

PROJECT-BASED LEARNING: DESIGN AND BUILD A RAIN GARDEN

Part 3: Rain Garden Design and Planting Plan

Purpose and Overview:

In this lesson, students engage in a creative design process to develop a final design for the rain garden, using the base map produced and selected in Part 2. In the process, they learn how to visually represent plants and other garden features and what native plants will work well in their garden. This is the final lesson before installation of the rain garden.

Time: Two-three 45-minute sessions

Objectives:

The student will...

- Explore how a 3-dimensional space can be represented on paper
- Utilize site information to make decisions about placement and design
- Use measurement and architectural drafting tools
- Apply creativity to a design
- Work collaboratively to produce and select a design

Materials:

For teachers:

- Access to computer, Internet, computer, speakers, projector
- **Rendering Examples** PowerPoint
<https://www.natureworkseverywhere.org/resources/design-and-build-rain-garden/>

For each individual or group of students:

- Copy of **Part 3 Rain Garden Design Guidelines** handout
<https://www.natureworkseverywhere.org/resources/design-and-build-rain-garden/>
- Access to computer with internet
- Poster-sized paper
- Base map with garden layout
- T-square
- Architectural scale
- Drafting triangles
- Drafting dots or drafting tape
- Circle template
- Tracing paper
- Colored pencils
- Wood or metal stakes
- Flagging tape

Suggested Flow:

Day One: Prepare for the Final Garden Design

Engage

1. Show students the **Rendering Examples** PowerPoint (<https://www.natureworkseverywhere.org/resources/design-and-build-rain-garden/>). Discuss the objectives for creating a rendering and go over the various types of renderings as depicted in the PowerPoint.
2. Show students examples of gardens and garden designs if desired. You may find additional examples on the Internet, be sure to search for local examples that students may have seen about town. Discuss the depiction of various components, such as trees, pathways, shrubs and small plants, etc.
3. Remind students that the garden plan will both guide the installation of the garden and keep school personnel and other stakeholders informed about the project. They can also use the plan to communicate with the community about the garden. Generally speaking, the more detailed and attractive the design drawings, the easier it will be to sell the concept to community members, school administrators and other stakeholders. The purpose of a rendering is to accurately depict a design but also to market an idea and make it seem plausible and positive.
4. Have students view the segments listed below of the video *Building a Rain Garden in the Pacific Northwest** (<http://www.12000raingardens.org/build-a-rain-garden/>). This can be done in class or as homework.

Time codes for video sections:

- 19:59-25:05: Planting and Mulching Your Rain Garden
- 25:06-27:54: Maintaining Your Garden, garden design and installation considerations

**While the title references the Pacific Northwest, the video covers the general process of building a rain garden and the information is relevant for most areas.*

Explore

1. Review the base map produced and selected in Part 2 and explain to students that they will draft final garden designs for the rain garden using this map. By the end of this part, they will select a single final design to use for installation of the rain garden.
2. Ask students what they needed to keep in mind as they created the base map in Part 2 (responses might include existing structures and trees, location and quantity of rainwater the garden needs to capture, required size of the rain garden, the amount of sun received).
3. Ask students to generate a list of other design considerations for the garden. The list might include
 - What look, or aesthetic, the garden will have (formal, wild, color scheme)
 - What new structures/hardscaping to add (paths, seating, wildlife features)
 - What native plants will thrive under existing garden conditions (e.g., sun exposure, climate)

- What will the garden look like from different views outside the garden (people walking by, nearby buildings, other outdoor spaces)?
4. Have groups of students each explore one of the above considerations.

For example,

- a. The look, or aesthetic, the garden might have (formal, wild, color scheme).

Suggested resources:

- Rain Garden Design and Benefits (Garden Design Magazine)
<https://www.gardendesign.com/eco-friendly/rain-gardens.html>
- Sample rain garden designs (Three Rivers Rain Garden Alliance)
<http://raingardenalliance.org/planting/design>
- Sample Rain Garden Designs (Washtenaw County)
http://www.ewashtenaw.org/government/drain_commissioner/dc_webWaterQuality/rain-gardens/tour

- b. Possible structures and hardscaping to add.

Suggested resources:

- What is Hardscape? (The Spruce) <https://www.thespruce.com/what-is-hardscape-2131060>
- What is the difference between hardscape and softscape? (The Spruce) <https://www.thespruce.com/learn-difference-between-hardscape-and-softscape-2736691>

- c. Consider adding features to attract wildlife like bird baths and bat boxes, etc.

Suggested resources:

- Where to Place Habitat Features to Protect the Wildlife You are Attracting
<http://content.yardmap.org/learn/placing-habitat-features/>

- d. Native plants of the region (including trees, shrubs, and perennials). Students should consider plant size, water needs, sun or shade, seasonal interest, wildlife host characteristics, color, and growth habit.

Suggested resources:

- Native Plants Database (Audubon) <https://www.audubon.org/native-plants>
- Native plant database (Plantnative)
<http://www.plantnative.org>
- Sample Rain Garden Designs (Washtenaw County)
http://www.ewashtenaw.org/government/drain_commissioner/dc_webWaterQuality/rain-gardens/tour
- See <http://rainwaterharvesting.tamu.edu/files/2011/05/Rain-Garden-Plant-List-11-02-09.pdf> for an example of how to organize plant information.

Note: Have students compile a limited plant list that includes choices of 5-10 shrubs, 15-20 herbaceous plants, and 5 or so native grasses. Because students will likely find vast numbers

of plants through these searches, it might be worthwhile to consult a local greenhouse on which plants are the most hardy for your region and readily available for purchase. Be sure to check with the school district to determine if there are allergy-free plant requirements for the school.

5. Have students produce a brief document to share the information they found with other groups. For example, garden images representing various aesthetics, sample hardscaping options (with a brief description of the installation process), native plant lists. All students will need this information for use in drafting a final garden design. You may want to add this document to the students' Padlet accounts or Google docs, or you can distribute copies of the documents. If possible, have students review the documents beforehand to prepare for design day.

Day Two: Draft the Final Garden Design

Explain

1. Distribute the [Rain Garden Design Guidelines](#) handout. Using Brainsketching, C-Sketching (also known as 6-3-5), Gallery, or another group design method of your choice, have students work in groups to draft garden plans using the Guidelines.

C-Sketching:

- Each student in each group quickly sketches 3 garden design ideas on a large piece of paper, using tracing paper over the base map produced in Part 2 .
- After 5-10 minutes, students rotate and add design ideas to the next student's designs. This continues until all the students have added to all drawings.
- Students return to their own designs to review and modify as they want.

Brainsketching:

- Similar to C-Sketching, but students only produce one sketch of their ideas before rotating and reviewing and adding to other students' work.

Gallery:

- Each student in each group sketches 3 garden design ideas on a large piece of paper, using tracing paper over the base map produced in Part 2.
- After 5-10 minutes, students post their sketches around the room.
- Students walk around the room viewing one another's work. They add post it notes to comment on the designs.
- After 5-10 minutes of viewing, students spend another 5-10 minutes modifying their designs as they wish in response to the comments.

2. Ask each group to discuss, modify as needed, and select a design to present to the class.
3. Talk through each design as a class and choose a final design. Discuss as a class whether to make any changes on the selected design.

Evaluate

For homework, have students self-evaluate for the following:

- Research: Did they explore a number of websites in their research? How did they evaluate the information they found?
- Group work: Did they engage in the group design process? What did they think of the process?

- Content:
 - Do students understand why rain gardens work best with native plants (e.g. because these plants better tolerate local conditions; including temperature and rainfall/ drought)?
 - Do students understand the need to consider weather/climate needs in selecting plants?
 - What considerations about rain gardens did they take into to account in their designs?

Specific questions:

- Approximately how many websites did you explore in your research on native plants? How many of these did you find useful? Cite two of the websites you found useful in your research.
- Identify 2-3 factors you considered in determining the usefulness of a site.
- Write a brief evaluation of the C-Sketch or other group design process.
- Name three important characteristics of rain gardens (e.g. they reduce pollution; they absorb rainwater that might otherwise run off impermeable surfaces; they can help prevent flooding; etc.).
- List 2-3 considerations about rain gardens you applied to your design (see Explore, step 4 and the Rain Garden Design Guidelines handout).

Additional Resources and Further Reading

Websites

- Sample rain garden designs (Washtenaw County, MI)
http://www.ewashtenaw.org/government/drain_commissioner/dc_webWaterQuality/rain-gardens/tour
- Drawing a Landscape Map (National Garden Association)
<https://garden.org/learn/articles/view/1296/>
- How to Draw Landscape Plans (The Spruce) <https://www.thespruce.com/how-to-draw-landscape-plans-2132398>
- Tools to Draw Landscape Plans (Paper Garden Workshop)
<https://www.papergardenworkshop.com/blog/2016/7/16/tools-to-draw-your-landscape-plans>

Journal Articles

Lombard, KA, Forster-Cox S, Smeal D, O’Neil MK. Diabetes on the Navajo nation: What role can gardening and agriculture extension play to reduce it? *Rural and Remote Health* 2006; 6:640. Available at: http://www.rrh.org.au/publishedarticles/article_print_640.pdf[PDF - 1.05 MB].

Twiss J, Dickinson J, Duma S, Kleinman T, Paulsen H, Riveria L. Community gardens: lessons learned from California healthy cities and communities. *American Journal of Public Health* 2003; 93(9):1435–438.

Wakefield S, Yeudall F, Taron C, Reynolds J, Skinner A. Growing urban health: community gardening in South-East Toronto. *Health Promotion International* 2007; 22:92–101.