

## **PROJECT-BASED LEARNING: DESIGN AND BUILD A RAIN GARDEN**

### **Part 4: Installation and Final Evaluation**

#### **Purpose and Overview:**

This lesson covers guidelines for pre-installation activities and for preparing and installing the garden. It also includes the final evaluation for the project.

**Time:** Two-three 45-minute sessions or after school/weekend work party, plus homework

#### **Objectives**

The student will...

- Translate a 2D map to 3D space
- Become familiar with landscaping tool use and safety
- Understand the tasks required for garden installation
- Problem solve measurement and other issues and make decisions
- Work collaboratively and communicate effectively to create a final product
- Evaluate their personal growth and reflect on both technical and soft skills acquired throughout the project.

#### **Materials:**

- Final garden design layout and planting plan
- Wood or metal stakes
- Flagging tape
- Measuring wheel
- Tape measures
- Spray paint
- Pitch forks
- Shovels
- Trowels
- Hand cart(s) and/or wagon(s)
- Wheelbarrow(s)
- Shoes and clothes that can get dirty
- Mulch, soil, plants, hardscaping materials, etc.

#### **Installation Guidelines/Checklist**

##### **Pre-installation Preparation**

1. If you did not already call 811 during the Site Inventory phase of the project to have a utility markout performed on the site, contact 811 at least 1 week prior to the work day in order to make sure there are no underground utilities where you plan to dig. This is a critical step in order to ensure safety for the volunteers who work on the garden. In most cases, utilities will be buried deeper than your gardening and excavation activities will affect, but you can never be too careful.

2. Do a tool inventory and review tool safety rules with students.
  - a. Make sure you have the entire set of tools that the school, you, and/or student's families are providing for installation.
  - b. If you are renting or borrowing any tools or equipment, double check on availability, price, and timing.
3. Work with students to organize specific installation activities. You may want to rotate groups through each activity, randomly assign activities, or have students identify what they want to do, making sure all necessary work is covered:
  - a. Site marking
  - b. Digging--depending on the size of the garden, divide up areas for different groups to work in. If the area with the garden is covered with grass, you'll need to have a team remove the grass.
  - c. Addition of soil amendments (if deemed necessary in Part 2 of the lesson).
  - d. Watercourse installation (input and outflow)
  - e. Pathway installation
  - f. Seating installation
  - g. Quality assurance--this team moves around the garden area, checking features against the final design.
  - h. Planting--having all students participate in planting
  - i. Mulching
4. Arrange for volunteers and/or experts you will need for installation.
  - a. Have plenty of fluids and snacks on hand to energize the installation crew.
  - b. Be sure to schedule expert help for when you specifically need them in the process.

### **Installation Day**

1. Set up water and snacks where they will be readily accessible to the crew.
2. Remind students to be mindful of the tools they use and other crew members and set up an area where tools will be kept when not in use.
3. Mark the garden. Using the final design layout produced in Part 3, work with students and volunteers to mark the garden area using flagging tape and stakes and spray paint. Make sure the following are clearly marked:
  - a. The size and exact position of the garden(s)
  - b. Where stormwater will enter the garden
  - c. Where stormwater will pond in the garden (is there one basin or several basins in your design?)
  - d. Pathways and seating areas
  - e. Erosion control areas
4. Review the marked-out garden, asking students to note any areas they think might be problematic or should be changed. Modify as needed, making sure to consider any other design features that will be affected by the changes.

5. Once the garden space is prepped, work with students to layout plants according to the planting plan chosen in Part 3 of the lesson. Everyone should have a copy of the planting plan.
  - a. Layout all of the plants before digging any holes.
  - b. Once plants are placed, have students examine the design and determine if any changes should be made.
  - c. Once the students are satisfied with the plant placement, they can begin to dig holes for the plants.
  - d. You may need to educate students on how deep to dig a hole, how to remove a plant from its pot, break apart the root ball, place in the ground, and fill hole with soil. More information on this process can be found here <http://homeguides.sfgate.com/steps-transplanting-plant-pot-ground-103265.html>
  - e. Make sure to water the garden after everything is planted!

### Post-installation

1. Spread the word! Have students post and/or distribute copies of the final design and photographs of the process to parents, school personnel, local government, community organizations, and local businesses.
2. Revisit the maintenance plan the class created early in the process. Now that the garden is complete, are there any changes or additions to be made? Who will care for the newly planted garden?
3. Have a party! You may want to do this once the final evaluation is complete and interpretive signs are installed (see below).

### Final Evaluation

1. Students design and write interpretive signs for the rain garden, explaining green infrastructure and rain gardens and how the garden benefits the school community as well as the larger community, and identifying the plants in the garden.

Specific questions that the signs should address:

- Do the signs include an explanation of green infrastructure? Is the information accurate?
- Do the signs contextualize rain gardens in larger green infrastructure issues?
- Do the signs accurately convey key information about rain gardens?
  - Rain gardens are an example of green infrastructure, the human management of natural resources that works with and mimics natural processes or systems.
  - Rain gardens manage stormwater runoff from impervious surfaces, such as roofs and paved areas.
  - The rain garden has a basin 6 inch deep to hold stormwater.
  - The plants in the rain garden are native plants. Native plants help to increase biodiversity by supporting local wildlife and pollinators.
  - The plants are selected to withstand changes in the availability of moisture.

- The sign(s) describes the water catchment area (the nearby impervious surface) that the rain garden is mitigating and explains how much water the rain garden filters.
  - Are the plants fully and accurately identified?
  - Are the signs visually clear and well-designed?
2. Students write a self evaluation for the skills they learned and used during the planning, design, and installation phases of the project. You may want to initially have students write without the list below in mind, to get a more clearly self-generated understanding of what they experienced and learned. As a follow-up exercise, you can have them respond to all or some of the categories or revise their evaluation in reference to the list.
- |                                     |                                       |
|-------------------------------------|---------------------------------------|
| a. Planning                         | g. Leadership                         |
| b. Proposal development and writing | h. Problem solving                    |
| c. Drafting                         | i. Online research                    |
| d. Creativity                       | j. Self discipline and perseverance   |
| e. Revision                         | k. Personal enjoyment or satisfaction |
| f. Collaboration and communication  | l. Learning new skills                |

### **Additional Resources and Further Reading**

#### Example Rubric for Evaluation

- 6 Reasons to Try a Single-Point Rubric (Edutopia)  
[https://www.edutopia.org/article/6-reasons-try-single-point-rubric?utm\\_source=facebook&utm\\_medium=socialflow](https://www.edutopia.org/article/6-reasons-try-single-point-rubric?utm_source=facebook&utm_medium=socialflow)

#### Resources for Sign Inspiration

- Making Garden Signs (Life Lab)  
<http://www.lifelab.org/2012/01/making-garden-signs/>
- Interpretive Panels (USDA Forest Service)  
<https://www.fs.fed.us/wildflowers/features/panels.shtml>
- Wildlife and habitat interpretive signs and displays (National Trails Training Partnerships)  
<http://www.americantrails.org/photoGalleries/cool/14-habitat-wildlife-trail-interpretation-sign.html>
- Rain Garden Signs (Vacker, Inc.)  
<http://www.vackersign.com/rain-garden-signs>

#### General Resources

- Resources for Rain Gardens (12,000 Rain Gardens)  
<http://www.12000raingardens.org/resources/>