenge of no existing irrigation, requiring thoughtful plant selection to ensure they could thrive with seasonal rainwater only. Natural social paths were incorporated into the design to avoid plant trampling and taller plants were used along the border to delineate the paths which were later installed with gravel.

After visiting the site to perform quality assurance a month after completion, it was apparent that the Bermuda grass in the front section was coming back with vengeance. After testing the irrigation system it was clear that the neighboring sprinklers had not been converted to 180 degrees (previously 360), which meant there was consistent overspray on the newly sheet mulched areas. Additionally, it was determined that there was only one zone available for irrigation programming, meaning that the new plants were being watered to the equivalent of the existing lawn. For this reason half-gallon emitters were installed on the plants to reduce over-watering of drought tolerant natives and Mediterranean plants. However, recommendations were made to El Molino maintenance crew to monitor the health of plants and to install additional shut off valves if isolating these lines is needed in the future.

Guerneville School Project Summary

Project Metrics	
Crew Members	**8**
Square feet of lawn converted	**1,547**
Number of gallons saved per year	**19,337**
Number of yards compost	**5**
Number of yards mulch	**14**
Number of cardboard rolls	**2**
Number of plants installed	**126**
Number of weeks to complete	**2**

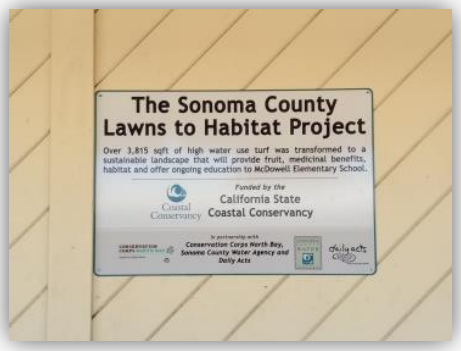
The third project site for this program was Guerneville School, which began on March 5th 2018 for the duration of two weeks. This site had many additional features planned for their outdoor classroom including raised beds, fencing, and a greenhouse and kitchen space which ultimately created scheduling challenges and re-design for the sheet mulch and rain catchment system. The originally proposed scope of work involved 5,000 square feet of sheet mulched area, a 5,000 gallon rain tank installation and an overflow rain garden. All of this changed over the course of two months.

The final area converted, planted and irrigated was 1,547square feet for a total savings of 19,337 gallons a year. With the help of CCNB supervisor, Josh Montgomery, and 5-6 wonderful crew members the area was sheet mulched, planted, with irrigation installed within the first week. The design featured plants that were hardy and could withstand potential trampling by children as this area is located next to the new playground. Due to a large number of evergreen trees and the proximity to a Russian River tributary, native plants were selected that would thrive in this setting. During the second week, Daily Acts contracted with rainwater harvesting expert and designer, Sebastian Bertsch of Permaculture Artisans to design and lead the install of the catchment system. The location of the tanks was specific, and required multiple site visits leading up to the installation. Having been a high school instructor, Sebastian had great experience with teaching the crew members, helping them learn installation techniques and empowering them to complete the project.

With many groups and contractors working on the installation of this outdoor classroom, crew members were able to learn a variety of different skills and assist and on various installs. As half of the crew worked to finish the rain tanks, other crew members helped assist Avalow staff in the construction of their sub-irrigation raised bed system.

McDowell Elementary Project Summary

Project Metrics	
Crew Members	**9**
Square feet of lawn converted	**3,815**
Number of gallons saved per year	**47,687**
Number of yards mulch	**35**
Number of cardboard rolls	**7**
Number of plants installed	**140**
Number of weeks to complete	**2**



Leftover funding in the grant allowed for a fourth school to be added to the Lawns to Habitat program. McDowell Elementary was selected due to its qualification as a low-income school, its desire to replace an existing lawn with an educational habitat garden and support for materials through the City of Petaluma Mulch Madness program.

Beginning on April 2nd, Daily Acts worked again with CCNB supervisor Arthur, for a two week time span to create a native, pollinator attracting habitat garden in-between two of the main classrooms on campus. With some obvious low-spots on the site, crew members helped to excavate a small rain garden around a drain, and rushes were planted into this area. Colorful, pollinator attracting plants were placed throughout the landscape, and several areas were left unplanted so that the students could infill later with swaths of milkweed when the season is right. Originally, the school wanted the entire area to be transformed, but due to previous experience with Bermuda grass, Daily Acts strongly urged that the section where the weeds were most prominent be solarized over the summer prior to sheet mulching. In total, 3,815 square feet of lawn was converted, and about 2,000 square feet was solarized.

Crew members helped to lay re-used plastic that was donated by the City of Petaluma, over the Bermuda grass area, and learned more about the solarization process. To send the message home, Daily Acts took everyone out to the Petaluma Library to see a firsthand example of how a site can thrive with little to no weeds after solarizing is complete. McDowell was one of the most engaged schools during this project. Teachers led a school assembly to prep the students on what the garden would be like, and developed curriculum for plant and insect identification, and will add water conservation into next year's agenda.

Quality Control & Feedback

Quality control was emphasized throughout the project, focusing on each step along the way – sheet mulching, planting, and irrigation installation. However, frequently rotating crews made it challenging to ensure that all members were properly trained and initial work reviewed. If this program were to be conducted again, it would be critical to build in funding that allows for Daily Acts staff/lead installer to be available and on-site each day in order to ensure quality of work is being achieved.

Project Management

As mentioned previously, the frequent rotation of crews was challenging in regard to training and ensuring quality control. While CCNB supervisors had some experience with the tasks at hand and were able to support crews during installation, it was clear that more consistent communication and training of the supervisors would have been ideal. DAO staff made sure to check completed work, reviewing work every other day and providing training on next steps and feedback on opportunities for improvement.

Crew size was manageable, averaging between 5-7pp per day and allowed for clear demonstrations to be executed. Members had opportunities to practice what was demonstrated, and were empowered to complete installation without DAO lead. Attention to details could have been improved with planting and irrigation in particular.

Communication with individual schools both at the administrative and maintenance levels, were good overall. However, Guerneville School became challenging to manage due to multiple organizations, contractors and design features being incorporated on site. Difficulty reaching the Superintendent while designing and sourcing the rain tanks ultimately led to confusion on ideal size, placement and design.

Photography

https://www.flickr.com/photos/dailyacts/albums/72157668500338817

Attachment A

Conservation Corps North Bay – Corps Member Participant List & Work Schedule

Santa Rosa Junior College - October 16 – November 2, 2017

11 work days

a. 442.75 Corps member hours worked
b. 102 Staff hours worked

El Molino High School - November 6-30, 2017

15 work days

a. 770.25 Corps member hours worked
b. 120 Staff hours worked

Guerneville Elementary - March 5-15, 2018

7.5 work days

a. 238.75 Corps member hours worked
b. 60 Staff hours worked

McDowell Elementary School - April 2-12, 2018

8 work days

a. 350.25 Corps member hours worked
b. 64 Staff hours worked

Supervisor's working on Project

1. Arthur Stringham (SRJC and McDowell)
2. Matt Wissler (El Molino phase 1)
3. Josh Montgomery (El Molino phase 2, and Guerneville)

Participating Corps Members

1. Abisai Lopez	12. Damien Chanpheng	23. Jonah Wicker	34. Nathaniel Jump
2. Albert Sedeno	13. Elias Gallardo	24. Jose Galvan	35. Nathaniel Williams
3. Alexis Garvin-Boggs	14. Erin Murphy	25. Josh Abram	36. Niles Hubbard
4. Andrew Brown	15. Garrett Cordova	26. Keith Lutter	37. Patrick Jones
5. Brayan Gualito	16. Graham Mueller	27. Kurt Riggs	38. Pedro Trejo
6. Bryan Tovar	17. Guiovani Bailon	28. Marcel Chagnon	39. Shawn Byrd
7. Chase Hawkins	18. Gy'Vaughn Smith	29. Marco Angel	40. Steven Angulo
8. Christian Hamdorf	19. Isaac Cebreros	30. Marco Solis	41. Theo Catalano-Case
9. Chyanne Simmons	20. Jacob Allen	31. Mario Luna	42. Troy Gordoa
10. Cody Christensen	21. Jacob Russell	32. Mariyaam Crus	43. William Catalano-Case
11. Dakota Scott	22. Jazmin Carranza	33. Michael Solis	

Attachment B

Feedback Survey Results

A request to complete the survey was sent to all four schools to collect feedback on project planning and implementation, project benefits, and opportunities for improvements.

Responses to *"How do you rate the process for this project planning and implementation that occurred?"*

School	Rating (1-10)	Comments
Santa Rosa Junior College	7	"The project felt rushed in the beginning and there wasn't a finalized scope and design before implementation began. However the project is a great success and beautiful addition to our campus landscape and is provide a number of ecosystem services."
El Molino High School	8	"Everyone did a great job coordinating dates/times/project scope."
Guerneville School	10	
McDowell Elementary	8	"All of the people involved in the project have been a pleasure to work with. Representatives of both Conservation Corps North Bay and Daily Acts came well-prepared with ideas, thoughts, and plans. In one meeting, we were able to understand the project, consider options, establish a timeline, and get the ball rolling. With many busy people involved and tricky logistics, I would have expected a rockier road; I am very glad it ended up working out, due to the cooperation of great people."

Responses to *"How do you rate the benefits of the project from a sustainability perspective?"*

School	Rating (1-10)	Comments
Santa Rosa Junior College	10	
El Molino High School	8	"I think this is a great project, so far, the areas are blooming and we couldn't be happier with the result. It's nice to do sustainability projects showing our students that we are about our campuses and the impact we have to reduce our water consumption."
Guerneville School	10	"Our rain catchment system will significantly increase the use of rain for new garden beds. Families have shared they want to adopt a similar system at home!"
McDowell Elementary	8	"Maintenance and upkeep of a garden is always a challenge; I am confident that the payoff will be worth it. The installation of the drip irrigation was an incredibly valuable component of this project, and will increase the project's sustainability. The excitement and education of lead teachers on this project was essential to making sure the project has sustainability benefits."

Responses to *"How do you rate the benefits of the project from an educational perspective?"*

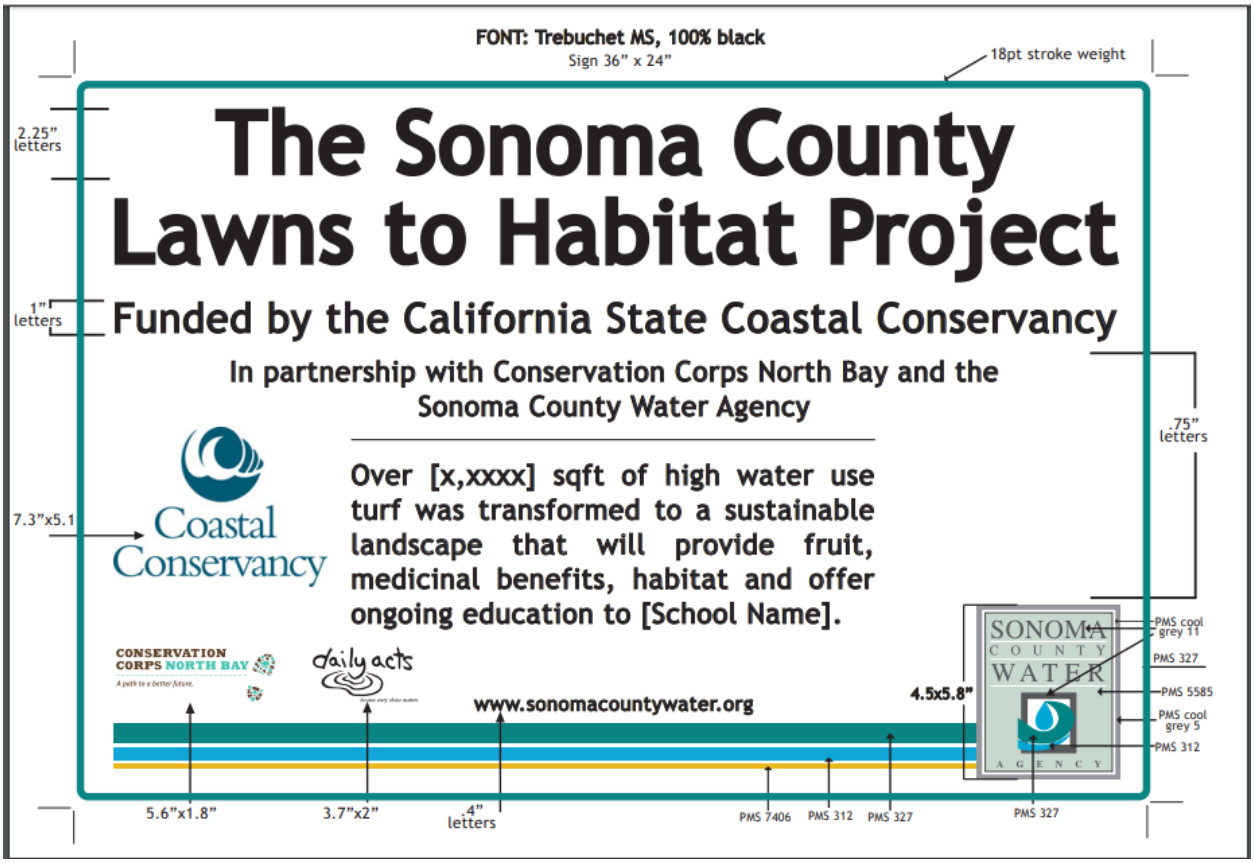
School	Rating (1-10)	Comments
Santa Rosa Junior College	10	"This project is part of our living learning laboratory and is being used to educate folks about water retention landscapes and native gardens."
El Molino High School	8	"Very beneficial, we have a green team committee of students that works on projects around campus; they were very excited to see this project move forward."
Guerneville School	10	"We will incorporate catchment totals in math/science lessons for K-8."
McDowell Elementary		"From the project's earliest stages, our teachers enjoyed speaking with and teaching students about the processes happening in the native habitat garden. This sparked many class' studies of specific processes, organisms, and concepts as they related to what they were seeing develop daily before their eyes. As the garden grows and attracts wildlife, and the students grow up with the garden, there will be ample opportunities to keep their interest in this space alive. Caring for the garden has already helped us reinforce our McDowell values of respect, responsibility, compassion, and perseverance."

Responses to *"What improvements that can be made to the process and implementation?"*

School	Comments
Santa Rosa Junior College	a) "Need to final design before construction begins." b) "Define scope with regards to what district personnel are needed for irrigation, testing, etc..."
El Molino High School	c) "Not sure any improvements could be made, good communication, good coordination, good people = good and successful project. Thank you everyone for your help."
Guerneville School	a) "Further refining procurement/contract procedures." b) "Monthly virtual meetings for progress checks."
McDowell Elementary	a) "Establishing and adhering to timelines, and communicating consistently about stages of the project. No one likes to be facing an urgent deadline, and it would be great to get out ahead of these due dates!" b) "For the future, collecting and incorporating a resource binder for native habitat garden projects that have been successful at other sites. This would give teachers more ideas of how they might incorporate the garden into student learning over the years." c) Not a whole lot of other suggestions. We appreciate this program, it has added a lot to our campus! Thank you!

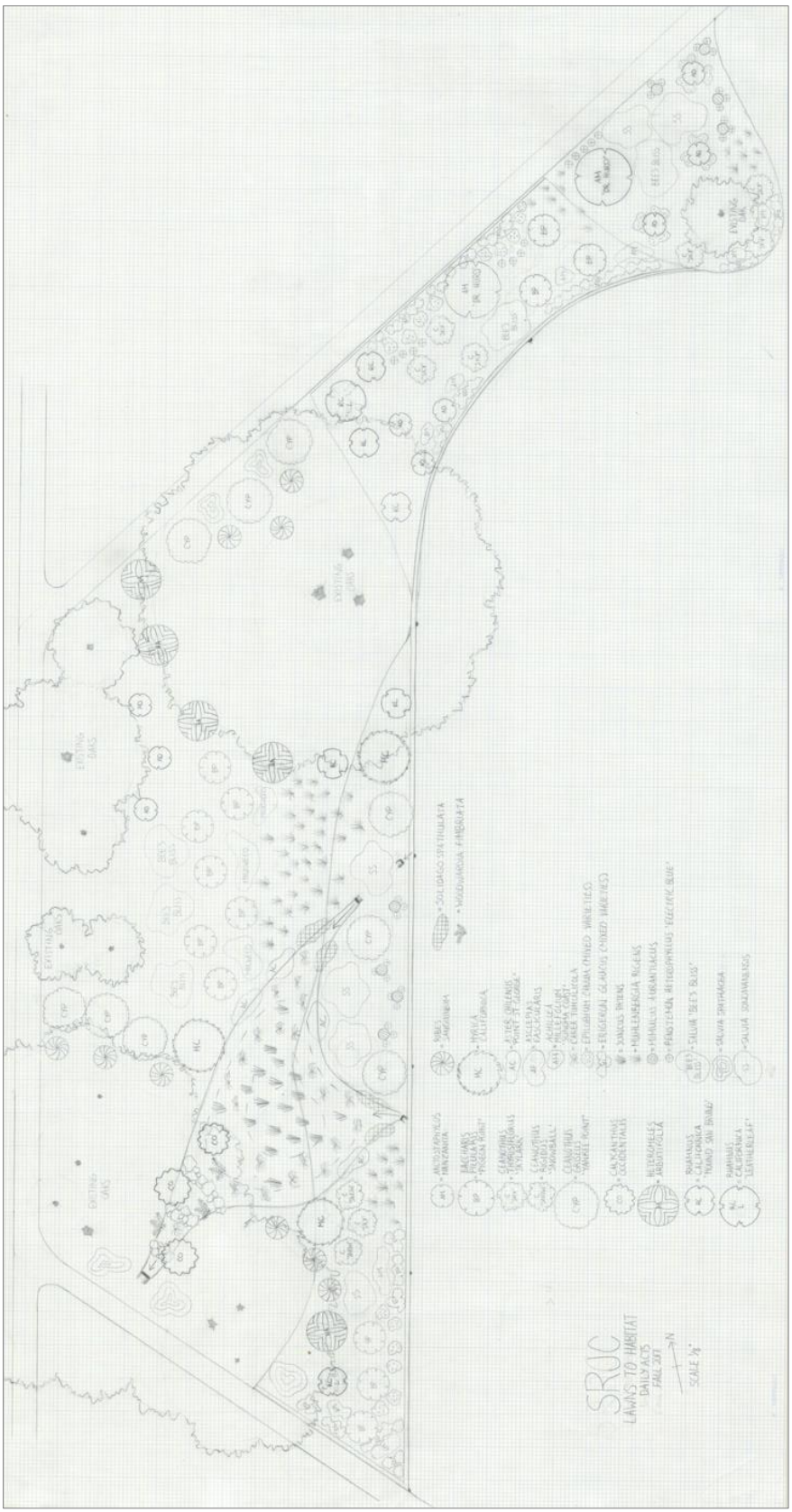
Attachment C

Sample Sign Layout & Content



Attachment D

Sample Landscape Design from Santa Rosa Junior College



Attachment E

Sample Maintenance Plan from Santa Rosa Junior College

Habitat Garden Maintenance Plan – Santa Rosa Junior College

The habitat garden at Santa Rosa Junior College was designed to be a demonstration of water conservation and ecological landscape practices, providing an outdoor classroom for students to observe pollinators and native plants. In addition, the conversion of **9,650 square feet of underutilized lawn through sheet mulching, is now saving 120,625 gallons of water a year!** In order to keep this garden growing and accessible for many generations of students to come it is important to perform seasonal maintenance to ensure the health of the plants and the landscape. For more details on specific tasks read below and consult the maintenance schedule.

Weeding

Any weeds, especially Bermuda grass, should be removed by hand immediately. **It is very important that weeds are not allowed to go to seed or re-establish via rhizomes.** Bermuda grass in particular will start to invade quickly if it is allowed to establish itself on top of the mulch, and any regrowth should be pulled while still young. Where Bermuda grass's rhizomes break off, a tiny bit of concentrated vinegar in a squirt bottle can be sprayed to prevent regrowth. Because this garden can function as an outdoor classroom demonstrating ecological landscape practices, **no herbicides should be used** besides concentrated vinegar, and that should only be used very sparingly.

Irrigation

The irrigation system built for this habitat garden is composed of two hydro-zones operated by a Hunter Node Timer. Please read on for specific details on each zone, consult Seasonal Maintenance Plan below and attached Irrigation Schematic for troubleshooting leaks or other issues with buried poly tubing.

1) **Zone 1:** This zone comprises plantings to the south and north of the rain garden including the rain garden. All shrubs were provided with two 0.5 gph emitters applied through point source via ¼" tubing and were staked down to prevent emitter getting clogged. For herbaceous plants, one 0.5 gph emitter was used per plant and rhizomatous spreading perennials were provided ¼" inline emitter tubing to encourage spreading. Rain garden plants received two 1.0 gph emitters per plant to ensure healthy establishment. Suggested watering time for Ca. native plants for establishment is 2 x per week for 45 minutes, however adjust as needed.
2) **Zone 2:** This zone includes everything north of zone 1 to the Rose Garden and is comprised on shrubs, herbaceous perennials and rhizomatous spreaders that should be programmed the same as zone 1.

Please check the irrigation monthly. Turn on the system and walk around making sure each plant is getting water and that there are no leaks. Checking the battery in the timer is also important, and batteries should be removed during the winter to prevent corrosion.

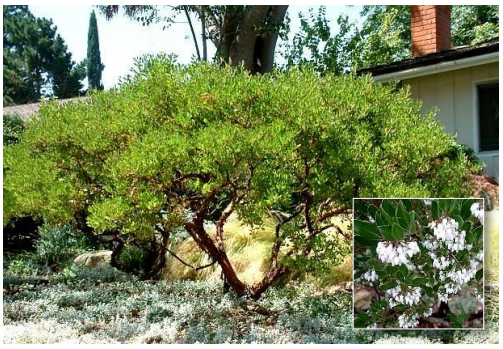
Mulching

A process known as **sheet mulching** was used to convert the lawn here to a garden. The existing lawn was covered in 1" compost, two layers of recycled cardboard, and 3" of mulch on top. This process builds soil quantity and health as these materials degrade and compost the lawn underneath. Weeds that appear on top of the mulch should be thoroughly removed on a regular basis, but if weeds do get out of control, additional cardboard and mulch can be layered on top of the weeds. Otherwise a fresh layer of mulch should be applied every two years or as needed to provide weed barrier and help hold moisture in the soil during hot summer days.

Planting

This habitat garden was designed to meet the specific need of the site by providing plants that would expand the understory of the existing native oak trees and thrive in a much needed rain garden to absorb seasonal flooding. A planting plan has been provided to the school to address any need for replacement plants in the future. More detailed information on seasonal plant care by species can be found below.

Plant Specific Information:



Manzanita *(Arctostaphylos densiflora 'Howard McMinn')*

This manzanita is very flowery with red stems, green foliage. Berries are edible and good for making cider. It likes to be five to ten feet from a watered area where it can get the root moisture without the wet feet it hates. It is one of the most garden tolerant of the manzanita, although you can kill it from overwatering or underwatering. Moths, hummingbirds, butterflies and other native wildlife like the plant.

Manzanita *(Arctostaphylos manzanita 'Dr.Hurd')*

An evergreen shrub to small tree that grows fairly rapidly to 12-15 feet tall and about as wide, with an open structure and beautiful dark mahogany red-barked stems holding large ovate light green leaves at their tips. The clusters of small white flowers dangle at the branch tips in late winter. Plant in full sun to light shade and irrigate occasionally to not at all.

California Buckeye *(Aesculus californica)*

Irrigate occasionally to not at all - this tree will naturally go summer deciduous in response to dry or hot conditions, which in some locations in dry years can occur as early as late spring and at other times and locations as late as mid fall. Occasional irrigation in the summer will keep the Buckeye in leaf into the fall and newly emerging leaves in early spring are apple green.

Toyon *(Heteromeles arbutifolia)*

An evergreen shrub to small tree that usually grows to 6-8 ft. high and 4-5 ft. wide. Toyon can go to 15-20' tall if it's old and happy and become a delightful evergreen multi-stemmed tree with white flowers in summer and red berries in winter. Decent air flow and no summer water after first year in coastal areas. Inland they will tolerate regular water and even heavy shade.

Coffeeberry *(Rhamnus californica 'Mound San Bruno')*

This evergreen shrub is more compact than the species, growing to 4-6 feet tall and twice as wide as it is tall with leaves that about half the size typical of the species. Tolerates shearing and can be shaped into a poodle if you have nothing better to do. San Bruno is great for a bird garden. **Do not eat!**

Coffeeberry *(Rhamnus californica* 'Leatherleaf'*)*

This selection of the California native Coffeeberry is an evergreen shrub that is more compact than the species but can still may grow to a large mound to 8 feet tall and wide though is more often seen to 5 to 6 feet. As with the species, the inconspicuous greenish-yellow flowers that are followed by showy berries that are first green then red and finally black when ripe. A hardy fast growing shrub that can grow in most soils, but does best in a sandy soil - more of a challenge in heavier soils and away from the coast. Grows in sun or light shade and is drought tolerant. **Do not eat!**

Pink Flowering Currant *(Ribes sanguineum)*

A five foot deciduous shrub with long showy pink flower clusters that cover the plant in January to March. Ribes sanguineum glutinosum is native to canyons and north slopes in the coast ranges. This currant likes shade to part shade, moderate water in interior, very drought tolerant in coastal gardens. Sometimes growing in deep shade next to a seasonal stream in heavy clay, sometimes on north slopes.

Beardtongue *(Penstemon spp.)*

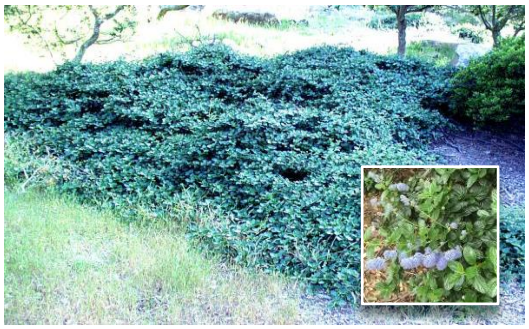
It is an evergreen perennial or sub-shrub to 3 feet tall with purple-tinged stems heavily clothed with 4 inch long lance-shaped dark green leaves with slight dentations towards the tips. Pinch plants after the first bloom to promote a quick re-bloom and cut back hard in winter to encourage a new flush of dense growth in spring.

Milkweed *(Asclepias speciose)*

Very little milkweed winter care is needed and pruning can be done in fall, but isn't really necessary part of winterizing milkweed plants. Milkweed plants in winter are valued by birds and small animals who use their natural fibers and seed fluff in their nests. Simply cut last year's stems back to the ground with clean, sharp pruners.

Deer Grass *(Muhlenbergia rigens)*

Deer grass is known for growing to a height of approximately 2.93 feet (that's 90.0 cm in metric) with a grass habit. This plant tends to bloom in early spring. Cut back long shoots to promote more growth before the winter.



Ceanothus *(Ceanothus griseus horizontalis 'Yankee Point)*

This fast-growing, durable groundcover reaches 2 to 3 feet tall and spreads 8 to 12 or more feet wide. Plants bear 1 1/2 inch long, glossy, dark green leaves and bright blue flower clusters in winter through early spring. Despite its coastal origins, 'Yankee Point' will grow inland with no watering once established in partial shade. Plants typically mound up to 5 feet tall if planted too close together. Prune ofter to maintain a dense form and promote vigor.

Coyote Brush *(Baccharis pilularis* 'Pigeon Point')

Baccharis Pigeon Point' grows into a one foot tall by twelve foot wide dark-green groundcover. This is the preferred form of Dwarf Coyote Brush for slope stabilization and landscaping in almost all areas. Plant from gallons six to ten feet apart for a two year or so fill-in. 'Pigeon Point' doesn't lose its bottom and seems to stay low and clean for at least ten to twelve years. Highly recommend these plants next to a back sitting area to attract wildlife.

Ceanothus *(Ceanothus thyrsiflorus 'Skylark')*

Valued for its compact habit and late flowering, this selection offers clusters of dark blue flowers on short stems appearing just as other ceanothus are finishing their show. 4 - 5 ft. tall and 6 - 7 ft. wide with shiny evergreen foliage. Shrubby ceanothus provide seeds eaten by bushtits, mockingbirds, quail and finches, as well as cover for birds.

Ceanothus *(Ceanothus thyrsiflorus 'Snowball'*

A low evergreen shrub with small dark green, leathery, holly-like leaves, and white flower clusters cover the foliage in spring. 'Snowball' needs some summer water and afternoon shade in the interior. This California lilac, like many others, likes cool soils (roots hidden under rock, log, mulch or afternoon shade) and to be summer dry, but for the soil to still have some moisture in it.

Spice Bush *(Calycanthus occidentalis)*

Likes sun to partial shade and moist soil. It is tolerant to sandy or clay soils, and likes water. In the interior it will get leaf burn if it goes dry, but looks good if given regular water. Calycanthus occidentalis is pollinated by beetles in the Nitidulidae family. Calycanthus occidentalis's foliage turns a different color in the fall, color is green, and type is deciduous and has fragrance.

Hummingbird Sage *(Salvia spathacea)*

Hummingbird Sage is a 1' high perennial that spreads by rhizomes and sends up gorgeous magenta flowers. Leaves are sticky and very fragrant. This sage is native to coastal California from Napa to Orange and will take full sun, full shade, and just about any soil. As the name implies hummingbirds work this species very heavily, and often stake it out as prime territory. Deadhead in late summer and prune back a bit if needed.

Coast Golden Rod *(Solidago spathulata)*

Native to coastal strand and coastal scrub communities where it forms low mats of spreading bright green foliage. Summer brings flower stems a foot or so tall made up of small bright golden-yellow daisies. Full sun to light shade with some summer water. Tolerates heavy soils. Attracts various beneficial insects.

Penstemon (*Penstemon heterophyllus 'Margarita BOP'*):

This native is very, very showy and long lived (20+ years if it's happy!). It is one of those that you can see from the car at 60 mph. It grows in clay or decomposed granite, always on slopes, and is popular with native bees. Deadhead as need to encourage new blooms, by cutting the flower stalk off at the base of the plant.

Sticky Monkey Flower (*Mimulus aurantiacus)*

The sticky monkey-flower is a flowering perennial that grows up to 3 feet tall, has deep green sticky leaves 3 to 7 centimeters long, with flowering stems that grow vertically. The flowers are tubular at the base and about 2 centimeters long with five broad lobes; they occur in a variety of shades from white to red, the most common color being a light orange. They are pollinated by bees and hummingbirds.

Pacific Wax Myrtle *(Myrica californica)*

The Pacific wax myrtle is a fast-growing, multi-trunked shrub that can climb as much as two to four feet a year, if given more than an average amount of water. The wax myrtle can be trained as a dense, closely knit shrub that can serve as a screen, windbreak or formal manicured hedge. Establish in a rain garden or near a disconnected downspout. Waxy coating on berries traditionally used as natural crayon.

California Fuchsia *(Epilobium canum 'Everett's Choice')*

A low, spreading form of California fuchsia staying below 1' in height. Distinctive for its fuzzy, gray-green foliage with many scarlet tubular flowers from summer through to fall. Good for sunny areas. Flowers best with occasional deep watering. Attracts hummingbirds. Pruning plants down to a few inches in late autumn helps to rejuvenate them for the following year.

California Fushcia *(Epilobium canum 'Schefflins Choice')*

A low growing selection of California Fuchsia that mounds to 6 inches tall, spreading or trailing 3 feet or more with bright red orange tubular flowers summer, fall. Attracts hummingbirds, prefers full sun, poor soil, average to no water. Quite deer resistant, sometimes invasive. Hardy to at least 25°F.

Seaside Daisy (*Erigeron glaucus 'Cape Sebastian'*)

Wide, pink daisy flower with a yellow center that bees love, this evergreen native groundcover is low-water-use and well adapted to many soils. Flowers bloom spring through fall preferring full sun, but can take some shade. Prune off old flower stocks to maintain green appearance. Grows 1' tall and 3' wide. Maintenance is the same for the three varieties.

Berkeley Sedge *(Carex divulsa)*

This tough native sedge has tufted basal foliage that consists of narrow pointed leaves reaching 2' in length. Plant in full sun to partial shade. Great in rain gardens or even as a lawn replacement. Creates nice structural anchors in a garden and good habitat for beneficial insects and beetles. Prune off dead flowering stalks to maintain shape.

Grey Sedge *(Juncus patens)*

One of our most versatile native plants, Juncus can take standing water and dry summers. Often found in wet seeps in pastures. Flowers are discreet and brown, but good for native insects and birds. Cut back brown dead shoots as needed.

California Fescue *(Festuca californica 'Phil's Silver')*

Gray-green in spring, it turns more silver-gray as the dry season progresses. Relatively dense (2 ft. X 2 ft.) foliage with unusually stout and heavy grass-flowers, this robust clone holds up well throughout the season. Its cultivar name is a pun for baby boomers that watched the 50's show The Phil Silver's Show, starring Phil Silvers. It prefers good drainage and bright shade inland with little to occasional summer water. Deer resistant.

Bee's Bliss *(Salvia Bee's Bliss)*

This native CA shrub grows low to the ground, never exceeding 2 feet, and can reach 6 to 8 feet wide and draping over rocks or walls. It has an extended bloom with whorls of lavender-blue flowers on 1 foot long spikes from mid-spring into early summer, rising above the tomentose gray-green leaves. Plant in full sun and water sparingly. Drought tolerant, particularly in coastal gardens, it dislikes overhead irrigation which can promote powdery mildew along the coast.

Sonoma Sage *(Salvia sonomensis)*

The leaves are hairy, with underside densely covered with hairs making it appear white. The flowers cluster and range in color from white to blue, lilac and purple. It is moderately drought tolerant if given some shade. It is sensitive to heat and direct sun; leaf drop is an indication of too much sun or heat or inadequate moisture.

Pacific Aster *(Aster chilensis 'Point Saint George')*

A low growing vigorous native perennial, reaching up to 6 inches in height and spreading widely and aggressively. Covered with soft lavender daisies summer through fall. An excellent nectar source for bees and butterflies and seeds for birds. Can use in rain garden.

Yarrow *(Achillia millefolium 'Sonoma Coast White' and 'Moonshine')*

A wonderful groundcover that is super attractive to pollinators and can accumulate nutrients from deep in the soil, making them more available for other plants. Also has a long history of use for healing teas and poultices. This plant can get to around 2' tall and about 1-2' wide. Cut back after flower if it looks spent, and it will happily re-sprout

Chain Fern (*Woodwardia fimbriata*)

A wonderful groundcover that is super attractive to pollinators and can accumulate nutrients from deep in the soil, making them more available for other plants. Also has a long history of use for healing teas and poultices. This plant can get to around 2' tall and about 1-2' wide. Cut back after flower if it looks spent, and it will happily re-sprout

Yerba Buena *(Saturja douslasii)*

A delicious and easy native mint groundcover that can be used in all the same ways as it's more invasive cousins. The stems grow across the ground, not with rhizomes. To harvest for tea, cut the upper parts of the stems right before the plant blooms, then dry and store in an airtight container. Likes more regular water.

Rain Garden

The rain garden diverts and infiltrates stormwater from the streets that would otherwise flow under existing buildings and cause potential damage and flooding. The rain garden should drain within three days, so if water is not draining quickly enough more plants can be added to help with infiltration rates. In large storm events, water may overflow out of the drains at either end of the garden, which is okay. Please ensure that drains are clear of debris each fall before the rains start. For more info view http://www.srcity.org

Maintenance of LID features shall include the following at a ***minimum*** to ensure continued and effective function:

- Dry street sweeping upon completion of construction
- Dry street sweeping annually, and
    - When water is observed flowing in the gutter during a low intensity storm.
    - Algae is observed in the gutter.
    - Sediment/debris covers 1/3 of the gutter width or more.
- Inspect twice annually for sedimentation and trash accumulation in the gutter
- Obstructions and trash shall be removed and properly disposed of.
- Inspect twice during the rainy season for ponded water.
- Pesticides and fertilizers shall not be used in the bioretention area.
- Plants should be pruned, weeds pulled and dead plants replaced as needed.

Seasonal Maintenance Schedule	Spring	Summer	Fall	Winter	Monthly	As Needed
IRRIGATION SYSTEMS						
Valve system						
Repair leaks						*
Check timer batteries and settings	X	X	X			
Turn timer off for Winter				X		
Turn timer on for Spring	X					
Clean filters	X	X				
Drip system						
Repair leaks	X	X	X			*
Add/remove emitters or tubing		X				*
Open ends and flush	X					*
Take mature plants/trees off irrigation system						*
PLANT AND BED CARE						
Tasks						
Weeding					X	
Other trimming (shrubs and herbaceous)			X			
Dead heading	X	X	X	X		
Plant replacement	X			X		
Mulching	X		X			*

Attachment F

Sample Plant Pamphlet Brochure from Santa Rosa Junior College