

Designing a Sustainable Landscape to Serve Your Needs

Many traditional home landscapes feature vast areas of under-utilized space, such as large turf grass lawns. Sustainable sites feature spaces for human enjoyment, considering opportunities to design outdoor rooms that suit specific needs as well as promote the health of the environment.

This fact sheet describes the design process for home landscapes. You may consider hiring a landscape design professional who can help you work through this process to create a personalized, functional, and sustainable landscape.

Creating your base plan

The first step of designing a landscape is to create a base plan, a bird's-eye view map of your present landscape that includes property lines, buildings, and existing landscape features.

First, obtain or draw a map of your property that shows buildings and property lines. All the elements in the plan should be drawn to the same scale. For instance, if 1/8" on the map equals 1' in real life, your 80 x 160' property would take up 10 x 20" on paper, and your 40 x 64' rectangular house would be drawn as a 5 x 8" rectangle.

After you draw in property lines and buildings, add in existing trees, other vegetation, or other features such as patios and driveways you may consider keeping. (You can make further decisions on this later—if in doubt, draw it in).

Analyzing site conditions.

Next, cover your base plan with a piece of tracing paper. Draw in and label features that will help you analyze the problems and opportunities on your site, for example:

1. Contour lines to indicate slopes
2. Outlines of areas that are wet or dry, shady or sunny
3. Arrows to show how water moves through the property after a rainfall and in what directions the winter winds and summer breezes blow
4. Lines that mark the location of overhead, ground level and underground utilities (e.g. telephone lines, converter box, septic fields)

- Stars to indicate good views you want to preserve and X's to show bad views you want to hide

Design program

Using your site analysis as a guide, make a list of your wants and needs, special problems you may need to solve on your landscape, and goals for sustainability. This is called your design program, and it will serve as a checklist of features to consider in your design. For example, your program may include:

Wants and Needs:	Problems to Solve:	Goals for Sustainability:
<ul style="list-style-type: none"> ▪ patio for entertaining ▪ garbage/recycling bin storage ▪ vegetable garden ▪ play space ▪ utility space for working outdoors ▪ space for barbecuing ▪ water feature (pond, fountain) ▪ aesthetic interest throughout the changing seasons ▪ compost area 	<ul style="list-style-type: none"> ▪ windbreaks to direct summer breezes and protect from winter wind ▪ shade for summer comfort and lower cooling costs ▪ privacy from neighbors ▪ frame views of off-site landscapes ▪ screen undesirable views ▪ maximize sun exposure during the cold seasons ▪ reduce glare from windows and water bodies ▪ direct movement of people to certain entryways 	<ul style="list-style-type: none"> ▪ on-site stormwater management ▪ erosion control ▪ minimize grading ▪ preserve existing vegetation ▪ low-maintenance ▪ maintain and create wildlife habitats

Explore the University of Delaware Botanic Gardens' *Sustainable Landscapes* website at <http://www.ag.udel.edu/udbg/sl/> for other ways to promote sustainability in your landscape.

Designing outdoor rooms

Once you've developed your lists of wants and needs, it is time to consider how these might be fulfilled by specific spaces in your landscape. Think of these spaces as "outdoor rooms," with each serving a specific function—much like the kitchen, bathroom, bedroom, and hallways have specific functions in your house. For instance, some of the outdoor rooms you might include are

an entertaining space, a place for children to play, an area for barbecuing, and an arrival space for people to stand while knocking at your front door.

For this part of the design process, you should cover your base plan and site analysis with another piece of tracing paper, and draw your outdoor rooms on this sheet using the guidelines explained below. Multiple pieces of tracing paper can be used to explore various alternatives. At this stage, it is important to draw your outdoor rooms as general “bubbles” rather than specific shapes to help you focus on designing functional spaces.

1. Size and general shape. First, determine sizes and general shapes of the spaces you want, considering how they will relate to each other within the bounds of your property. Some sizes of typical spaces are listed in the box below; when outlining your rooms, be sure to draw them at the same scale as your base plan. As shown above, at this point you should remain as general as possible when considering the shapes of your spaces, establishing the shape's proportions rather than precise forms. For example:

- Will your space have equal proportions, like a square or circle? These are best for gathering places, where people can assemble in a small grouping.
- Will your space have unequal proportions, like an oval or rectangle? These is best for looking out into a view, or for directing people to move from one end to another (like a long and skinny hallway).

What are some typical sizes of landscape spaces?

Sitting or eating for 2 people: *about 25 sq. ft.*

Sitting, eating or lounging space for a small group of people (4-8):

64-100 sq. ft (single chairs = 2' x 2')

Space for people standing in conversation: *8 sq. ft / person*

Food cooking and preparation space: *25 sq. ft. (grill = 3' x 2')*

Play space with swing set: *10' x 15'*

Storage place for two garbage/recycling bins: *2.5' x 6'*

Small compost pile: *3' x 3'*

Cord of wood: *4' x 8' (stacked 4' tall)*

Rain Garden:

Depends on the depth of the rain garden, and the source area for the stormwater you want to treat. For more information, consult the fact

sheet “Rain Gardens,” available at

<http://www.ag.udel.edu/udbg/sl/hydrology.html>

2. Location. As you begin assigning appropriate sizes and shapes to your outdoor rooms, consider where these spaces will fit into your property in a useful location—similar to the way you would decide where furniture and other items might be arranged in your house. Some considerations include:

- a. How will the new spaces fit with existing elements and site features? Try to preserve as much healthy, mature, and non-invasive vegetation as possible. (For more information, consult the fact sheet “Checklist for Plant Removal Decisions,” available at <http://www.ag.udel.edu/udbg/sl/vegetation.html>)
- b. What spaces should be next to each other? For instance, you would want the outdoor food preparation area near to the indoor kitchen as well as to the outdoor eating area.
- c. What spaces should not be next to each other? For example, you will probably want to locate the garbage can storage space away from the outdoor eating space.
- d. How will people move from one space to another? Draw arrows to define where pathways will connect your outdoor rooms.
- e. What are the views you want to have from a space? For instance, you may want your patio oriented towards a statue or an attractive planting rather than towards your work/storage area.

3. Form composition. After you have finished defining the size and arrangement of your spaces, you can now begin to develop their precise shape using another overlay of tracing paper. First, you should consider a theme that will guide your design and promote unity of the individual spaces. Browsing landscape design books, magazines or websites is a good way to see examples of how spaces are tied together by unifying themes to create functional and attractive landscapes. Though you are designing from a bird’s-eye view, if your design is unified on paper it will generally be unified in the landscape as well.

Theme considerations may include:

- a. Will you have rectangular or circular spaces?
- b. Will the edges of your spaces be straight-lined or curvilinear?
- c. Will your design be formal with identical symmetry, or informal with more casual asymmetry?

Once you have chosen a theme, you can begin experimenting with the shapes in your design, using various pieces of tracing paper to explore different options.

- a. Start by designing specific shapes: the lawn spaces, the patios, the decks, or other hardscaping material, vegetable gardens, rain gardens.
- b. Then, establish walkways or paths of movement between your shapes based on how people will move from one space to another.

- c. Finally, fill in the leftover space with plants, including trees, shrubs, perennials, and general groundcovers. (More about plants below).

Some guidelines for form composition:

- a. **Avoid designing shapes with acute angles**, as they are difficult to install and maintain in the landscape. Connect walkways to spaces at right angles.
- b. **Connect shapes by overlapping their edges by at least 1/3rd**. Less makes movement difficult between spaces.
- c. **Establish what spaces or shapes will be dominant**. Putting emphasis on certain spaces or shapes will make your landscape more interesting and dynamic. Contrast a dominate space with adjacent spaces by varying a characteristic such as:
 - i. Size
 - ii. Shape
 - iii. Material (hardscapes) or texture (plants)
 - iv. Seasonal interest (flowers, evergreen/deciduous, fall color)
- d. **Use rhythm and repetition**. Repeat different elements throughout the landscape to tie them together, for example a certain plant, a certain paving material, or a certain color. For instance, if your house is Cape Cod style with peaked window boxes, you could repeat the triangle shape with pyramidal evergreens to connect the landscape to the building's architecture.
- e. **Establish unity**. Do not use too many different textures, shapes, sizes etc. in your landscape, but try to match the different elements to create harmonious relationships. Design plants in groupings, not scattered across the landscape. Relate them to the shapes of your hardscapes—the goal is to make the planting patterns look natural, and the hardscapes like they “fit in” to those planting patterns (not the other way around, as it is in reality!)

4. Plants for function. Each plant should be located so it serves a function, examples of which are listed below. At this stage, remain very general in your plant selection and placement—think “evergreen / deciduous”, “spreading / upright”, “pyramidal / oval”—characteristics that will serve a function in the landscape.

- At the same scale as your base plan, draw circles of varying sizes to show the mature spread or canopy of a plant (literally how much room it takes up in the

landscape). Fill in the largest plants first (tall trees, about 20-25' in diameter), then the medium size plants (understudy trees and shrubs, about 5-15' in diameter), and finally the smaller plants that make up the ground layer (perennials, small shrubs, and groundcovers, about 1-5' in diameter). The smaller plants can be drawn in as shading rather than individual circles.

- Use different symbols to denote different characteristics of plants (e.g. evergreen/deciduous).
- Draw plants in groups rather than individually placed around the landscape. This heightens the visual impact of smaller plants and improves the flow of the design by helping the eye move more easily across the landscape. Additionally, when plants are grouped to grow together over time, the need for mulching and weed control is reduced.

Consider how plants can be utilized to serve various functions in the landscape:

- **Background for other plants.** For instance, an evergreen shrub can serve as background to throw focus onto a flowering perennial in the foreground.
- **Focal points.** Flowering plants, fall-foliage plants, or plants with interesting texture or branch architecture can serve as focal point of aesthetic interest.
- **Define and connect spaces architecturally.** Like the walls of a house, plants can provide vertical separation rooms in a landscape. Privacy and intimacy can be promoted by placement of dense plantings; connections between separate spaces can be promoted by use of a unifying groundcover.
- **Block, filter or frame views.** A tall evergreen hedge may be used to block the view from your patio into the neighbor's storage area. A tall canopy shade tree could be used to direct views under its branches to a low perennial planting bed.
- **Promote infiltration of stormwater runoff.** You can employ rain gardens to capture stormwater and allow it to percolate gradually into the soil. For more information, consult the fact sheet "Rain Gardens," available at <http://www.ag.udel.edu/udbg/sl/hydrology.html>
- **Prevent erosion.** Plant roots keep soil bound together, and leaves shield the ground from the eroding splash of rain drops. These functions are especially essential on erosion-prone slopes and streambanks. (For more information, consult the fact sheet "Preventing Erosion," available at <http://www.ag.udel.edu/udbg/sl/hydrology.html>)
- **Provide shade and wind breaks for comfort and to reduce need for cooling/heat of buildings.** Using deciduous trees on the south side of your building will offer cooling in the summer and insulation in the winter. A strategically-placed evergreen hedgerow can block prevailing winter winds and direct summer breezes.

- 5. Materials.** Although you probably already have an idea of what hardscaping and plant materials you would like to see in your landscape, once the form of your design has been established you can dive into this aspect in earnest. Factors that should play a role in your choice of materials include existing architectural and landscape features, cost, and how the materials contribute to goals of sustainability. For more in-depth information about selection and use of sustainable landscape materials, visit the University of Delaware Botanic Gardens' *Sustainable Landscapes: Materials* page, available at <http://www.ag.udel.edu/udbg/sl/>.
- a. **Hardscaping materials.** When deciding what materials you will use for hardscaping, take into consideration the principles of dominance, unity, rhythm and repetition discussed above under "Form Composition." Additionally, think about how the materials you choose can contribute to sustainability:
 - i. As much as possible, use renewable, local, and low-energy input materials. For more information, consult the fact sheet "Sustainable Landscape Materials and Practices," available at <http://www.ag.udel.edu/udbg/sl/materials.html>
 - ii. Limit the amount of impermeable surfaces, which force stormwater to run off. Consider using a permeable paving system to promote infiltration. For more information, consult the fact sheet "Permeable vs. Impermeable Surfaces," available at <http://www.ag.udel.edu/udbg/sl/hydrology.html>
 - b. **Planting materials.** During the form composition stage, you developed general principles for what your plants looked like and what functions they served. Now, you need to find plants with those characteristics that fit the specific conditions of your site (light, soil, hardiness, water, etc). There are many plant books and reputable websites that offer suggestions in choosing plants appropriate to your landscape. See the end of this fact sheet for recommended sources.
 - i. For specific information about planning vegetation for sustainable sites, visit the University of Delaware Botanic Gardens' *Sustainable Landscapes: Vegetation* page, available at <http://www.ag.udel.edu/udbg/sl/>
 - ii. Native plants especially offer a variety of benefits for your landscape, especially in supporting wildlife. For more information about ways to sustain wildlife in your landscape, consult the fact sheet "Supporting Biodiversity in the Garden," available at <http://www.ag.udel.edu/udbg/sl/vegetation.html>
 - iii. Sustainable sites limit the use of turf grass. Consider low-maintenance groundcovers as an alternative to turf. For areas where you do use turf, be sure to choose an appropriate variety to promote the health of your lawn. For more information, consult the fact sheets "Turf Grass Madness: Reasons to Reduce the Lawn in Your Landscape" and "Groundcover Alternatives to Turf Grass" (available at <http://www.ag.udel.edu/udbg/sl/vegetation.html>) and "Turfgrass Selection for Delaware" (available at <http://ag.udel.edu/extension/horticulture/lawn.htm>).

Consider different perspectives

As you design certain landscape features from a bird's eye view, it may be useful roughly sketch certain elements as they will appear from the ground. This will help you determine appropriate relative heights for various features such as plants and fences. It also offers a more realistic picture about what your design looks like from the perspective that you will use it. Include people—drawn to scale—in your sketches to keep everything in perspective. Stick figures work just fine for both plants and people!

Continuously check your design program

As you work on your design, remember to check back in with your design program to make sure you are incorporating elements to suit your needs and sensibilities.

Final (but still dynamic) design

Draw a final draft that incorporates all of your design elements and decisions. Make a few copies of the final design for safekeeping. Better yet, scan it to a computer so you have a digital copy on file. Now, you can begin to make your design a reality, implementing it in stages and making adjustments as necessary.

Additional Resources

Landscape Design

Designing the Landscape: An Introductory Guide for the Landscape Designer by Tony Bertauski (Pearson-Prentice Hall, 2004)

The Landscape Design Answer Book: More Than 300 Specific Design Solutions for Your Landscape by Jane Bath (Cool Springs Press, 2006)

Landscape Design Fact Sheets – University of Georgia Extension (Horticulture > Ornamentals)
http://www.caes.uga.edu/publications/subject_list.html#Horticulture

Residential Landscape Architecture: Design Process for the Private Residence by Norman K. Booth and James E. Hiss. (Pearson-Prentice Hall, 2008)

Plant Selection

Livable Plants for the Home Landscape
<http://ag.udel.edu/extension/horticulture/pdf/lowres18spreads.pdf>

Plants for a Livable Delaware
<http://ag.udel.edu/extension/horticulture/pdf/PLD.pdf>

Plant Database of Trees, Shrubs and Vines, University of Connecticut
<http://www.hort.uconn.edu/Plants/>

Manual of Woody Landscape Plants by Michael A. Dirr (Stipes Publishing, 1998)

Plant Fact Sheets, NC State University Cooperative Extension & College of Agriculture and Life Sciences
<http://www.ces.ncsu.edu/depts/hort/consumer/factsheets/shrubs/>

Missouri Botanical Garden Kemper Center for Home Gardening Plant Information
<http://www.mobot.org/gardeninghelp/plantinfo.shtml>

Native Plants for Wildlife Habitat and Conservation Landscaping: Chesapeake Bay Watershed
<http://www.nps.gov/plants/pubs/chesapeake/>

University of Texas at Austin Lady Bird Johnson Wildflower Center Native Plant Database
<http://www.wildflower.org/plants/>

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