

DIGGING IT

A Guide for Greening School Grounds in Peel Region



Toronto and Region
Conservation
Authority

About this guide

This document is designed for any school in the Region of Peel embarking on a school ground greening project. Whether you plan to build a rain garden, a pollinator garden or a food garden, this guide is for you and will help you navigate school board procedures and commonly faced hurdles. Consider also setting your garden in the wider context of a natural space for play and learning. See the Evergreen chapter for design tips and ideas.

Connections to Ontario EcoSchools

The projects outlined in this guide can be used to deepen your Ontario EcoSchools program. If you are participating in the certification program, these projects can support the School Ground Greening section of your application. For details on how your project can link to the EcoSchools program, please refer to the current Certification Guide. For additional greening resources and templates, visit www.ontarioecoschools.org

Read on to get started with your greening project!

Acknowledgements

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**We want
to build a
garden—
where do
we start?**



Establish a team

Gather your troops—building and maintaining a garden is a fun, but year-round commitment. Success may depend on how many people you have to help you. Don't think about taking it all on yourself! Make sure to include someone from the school's custodial team on your team as well as your principal, to ensure that there is a long-term plan for the sustainability of your project.

Enlist the support of community partners—environmental organizations, conservation authorities and your local municipality are great resources to tap into for advice and guidance on your project, and they may be able to support your planting event. See page 62 for a list of useful contacts and links.

Think carefully about who will look after the garden over the summer—are there local parents who don't have their own outdoor space and might welcome the chance to look after a garden? Is there a teacher who lives close by and would be prepared to help out? Can you organize a team of students to water and maintain with minimal support from an adult?

Remember that garden construction may also have a cost, and work together with parent council members and local community partners to seek donations, small grants and other sources of funds to bring your garden dream to life.

Work with your school board

Before you put your shovels in the ground, you will need to make sure you are acting in accordance with the policies, procedures, and business processes of your school board and have obtained any necessary approvals from board officials or other stakeholders. Be sure to communicate clearly with everyone involved, from the very beginning of the planning process:

- School board staff
- School administrators
- facilities staff
- external suppliers
- parents
- the broader community

Departments to contact when planning your project:

- for schools in the **Peel District School Board**, contact Maintenance Services.
- for schools in the **Dufferin Peel Catholic District School Board**, contact the Plant Department.

They will be able to advise you on siting, planting and landscaping. Before you contact them, have a clear idea in your head of the kind of project you are planning. Here are some points to consider when you make your plan:

- “Keep it simple and incremental” - don’t try and do it all at once, you can always add more afterwards, as long as you have a plan in place.
- Things need to be done in a certain order—it is difficult to add hardscaping elements (e.g. armour stone seating, permeable paving) to a garden once plants are established. Similarly it might be difficult to add a large tree, but if you want to enlarge your pollinator plant bed, that should be possible.
- If you want to engage a landscaper, you need to use one of the board’s approved landscapers. The Plant Department will be able to connect you with one of these companies. This could affect your budget for the project, so be sure to engage the board early on in the planning process.
- Check with your administrator and facilities manager that your planting will not compromise any sight lines for safety, fire drills and security.

- Consider where snow will be piled in the winter—plants will struggle to survive if too much snow is dumped on top of them.
- Consider whether your planting will affect the community in any way, for example, could it impede a view?
- Check where your sources of water are—your plants will need watering, you'll need to have access to water close by. It could be a rain barrel!



What if...

...you had some plants donated and want to plant them in existing beds?

Plantings in existing beds are permitted, but you need to be aware of the needs of the plants you are adding, the size they are likely to grow to and their impact on any surrounding planting.

...you have a parent who owns a landscaping business?

Due to safety and insurance issues, only contractors and vendors that are on the board's approved list may engage in board approved projects.

In all cases, consider maintenance and have a long-term plan in mind, especially if you are planting trees. Teachers come and go, the gardens will remain much longer. It is important to safeguard the investment you will be making.

Make sure you have the support of the school administration (the Plant Department will want to speak to a principal) and enlist help from parents and community partners to help maintain the garden through the summer months.



Fundraise for your project

Keep your administrator in the loop—there may be board policies and procedures that you'll need to follow when applying for or accepting funds, so be sure to speak to your principal.

- **Set your budget.**
Create a detailed budget that will consider the various phases of your project.
- **Align your project with funding goals.**
Funders will have specific interests or priority areas that they'll support. Submit a strong application by familiarizing yourself with these goals and tailoring your proposal.
- **Contact the grant administrator.**
Funding agencies and programs have grant administrators that are happy to discuss the scope and feasibility of your project with you. Contact them if you have any questions about the application process.
- **Funder recognition.**
If you're awarded a grant for your project, don't forget to acknowledge the funder's contribution. Recognition criteria will vary depending on the funder, so you'll want to check with your administrator to make sure that the acknowledgement (e.g. logos) will be in line with board policy.

PDSB Fundraising Guidelines

All fundraising activities undertaken to support your school ground greening project must adhere to the board's fundraising Policy #5 - Partnerships/Fundraising. Prior to spending these funds, schools are required to complete and obtain the necessary approvals for School Activity Funds (SAF) Purchasing for facilities-related projects.

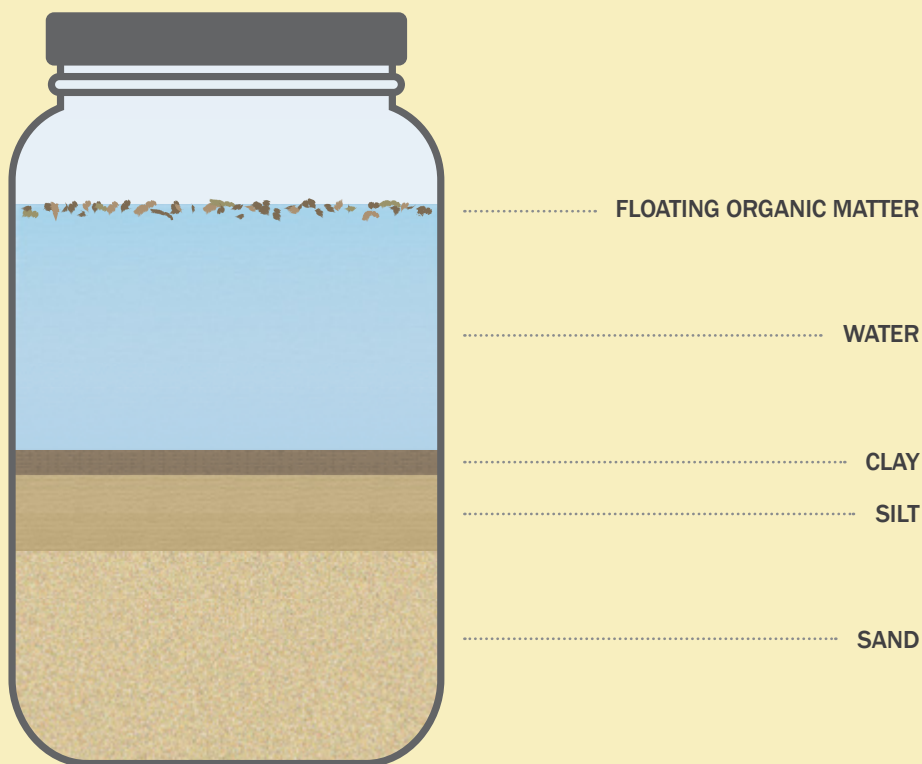
DPCDSB Grants Review Committee

Schools in Dufferin-Peel need to consult with the board's Grants Review Committee before applying for funds. The Committee reviews and advises on all grant applications, so it's important to factor this into your project timeline. Before you start fundraising, speak to your principal about how to initiate this process.

Soil testing

In order to select plants that will thrive at your site, you should perform a simple soil test. Here's how to do it!

1. Collect your soil sample.
2. Spread soil out on an old cookie tray to dry. Once dry, sift it through a colander or remove small stones and roots and break up any lumps.
3. Fill a jar halfway with the sifted soil and then fill it completely with water. Put the lid on the jar and shake well.
4. Place the jar in an undisturbed area and compare the results to this diagram.
5. If you see mostly sand in your jar, you have sandy soil. If you see mostly clay in your jar, you have clay soil. If you see equal amounts of clay, silt and sand in your jar, you have loamy soil.



Tools and equipment

If you have secured a grant for your project, you may be able to purchase tools to meet your needs (make sure you observe the correct board protocols around grants). Local hardware stores or online retailers such as Lee Valley offer a range of different tools depending on your budget, and some specialized options for young gardeners. Remember that tools used and shared by many need to stand up to lots of wear and tear—purchase good quality where possible so that items last. If you don't have a large budget for gardening supplies, ask parents and local community organizations (see support section) for tools to borrow or loan.

Safety!

Remember that all gardening tools and equipment must be used in a safe manner. Ensure that safe lifting, proper digging, tool handling and other relevant safety messages are shared and clearly understood by all participants, and that staff and parent volunteers helping out on garden planting days model good safety behaviour.

Tool checklist

- Gardening gloves
- Spade
- Digging fork
- Hand trowels
- Buckets for mulch and soil
- Rake
- Shovel
- Hose or watering cans
- Plant identification markers/signs
- Wheelbarrow

Access

When considering the site for your garden, it is important to consider access. Getting people and plants to, from and in to the garden are all important. Here are a few items to keep in mind:

- **Water access:** a garden needs regular watering. Choosing a site that is close to a water source makes summer maintenance much easier!
- **Tool storage:** tools and equipment like shovels, buckets and hoses are often required for a garden project. Be sure to designate an equipment storage space that is close to your garden site, or consider including a shed or outdoor tool storage box as a part of the garden itself.
- **Vehicle access:** occasionally large items may need to be delivered to the garden—soil, mulch or other heavy things. Consider if your site has easy drive-in access to make these deliveries easier.



Rain Gardens

Why plant a rain garden?

Rain gardens are shallow, sunken areas, designed to collect rain water that runs off your school's roof, playground or parking lot, instead of it running straight into the storm drain. Did you know that water from the storm drains flows directly into our rivers and lakes? Complete with all the pollutants it has collected along the way, such as road salt, fertilizers, and detergents. Having rain water collect in a rain garden ensures that many of the pollutants are removed before the water reaches the rivers and lakes. **Building a rain garden can make a significant contribution to cleaning up run-off water on your school grounds.**

Rain gardens are a great resource for teaching, whether it's learning about the water cycle in grade 2, or exploring water quality and potential pollutants in environmental science in high school. Check out the activity list for detailed curriculum links.

Rain gardens can be planted with any combination of shrubs, grasses and perennial flowers, and look just like a regular garden. The most important part of a rain garden is what you can't see—the loose, deep soil underneath that absorbs and filters rain water. Rain gardens are easy to build and maintain, even if you don't have a green thumb!



A rain garden will:

- absorb excess water on your property during rain storms.
- filter oil, fertilizer and other pollutants out of stormwater before they reach nearby storm drains and are carried to local rivers and lakes.
- increase the amount of water that soaks into the ground to recharge the local groundwater supply.
- provide habitat for wildlife like birds, butterflies and beneficial insects.
- provide ecological benefits to your school grounds and serve as a unique demonstration site for other schools and members of your community.

Choosing a site

A rain garden needs to be:

- in a low-lying area where water naturally flows during a heavy storm.
- at least 3 metres away from any building foundation.
- a relatively flat space (between 1% and 5% slope).
- close to a source of water - e.g. a downspout, a paved area or a rain barrel.

IMPORTANT: Notes of caution

- Rain gardens should never be placed within 4 metres of a septic bed, and if uphill of a septic system, they should be at least 15 metres away. Rain gardens placed near any type of steep slope have the potential to cause landslides because of the excess water being absorbed into the soil, therefore rain gardens should not be installed within 15 metres of any steep slopes on or around school property.
- As with any project that requires digging, before putting a single shovel in the ground, you must locate and mark all underground utilities. Some utilities are quite shallow. **Check with your facilities manager first!**
- Lastly, bear in mind that areas of poor drainage are not likely to be good options for rain gardens. If your soil is high in clay, it can be challenging to create a rain garden. To make sure, perform this simple test: dig a hole approximately 30 cm wide and 50 cm deep in the area you plan to build your rain garden. Fill it with water, and let it drain naturally. Return to the hole 24 hours later—**if there is still water in the hole, the soil is unsuitable for installing a rain garden.**

How big should the garden be?

The first step is to determine the source of water for your garden. The water source could be runoff from a paved area or compacted lawn, a rain barrel or a downspout on a building. If you're not sure where water flows in your school yard, check it out during a heavy rain event. Choose an area for the rain garden that will intercept and collect water as it flows on its route to the road surface, storm drain or water body.

The next step is to measure the total area that will drain to the garden. If the garden receives water from a parking lot or another paved ground surface, the drainage area is the size of that surface. If the garden receives water from a roof (for example, the roof of a portable), the drainage area will be the size of the roof divided by the number of downspouts draining from that roof.

The final step is to calculate the best size for the garden. The recommended size for your rain garden is the total drainage area divided by 10. Keep in mind that this number is only a guideline and if you are unsure about the sizing process, you should consult an engineer.

What should we plant?

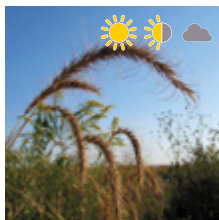
Rain garden plants need to tolerate both wet and dry conditions. This is because rain gardens experience alternate flooding (following a large rain storm) and drought (during periods of low rainfall). Any combination of perennial flowers, shrubs, grasses or ferns that meet these criteria will do well in a rain garden. Native plants are always recommended for rain gardens because they are well suited to local growing conditions, and support local wildlife including birds and butterflies.

The following is a list of native plants for rain gardens, identified based on the light conditions they grow well in: sun, partial sun or shade.

Grasses



Big Bluestem
(*Andropogon gerardii*)



Canada Wild Rye
(*Elymus Canadensis*)

Photo: Crazytwoknobs [CC BY 3.0], via Wikimedia Commons



Tufted Hairgrass
(*Deschampsia cespitosa*)

Photo: Christian Fischer [CC BY-SA 3.0], via Wikimedia Commons



Little Bluestem
(*Schizachyrium scoparium*)

Shrubs



Red-Osier Dogwood
(*Cornus sericea*)



Eastern Ninebark
(*Physocarpus opulifolius*)



Nannyberry
(*Viburnum lentago*)



Common Elderberry
(*Sambucus canadensis*)

Flowering herbaceous plants



Wild Columbine
(*Aquilegia canadensis*)



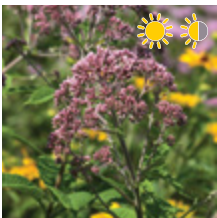
Butterfly Weed
(*Asclepias tuberosa*)



White Turtlehead
(*Chelone glabra*)



Blue Flag Iris
(*Iris versicolor*)



Spotted Joe-Pye Weed
(*Eupatorium maculatum*)



False Sunflower
(*Heliopsis helianthoides*)



Wild Bergamot
(*Monarda fistulosa*)



Black-eyed Susan
(*Rudbeckia hirta*)



Culver's Root
(*Veronicastrum virginicum*)

Photo: Crazytwoknobs [CC BY 3.0], via Wikimedia Commons



New England Aster
(*Symphyotrichum novae-angliae*)



Swamp Milkweed
(*Asclepias incarnata*)



Eastern Purple
Coneflower
(*Echinacea purpurea*)

Before you plant

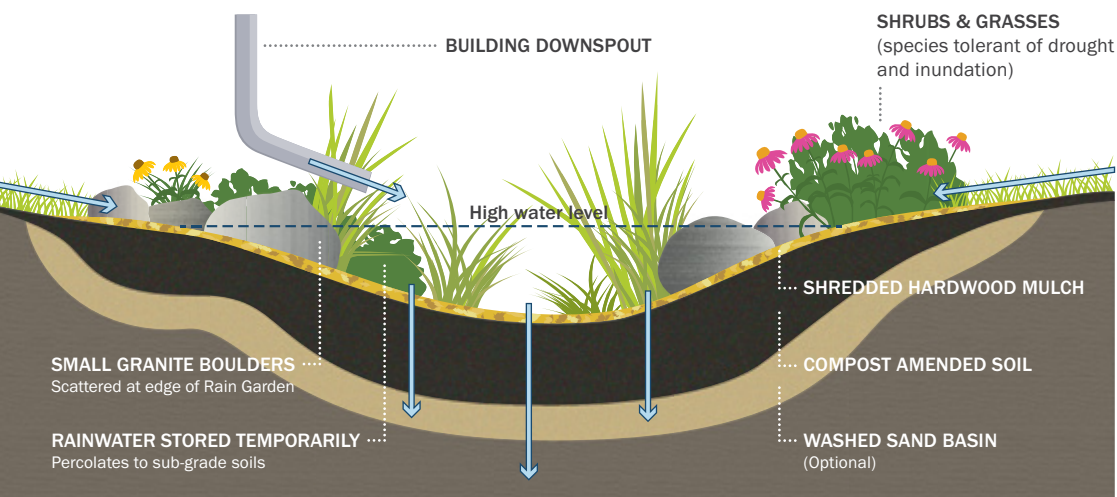
Now that you have decided where to put your rain garden, you will need to design and build it.

Designing your rain garden

There are a few things you might want to think about when designing the look of your rain garden:

- Choose a variety of plants, including shrubs, perennial flowers and grasses, to create variety in colour, height and texture. Avoid selecting too many or too few species—too many can look jumbled and messy and too few can look sparse and uninteresting.
- Group like-plants in masses for easier maintenance and improved appearance.
- Consider the year-round look of your rain garden—clumping grasses will hold their shape throughout the winter, and many types of shrubs develop striking red branches in the colder months.
- Consider your school’s existing landscape, and the landscaping of the surrounding neighbourhood. If the rain garden is near the road, consider sight lines and set-backs. Check with your facilities manager.

Take a minute and draw out a rough sketch of your ideal rain garden—use the design page in the appendix.



Building your rain garden

Tools required

- Shovels
- Ground paint or string

TIP: You should be able to find sand and compost at your local garden centre. Many centres will even create the custom mix required if you ask.

Materials required

- Mulch
(calculate: length x width of the garden x depth of mulch (0.1m) = ____m³ of mulch required.)
- Sand/compost mix
(refer to information below for quantity calculation)
- A collection of small rocks and stones
- A variety of native plants

How much compost should I order?

First find out what kind of soil you have—sandy, loam or clay. Use the soil test on page 12.

If your soil is sandy or loam soil

Set aside the excavated soil and mix with compost for refilling the rain garden. The mixture should be about **60% existing soil and 40% compost**. Calculate the amount of compost needed as follows.

COMPOST

(length x width of the garden x 0.6 (depth)) x 0.4 = ____ m³ of compost needed

EXCAVATED SOIL *

(length x width of the garden x 0.6(depth)) x 0.6 = ____ m³ of excavated soil needed

**Remember, this is the soil you've saved from excavating the garden area. You don't need to purchase more.*

If your soil is clay soil

Replace all the excavated soil with a rain garden soil mix of about **60% sand and 40% compost**. Calculate the amount of sand and compost needed as follows:

COMPOST:

(length x width of the garden x 0.6 (depth)) x 0.4 = ____ m³ of compost needed

SAND:

(length x width of the garden x 0.6 (depth)) x 0.6 = ____ m³ of sand needed



Photo courtesy of Credit Valley Conservation: Alton Park Public School celebrating their rain garden

Digging your rain garden

Before you even pick up a shovel, mark out your rain garden area to make sure you are happy with the size and how it will look. Ground paint, or string tied to wooden stakes are both easy ways to mark the area, and let you make changes if you would like. You should also mark out the area where water will get to your rain garden, and where the water overflow area will be.

Once you are happy with the layout for your new garden, it's time to start digging. Rain gardens should be dug to a depth of approximately 85cm (or deeper if you're building a small rain garden—10–20cm deeper). The ground under a rain garden should not be packed down, so try to stand outside of the garden area as much as you can, and avoid placing any heavy instruments or machinery inside the digging area.

Soil for your rain garden

Once you have finished digging your garden area, it's time to fill it back up with your rain garden soil mix. This is one of the major differences between building a rain garden and building a regular garden; rain gardens require a special soil mix to work properly. Soil mix should be added to your excavated rain garden to a depth of approximately 60cm (this will leave approximately 25cm for plants, mulch and water pooling—remember, rain gardens should be sunken into the ground to allow rain water to collect and filter into the soil). When filling with soil, lightly tamp down the area with your feet every 20cm or so to help the soil settle. Be sure to prevent contamination from adjacent soils—this can impact on the permeability of the rain garden. Keep your new soil stockpiled separately (i.e. on a tarp).

Getting water to the rain garden and providing an area for overflow

You need to create the inlet (area for water to enter the rain garden) and the overflow (area for water to exit the rain garden in case of overflowing) for your garden.

Creating an inlet: Water can be carried to your rain garden in a variety of different ways. It can be carried through an extension on the end of a downspout, across a landscaped area, through an infiltration trench lined with plants or decorative rock, or through the overflow pipe from a rain barrel. The spot where water will enter the rain garden should be lined with river rock to slow the water and protect the soil from being washed away.

Creating an overflow: During most of the year, all the water that flows into your rain garden will soak into the ground. Occasionally, when the ground is wet and a big storm occurs, the garden can fill up and overflow. A rain garden needs to have an overflow area to let excess water leave the rain garden. The overflow should be located on the downhill side of the garden, directing excess water towards a second garden or an open area of grass. As you did with the inlet, you should line the overflow area with river rock to slow the water as it exits and protect the soil from being washed away.



Photo courtesy of Credit Valley Conservation

Putting the plants in the ground

Planting your rain garden is the final step. Refer back to your original design plan when planting. It's best to position all of your plants in the garden before removing them from their containers to make sure you like the layout. Now you can start planting. Turn the plant's container upside down, give the bottom of the pot a sharp rap, and catch the root ball as the plant slides out from the container. Tease the roots out with your hands—don't worry if you break a few of the roots. Make sure you do not plant the new plant too deep into the soil. The depth should be equal to the depth in the container. Also, make sure you consider how much the plant will grow when spacing them—you don't want to overcrowd your garden. Press the soil firmly around its base and water well. Plants will need to be watered every few days until established (about 4 weeks), and then regularly but less frequently. Once established, the plants will not need to be watered regularly, except for during times of drought. Once all of your plants are in, cover your new garden with a 5–10cm layer of mulch. Mulch helps to keep out weeds, resists drought and gives the garden a tidy appearance. Mulch is especially important for rain gardens as it also helps to absorb and filter the rain water. Your layer of mulch should not be more than 10cm deep. Mulch in a donut shape, keeping it pulled back from the base of trees and plants to prevent rotting, disease and fungus.



WATERING TIPS

- Water deeply, but infrequently, so that the top 15–30cm of the root zone is moist. To know if you're applying enough water, dig down 20–40cm off to the side of the plant a few hours after watering—don't disturb the roots. If the ground is wet here, you know you've applied enough water.
- Use soaker hoses to ensure water soaks directly into the soil and isn't lost to evaporation.
- Don't over water. Over watering can rot plant roots and soggy soil reduces oxygen needed for healthy soil and plants.
- Water in the morning or evening to reduce evaporation during warm mid-day temperatures.

Maintaining the garden

A well-designed rain garden needs minimum care. However, just like any garden, it requires some maintenance to look good and function properly. There are five things to remember when maintaining your rain garden over the years.

1. Mulching: Every year check the mulch layer and, if needed, apply more to maintain a layer that is about 10cm thick. Mulch can be applied any time of the year, but it's usually easiest to remember in spring at the start of the growing season.

2. Erosion and Debris: Water flowing into the rain garden can carry with it various types of debris that can clog the soil mix and slow drainage. Fast flowing water can also slowly eat away at your soil layer, washing it away and damaging your garden. To guard against soil erosion and debris build-up:

- check the rain garden for areas of exposed soil and re-mulch as needed. Mulch helps to absorb water and protect the soil underneath.
- maintain a healthy cover of plants, and replace any dead plants to fill in holes.
- maintain the river rock around the inlet and overflow area to protect the soil.
- trim back plants in the spring and remove all dead stalks, leaves and other debris
- at least twice a year, check around the inlet and overflow areas for debris build-up such as leaves, sticks, and other items. Keep these areas clear to help your garden absorb rain water.

3. Fertilizing—no need! Do not apply fertilizers to your rain garden. The rain garden soil mix provides plenty of nutrients and the native plants in your garden are well suited to local growing conditions, so extra fertilizing is not needed.

4. Weeding: Rain gardens will still soak up and filter rain water even if they are full of weeds. However, the plants in the rain garden will likely not grow as well with all the competition and your rain garden may not be as attractive. Soils in rain gardens have good structure, so weeds should be easy to pull by hand, especially in the spring when the soil is moist and the weeds are small.

5. Watering: For the first year most plants need deep watering during the dry summer season to establish healthy root systems—you may want to have a watering roster for this period. After two or three years the native plants in your rain garden will need little or no watering. However, watering may be necessary during prolonged dry periods even if plants are established.

*This chapter was adapted from **Greening Your Grounds: A Homeowners Guide to Stormwater Landscaping Projects** produced by Toronto and Region Conservation.*



Pollinator Gardens

Why plant a pollinator garden?

Pollinators and flowering plants depend on each other. Insects and animals like bees, flies, beetles, moths and butterflies, birds and bats transfer pollen between flowers and enable reproduction in plants. In exchange, plants produce nectar and pollen, rich sources of food that attract pollinators to the plant. People benefit from this, too—pollinators are responsible for pollinating approximately one-third of our food crops (wind and self-pollination are examples of other ways that plants are able to reproduce).¹ The relationship between pollinators and plants is essential to creating the diversity that we enjoy in our food choices and our environment.

Pollinators are in decline and factors such as loss of habitat and pesticide use are putting an increasing amount of pressure on pollinator populations. By creating a pollinator garden, you are helping to improve biodiversity at your school by adding plants that provide wildlife value, while providing rich opportunities for student learning and engagement.

DID YOU KNOW? Solitary native bees aren't social (they don't live in colonies), and they rarely sting.²

Navigating the risk of bee stings

Planting a pollinator garden will bring a variety insects and animals on your school-yard, including bees. Educate students, staff and visitors about your garden and the different types of bees and other wildlife that will visit your garden and school. Ground-nesting solitary bees tend not to sting, and honey bees and bumble bees only become defensive when they are pinched or get caught in clothing, or if their nests are disturbed.³ Yellow jacket wasps can present a stinging concern, but are carnivores and aren't attracted to flowers.

To mitigate anxiety around the risk of stings, you can minimize exposure by locating the garden away from entrances and exits, and high-traffic areas.



¹Attracting Native Pollinators: protecting North America's bees and butterflies. The Xerces Society. 2011.

²Chan, Susan. A Landowner's Guide to Conserving Native Pollinators in Ontario. Pg. 7. Accessed October 15, 2015. <http://www.feedthebees.org/wp-content/uploads/2013/03/A-Landowners-Guide-to-Conserving-Native-Pollinators-in-Ontario.pdf>

³<http://www.pollinator.org/PDFs/NAPPC.NoFear.brochFINAL.pdf>. Accessed October 15, 2015.

Choosing a site

As with any greening project, your pollinator garden will require special care and consideration, especially when it comes to selecting your site. Pollinator gardens are versatile and resilient, but it's important to assess your site to ensure the long-term sustainability of your project.

Before you begin, consult with your school board's Facilities Services or Plant Department to keep them in the loop about your project. They will be able to guide you through the process required by the board to implement a school ground greening project, and provide you with valuable information regarding board approved vendors, utilities stakeout procedures and any site specific details (e.g. future portable locations, snow removal areas, etc.)

Size

Adapt the size of your pollinator garden to incorporate factors such as availability of space, overall budget and the amount of help you have to implement your project. Depending on your situation, you may choose to create a new bed, convert an existing garden or build a simple raised bed.

Water

Identify access and availability to a water source. If water isn't readily available for your site, consider installing a rain barrel.

Wind

If you are looking to attract butterflies to your garden, make sure that it's in a well-protected area away from wind. Butterflies can easily be blown off course by gusts of wind.

Sun

Most plants found in a pollinator garden thrive in sun-loving conditions. Select an area that receives at least 6 hours of full sun each day.

Aesthetics

Native plants that are often included in pollinator gardens can take on a 'weedy' or unruly appearance, especially at the end of the blooming season. Talk to neighbours and other people in your school community about the project—it will increase buy-in for your garden. Better yet, create interpretive signage that will communicate the purpose of your garden space.



What should we plant?

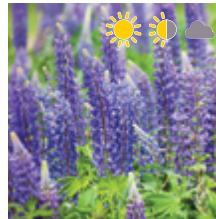
Pollinators have evolved alongside native plants, developing a historical relationship with local plant species over time. In fact, pollinating insects and animals have been observed to prefer native plants because of their abundance of pollen and nectar.⁴ Here are some suggestions for nectar and host plants that will attract pollinators to your garden.⁵



Gray Goldenrod
(*Solidago nemoralis*)



New England Aster
(*Symphyotrichum novae-angliae*)



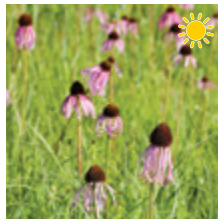
Wild Lupine
(*Lupinus perennis*)



False Sunflower
(*Heliopsis helianthoides*)



Black-eyed Susan
(*Rudbeckia hirta*)



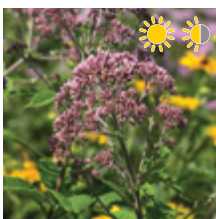
Pale Coneflower
(*Echinacea pallida*)



Lanceleaf Coreopsis
(*Coreopsis lanceolata*)



Wild Bergamot
(*Monarda fistulosa*)



Spotted Joe-Pye Weed
(*Eutrochium maculatum*)



Common Milkweed
(*Asclepias syriaca*)



Swamp Milkweed
(*Asclepias incarnata*)



Butterfly Weed
(*Asclepias tuberosa*)

⁴http://www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/mipmctn11774.pdf. Accessed October 15, 2015

⁵http://www.xerces.org/wp-content/uploads/2014/03/GreatLakesPlantList_web.pdf; *Creating Monarch Friendly Habitat; Maintaining Your Pollinator Garden*. <http://www.trca.on.ca/dotAsset/150579.pdf>. Accessed October 21, 2015.

Handling and planting milkweed

Adult Monarch butterflies are generalists and will feed from any flowering plant that produces nectar. However, milkweed is the only plant that Monarch caterpillars will eat. If you want to support Monarch habitat in your garden, you will need to plant milkweed.

There are some precautions that you will need to observe when handling and planting milkweed. Milkweed has a milky sap that can irritate eyes or cause dermatitis. Supervising teachers and adults should be aware that the leaves and stalks will release sap when broken. As with all plants, it's a good idea to review basic safety rules with students and take precautions when handling and planting. Here are some best practices and guidelines to follow when handling milkweed:

- Provide gardening or disposable gloves to students to prevent contact with skin in the event of sensitivities.
- Remind students to avoid touching their face and eyes after handling or planting.
- Students should wash their hands with warm, soapy water after handling or planting.
- If milkweed sap gets into your eyes, seek medical attention immediately.

It's very important to select species that are native to your site—speak to your local nursery to see what's suitable for your specific conditions and seed zone. Choosing native or wild type plants (species that are genetically and geographically specific to a given seed zone) nurtures local biodiversity and preserves the ecological integrity of your region's ecosystem.

Things to consider

Plant a calendar of blooms. Provide a constant food source for pollinators by planting different types of flowers that bloom from early spring to late fall.

Avoid hybrid ornamentals. Often identified by their double or multi-petalled structure, hybrids produce “perfect” flowers, but most varieties offer little to no fragrance, pollen or nectar for pollinators.⁶

Integrate habitat elements such as bundles of hollow reeds for nesting bees, flat rocks for basking and shallow areas for “puddling” (some butterflies drink and extract minerals from moist soil.) See the Resources section for additional habitat ideas for your garden.

⁶<http://www.pollinator.org/Resources/Better%20with%20Bees.pdf>. Accessed October 15, 2015. <http://www.seeds.ca/pollination/pollen-and-flowers/pollen>. Accessed October 15, 2015.

Before you plant

Start by conducting a site survey of your school grounds to identify patterns of use (e.g. areas of active play, snow removal) and environmental features (e.g. shady or windy zones, poor drainage, compacted soil). Once you have determined the ideal site for your project, create a garden design to map out how your project will be integrated into your school's landscape. Record the plant species on your garden design to help with future maintenance plans.

Here are two suggested methods of preparing a new bed for planting⁷:

Sod removal (best for smaller areas, labour-intensive, but allows for immediate planting)

- Using a square-edged spade, break up the sod into 1x1 squares, shake out the soil and compost the grass.
- Loosen the new soil and amend with compost and topsoil.

Sod conversion (good for areas of any size, low effort, but requires time and patience)

- Lay down two or more layers of heavy cardboard or 10–20 layers of newspaper, then apply at least six inches of compost or topsoil.
- After approximately 6–8 weeks, the paper will cause the grass to decompose and prevent most weeds from emerging.

For both methods, be sure to apply a thick layer of mulch after planting to discourage weeds and help with moisture retention.

It's also helpful to know the type of soil that you will be planting in. You can determine the type of soil you have by conducting a simple soil jar test (refer to instructions on page 12).

- If your soil is mostly silt or clay, you may need to add amendments like sand to promote proper drainage.
- If your soil is sandy, you'll want to mix in some compost and topsoil to improve nutrient retention and quality.

Choosing the right native plant for your specific growing conditions will guarantee the best success.

⁷<http://yougrowgirl.com/lawns-to-gardens-convert/>. Accessed October 21, 2015





Putting the plants in the ground

Organizing a planting day event is a great way to celebrate the project, get help with implementation and engage the wider school community in the process. Here are some suggestions to help ensure that your planting day goes smoothly and your plants have the best chance of survival.⁸

- Plan your planting day for the spring, after the last hard frost in your area, or in early fall.
- Make arrangements to invite special guests to celebrate and participate in the planting day—parents, trustees and superintendents, community partners and businesses, and even the local media. This will help raise awareness and support for your project.
- Try to plan your plant purchases and deliveries so they can be planted immediately. If that's not possible, make sure to keep them watered and in a shady, sheltered place until you can plant them.
- Plant in clusters of colour—pollinators are drawn to groupings of brightly coloured flowers.
- Give them space—native plants require approximately 30–50cm between plantings.
- Make a plan for watering your beds. Try to plant your beds when there is rain in the forecast. This won't always be possible so make sure that you have everything you need on hand to water your flowers immediately.
- To help keep track of what's been planted, have students design plant identification markers/signs.
- Mulch your garden to discourage unwanted plants and to retain moisture in the soil, but leave a few exposed patches of bare ground for ground-nesting bees.



⁸Adapted from *Creating Monarch Friendly Habitat*.

Maintaining the garden

Without regular maintenance, pollinator gardens can take on a wild and naturalized appearance that could be undesirable, especially if it obstructs sight lines on school grounds. Creating a year-round maintenance plan will keep your garden healthy and thriving, and address any aesthetic issues that might arise.⁹

Refer to the following seasonal task list when you are creating your maintenance plan.

Fall

- Divide perennials that have spread too quickly.
- Add 5–8 cm of mulch once the ground is frozen.
- If possible, leave dead plant material to provide winter habitat.
- If you are planning to create or add new beds in the spring, prepare the site by covering areas with newspaper or cardboard.
- Add new plants, if desired.

Winter

- Start to plan for spring.

TIP: Re-engage the community in your project by hosting an annual garden maintenance event. Split plants and offer to volunteers as a thank you gift. Or, host a native plant sale at your school with the divided perennials to raise money for tools, materials and new plants.

Spring

- Remove large, wet clumps of leaves.
- Add a fresh layer of mulch or compost to garden beds.
- Water new plants during dry periods.
- Cut back dead plant material to the ground, or leave it as it is (dead plants could provide habitat or nesting materials for a variety of insects and animals).
- Add new plants, if desired.

Summer

- Remove weeds from the garden, replenish mulch.
- Monitor the weather and water the garden regularly during dry periods.
- Monitor and treat for garden pests and diseases.
- Prune or thin any plants which are growing fast to promote good air circulation.

⁹Maintaining your Pollinator Garden. <http://trca.on.ca/dotAsset/150579.pdf>. Accessed October 21, 2015.

Seed balls

Seed balls are tiny packages of portable plant power! The popularization of the classic seed ball is attributed to a Japanese natural farmer named Masanobu Fukuoka. Seeds are mixed together with soil and clay, and rolled into little balls. Once dried, they can be directly sown into garden beds or other areas that would benefit from reseeding or restoration. The seeds are protected from the wind and seed-eating insect and animals—when enough rainfall has softened the clay, the seeds will sprout and germinate.

Seed ball recipe

- 3 parts triple mix
- 5 parts dry red clay (such as Cedar Heights Redart potter's clay)
- 1 part pollinator seed mix (such as milkweed, rudbeckia, coreopsis, joe pye weed)
- 1–2 parts water

1. Measure out three parts of triple mix. This provides a growing medium for your seeds.
2. Measure out five parts of dry clay. Once mixed with water, the clay will hold the seed balls together.
3. Add one part seed. Be sure to use small seeds in your mix—seeds that are too large will cause your seed balls to split when dried.
4. Add one part water, and combine. You want the mixture to be moist, but not really wet. If the mixture is still too dry to hold together, add more water gradually.
5. Roll the seed ball mix into balls 2.5–5cm diameter.
6. Set aside to dry on cookie sheets lined with plastic wrap for a few days before storing or using. This step is important to prevent the seed balls from developing mold.
7. Wrap the seed balls in strips of newspaper or recycled paper, tie with string or twine and include instructions on use. They make great gifts!



Adapted from: *Heavy Petal*. <http://heavypetal.ca/archives/2011/01/step-by-step-how-to-make-seed-balls/>



Food Gardens

Why plant a food garden?

We can all benefit from gardening and community food-growing projects. Multiple studies have concluded that these types of projects provide numerous environmental and community health benefits, including:

Improved local ecology and sustainability

Using organic and natural gardening practices, a vegetable garden with lots of compost and a pollinator corner can provide much needed biodiversity and habitat into the school yard.

Increased access to healthy food and better nutrition

Harvesting vegetables that are grown with love and care can transform healthy eating from a chore into an exciting and delicious exploration for students.

Increased access to culturally appropriate foods at low cost

Depending on the size and scale of your garden, you may have space to grow special foods not often found in the grocery store and connect with students' family food traditions.

Improved neighbourhood security and reduction of crime in public spaces

Studies have shown that community food gardens can bring a positive presence into public spaces.

Increased community development and social capital

Growing food and exploring the food system provides a rich context for place-based learning and connecting students to their broader community. Having parent and community volunteers help out at the garden, summer educational programs, and food bank or community kitchen donations are just a few examples of ways a garden strengthens community relationships and builds character for participating students.





Photo courtesy of Ecosource: celebrating the garlic scape harvest at the Hillside Park Community Garden.

Choosing a site

Sunlight, soil quality and wind exposure are several important things to consider when selecting a location for your vegetable garden.

Sunlight

Most vegetables grow best in full sun—pick a location that receives a minimum of 6–8 hours of direct sunlight each day if possible. If a sunny location is not an option, be sure to consider the type of vegetables that you plant and select items that can thrive in partial shade. Gentle slopes that face south and west capture the most sun and heat in our region, but too much slope can lead to erosion.

Wind exposure

A little bit of air circulation in your garden is good, but strong winds can remove heat from the soil, dry out moisture, and stunt or damage young plants. Consider prevailing winds on your school property and where possible, select a location where buildings or large plants (trees, shrubs) provide shelter and block wind.



Soil quality

Healthy soil is the foundation of a thriving organic vegetable garden. When selecting your garden site, consider the type of soil (sandy, clay). Vegetables grow best in loam soils (a combination of sand and clay) that allow roots to penetrate the soil easily and water to drain away. Soil quality can often be improved by adding compost.

Soil testing

For instructions on how to test your soil, refer to the soil test described on page 12. Additionally, if you are unsure about the history of your site and are worried about contamination, a more extensive test may be necessary. Toronto Public Health has released a guide on understanding soil quality and soil testing in the urban environment which provides helpful information when assessing your site (see page 66).

Accessibility

Make your garden a space that can be shared by everyone. If you are building a vegetable garden with traditional rectangular plots, think about how far people will have to reach to plants in the middle—a good general rule is to keep beds to a maximum of 1–1.5 metres wide. Consider including a specially designed raised garden bed to accommodate individuals who cannot reach the ground, and plan to have wide garden pathways (minimum of 1 metre) so that walkers, wheel chairs and other mobility assistance devices can easily move through the garden.

Remember that container gardens and raised bed gardens are excellent options for improving soil quality and addressing other location concerns! If those options are not possible and a suitable site is not available on school property, reach out to your community—explore opportunities to take on a school plot at your local municipal community garden, or share space with another school or community organization in the neighbourhood.

Size

The size of your garden depends on your location, experience and interest. Consider how many classes have expressed a desire to participate, how many parents, students and community partners will help to look after the garden during the summer months, and how much food you'd like to harvest from your garden. Remember that bigger isn't always better—often, starting small and growing your garden over the years will lead to the best result. A manageable garden helps to avoid volunteer/leader burn-out and lays a solid foundation for continued success over multiple years. If your school is brand new to gardening, consider classroom planter/container gardens to start out while you engage staff, students, parents and the broader community in a larger school garden planning and design process.

What should we plant?

There are so many vegetables to choose from! Depending on your garden plan, you may want to select vegetables based on their time of harvest or the needs of a local community kitchen or food bank. Here are a few suggestions:

Spring Harvest. Plants that can typically be sown from seed and harvested before summer dismissal from April–June:



Radishes



Sugar snap peas



Salad mix/baby lettuce



Spinach

Fall Harvest. Some plants can be started in the late spring, and tended over the summer for harvest in September/October:



Butternut Squash



Leeks and onions



Kale and Collard Greens



Pumpkin



Beets



Carrots



Dry (soup) beans

Perennial Herbs. Perennial herbs add great texture and flavour to your garden. Herbs that will grow back each year in your garden:



Chives



Oregano



Lavender



Thyme

Easy Favourites. Depending on your summer garden maintenance plans, you may want to include some well know garden favourites. These require care and regular harvesting over the summer months:



Tomatoes



Green beans



Eggplant



Peppers



Garlic



Cucumber



Zucchini

Sourcing your plants

When sourcing plants for your garden, you may want to purchase ready-grown seedlings or you may want to start your own plants from seed.

Starting from seed

Starting plants from seed in the classroom can provide many exciting learning opportunities for students, and access to special vegetable varieties that you might not find when buying plants at your local garden centre. Tomatoes, cucumbers and onions are a few favourites that are relatively easy to grow from seed. Choose a sunny, south facing windowsill or install a grow light/grow shelf in your classroom to start your seedlings. To learn more about caring for seedlings indoors, read seed packets carefully and consult some garden resource books (see resources section). Check how many days it will take for your plant to grow to maturity. Count backwards from the date you'd like to harvest and you'll know approximately when to start each different seed.

Seeds of Diversity Canada partners with groups in cities across Canada during the months of February to March to host “Seedy Saturdays” where avid gardeners and local seed companies get together to share seeds and plan for the season. Internet and mail order seed companies are another great resource—for example, Urban Harvest Seeds, Veseys Seed, and William Dam Seeds.





Buying plants

When you are selecting seedlings ready-grown to transplant into your school garden, choose sturdy looking plants with few yellowing leaves. Check to see if the roots have begun to grow out of the bottom of the pot, which can indicate that the plant has become 'root bound' and may have difficulty adapting to a new garden. Local farmers markets in springtime and garden centres are great resources. **Urban Harvest**, a Toronto seed company, frequently has heirloom organic seedlings for sale around the City of Toronto and at pop-up spring storefront locations and partner grocers across the GTA. Many local garden clubs and horticultural societies often have spring plant sales—keep an eye on local community bulletin boards to find out if there are sales happening close to you. Another option is to put the word out to parents and community partners—many avid veggie gardeners end up with too many seedlings and not enough space when it comes time to plant, so you might get lucky and have the chance to adopt a few for your school garden.

Before you plant

Planning and construction

If you are building a new raised bed garden you will need to make arrangements to purchase or build your garden beds. Discussion and approval of your garden plan should begin a minimum of 6–8 months in advance of your desired planting date, in collaboration with your school’s administrative team and the school facilities manager.

Soil and compost

No matter where your garden is located, or what size, you will probably want to add compost or quality garden soil (known as amendments). Match your amendments to the type of soil, size of bed/container and other specific information for your site. Consider quality when you are sourcing these items to add to your garden. If you are purchasing soil or compost from a supplier, you can ask about the amount of organic matter and nutrients in different commercial soil mixes. Garden centres should be able to confirm the source of any soil mix or compost they are supplying and provide a nutrient profile and other information to help you meet your gardening needs. Many larger nurseries now offer OMRI (Organic Materials Review Institute) certified soil mixes—a certification that indicates that a soil product conforms to traceability and safety requirements for use on certified organic farms in Canada.



Getting organized

Once your garden plan is approved and you've sourced all of the materials you will need, it's time to start organizing for the big day! You may have a school-board approved contractor assisting you by constructing raised beds, tilling the soil, organizing utility locates or delivering compost. You may also have plant deliveries and community partners bringing donations or helping out in other ways.

Make a detailed plan of action and designate a garden team member to be the point of contact for each step to help things run smoothly. Ensure that you have clear communication to identify how many days of work are planned to set up the garden site, how much space contractors require to work, the types of vehicle and equipment access that will be required on the days of work/for deliveries, etc. Keep the garden space and access points clear and coordinate with school yard/recess monitors to ensure that eager observers can watch from a safe distance without interrupting work.

TIP: The Region of Peel produces Grade A certified compost as a part of our municipal green bin program, which you may be able to pick up at a local community recycling centre.



Putting the plants in the ground

If you are planting from seed directly into the garden (called ‘direct seeding’), follow the directions provided on the seed packet. A good general rule is to plant a seed as deep as it is big – so, smaller seeds are planted closer to the surface of the soil, and larger seeds a bit deeper. Some vegetables that do best when direct-seeded into the garden include peas, beans, carrots, beets and radishes.

If you are planting seedlings, you will want to dig a hole slightly larger than the size of the plant pot. Fill the bottom of the hole with compost and a bit of water. Gently loosen your plant by squeezing the sides of the pot. Holding carefully with your hand covering the surface of the soil and supporting the stem, tilt the pot sideways and allow the plant to slide out of the pot. Try to avoid pulling too hard so that the roots are not broken. Support the root ball of the plant with both hands (to prevent it from separating/falling apart) and gently transfer into the hole you’ve prepared. Fill in the sides of the hole and gently but firmly press the soil around the newly planted seedling to remove any air pockets. Watering within the hour will help your new seedling to get well established in the garden.

Arranging your garden

Garden plants can be arranged in many different ways! Learn about the size and shape of the plants you’d like to grow and pair them accordingly. Tall and narrow plants (for example onions or garlic) match well with short and wide plants (like lettuce or spinach) to maximize garden space. Some larger plants like tomatoes may need to be staked, and some climbing plants (pole beans, cucumbers and peas) can be trained to climb a trellis which will save space in your garden. Think about harvest time frames as well—for fast growing vegetables, succession planting is a neat concept where you can use the same garden space for several crops in one season (for example, spring radishes, summer lettuce, and then fall spinach).

TIP: Make sure your raised beds are no wider than the length of your arms out-stretched: then you know you will be able to reach right into the middle of the bed.

Maintaining the garden

Your garden will want regular love and care. Try to assign a volunteer team or class to visit the garden each day. You can water plants if necessary, observe how they are growing, remove weeds and spot any pest problems early.

When to stake plants: larger plants like tomatoes can be staked to help prevent soil borne plant diseases such as blight. Stake tomatoes upright by tying the main stems loosely to the stake. You'll also want to remove 'suckers' (new stems forming at the axis where the leaves join the stem) so that the tomato can put all of its energy into growing up one or two main stems.



Photo courtesy of Ecosource: caring for the "Wheely Gardens" container vegetable garden on wheels at Celebration Square.

When to water: seeds and new seedlings should be watered regularly until they are well established. Once plants are established, a good test to see if you need to water is to put your finger 1 inch into the soil. If the soil below the surface is dry, it's time to water! Try using straw mulch in your veggie garden to keep the soil moist by preventing evaporation—a great lesson for students, and a time saver.

Should I add compost? Compost is typically added to the garden at the beginning and end of the season. If your plants are yellowing and look like they need an extra boost of nutrition during the growing season, you can add some kelp meal (dried kelp contains many nutrients and minerals) or you can experiment with making "compost tea" by adding compost to a bucket of water, letting it 'steep' and then watering your garden. Compost tea carries many of the water soluble nutrients from compost directly to the roots of your plants.



Photo courtesy of Ecosource: investigating vegetable growth at the Malton Community Garden.

What if...

No vegetable garden season would be complete without a few challenges along the way. Try to look at challenges that come up as puzzles to be solved and don't get discouraged—even the most experienced gardeners learn something new every year!

Vandalism: depending on the location and public access to your garden site, vandalism may occur. The best way to prevent vandalism is to work hard to engage the surrounding community, including youth and adults, in your garden project.

Wildlife: if you are lucky enough to have wildlife in your school neighbourhood, you may have some uninvited guests sharing your harvest! If you find that squirrels are often digging up your seeds, you may want to start your seeds indoors or plant seedlings. If rabbits are nibbling on your greens, plant some veggies that they will find less 'delicious'—garlic, onions or peppers for example. If wildlife is an ongoing problem, you may want to consider a fence or mesh hoop enclosures to protect certain parts of the garden with physical barriers.

Insects/Pests: biodiversity is a great helper in an organic vegetable garden! Use companion planting and habitat gardening strategies to encourage lots of predatory insects (such as ladybugs, spiders and dragonflies) to visit your garden. Rotate where you plant vegetables each year to avoid encouraging overwintering of pests in the soil. When you do encounter a pest insect, research its life cycle with your students and learn about the best ways to address the situation. Each pest is different, so knowing your 'enemy' is always the first step! One common helper in the organic garden is 'row cover'—a lightweight fabric which is often used to create a physical barrier protecting crops from insects like flea beetles and cabbage looper moths. If you have an ongoing troublesome pest, try planting different vegetables. Most pests will only target one 'family' of vegetables (for example, all brassica—arugula, radish, kale, cauliflower etc, or all solinacea—peppers, eggplants, potatoes, tomatoes etc.). If you change your garden plan to avoid that family for one or two years, you'll remove the food source for the pest and hopefully it will move on from your garden!

What is companion planting?

If you choose carefully, the plants in your garden can work together to help each other. For example, planting marigolds among your vegetables will repel some insects and animals and stop them eating your vegetables. Some herbs will also help with pest control, confusing bugs with their strong odours.



Diseases: diseases can be ever-present in the environment and exacerbated by particular weather/watering/planting conditions, or they can be unintentionally introduced into the garden by infected seedlings and tools.

If you plant tomatoes, you will want to learn about **blight**. Blight is a disease that lives in the soil and is transmitted when drops of water from rain (or your watering can) splash soil up onto the leaves of the plant. The best way to prevent blight is to lay straw mulch around your tomatoes, stake them so they are not laying on the soil, and trim the lower leaves off so that there are no leaves hanging down and touching the soil.



Another common disease in cucumbers, zucchini and other members of the cucurbit family is **downy mildew** - leaves turn white and then wither away. This disease is caused by too much moisture on the leaves of the plants, and too little air circulation. Prevent downy mildew by avoiding overcrowding your plants to encourage good air circulation, and watering the soil at the base of the plant and not the leaves.

If you have a disease problem in your garden, try to reduce transmission to other plants. Water, hands and tools can all carry disease from one plant to another. Here are three good rules to follow:

1. Water the soil, not the leaves of the plants - most efficient, and also prevents drops from a diseased plant splashing onto a healthy plant.
2. Always trim or touch diseased plants last in the garden, so that you are not carrying the disease onto healthy plants.
3. Wash hands and tools between use.



Photo courtesy of Evergreen.



EVERGREEN

Designing Natural Spaces for Play and Learning



Photo courtesy of Evergreen.

A wider context for your garden

The following content is a primer and a high level outline of steps towards creating natural spaces for play and learning. Project teams should refer to additional resources suggested in Appendix 2 (p.119) for more information before advancing any projects.

Research shows children today do not spend enough time in nature: this idea has developed into a concept that has been coined by Richard Louv as the “nature deficit”. Creating engaging, inclusive spaces for children to play in our school grounds will help to combat this, and to bring the outdoor experience back into children’s lives.

The following guide will provide practical ways to incorporate nature into your school yard in a fun, playful, and educational way.

Before you start: Get to know your space

To create a natural play and learning space that is engaging, active and fun, it is important to discover what already exists on your school ground.

Consider the following questions:

- What areas are students currently engaging with?
- What spaces are being underused?
- Is there adequate shade, either natural or human-made?
- What natural features exist in this space (trees, shrubs, gardens)?
- How are these spaces being used?
- What are the overall successes of the space, and places where opportunities for improvements exist?

Take some time to ponder these questions, while also observing play patterns that exist among your students, as these are often great indicators of the uses of the space. Students are, after all, the ones that will benefit the most from the space, and use it most often!

Discovering your space, and taking some time to allow students to explore and tell you (directly or indirectly) about their use patterns will set up the framework for designing your new natural play and learning space.

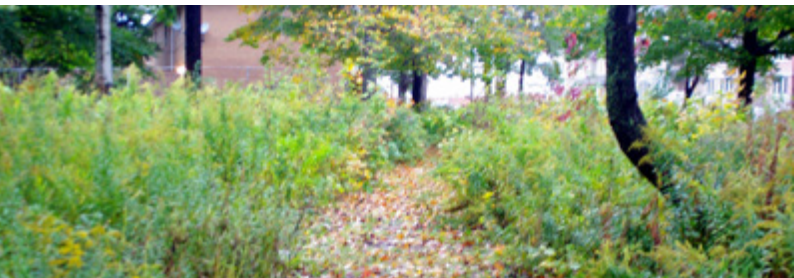
Planning your space

Planning principles

Good design that balances natural and built features is essential to realizing the potential of your school ground in becoming a rich environment for play and learning. To create a landscape that supports rich and authentic hands-on learning experiences, the following ten design principles are recommended:

1. **Participatory approach:** Build a well-rounded team! Include teachers, students, parents, administrators, custodial staff, and community members.
2. **Safety in design:** While creating a space that is fun and engaging for students, the space must also be designed with safety in mind. For example, by ensuring trees are not planted in areas that will block sight lines and make sure there are two ways in and out of paths and fenced areas.
3. **All ages, stages, and abilities:** Schools are places of diversity, and natural learning and play spaces should be designed keeping this in mind! Consider scale, levels of safe risk taking, and sensory clues for students of all ages, developmental stages, and abilities.
4. **Diversity of spaces:** A natural play and learning space should be suggestive, not prescriptive. This will allow students to imagine the possibilities and change the way the space is used with every experience. Refer to the “Key Spaces” section for more details.
5. **Multi-purpose elements:** The elements of a natural play and learning space should serve many purposes. For example, let an area of grass grow (no mow zone) that can serve as a nature study area, hide and seek space, or a maze with mown paths. Nature Study Areas need signage to help the public to understand that they are being managed for educational use.

See **Appendix 2 on page 119** for additional ideas, links, and resources.





Photos courtesy of Evergreen.

Accessibility

When designing an outdoor space for play and learning it is imperative that it is designed to encourage shared use among students of all abilities. Requirements for accessible natural play and learning settings are as follows:

- **Features:** Incorporate accessible features, such as sensory and active play components, into the design of the outdoor play space. An inclusive play space is highly sensory—active and mobile (pathways, topography), textured (sand and water), colourful (flower gardens and mosaic paths), aromatic (sensory gardens, herbs, and flowering shrubs), and include unique opportunities to create sound using wind chimes, music walls, or talking tubes. *For more information on engaging the senses, please see page 63.*
- **Seating areas:** Provide accessible seating areas so that ALL students with a disability can comfortably take part in the learning
- **Path of travel:** Provide firm and stable surfacing for accessible routes that are minimum 1.5m wide, connecting the play space elements.

See **Appendix 2 on page 119** for additional ideas, links, and resources.



Photo courtesy of Evergreen.



Photos courtesy of Evergreen.

6. **Year round use:** Utilizing permanent structures is a good way to ensure that your natural play and learning space is able to be used on both hot, sunny days, and windy, cold or wet ones. Permanent structures, either constructed or natural, can help provide shade which will allow students to be both comfortable and sheltered from the sun.
7. **Curriculum connection:** Use your natural play and learning space as an extension of the classroom. Although science based learning comes to mind first, the outdoors can also provide a springboard for learning in the arts, literacy and language, social science, and physical development.
8. **Responsive design:** Include local ecology in the design of the outdoor play and learning space, and create cultural connections to the neighbourhood of your school through art and site elements such as murals, sculptures. Allow children to be directly involved in the painting of a mural, the planning of a sculpture, or the planting of a theme garden.
9. **Meeting staff needs:** Talk with staff about their role in supporting a more natural and dynamic play environment. Ensuring that staff are on-board with the project from the beginning will make managing your new space a breeze! *For more information on creating a team refer to page 7 of this guide.*
10. **Management and sustainability:** Incorporating students in the care of the space can create stewardship and responsibility. In order to ensure that the space remains functional and looking good year round, you may consider building a shed for storage of loose parts, and having child-friendly tools (shovels, rakes, etc.). Maintenance can be done in a way that is both helpful and fun for all, such as a litter cleanup day. It is also important to consider the materials you will choose for your site to ensure longevity and year round play and learning value.



Photo courtesy of Evergreen.

Loose parts

Loose parts play empowers creativity and imagination by allowing children to develop their own ideas and explore their world. All parts below can be moved, carried, lined up, sorted, collected, put together and taken apart. The following objects are easily sourced elements of a loose parts play kit:

- Logs, wood cookies, sticks, and stumps
- Ropes and tarps
- Cardboard and clamps
- Sand and clay
- Leaves, pine cones, shells
- Milk crates, buckets, tubs
- Fabrics and feathers



Photos courtesy of Evergreen.

Engage the senses

When creating a natural play and learning space, designing a beautiful aesthetic does not just refer to a space that is attractive to the eye, but one that influences all of the senses—seeing, hearing, feeling, smelling, and tasting.

Incorporating these senses will encourage children to notice things they might otherwise overlook. Observation (eg. seeing, hearing, smelling) will ignite the beginning of the inquiry cycle. For example, planting trees with leaves that rustle or tall grasses that sway in the wind appeals to our sense of hearing, while planting a sensory garden appeals to both our sense of sight and sense of smell.

See **Appendix 2 on page 119** for additional ideas, links, and resources.



Photo courtesy of Evergreen.

Using your space will inform the design

The programming and design of the school grounds are inextricably linked. Program choices impact the space which informs design decisions and vice-versa. Other forces such as environmental conditions and seasonal changes also factor into this dynamic relationship. Using your space and observing how the current design of the school ground affects behaviour and then determining what behaviours and educational uses are desired, will help you in developing your conceptual design plan.

Nature play and learning begins in the early years with experiential learning on the school grounds, and continues through elementary, middle, and secondary school. Below is an example of how you might think about nature-based learning activities across the spectrum of ages.

- **Early childhood:** use loose parts, explore nature on the school ground, develop an understanding of the connection to place, explore through the senses
- **Elementary and middle school:** continue loose parts play, emphasis on community connections and project planning, development of empathy, foster ownership over the space and acquire stewardship skills, further exploration of principles of ecology and local watershed
- **Secondary school:** continued community connected experiential learning (providing students with opportunities to participate actively in experiences connected to a community outside of school, for example, partnering with a conservation group to study fish populations in a local stream over a spawning season), ownership and care of the space, in-depth analysis and exploration of ecosystems, human impact and connections to the natural world

See **Appendix 2 on page 119** for additional ideas, links, and resources.



Approaches to using your space

- **Place-based:** Children should build a foundation of knowledge through a focus on local nature, culture and community.
- **Ecological:** Provide children direct contact with nature. This could be in the form of several key spaces, discussed later in this chapter.
- **Hands-on:** Create a setting for compelling learning through multi-sensory, direct experience and child-led play. Loose parts and a combination of hard and soft spaces in a school ground will allow children to engage in hands-on learning.
- **Active and mobile:** Encourage children to move the body to engage the mind through the design of a play space that is both active and reflective.
- **Arts infused:** Breathe life into learning through creativity, storytelling, and arts activities to support students' cognitive and emotional development.
- **Integrated:** An integrated outdoor learning environment takes a holistic approach to design, is responsive to the local environment (natural and built) and inclusive of all children's developmental needs, educator pedagogical goals, and the uniqueness of the school community.



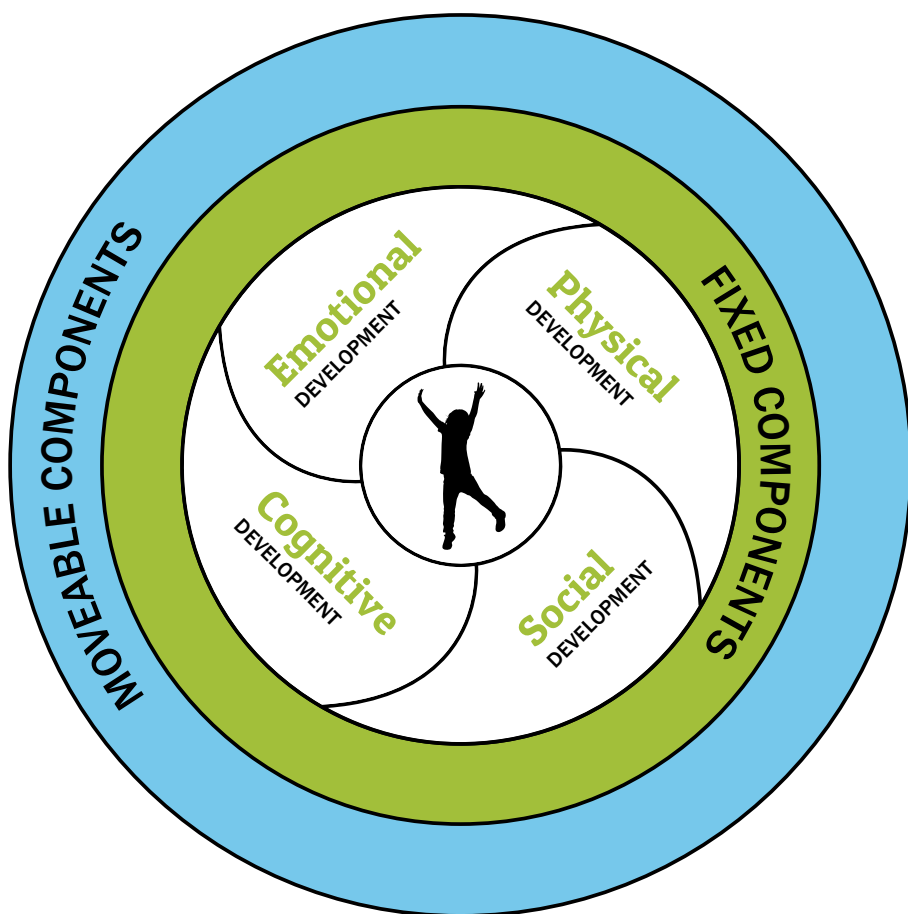
Photo courtesy of Evergreen.

See **Appendix 2 on page 119** for additional ideas, links, and resources.

Designing your space: consider children's developmental needs

When designing natural play and learning spaces, it is important to acknowledge the child's physical, social, emotional, and cognitive development. A purposeful combination of fixed and moveable components of the space will allow for well-rounded development.

This design framework will link students' developmental needs (physical, social, emotional and cognitive) to the choices and arrangement of the components of your design, while creating key spaces for learning and playing.



See **Appendix 2** on **page 119** for additional ideas, links, and resources.

What are fixed and moveable parts?

Fixed landscape components are the anchor points of a play space that are more permanent in nature—for example, paths and trails, groves of trees, hills and rock seating circles.

Moveable components are furnishings, props, loose parts, and natural materials that can be moved around the play space to create a sense of wonder and beauty and that meet programming needs seasonally or for a certain period of time.

For examples of how to incorporate these elements in your natural play and learning space, refer to *Case Study: Rockway Public School* (on page 74).



Photos courtesy of Evergreen.



Photo courtesy of Evergreen.

Physical development

Outdoor play develops fine and gross motor skills, physical stamina, and confidence while promoting fitness and health.

CHILDREN NEED TO...

move, climb, dig, roll, run, jump, leap, ride, hop, skip, balance, hang, cling, swing, lift, push, pull, stretch, carry, pour

FIXED COMPONENTS

- Open areas for running at top speed
- Natural elements for climbing - mounds, and hills
- A balance of hard and soft surfaces
- Built elements for climbing
- such as hanging bars, bridges and play decks
- Areas for loose materials – sand, mulch, soil
- Groves of trees for playing hide and seek and winding trails for building obstacle courses

MOVEABLE COMPONENTS

- Flat topped logs, square logs
- Buckets, pulleys, ropes
- Rock piles
- Wagons, tricycles, scooters
- Wheelbarrows
- Wood cookies
- Clay
- Milk crates
- Stumps for rolling, balancing and stepping across



Photo courtesy of Evergreen.

Social development

Through play, children learn rules, cooperation and sharing. Children learn to use moral reasoning to develop values during play. Children develop a strong cultural identity, a sense of self and experience the consequences of their decisions through play.

CHILDREN NEED TO...

socialize, talk, laugh, share, hang-out, engage in free play, walk and run together, play games, negotiate, problem-solve

FIXED COMPONENTS

- Trails and pathways
- Places for small groups
- Spaces for quiet games
- Spaces for lying or sitting on grass
- Work areas for cooperative projects
- Stages and decks
- Groves of small trees and tall shrubs
- Seating circles
- Mud Kitchens
- Construction/building zones

MOVEABLE COMPONENTS

- Play tables
- Wooden planks for building bridges and pathways
- Logs, wood cookies, rocks
- Fabric pieces of different sizes
- Sand and water
- Building materials
- Tarps and clamps
- Stumps for moveable seating



Photo courtesy of Evergreen.

Emotional development

Through nature play, children develop creativity, expression and emotional connect- edness. They learn empathy and responsibility, and build sensory awareness and a stewardship ethic.

CHILDREN NEED TO...

have daily contact with nature, explore natural areas, experience beauty, collect and find things, develop an emotional bond with nature

FIXED COMPONENTS

- Nature Study Areas
- Groves of trees and shrubs
- Habitat gardens
- A variety of plant communities
- Wetlands
- Meadows, wildflower gardens

MOVEABLE COMPONENTS

- Rotting stumps that can be turned over to find bugs
- Container gardens - rain, bird and butterfly gardens, sensory herb garden
- Bug trails and bug hotels
- Seeds, leaves, buds, needles, pine cones, flowers



Photo courtesy of Evergreen.

Cognitive development

Constructive play nurtures a child's cognitive skills, creativity, perceptual and problem solving skills. Fantasy play encourages abstract thinking through experiences with language and emotion. Children also develop flexible thinking and imagination through fantasy play.

CHILDREN NEED TO...

be involved in decisions about their play space, define and evolve their environment, explore, discover, reflect, perform, feel ownership and partnership

FIXED COMPONENTS

- Construction areas where children can build projects
- Art studio space
- Semi-private spaces (nooks, hideouts, secret places)
- Dramatic play areas, stage areas

MOVEABLE COMPONENTS

- Activity walls, chalk walls, easels
- Work tables and simple decks made out of ply wood and pallets
- Fairy gardens, scented gardens
- Chimes, drums, bongos
- Mud and dirt piles
- Clay pits
- Buckets, mixing tools, water

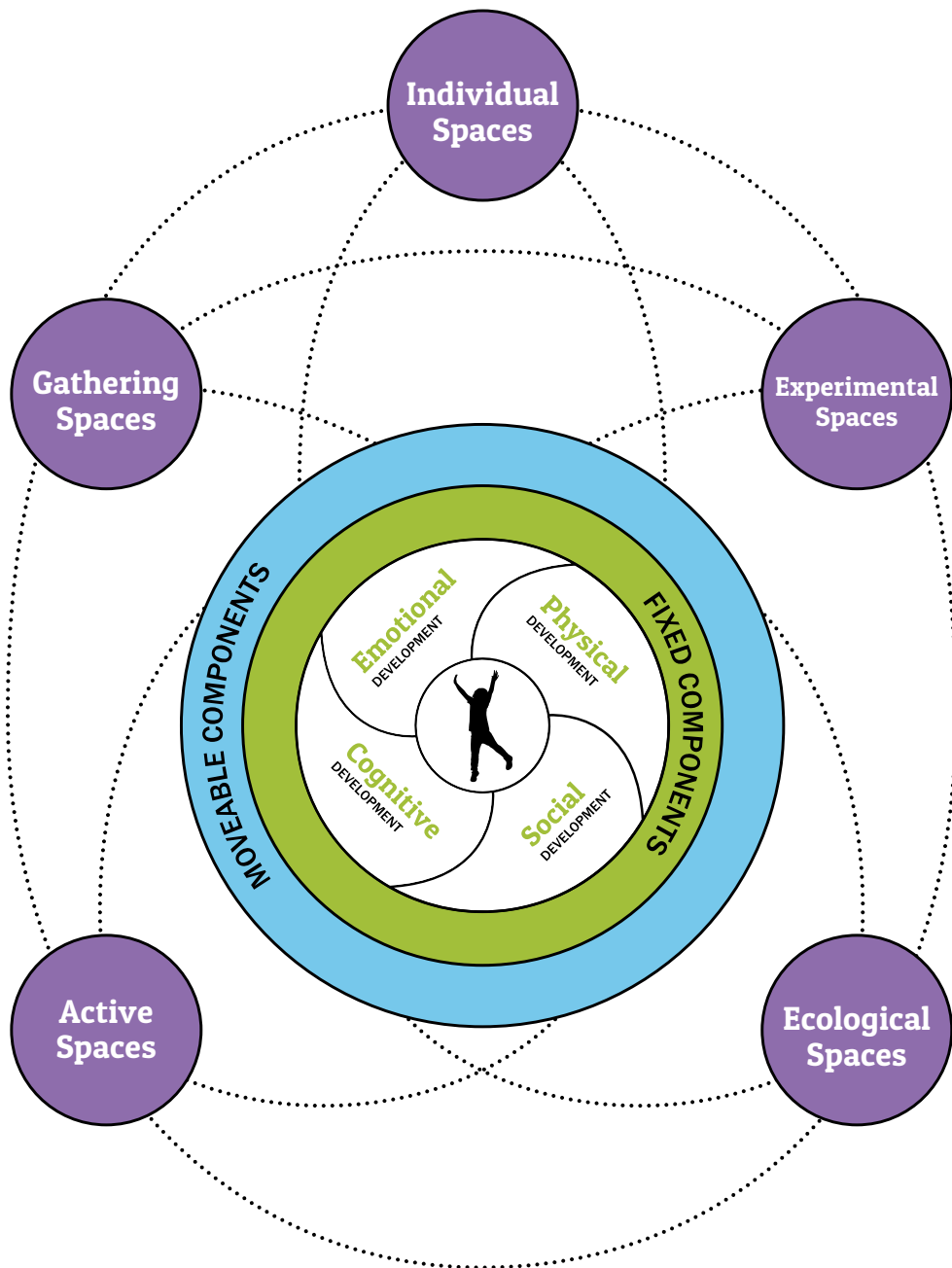
Key spaces

A natural play and learning space that is designed using a combination of fixed and moveable parts, and incorporates the following five key spaces, will be engaging and exciting to students of all ages.

- **Active:** These spaces should encourage active play and vary in topography and incorporate changes in height and physical fitness elements. These spaces feel energetic, and support fitness and health. Active spaces allow children to run, jump, dance and hide.
- **Individual:** These spaces support quiet reflective moments, observation, and listening. This type of space would accommodate one or two students, and could be on the edge of another play zone, most likely away from an active play area.
- **Gathering:** These spaces can be for a large or small group. These spaces foster social interaction, offer seating and shade, and have a balance of soft and hard surfaces.
- **Experimental:** These spaces are flexible and temporary in nature. They promote discovery and exploration, and encourage creativity, construction, building, testing and idea-generating. These spaces are filled with loose materials, and have seating and storage.
- **Ecological:** These spaces attract birds, butterflies, and insects. They are a real-life demonstration of the cycles in waste, energy and water, and inspire creative thinking, invite observation and provoke inquiry. Ecological spaces also evoke an emotional response, nurture a sense of responsibility, stimulate all the senses, and offer moments for reflection.

As you create your design be conscious of the interplay between the fixed and moveable components within these spaces and how they will invite a variety of reactions from the children. For clarity, they are explored as distinct spaces, but in practice, it is their relationship to each other that generates the greatest amount and diversity of play and learning activity and benefits across all the developmental domains.

See **Appendix 2 on page 119** for additional ideas, links, and resources.



Case Study: Rockway Public School

This rendering shows how Rockway Public School in Waterloo Region incorporated both fixed and moveable parts in their natural play and learning space.

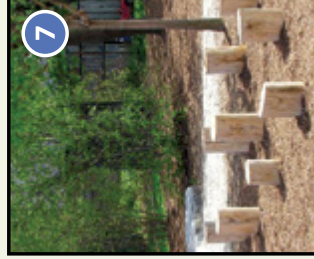
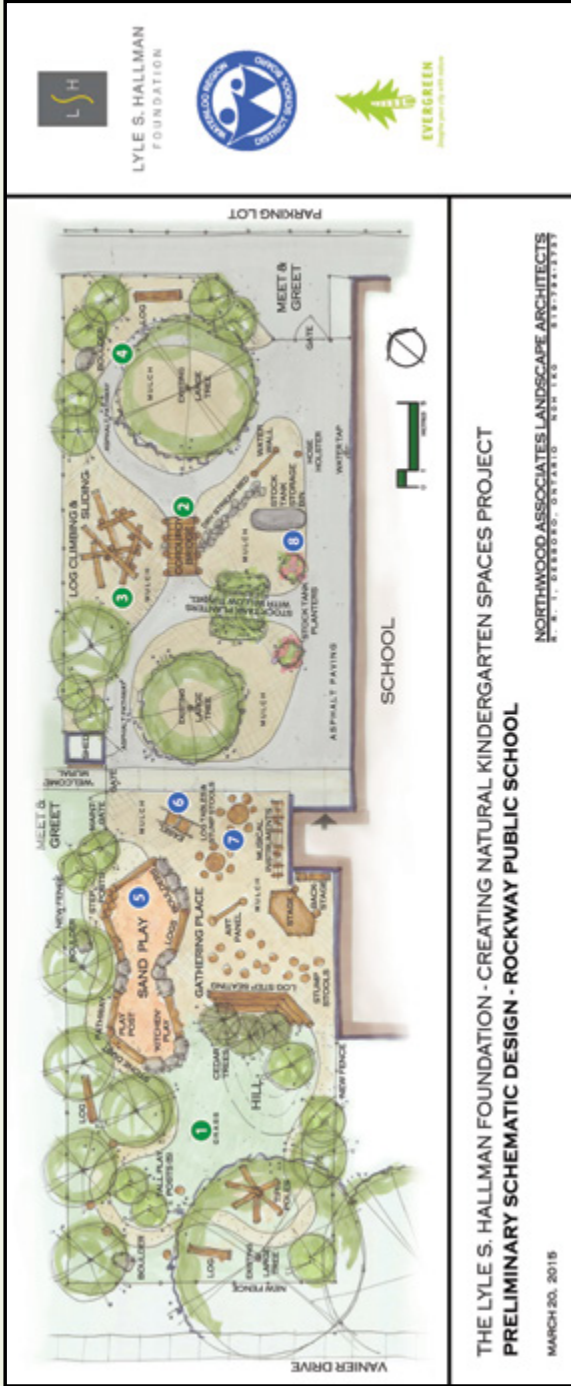
Design: Evergreen and Northwood and Associates Landscape Architects Ltd.

FIXED COMPONENTS

- 1 OPEN, GRASSY SPACE** is a fixed component that allows many areas of development, including social, physical, and emotional.
- Connecting spaces with a **CORDUROY BRIDGE** provides variation and challenge for children and enhances the visual interest of the space.
- 3 LOGS** can be used as both a fixed component, as they are here, or a moveable component. They are cost effective, and easy to maintain.
- Groves of large **TREES** provide many play opportunities. They can be sat under, ran between, hid behind, or explored for creatures.

MOVEABLE COMPONENTS

- 5 SAND** is one of the best loose parts play materials. It can be sculpted, sifted, dug, poured, and drawn on.
- A moveable **ART EASEL** allows students to be continually inspired by nature, and to explore new inspiration every day.
- Seating is important on the playground. With moveable **LOG TABLES** and **STUMP STOOLS**, both large and small groups can be formed.
- 8 STOCK TANKS** can be many things, including planters and storage bins, while remaining mobile and versatile.



Case Study: Centennial Public School

At Centennial Public School, a beautiful natural play and learning space was created using all five key spaces: active, individual, gathering, experimental, and ecological.

Design: Evergreen and Northwood and Associates Landscape Architects Ltd.



Photos courtesy of Evergreen.



LYLE S. HALLMAN
FOUNDATION



THE LYLE S. HALLMAN FOUNDATION - CREATING NATURAL KINDERGARTEN SPACES PROJECT
PRELIMINARY SCHEMATIC DESIGN - CENTENNIAL PUBLIC SCHOOL

NORTHWOOD ASSOCIATES LANDSCAPE ARCHITECTS
401-288-0801, 825-1100
400-1100

MARCH 20, 2015



Photo courtesy of Evergreen.

Next steps

Ready to get started? Here's a 'quick start' check list that will help you take your first steps towards a school ground greening project.

- Build a team** - Engage a diversity of people with different perspectives, resources and expertise—students, teachers, Principal, caretaking staff, and parents to be on your project team.
- Research** - Visit other school ground greening projects and learn what helped their projects to be successful.
- Survey the school community and size up your site!** - First, ask students, teachers, administrators, caretakers, parents and community members how they use the school grounds. Collect their ideas about how they would like to use the school grounds through a natural play and learning lens. Next, engage students in assessing the school grounds – look for patterns of use, map natural and built elements, and record environmental changes like wind, shade and the flow of water when it rains.
- Draft a statement of purpose** - What are your goals for the project? What are you trying to achieve?
- Plan, design and get approvals** - Take all the information you've gathered from surveying the school community and the site, and the statement of purpose and engage students in determining what are the top 3–5 design ideas for the school ground and begin the planning and design process. You can have the students communicate ideas by creating models, drawings, and posters of design concepts that can then be presented to the Board and school community for feedback.
- Implement, steward and celebrate!** - Fundraise for the first phase of your project and make a list with the students of what resources and expertise you need to get the project done. Recruit volunteers from the school community to help build and take care of the project and be sure to celebrate your successes!

See **Appendix 2 on page 119** for additional ideas, links, and resources.

To connect with an expert at Evergreen, please contact: info@evergreen.ca



Photo courtesy of The Riverwood Conservancy.



Enabling Gardens

By Jane New

What is an enabling garden?

An enabling garden is an outdoor green space designed to be accessible to everyone regardless of ability. Enabling gardens commonly have a variety of raised planters to accommodate people in wheelchairs and to assist those with physical challenges and have adapted tools available for those who find regular tool use difficult. Plants are chosen based on their sensory appeal (sight, sound, touch, taste and smell) and activities are designed to promote learning, enjoyment, reflection and general well-being.



Photo courtesy of The Riverwood Conservancy.

Why build an enabling garden?

Being outdoors with our hands in the soil simply feels good, yet many students with disabilities are excluded because the garden is not accessible. The benefits of having an enabling garden on the school grounds are many and include the following:

- **Improved accessibility for all.** Creating an enabling garden sends a powerful message to the public, the school and to individual students that this is an inclusive environment. It provides opportunities to challenge preconceived notions of disability and teaches students and staff never to under-estimate a person's ability. By removing barriers such as steps, narrow pathways, soft surfaces, garden beds that are out of reach and trip hazards, an enabling garden can make outdoor experiential learning accessible to all students.

- **Therapeutic connection to nature.** An enabling garden can be a valuable tool in supporting the holistic well-being of students. Research has proven that working on the land can improve attention, assist with anxiety, raise mood, provide learning opportunities and re-ignite hope.¹ A simple seed may invite explorations of strength, resilience and hope for students struggling with depression, or the nature of compost may prompt reflection on the past, present and future. New perspectives can take root through time spent in the garden.
- **Community and Peer Connection.** Social isolation is particularly common amongst young people living with disabilities and many claim that the barriers to creating friendships are greater for them than people without a disability.² An enabling garden can encourage a sense of belonging and connection to others, and can provide a powerful antidote to feelings of isolation, anxiety and depression.
- **The Opportunity to Nurture.** It's easy to dismiss the value of nurturing compared to the many other benefits of land-based learning, but nurturing is an important component of independence, responsibility and self-efficacy. In addition to curriculum-based learning, taking care of a garden can strengthen hope for those struggling with mental health issues and can often be the precursor to healthy self-care. *“Taking care of plants allowed me to give instead of always having to be on the receiving end of care from others.” (Paul)*³
- **Modelling interpersonal relationships.** Not only does a garden provide opportunities to develop friendships between students and between the garden and an individual, the garden itself can model healthy relationships and offer pathways to communication that might be inhibited in a regular school environment. For example, combining native and non-native plants in a mutually supportive way can open up conversations about Indigenous rights and reconciliation, or discussing the impact of invasive plants on the environment might lead to a discussion about cyber bullying.



Photos courtesy of The Riverwood Conservancy.

Choosing a site

When designing your enabling garden make sure you incorporate Universal Design Features for accessibility into your plan to guarantee accessibility for all students.⁴

Site Requirements

Follow the City of Mississauga's accessibility requirements when designing your enabling garden.⁵ Below are key features to help you.

- Paths should be a minimum of 36 inches wide and should be a firm and stable surface for wheelchairs and wheelbarrows.
- Allow a wheel chair turning radius of 8 feet (diagram 1).
- Location should receive a minimum of 6 hours of sun per day as many sensory plants and vegetables thrive in full sun.
- Location should be sheltered from prevailing winds as raised planters dry out more quickly than ground level beds.
- Have a water source at the garden.
- Have access to a tool storage shed.
- Have access to a compost area for weeds and dead plants.
- Provide adequate tree clearance (diagram 2) to accommodate students with vision loss.⁶
- Have a quiet shaded sitting area nearby for rest and passive participation in garden activities. Include adequate space for wheelchairs (diagram 3).

The Seven Principles of Universal Design were developed in 1997 by a working group of architects, product designers, engineers and environmental design researchers. The purpose of the principles is to guide the design of environments, products and communications, with the intention to produce more usable products and environments.

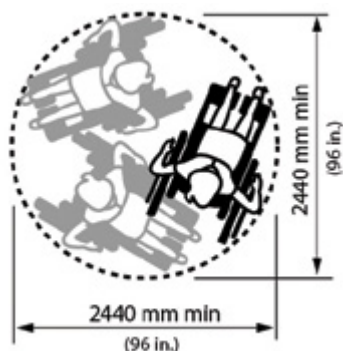


Diagram 1: Wheel chair turning radius.

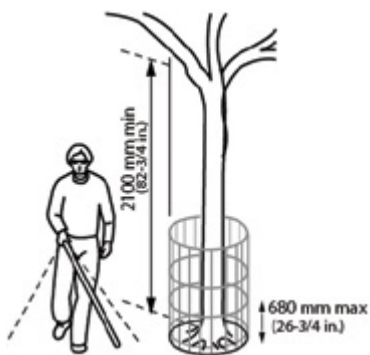
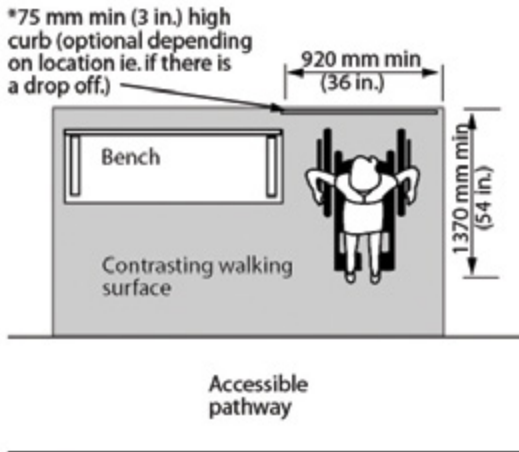


Diagram 2: Tree clearance to accommodate people with vision loss.



**To reduce need for 75mm edge protection where bench is located adjacent to 3:1 grade change, provide a minimum 1000mm (39 3/8 in.) shoulder with 2% slope from edge of bench pad. Where a 1.0m shoulder cannot be provided, 75mm high edge protection must be provided.*

Diagram 3: Wheel chair space in seating area.



Photo courtesy of The Riverwood Conservancy.

Safety Considerations

- Site should be free of steps and trip hazards such as rocks or low curbs and slopes should have no more than a 2.5% grade while allowing the 2% needed for water to flow away for maximum safety for wheelchair users.⁷
- Delineate specific areas such as seating or planting with a change in ground texture.
- Highlight curbs or trip hazards with high visibility paint or tape
- Provide a shaded area to protect gardeners from the sun.



Photo courtesy of The Riverwood Conservancy.

How big should the garden be?

When planning the size of your garden, consider the following:

- **Budget:** How many raised planters can you afford to build?
- **Usage:** How many people will be using it at any given time and how often will it be used? Is it functional or purely decorative?
- **Maintenance:** Who will maintain it, especially in the summer months? Watering and weeding take time
- **Space:** How much space do you have available?



Concept Drawing by Land Plan Landscape Architecture, The Riverwood Conservancy Enabling Garden.

Choosing your raised planters

Planters can be made with a range of materials including rot-resistant Cedar, yew and Juniper and hardwoods such as Black Walnut, white oak and locust. Upcycled materials such as rubber tires, concrete blocks and assorted ceramic planters provide useful additional planting space but are not universally accessible.

To accommodate a range of student abilities choose raised planters with different heights and add smaller containers to expand your planting space. If many classes are using the garden you will find planting space a challenge. Sometimes it's necessary to have one class plant and **then those same plants are dug up and re-potted for the next class.**

TIP: Add rubber castors with rust-proof hardware to the bottom of small planters for ease of movement.





Photo courtesy of The Riverwood Conservancy.

OPTION 1: A-Frame and Table Top Frame

Advantages

- Front approach from all sides is possible for wheelchair users without having to twist their body.
- The planting pans on some models can be raised and lowered using a crank.

Disadvantages

- The planting pan can be too shallow for many plants, most of which need at least 10 inches of soil depth to flourish.
- The soil in the pan dries out quickly and drainage can be problematic.
- Different sizes of wheelchairs can make it challenging to find a table height that allows reasonable front access without compromising the requirements for knee clearance.

OPTION 2: Rectangular Raised Planters

Advantages

- Can be built at different heights to accommodate different users.
- With a wide perimeter top piece added, students can sit while working.
- Good soil depth allows a variety of plants, vegetables and herbs.
- All students, regardless of ability, can get close to the plants, creating a sense of intimacy and connection that is hard to achieve with ground-level beds.

Disadvantages

- Students using wheelchairs have to twist their bodies to access the planter.
- Because of the height of some beds, some tall pollinator plants are inappropriate to include because only the stems will be visible especially to those using wheelchairs.
- Planter wall surface can be rough on the knees of wheelchair users.



A-frame planter. Photo courtesy of The Riverwood Conservancy.



Rectangular raised planter. Photo courtesy of The Riverwood Conservancy.



OPTION 3: U-shaped pre-formed Planter⁸

Advantages

- comfortable for wheelchair users
- can be accessed from all angles
- can be used in a variety of configurations
- some models have built-in water tanks for constant moisture levels

Disadvantages

- more expensive than wood constructed beds⁹
- some models have to be emptied and stored for winter
- May be considered aesthetically less attractive than wooden models

OPTION 4: Ready-to-assemble trug:

Advantages

- Inexpensive ready-to-assemble option.
- Offers a variety of planting depths.
- Comes with a table, cold weather and warm weather covers that extend the planting season.
- It can be emptied and moved if necessary.

Disadvantages

- Planter slant does not allow access for medium to large wheelchairs and is too high for children in most wheelchairs.
- Space is limited.
- Needs vigilant watering as soil dries out quickly.

OPTION 5: Vertical Gardening

There are numerous ways to incorporate vertical gardening into your Enabling Garden using everyday items or store-bought wall-mounted containers. It can be as simple as growing beans up a trellis mounted in a bucket, a container lowered via a pulley or an integrated wall system. Always ensure there is adequate soil to prevent the roots drying out and good drainage to avoid the plants becoming waterlogged.

Advantages

- Garden is expanded by using vertical space.
- It challenges students to create different ways of planting using items they have at home.
- It can provide “walls” which can instill a sense of security for some students.

Disadvantages

- Not always universally accessible.
- Plants dry out very quickly.
- Plants can't always grow naturally in a vertical space.
- Can be high maintenance due to water needs and costly due to premature plant loss.

TIP: for an easy DIY vertical planter using plastic pop bottles, visit:

garden.vivalcreek.com/diy-vertical-garden-planters-using-plastic-bottles/

What should we plant?

While it is always recommended to use native plants for their resilience and environmental benefits, enabling gardens require plants with high sensory impact so both native and non-native plants are best. Annuals are valued over perennials to maximize the sensory value of the plants and to provide as many seeding and planting opportunities as possible year to year. **Always thoroughly research your plants with attention to ones with any poisonous parts.**

SIGHT

Plants should be chosen for their vibrant colour as well as their texture and architectural interest. Yellow, red, orange and white flowers are easily seen by people with degrees of vision loss especially when set against a dark or green background. Balance strong colours with soft neutrals or foliage to avoid sensory over-stimulation.

PLANTS FOR SIGHT INCLUDE:

Common Name	Latin Name
Aztec Red Verbena	<i>Verbena 'Aztec Red Velvet'</i>
Nasturtium 'Whirlybird Mix'	<i>Tropaeolum minus 'Whirlybird'</i>
Marigold 'Durango Yellow'	<i>Tagete 'Durango Yellow' and 'Durango Red'</i>
Nemesia 'Sunsatia Lemon'	<i>Nemesia Inuprasp 'Sunsatia Lemon'</i>
Love Lies Bleeding	<i>Amaranthus caudatus</i>
African Daisy 'Orange Symphony'	<i>Osteospermum 'Orange Symphony'</i>
Yellow Buttons 'Flambe Yellow'	<i>Chrysocephalum apiculatum 'Flambe Yellow'</i>
Heirloom Turk's Turban squash	<i>Cucurbita maxima 'Turk's Turban'</i>
Rainbow Swiss chard 'Bright Lights'	<i>Beta vulgaris 'Bright Lights'</i>
'Painted Lady' Runner Beans	<i>Phaseolus coccineus 'Painted Lady'</i>
Mandan Bride Ornamental Corn	<i>Zea mays 'Mandan Bride'</i>
Giant Allium	<i>Allium 'Giganteum'</i>
Globe Artichoke	<i>Cynara scolymus</i>
Strawberry Spinach	<i>Chenopodium capitatum</i>

TIP: spray paint the seed heads of Giant Alliums to provide winter interest.



Verbena. Photo courtesy of The Riverwood Conservancy.



Painted alliums. Photo courtesy of The Riverwood Conservancy.



Artichoke. Photo courtesy of The Riverwood Conservancy.



Salad harvest. Photo courtesy of The Riverwood Conservancy.



Butternut Squash. Photo courtesy of The Riverwood Conservancy.

TASTE

Growing plants for food is a great way to re-connect students to the food they eat. **Make sure you check that all parts of the plants are safe in case of accidental ingestion.**

Plants with edible flowers include Nasturtium, Squash, Lavender, Calendula, Borage, Pot Marigold and Chives.

PLANTS FOR TASTE INCLUDE:		
Common Name	Latin Name	
Tomatoes*	'Pendulina Orange' Tomato	<i>Solanum lycopersicum 'Pendulina Orange'</i>
	'Early Girl' Tomato	<i>Lycopersicon lycopersicum 'Early Girl'</i>
	'Indigo Rose' Tomato	<i>Lycopersicon esculentum 'Indigo Rose'</i>
Sweet Bell Peppers	<i>Capsicum annuum</i>	
Butternut Squash	<i>Cucurbita moschata 'Butternut'</i>	
Purple Runner Beans	<i>Phaseolus vulgaris 'Purple Queen'</i>	
Chocolate Mint	<i>Mentha × piperita 'Chocolate Mint'</i>	
Chives	<i>Allium schoenoprasum</i>	
Wild Strawberry	<i>Fragaria vesca</i>	
Nasturtium	<i>Tropacolum maius</i>	
*Avoid the leaves of the tomato plant		

TIP: Plant mint in its own container to prevent it from taking over the garden!

TOUCH

Look for plants with inviting textures: soft, spiky, smooth or craggy as well as interesting shapes to encourage students to touch them.

Include rocks in your raised garden beds. Not only do they provide visual and tactile interest but rocks are also our most ancient story-tellers and add a grounding effect to the garden.

PLANTS FOR TOUCH INCLUDE:

Common Name	Latin Name
Woolly Thyme	<i>Thymus pseudolanuginosus</i>
Lambs Ears	<i>Stachys byzantine</i>
Straw Flower	<i>Bracteantha bracteatum</i>
Corsican Mint	<i>Mentha requienii</i>
Romanesco Broccoli	<i>Calabrese romanesco</i>
Prairie Dropseed	<i>Sporobolus heterolepis</i>
Cape Blanco Stonecrop	<i>Sedum spathulifolium</i> 'Cape Blanco'
Dwarf Mugo Pine	<i>Pinus mugo</i> 'Corley's Mat' or 'Pumilio'
Dwarf Cedar	<i>Thuja occidentalis</i> 'Tiny Tim'
Dwarf Tamarack	<i>Larix decidua</i> 'Little Bogle' ; 'Newport Beauty'

TIP: Consider including dwarf conifers for touch as well as winter interest.



Photo courtesy of The Riverwood Conservancy.



Lavender.

SMELL

Did you know that people can detect at least one trillion distinct scents and that smell is the oldest sense triggering memories from long ago?¹⁰

OLFACTORY PLANTS FOR RAISED BEDS INCLUDE:

Common Name	Latin Name
Sweet grass (one of the four sacred medicines of many First Nations).	<i>Hierochloe odorata</i>
Lavender	<i>Lavandula angustifolia</i> 'Munstead'
Rosemary	<i>Rosmarinus officinalis</i>
Sweet Basil	<i>Ocimum basilicum</i>
Sweet William	<i>Dianthus barbatus</i>
Lemon thyme	<i>Thymus citriodorus</i>
Curry plant	<i>Helichrysum italicum</i>
Lemon scented geranium	<i>Pelargonium crispum</i>
Sweet Pea	<i>Lathyrus odoratus</i>
Lemon balm	<i>Melissa officinalis</i>

TIP: Space strongly aromatic plants a few feet apart so that their distinct scents do not overwhelm each other.

SOUND

Gardens are home to an orchestra of sounds. Birds singing, crickets chirping, the wind swishing through ornamental grasses and seed pods rattling each invite students to explore the sounds of nature. Including a water feature in the garden adds an additional sensory element although vandalism and curious critters can be a problem in a school garden.

PLANTS FOR SOUNDS INCLUDE:

Common Name		Latin Name
Ornamental Grasses	Mosquito Grass	<i>Bouteloua gracilis</i>
	Side Oats Grama	<i>Bouteloua curtipendula</i>
	Dwarf Fountain Grass	<i>Pennisetum alopecuroides</i> 'Little Bunny'
Straw Flower		<i>Bracteantha bracteatum</i>
Annual Honesty		<i>Lunnaria annua</i>
Love in a Mist		<i>Nigella damascene</i>
False Indigo		<i>Baptisia australis</i>

TIP: Hang bird feeders nearby to encourage birds to visit.



Love in a Mist.



Clematis 'Dr. Ruppel'.

VERTICAL PLANTS

Using vertical height can extend the range of your garden and add an interesting sensory element.

GOOD CLIMBING VINES INCLUDE:

Common Name	Latin Name
Sweet Pea	<i>Lathyrus odoratus</i>
Morning Glory	<i>Ipomoea purpurea</i>
Scarlet Runner Beans	<i>Phaseolus coccineus</i>
Clematis 'Dr. Ruppel'	<i>Clematis 'Dr. Ruppel'</i>
Clematis 'Madame Julia Correvan'	<i>Clematis Viticella 'Madame Julia Correvon'</i>
Virgin's Bower Clematis* **	<i>Clematis virginiana</i>
Sweet Autumn Clematis*	<i>Clematis paniculata</i>

*Has profuse small white flowers. **Native plant.

Building your enabling garden

As noted earlier, all building plans must be approved by your school administration and school facilities manager at least 9 months ahead of your planned planting date. Consolidate your design elements during the fall and plan to start building in early spring to maximize the use of the garden in its first year.

Suggested Dimensions for Rectangular Raised Beds¹¹

Width with reach from all sides: 3–5 feet

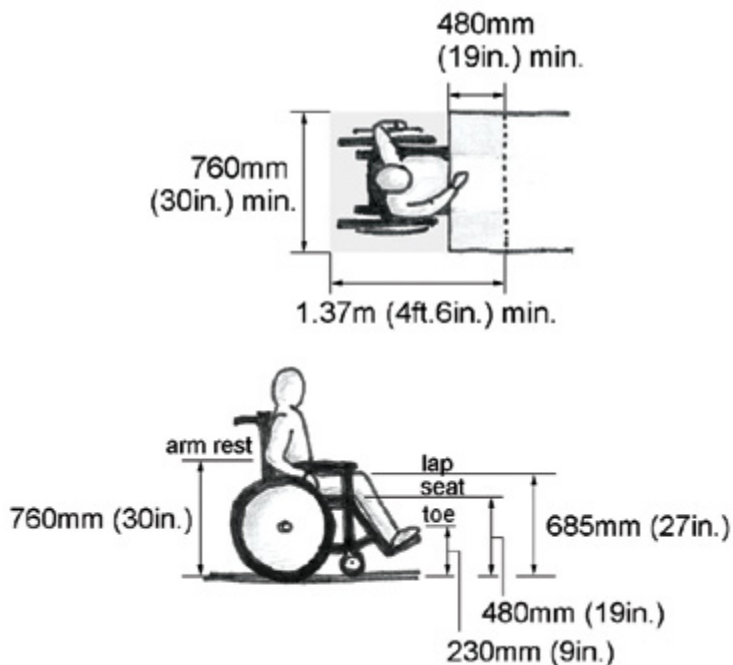
Width with reach from one side only: 29 inches

Height:

- Front approach by wheelchair users: 28-34 inches
- Knee clearance allowance for wheelchair access under the bed: 27 inches
- Side access for wheelchair users: 24 inches
- Bed at standing height: 35–37 inches

Pathways between beds: minimum 36 inches

Horizontal Height Guidelines



Before you plant

Drainage for Raised Beds

Every garden needs good drainage or the soil will get waterlogged and the plants will drown.

For beds on concrete: begin with a 3 inch layer of coarse gravel at the bottom of the bed covered by landscape fabric to prevent the soil from sifting down into the gravel.

For beds on soil: dig the ground 24 inches deep beneath the planter, remove rocks and stones and amend the soil with compost or manure.

TIP: Line the sides of your raised beds with a waterproof membrane to prevent the wood from rotting.



Photo courtesy of The Riverwood Conservancy.

Soil

Soil is the life-blood of your garden but filling raised planters can get expensive. An easy way to help you save money is by artificially raising the bottom of your planter so you need less soil.¹²

False Bottoms: for taller beds, layer *untreated* logs at the base of the bed, add shredded leaves and cover with landscape fabric or cardboard. Alternatively, fill 2/3^{rds} full with regular topsoil and the final 1/3 with the more expensive Triple Mix. For shallower beds, use empty upturned plastic pots and place soil on top.

Soil Mixes

Buying in bulk is cheaper than bagged soil and your local garden centre should be able to provide you with reputable sources.¹³

For beds 24" or higher: regular Triple Mix (three equal parts of topsoil, peat, and compost) with a top 1" dressing of compost or composted manure works well.

For beds with shallow pans: 2 parts Triple Mix to 1 part potting soil will help retain moisture since these beds tend to dry out faster than usual. For beds with 6" or less of planting space use a good quality potting mix only.

TIP: Ensure there is a team to move the soil into the planters and allow several weeks for the soil to settle before planting.

Mulch

Mulch helps retain moisture in summer, prevents weeds, adds organic matter and helps protect the roots of perennials in winter. Apply about 4 inches of mulch around but not touching any woody plant stems taking care not to get too close to the top of your bed to avoid spillage when watering. Best mulch for raised beds includes shredded leaves, brown grass clippings and straw.

Planting your garden

Orientation

To maximize sun exposure, orient your beds in a north/south direction away from shade-casting objects such as buildings, fences and trees. Place taller plants in the north and shorter plants in the south so that all plants have a minimum of 6 hours of direct sunlight a day.

Ordering soil

Soil is sold by the cubic yard. There are 27 cubic feet in a cubic yard. Plan to add soil annually to make up for what is converted to plant biomass and add approximately 20% to your soil order to allow for shrinkage.

To calculate your soil needs by cubic yards for each of your beds:

- Multiply width x height x depth
- Divide that number by 27
- Or use this on-line calculator to do the math for you!

www.soildirect.com/calculator/cubic-yard-calculator/

Planting Plan

Square Foot Gardening¹⁴ in rows using seeding/planting templates is useful for optimizing space in a raised bed and is especially helpful for students with vision loss. Templates can easily be made using scrap wood or inexpensive cardboard.¹⁵

For a more free-flowing garden consider these basic design tips:

- Plant brightly coloured plants together in clumps of 3 or 5 to avoid a scattered “pizza” effect.
- Put strong-scented plants in blocks to maximize their sensory appeal and ensure a suitable distance between other scented plants to avoid sensory confusion.
- Avoid putting strong architectural plants together because they will visually “fight” each other.
- Use soft coloured transitional plants, grasses or foliage plants between strong coloured plants to ease your eye from one to the other.



Photo courtesy of The Riverwood Conservancy.

Maintaining your garden

Watering

Hand watering a garden can help students build strength, balance and hand eye coordination as well as provide opportunities for nurturing and reflection. However it is time-consuming and challenging in hot summer months. Alternatives include:

Store-bought irrigation system with pop-up sprinkler heads:¹⁶

Benefits

- Can be used with a timer to minimize water loss in hot temperatures
- Relatively simple to install
- Sprinkler heads can be adjusted for water output and direction

Disadvantages

- When hooked up to a water main, hose can present a trip hazard
- Water is at the soil surface level not the root zone
- Can be unwieldy to work around in a smaller raised bed

Soaker hose:

Benefits

- Less water loss due to evaporation
- Water is directed at the root system
- Easy to install

Disadvantages

- When hooked up to a water main, leader hose can present a trip hazard
- Soaker holes can get clogged
- Can get disturbed if bed is used constantly

Weeding

Maintaining a garden can be a source of pleasure and pride for students and can encourage initiative and a sense of responsibility. To minimize weeds, apply a 2–4 inch layer of mulch around plants once planting work is complete.

Fertilizing

If you use good soil and amend with compost or manure on a regular basis there should be no need for additional fertilizers. Planting a fall cover crop such as a pea/oat mix¹⁷ will nourish the soil in readiness for spring.¹⁸ To prevent over-wintering diseases, rotate your crops every year for a 3-year cycle. To ensure the safety of students with allergies, do not use chemical fertilizers or organic fertilizers such as fishmeal.

Enabling gardens for mental health support

Many students face challenges such as trauma, substance use and mental health issues that can inhibit both learning and enjoyment of life. When viewed through a therapeutic, rather than a scientific lens, enabling garden activities can support students' emotional wellness and provide a catalyst for meaningful change.

EXERCISE 1: Therapeutic plant stories

Plant stories are visual creations that tell a story using plants instead of words. Students choose plants to symbolize elements of their life based on their subjective response to the plant's colour, shape, texture and smell. Plants are then arranged in a container or garden bed to represent the relationship between the different elements of the student's life.

Plant stories can be done either individually, focussing on a particular challenge, or as a group exercise, addressing broader topics such as gender relations or racism.

IMPORTANT: Make sure you include time for students to share their stories if they choose to. Afterwards, allow time for debriefing, supportive feedback and appropriate closure.

TIP: Choose plants with distinct visual or textural characteristics that can easily symbolize specific challenges, strengths or even broader stories.



Photo courtesy of The Riverwood Conservancy.

EXAMPLE: The following “plant story” was created by a student who had experienced violence. Using plants instead of words, she was gently and safely able to identify and explore her strengths and support for healing. The plants used are listed below, together with the meaning that the student attributed to each.

- **dominant red Coleus leaves:** feeling overwhelmed by trauma and depression
- **green Coleus leaves with red margin:** margins were her hidden stories of resilience and courage
- **red, droopy Love Lies Bleeding flower:** her ability to stand strong even when feeling fragile
- **blue Salvia:** her allies, both human and spiritual, standing up to trauma
- **white Euphorbia:** hope for the future, small but strong
- **pink Gaura:** moments of fun she has when dancing
- **yellow Zinnia:** spiritual inspiration
- **dwarf evergreen (not seen):** resilience, inner strength during difficult times
- **rocks (not seen):** holding on to her true story and staying grounded

EXERCISE 2: Therapeutic questions

When viewed through a therapeutic lens, everyday objects found in nature can enhance emotional intelligence, spark reflection and build resiliency. Here are examples of how simple questions can invite personal exploration.



Look closely and you will see a second colour bleeding into this green leaf.

In what ways is this issue you're facing bleeding into and affecting your daily life? Give an example of your resilience in the face of overwhelming difficulties.



Rocks are our most ancient story tellers.

What stories of inner strength can you share about yourself? What helps you stay grounded in times of stress? What story might this rock tell me about you?



This caterpillar has gone through a transformation and will soon turn into a butterfly.

What butterfly stage do you see yourself in right now and why? If you could transform yourself, in what ways would you be different? What steps can you take to become your newly transformed self?



This bean seedling is just emerging from the soil, entering a world full of risk and possibilities.

In what ways can you relate to this bean seedling? What holds you back from growing? What are your strengths?

EXERCISE 3: Using nature as an emotional resource

The natural world is rich with opportunities to support students' emotional well-being. Print the following out on small cards, distribute to students and have them explore their surroundings to find examples.

Nature supports us in numerous ways. Look for ways it shows you:

- Resilience _____
- Support _____
- Calmness _____
- Power _____
- Mystery _____
- Connection _____
- Courage _____
- Hope _____
- Spirit _____



Photo courtesy of The Riverwood Conservancy.



Curriculum Connections

A garden is a change of setting that takes a class outside of the regular indoor environment into a place that can stimulate different creative or inquisitive sides of each student and a living, ever-changing example of many curriculum concepts in action. Here are some ideas to get you started but there are many more! Use this list to spark your creativity, then delve deeper and add your own ideas.

Science and Technology

The science classroom is often viewed as the most easily linked to a school gardening program—a garden is a great place to see and understand concepts such as **biodiversity, water systems, soils, habitats, ecosystems, systems dependence/interaction**, as well as the human capacity to alter these environments. To learn about habitat, students might build habitat structures like bird houses or bee boxes for the garden. Students can also explore the chemistry of soil, soils in solution etc. A garden can also be a place for learning about and observing specific plants, animals and insects.

Grade 2: visit the garden in the fall to investigate seed dispersal. Find some seeds that fly, some that drop and some that “hitch-hike”. Discuss how these seeds travel and why they do this.
Growth and Change in Animals, 3.3

Grade 4: visit the garden and try to find parts of a food chain. Use your imagination to fill in the upper levels (you are unlikely to see a coyote or a hawk visiting your garden, but they may be nearby and would definitely eat the bird or squirrel that fed on your sunflower!) Can you find bugs, or evidence of them, that have eaten the plants? And what would eat the bug?
Habitats and communities, 3.2

Grade 6: conduct a bug hunt in the soil in your garden in the fall. Catalogue the number of different bugs you find, then do another hunt in an area such as the school field. Where were there more bugs? Why do you think there were more?
Biodiversity, 3.2, 3.4

Grade 8: test a sample of the water that runs off the roof of the school, compare it with a sample of water running out of the rain garden. Are they different? Why?
Water systems, 2.3





Photo courtesy of Credit Valley Conservation

The Arts

A garden is a place that can inspire artistic expression in students. The plants, insects and other elements of the landscape are great items to study for drawing, sculpture or painting. If your garden includes an outdoor classroom with group seating formation (or you have space where you can improvise), the garden can be a backdrop for dramatic performance or presentation. You could also have the children create artwork to decorate the garden. A musical element can also be incorporated into the garden through the recording of soundscapes of outdoor spaces and/or the creation of musical instruments from found natural materials from the garden.

Grade 1: visit the garden in the autumn, find as many different textures as you can. Collect items which have fallen on the ground to use in an artwork to show different textures. *Visual Arts, D1.1*

Grade 2: visit the garden to help with weeding, watering and general maintenance. Then play a mime game, creating short movements to represent each task: see if others can recognize your movement. *Dance, A1.1*

Grade 4: sit quietly in the garden for a few minutes. What can you hear? Try recreating the sounds you hear using found sounds or classroom instruments. Put them together to create a garden soundscape. *Music, C1.3*

Grade 8: take a look at the garden in your schoolyard and the way it contrasts with the rest of the yard. Create artwork juxtaposing the two contrasting landscapes using different angles, lines, textures, colours, etc. *Visual Arts, D1.1*

Language

The garden space can be a different setting for students working on a variety of language projects. The garden can be the subject of written pieces or of speeches—students can use language skills to describe the outdoor environment or the importance/impact of the garden. In particular, students can use language tools to explore the meaning and importance of a school green space or food traditions and to teach other students and members of the community about aspects of the garden. Students may also practice using language to describe particular items that they see or find in the garden.

Grade 6: sit quietly in the garden for a few minutes. As you sit, jot down pairs of words—one noun, one verb (e.g. leaves + rustling). Then add an adjective or adverb (ancient + leaves + rustling OR leaves + rustling + quietly), begin to build a haiku-inspired poem. *Writing, 1.1*

Grade 7: choose a plant in the garden that interests you. Describe how the plant develops throughout its life, charting the different stages. *Writing, 2.1*

Social Sciences

All plants have a history! Of the garden plants, which ones would have been found in Canada around 1900... which ones are new? How has the landscape in our country changed and what has caused these changes? How are different foods used in different types of cuisine, and what traditions and stories accompany them?

A garden can be a place where students study the landscape of the school grounds and begin to look at how land is used. Mapping the garden is a great way to encourage geographic observation skills, and also to keep an ongoing record of the school garden as it grows and changes over the years.

A garden can also be a place where students learn and explore the responsibilities of citizenship, particularly environmental obligations and the responsibilities of stewardship of land so that all citizens and future generations can enjoy it.

Grade 3: conduct a scavenger hunt in the garden, looking for plants and natural objects that had a practical use for early aboriginals or early settlers. Match with everyday items used today. *Heritage and Identity: Communities in Canada 1780–1850, A1.2*

Grade 5: construct a map to show the area from which rainfall is being collected and funneled into the rain garden to help manage run-off. *People and Environments: The Role of Government and Responsible Citizenship, B2.3*



Math

A garden grows and changes every day. Measuring these changes and estimating future changes can be a great way to take mathematical concepts and use them in a practical application—for example, counting the number of plants/birds/insects in the garden, or measuring the distance between specific areas in the garden. Older students can estimate the surface area or volume of a watering can and how many it will take to water the surface area of the garden, or measure the diameter of the stalk or radius of the leaves of individual plants.

Students can use a variety of low or high technology tools in order to help them to make garden measurements, or identify patterns and shapes within the garden and within nature. Seeds, leaves and many other small natural items can be collected from the garden area and compared to see the variety of shapes and sizes that can be found in nature.

Grade 2: hunt in the garden to find repeating patterns—give students sheets showing specific patterns that they can find, and have them find some new ones as well.
Patterning and Algebra, Patterns and Relationships

Grade 6: measure the tallest and shortest plant in the garden. Find some that are in between and measure them too. Create a chart or graph to show all your measurements. Try super-imposing your chart over a musical staff—can you turn your measurements into a melody?



Appendices

Appendix 1:

Community partners and organizations

Bumblebee Watch

Bumble Bee Watch is a collaborative effort to track and conserve North America's bumble bees. This citizen science project allows individuals to track and report on bumble bee sightings, and contribute to their ongoing conservation efforts.

www.bumblebeewatch.org

Canadian Wildlife Federation – Wild About Gardening

WILD About Gardening boasts resources to inspire and support Canadians in encouraging beneficial insects, pollinators and wildlife in their gardens. Resources include a Native Plant Encyclopedia, a Gardening Calendar and Over the Garden Fence, where everyone can share photos and stories of their nearby nature. Our “Wild About...” poster series introduces Canadians to wildlife they might find on their properties and are complemented with handouts on how to support these wild neighbours and garden in harmony with nature. www.wildaboutgardening.org

Credit Valley Conservation

CVC offers resources and technical expertise to school groups in the areas of educational programming, ecological landscaping, low impact development, and invasive species. Resources are available on-line and include native plant lists, ecological landscaping how-to guides, and school ground rain garden case studies. Contact CVC Education (education@creditvalleyca.ca) for more information on school ground greening-related programs and services available in the Credit River watershed. www.creditvalleyca.ca

Ecosource

Ecosource is an Ontario-based environmental education non-profit offering FREE opportunities for student field trips, teacher professional development, curriculum resources and lots more. www.Ecosource.ca

Evergreen

Toyota Evergreen Learning Grounds helps schools create dynamic outdoor classrooms that provide students with a healthy place to play and learn. Grants may be available. www.evergreen.ca → Our Impact → Children → Greening School Grounds

Monarch Teacher Network of Canada

Monarch Teacher Network of Canada is a growing collective of educators and nature enthusiasts that teach and inspire people to connect with nature through hands-on training and professional development workshops. They are committed to fostering a deeper connection to the natural world through explorations of art, science and environmental action. www.monarchteacher.ca

Ontario Invasive Plants Council – Grow Me Instead

The Ontario Invasive Plant Council (OIPC) is a multi-sector, non-profit group committed to the collaboration of organizations and citizens in order to respond more effectively to the threat of invasive plants in Ontario. www.ontarioinvasiveplants.ca

Pollinator Partnership

The Pollinator Partnership’s mission is to promote the health of pollinators, critical to food and ecosystems, through conservation, education, and research.

www.pollinator.org → Learning Center → Gardens

Pollination Guelph

Pollination Guelph is a group of individuals dedicated to the conservation and development of pollinator habitat for current and future generations. They promote awareness and understanding of the role of pollinators in achieving local and global environmental sustainability goals and showcase pollinator projects that are a model for citizens and communities throughout Canada and internationally.

www.pollinationguelph.ca → Resources → Our Downloads

Rain Barrels

A place to purchase rain barrels and accessories in large or small quantities. To minimize product transportation costs and meet customer demand, they partner with non-profit groups throughout Canada and the USA to host truckload fundraising rain barrel sales in their communities. Community partners raise \$10 or more from each rain barrel sold.

www.rainbarrel.ca

Region of Peel, Fusion Landscaping

This program is aimed at homeowners, but advice may be offered to schools embarking on a garden project. Use this website to gain useful tips on design, planting and water efficiency. There are also handy tools to help calculate how much soil and mulch you require as well as costing your plants.

www.peelregion.ca/watersmartpeel/residents/fusion-landscaping/

The Riverwood Conservancy

The Riverwood Conservancy is a volunteer and member-based charity providing programs in nature and environmental education, stewardship, gardening and horticulture at Riverwood—a 150-acre, urban nature preserve in south Mississauga. The Riverwood Conservancy’s mission is to enable people of all cultures, ages, and abilities to connect with nature and learn about the importance of protecting, conserving and restoring natural spaces for the well-being of future generations. www.theriverwoodconservancy.org

Seeds of Diversity Canada

The goals of Seeds of Diversity are to search out, preserve, perpetuate, study, and encourage the cultivation of heirloom and endangered varieties of food crops. They also educate the public about the importance of heirloom and endangered varieties

of food crops and the need for their continued cultivation and preservation.

www.seeds.ca/pollination

Toronto and Region Conservation (TRCA)

TRCA education provides hands-on learning opportunities for classes of all grades in the areas of nature, ecology and cultural heritage. By incorporating these experiences into education, students are encouraged to better understand environmental, sustainability and urban issues. www.trca.ca → school programs → outreach education

The Xerces Society of Invertebrate Conservation

A nonprofit organization that protects wildlife through the conservation of invertebrates and their habitat. Established in 1971, the Society is at the forefront of invertebrate protection worldwide, harnessing the knowledge of scientists and the enthusiasm of citizens to implement conservation programs. www.xerces.org

Nurseries offering native plants

These are nurseries located near Peel Region, taken from Credit Valley Conservation's list of native plant nurseries. Go to www.creditvalleyca.ca for the full list, with contact details.

Baker Forestry Services - Georgetown

BTN - Brookdale Treeland Nurseries - Schomberg

Carl Hills Horticultural Services Nurseries - Orangeville

Seeds: Sources of organic and heirloom seeds

Urban Harvest: Urban Harvest is dedicated to providing customers with certified organic seeds, seedlings and garden supplies that promote ecological diversity and preserve the health of our planet. Everything they sell is 100% certified organic. All seedlings are grown in or near the Greater Toronto Area to support the economies of Toronto, Ontario and Canada. u harvest.ca

Veseys Seed: Continuing the tradition of providing gardeners with the finest seeds available. Veseys has 75 years of history, providing products, services, and advice to gardeners. www.veseys.com

William Dam Seeds: Provide high quality seeds which are not chemically treated, including many heirloom varieties. www.damseeds.ca

Richter's Herbs: www.richters.com

Heritage Harvest Seeds: www.heritageharvestseed.com

Urban Harvest: u harvest.ca

Territorial Seed Company: www.territorialseed.com

Appendix 2: Useful resources

Designing Natural Spaces for Play and Learning

The Ecology of Imaginative Childhood - by Edith Cobb

Growing up in the inner city: Green spaces as places to grow - by Andrea Faber Tayler, Angela Wiley, Frances Kuo, William Sullivan

The Natural Environment as a Playground for Children - by Ingunn Fjørtoft, Jostein Sageie
Childhood's Future - by Richard Louv

Natural learning: Rediscovering nature's way of teaching - by Robin Moore, Herbert Wong
Young Children and the Natural World - by Lillian Phenice, Robert Griffore

Accessible Play Spaces In Canada - Leisure Information Network:

lin.ca/sites/default/files/attachments/AnnexHGuide2014final.pdf

But... Isn't it Dangerous? Risk and Reward in Nature Play - Ecology Global Network:

www.ecology.com/2012/07-17/risk-reward-nature-play/

Community-Connected Experiential Learning - Ontario Ministry of Education:

www.edu.gov.on.ca/eng/general/elemsec/job/passport/CommunityConnected_ExperientialLearningEng.pdf

A Conversation with Dr. Alison Gopnik - National Association for the Education of Young Children: www.naeyc.org/files/tyc/file/TYC_V3N2_Gopnik.pdf

Landscape and Child Development: Design Guide for Early Years–Kindergarten Play-Learning Environments - Evergreen:

www.evergreen.ca/downloads/pdfs/Landscape-Child-Development.pdf

The Learning Grounds Guide for Schools - Evergreen:

www.evergreen.ca/downloads/pdfs/2017/Learning_Ground_Guide.pdf

Loose Parts Play - Evergreen:

www.evergreen.ca/downloads/pdfs/Design-Ideas-12-Loose-Parts-Play.pdf

Murals and Mosaics - Evergreen:

www.evergreen.ca/downloads/pdfs/Design-Ideas-15-Murals-Mosaics.pdf

Shade Shelters - Evergreen:

www.evergreen.ca/downloads/pdfs/Design-Ideas-9-Shade-Shelters.pdf

Teaching Strategies: www.ecoliteracy.org/article/teaching-strategies

Teachers' Corner - Evergreen: www.evergreen.ca/tools-publications/teachers-corner/

School Ground Greening Photo Gallery - Toronto District School Board:

www.tdsb.on.ca/ecoschools/Home/Photo-Gallery/School-Ground-Greening-Gallery

Universal Design in the Playground - Unicef:

www.unicef.org/sowc2013/universal_design.html

Enabling Gardens: Chapter sources

1. www.discoverychild.on.ca/single-post/2015/09/14/10-Ways-Children-Benefit-From-Nature-Based-Learning

naturalearning.org/sites/default/files/Benefits%20of%20Connecting%20Children%20with%20Nature_InfoSheet.pdf
 2. **Research commissioned by the U.K. organization Sense:**
www.sense.org.uk/content/disabled-people-face-being-cut-society-warns-national-charity
 3. **Paul** (name changed to preserve anonymity), participant, The Riverwood Conservancy Enabling Garden
 4. **Universal Design Principles:**
universaldesign.ie/What-is-Universal-Design/The-7-Principles/
- Accessibility for Ontarians with Disabilities Act's (AODA):**
www.ontario.ca/laws/statute/05a11
5. **City of Mississauga 2015 Accessibility Facility Accessibility Design Standards new edition:** www7.mississauga.ca/Departments/Marketing/Websites/Accessibility/Mississauga_FADS.html
 6. **Vision Loss:** www.clearingourpath.ca/8.0.0-design-needs_e.php
 7. **City of Mississauga 2015 Accessibility Facility Accessibility Design Standards new edition:** www7.mississauga.ca/Departments/Marketing/Websites/Accessibility/Mississauga_FADS.html; p. 2–18
 8. **U-shaped planter:**
www.universaldesignstyle.com/terraform-wheelchair-accessible-garden-kit/
 9. Video of **u shaped planter** available in north America:
greencirclegarden.com/how-green-circle-garden-works
(\$1,043 Green Circle Garden model)
 10. **Facts about sense of smell:** www.everydayhealth.com/news/incredible-facts-about-your-sense-smell/

11. For more detailed **information on building raised beds** see:
extension.uga.edu/publications/detail.html?number=C1027-4

Larson, Hanchek, & Vollmar, 1996; Shoemaker, C.A., 2005 in **The region of Waterloo's "Barrier-Free Gardens Guide"**:

accessiblegardens.org/wp-content/uploads/2014/04/Barrier-Free-Gardens-Guide.pdf

The City of Mississauga's **Accessibility document** page 81: www7.mississauga.ca/Departments/Marketing/Websites/Accessibility/Mississauga_FADS.html

Building a raised bed video: youtu.be/KhhV6k70-LA

12. **Raised Bed Revolution: Build It, Fill It, Plant It...Garden Anywhere**; Tara Nolan; Cool Springs Press 2016; p.240
13. For more information on **soil mixes for raised beds** check here: learn.eartheasy.com/2012/01/6-tips-for-building-soil-for-your-raised-garden-beds-and-planters/
14. **Square foot gardening**: www.youtube.com/watch?v=dzrNbcW5xZO
15. **How to make a planting template**: www.youtube.com/watch?v=-KiAHJxbDb8
16. **Lee Valley Tools Drip and Flow Irrigation Systems**:
www.leevalley.com/en/Garden/page.aspx?cat=2,2280&p=49657
17. **Territorial Seed Company Nutra Blend mix**
www.territorialseed.com/product/Nutra_Blend_Cover_Crop_Seed
18. Article on **the benefits of cover crops**: covercrops.cals.cornell.edu/

Accessible garden tools

Easi Grip™ Garden Tools: disabilityworktools.com/easi-griptm-garden-tools-set-of-4/

Radius ergonomic light weight hand tools: www.leevalley.com/en/Garden/page.aspx?p=52902&cat=2,51810&ap=1

Telescoping tool set: www.leevalley.com/en/Garden/page.aspx?p=10507&cat=2,51810&ap=1

Other resources for enabling gardens

The Riverwood Conservancy Enabling Garden: www.theriverwoodconservancy.org

This Old House Planting a Raised Bed video: youtu.be/AzuuavHTq6c

Detailed exploration of school yard design: www.landscapesnaturally.co.uk/downloads/School_Grounds_Guidance.pdf

Plants for Vision Loss: www.carryongardening.org.uk/tips-on-garden-design-for-people-with-sight-loss.aspx

Edible flowers: gardentherapy.ca/ten-edible-flowers/

Seed templates: www.visionaware.org/info/everyday-living/recreation-and-leisure/gardening/raised-bed-gardening/1235

Resource books about gardening

Organic Gardening A-Z - by Tanya Denkle

The New Organic Grower - by Elliot Coleman

The Rodale's Encyclopedia of Organic Gardening - by Rodale Press

How to Grow More Vegetables - by Jon Jeavons

The Edible Schoolyard - by Alice Waters

Books for classroom/student use

Bizzy Bee and the Flowers - by Jill Warren

Old Elm Speaks (Tree Poems) - by Kristine O'Connell

Compost Stew (An A - Z Recipe for the Earth) - by Mary McKenna Siddals

Hungry Planet - by Peter Menzel

Videos and documentaries

The Garden - Directed by Scott Hamilton Kennedy

Food Inc - Directed by Robert Kenner

To Make a Farm - Directed by Steve Suderman (featuring an Ecosource staff Alumni, Tarrah Young!)

Dirt (The Movie) - Directed by Bill Benenson

Fresh - Directed by Ana Sofia Joanes

The Story of Stuff - Directed by Louis Fox

More than Honey - Directed by Markus Imhoof

Flight of the Butterflies - Directed by Mike Slee

Useful guides and factsheets

A Guide to Toronto's Pollinators - David Suzuki Foundation

www.davidsuzuki.org/issues/downloads/Pollinator_Guide_5pg.pdf

Native Plant Nurseries List - Credit Valley Conservation www.creditvalleyca.ca/nurseries

Native Plant Lists - Credit Valley Conservation

Scroll down to the bottom of the page for various native plant lists, depending on your project. www.creditvalleyca.ca/landscaping

Your Urban Garden is Better with Bees - North American Pollinator Protection Campaign
pollinator.org/assets/generalFiles/Better-with-Bees.pdf

No Fear of Stings! Inviting Bees to your Property - Pollinator Partnership and North American Pollinator Protection Campaign
www.pollinator.org/PDFs/NAPPC.NoFear.brochFINAL.pdf

Maintaining your Pollinator Garden: a guide for community gardeners - Toronto and Region Conservation www.trca.on.ca/dotAsset/150579.pdf

From the Ground Up: guide for soil testing in urban gardens - Toronto Public Health
www1.toronto.ca/City%20of%20Toronto/Toronto%20Public%20Health/Healthy%20Public%20Policy/Environmental%20Pollutants/Files/PDF/guide_for_soil_testing_2013.pdf

Pollinator Plants: Great Lakes Region - The Xerces Society for Invertebrate Conservation
www.xerces.org/wp-content/uploads/2014/03/GreatLakesPlantList_web.pdf

Further reading and research

Pollinator Health: A Proposal for Enhancing Pollinator Health and Reducing the Use of Neonicotinoid Pesticides in Ontario

The Ministry of Agriculture, Food and Rural Affairs (OMAFRA) published a discussion paper on the impact of neonicotinoids on pollinators as part of the province's comprehensive Pollinator Health Action Plan. The goal is to help improve the health of both managed honey bees and wild insect pollinators to support a strong, successful agri-food sector and a healthy environment. www.omafra.gov.on.ca/english/pollinator/discuss-paper.pdf

Feed The Bees: A Landowner's Guide to Conserving Native Pollinators in Ontario

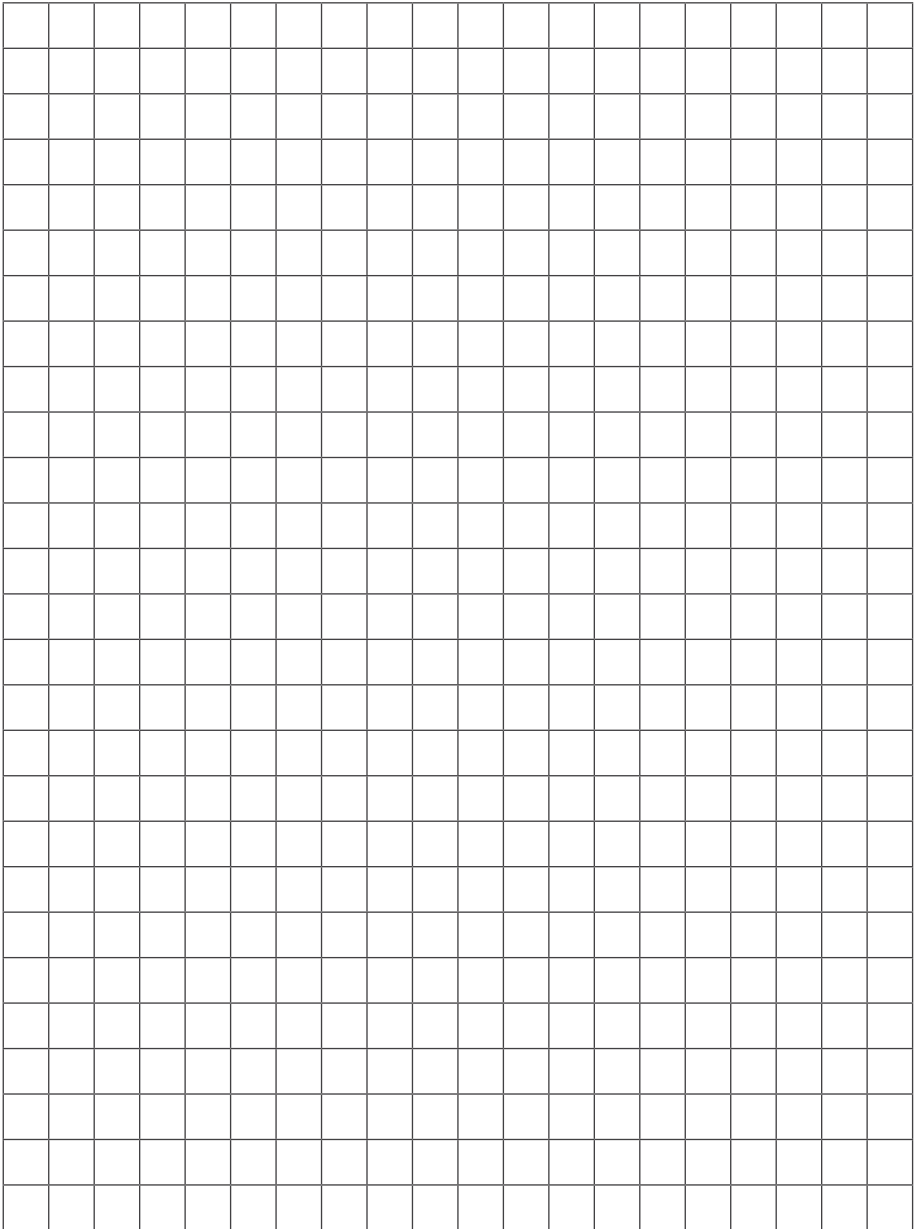
Feed the Bees is a community campaign to encourage individuals, businesses, organizations and governments to support a healthy and sustainable bee population, and plant gardens to feed pollinators and encourage biodiversity in our community. www.feedthebees.org/wp-content/uploads/2013/03/A-Landowners-Guide-to-Conserving-Native-Pollinators-in-Ontario.pdf

Toronto Zoo's Bat Conservation Guide

The goal of the Toronto Zoo's Bat Conservation Programme is to educate people about the importance of bats and to eliminate the misconceptions that contribute to negative human views and actions towards these animals. Bats provide an important pollination service to various tropical fruits, cacti and succulents in a wide range of ecosystems, from rainforests to deserts. www.torontozoo.com/pdfs/bats-conservationguide.pdf

Appendix 3: Design grid

Use the grid below to sketch your garden design.



Appendix 4: Costing your garden

Estimate the cost of your garden using this template.

REVENUE

Fundraisers:	\$
Grants:	\$
Total:	\$

EXPENSES

Compost:	\$
Sand:	\$
Mulch:	\$
Delivery:	\$
Plants*:	\$
Other (e.g. river rocks, lumber for raised beds, garden gnome):	\$
Help of friends and family:	Priceless!
Total:	\$

GRAND TOTAL: \$ _____

**As a general rule, you will need approximately 10 plants per square metre of garden space. This will vary depending on species used, so use your judgement when purchasing.*

