

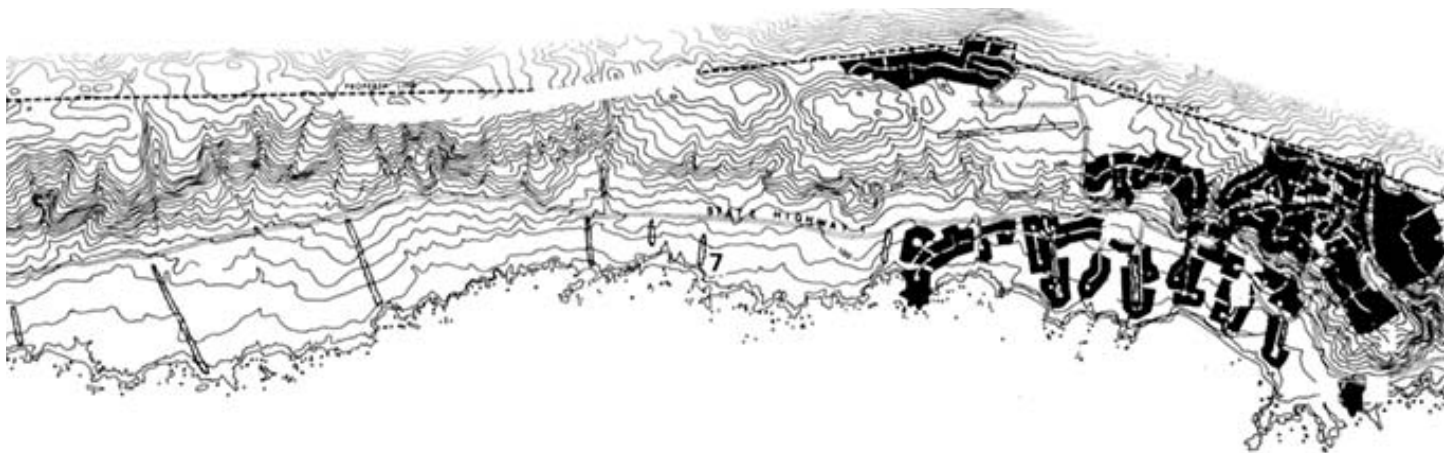
## 7.3 Nature-inclusive Design

### A. UNDERSTAND THE SYSTEM

Prior to initiating the site design process, Trent University is committed to developing an early, detailed understanding, and thoughtful systems-based analysis of the natural context. Site-specific decisions related to the proposed siting, function, land use, and program should be based on this initial analysis.

#### General Guidelines

- Undertake a contextual area-wide survey to understand system connectivity patterns and feature-specific sensitivities (refer to the Phase 1 Natural Heritage Report, and Sections 5.0, Otonabee River and 6.0, University Green Network).
- Engage in a collaborative process that includes an ecologist, First Nations, the development partner, and the University.
- Align future proposals with the overall goals and objectives of current watershed planning efforts from the City and Otonabee Conservation.
- Where possible, design proposed functions, land uses, and programs to integrate with existing flora and fauna identified on site.
- Prioritize avoidance of significant features, functions, and ecosystem services across the landscape. If avoidance is not possible, mitigate impacts throughout all phases, including design concept, detailed site plan, and the built project.
- Where avoidance cannot be reasonably achieved and minimizing has been explored, consideration is given to mitigation to address impacts (that are not direct removal of feature areas). If the feature will be directly impacted (wholly or partially) consideration is then given to replication or compensation.
- Refer to Part IV - Towards Implementation for measures to prioritize the protection of the natural system and guide land use planning with consideration for the presence and function of natural heritage features within the Symons Campus.



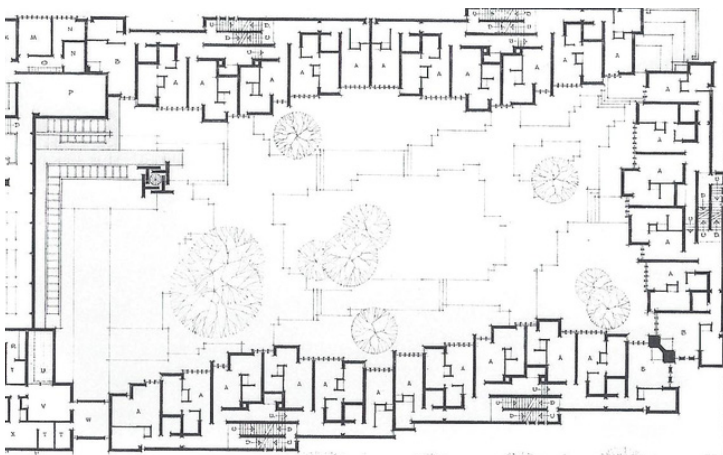
Survey by Lawrence Halprin used to understand the site's landforms and natural systems and to inform later design stages, Sea Ranch, California. Source: Lawrence Halprin

## B. DRIVE NATURE-INCLUSIVE SITING AND ORIENTATION

After developing a comprehensive understanding of the system and its needs, orient planned development components to reflect site conditions, natural areas and features, and the ecological context, and prioritize the protection and inclusion of natural elements that will contribute to achieving net benefit.

### General Guidelines

- Leverage and respect existing topography and natural heritage features, to the extent possible.
- Locate green infrastructure features and passive recreational spaces adjacent to buffers from natural heritage features in order to reinforce buffers.
- Orient and locate built form to minimize alterations to the solar conditions of existing natural features, and maximize the sunlight available to all surfaces of the built form.
- Consider the tradeoffs between height and lot coverage in regard to their respective impact on the adjacent natural features and contributions to climate change.
- For sites located adjacent to natural features and areas, minimize vehicular access to the extent possible, including parking and loading requirements, and locate them on the opposite side of the building to any significant natural features, where feasible.



Massey College demonstrates mitigation and nature-inclusion through Site Plan, University of Toronto. Source: Ron Thom. 1963



Built Massey College, University of Toronto. Source: Charles Birnbaum, The Cultural Landscape Foundation

## C. AVOID OR REDUCE DISTURBANCES

The construction of new projects and subsequent occupation of the site should aim to avoid or minimize disturbances to the ecological and hydrological context, especially when adjacent to natural features and areas. A proactive and collaborative approach that engages the City of Peterborough, Otonabee Conservation, and the local First Nations, should be used to design and monitor effectiveness of environmental controls.

### General Guidelines

#### Site Design

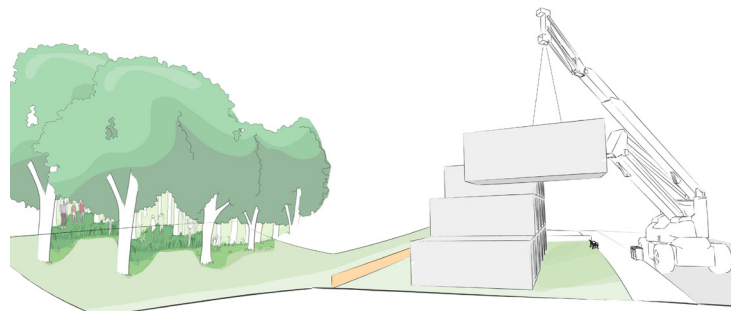
- Orient active outdoor amenity spaces that include communal gathering areas towards the street, while passive amenities should be oriented to the natural features.
- Provide accessible landscaped areas with naturalized plantings that have minimal maintenance requirements.
- Reduce noise pollution through the application of vegetated berms and dense landscaping.
- Orient lighting, including outdoor lighting, away from natural areas and inwards towards paths and built areas. Utilize strategies for lower mast lighting, downward directional, etc.
- Buildings, particularly those adjacent to natural features, attract birds and hence must avoid or reduce treatments that pose a collision risk. Effective deterrents include low reflectance, opaque materials, bird-friendly glazing, awnings and overhangs, and exterior screens and shutters.
- Ensure areas and building faces adjacent to natural features adjacent are not used as ‘back of house’ spaces (i.e. for waste collection and loading), where feasible, while minimizing visual impact and conflict with pedestrians and cyclists.
- Integrate wildlife-road mitigation areas (refer to Section 8.2).

#### Construction

- Utilize best practices for controlling runoff, collecting sediment, and monitoring construction.
- Ensure durable, timeless materials are used.
- Utilize modular prefabricated construction to reduce the impact of the construction on-site, where possible.
- Rely on foundation systems that avoid blasting and minimize impact on existing tree roots.

#### Occupation

- Establish a monitoring and research program to understand actual impacts on-site and provide recommendations for adaptations.
- Where landscaping maintenance is necessary, quiet electrical or manual devices should be used in lieu of gas powered ones.
- Avoid use of excess salt on roads and sidewalk in the winter. Ensure that stockpiled snow is managed for quality and quantity during melt-off.



Demonstration of less invasive modular construction approaches



GROUP AFFECTED



DISTURBANCE	amphibians	birds	fish	insects	small mammals	medium mammals	large mammals	reptiles	vegetation
Habitat loss	X	X	X	X	X	X	X	X	X
Habitat fragmentation / connectivity	X	X			X	X	X	X	X
Invasive species	X	X	X	X	X	X		X	X
Light	X	X		X					
Window strikes		X							
Noise	X	X			<i>bats</i>				
Garbage and dumping	X				X	X		X	X
Subsidized predators	X	X			X			X	
Domestic pets	X				X	X			
Roads (wildlife collisions, mortality)	X	X			X	X	X	X	
Erosion / sedimentation	X		X					X	X
Pollution (e.g., road salt)	X		X						X
Water quantity	X		X					X	X
Water quality	X		X					X	X

**Table 2:** Impacts of Potential Site Disturbances on Flora and Fauna

## D. INFUSE NATURE

Use nature-inclusive design strategies to knit the development into its natural and ecological context. Careful consideration of the elements and positive contributions by design will create the conditions for net positive benefits.

### General Guidelines

- Introduce natural features including learning gardens, arboretums, outdoor classrooms, perm-culture gardens, natural corridors, reflective spaces, bird and butterfly friendly spaces, and living walls. Ensure they are appropriate to the species associated with the site and are properly oriented to the species' requirements.
- Establish a mix of habitats and communities that reflect the diverse array of structures that occur in nature to complement, support, or diversify adjacent features and areas. This may include nest boxes, mast-producing species (i.e. wildlife food sources), natural cover, etc.
- Construct, restore, and enhance wetlands, especially on sites where streams or wetlands existed historically and water collects naturally.
- Ensure material considerations provide porosity at a variety of scales.
- Require a diversity of maintenance levels to meet the ongoing needs of the site (e.g., irrigation).
- Retrofit existing buildings and areas, where feasible, introducing mitigation and enhancement measures such as shoreline rehabilitation efforts, bird friendly applications, and/or naturalized landscapes.
- Select species based on expected growing conditions (exposure, moisture). Consider the purpose of the area being planted (aesthetic, buffer, etc.). Have one or more objectives in mind, such as:
  - Ecological – buffering function (thicker, dense base), under wildlife habitat (e.g., pollinators, food sources, cover).
  - Aesthetic – consider flowering times and overall colour and form of the species.
  - Maintenance – consider planting location, how it grows, and what maintenance might be required.
- Refer to Section 6.2 Composition of the UGN for a description of Naturalized Green Spaces.



This City of Mississauga pollinator garden is part of the Bee Cities initiative.  
Source: Bee City Canada

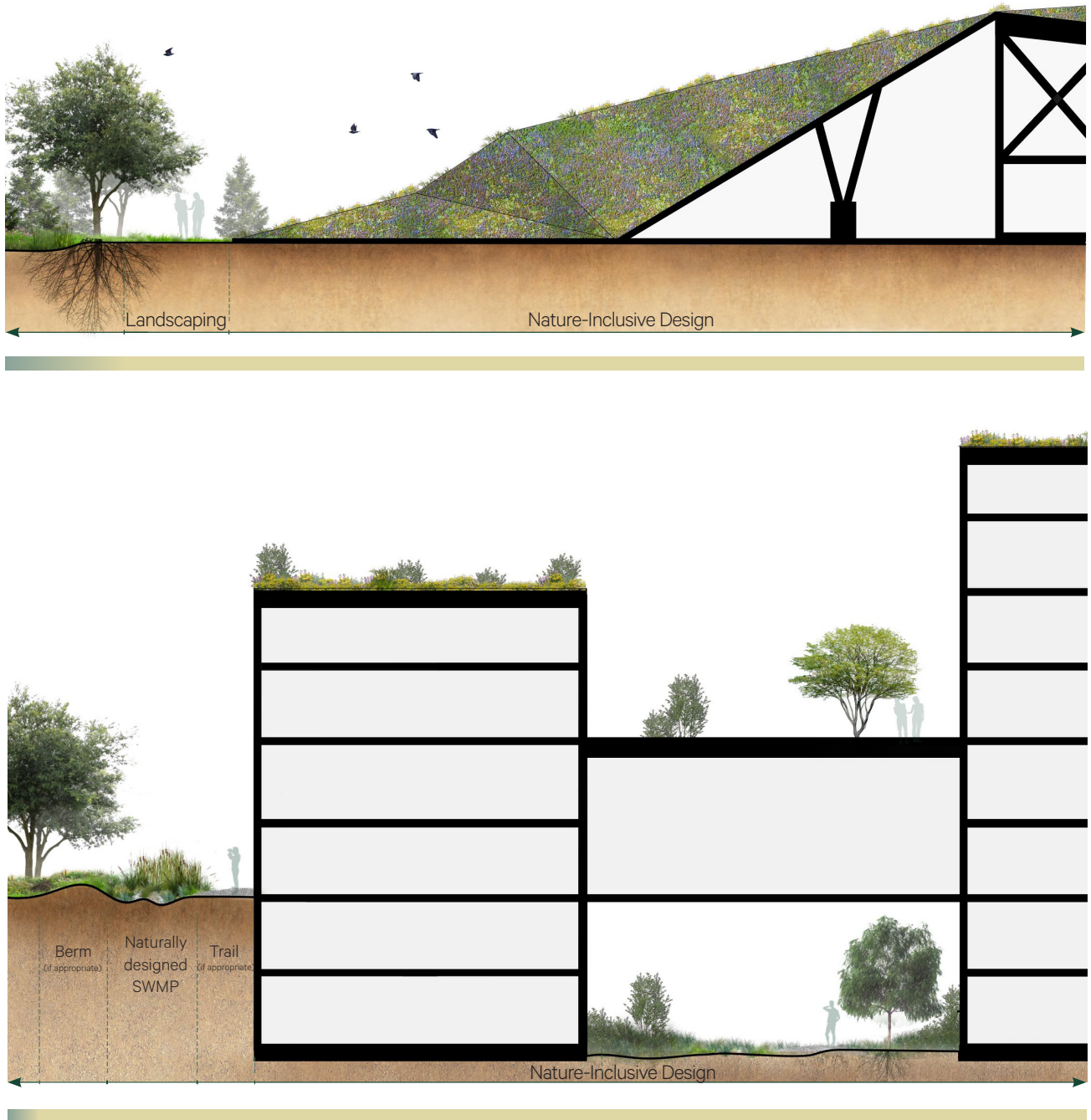






Figure 24: Examples of nature-inclusive design within Development Areas

**Figure 25: Landscape Palette**


The following is a list of native species that have been identified through the various consultation events as positively contributing to the ecology of the Symons Campus lands. This list is not exhaustive, and may be used as a general guide to inform planting in existing and new green spaces on Campus.






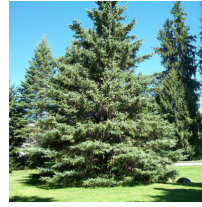
⊗ *Four Sacred Medicines*

			
<b>Tobacco</b> <i>asaamaa</i>	<b>White Cedar</b> <i>giizhikaandag</i>	<b>White Sagebrush</b> <i>mashkodejiibik</i>	<b>Sweet Grass</b> <i>wiingushk</i>




VALUES: ● Medicine ● Foods

**Trees**




					
<b>Basswood</b> <i>Tilia americana</i>	<span style="color: red;">●</span> <b>Eastern Red Cedar</b> <i>Juniperus virginiana</i> <i>L. var. virginiana</i>	<span style="color: orange;">●</span> <b>Black Cherry</b> <i>Prunus serotina</i>	<span style="color: red;">●</span> <span style="color: orange;">●</span> <b>Sugar Maple</b> <i>Acer saccharum</i>	<span style="color: red;">●</span> <b>Silver Maple</b> <i>Acer saccharinum</i>	<span style="color: red;">●</span> <b>White Elm</b> <i>Ulmus americana L.</i>

					
<span style="color: orange;">●</span> <b>Bur Oak</b> <i>Quercus macrocarpa Michx.</i>	<span style="color: orange;">●</span> <b>Northern Red Oak</b> <i>Quercus rubra L.</i>	<span style="color: orange;">●</span> <b>White Oak</b> <i>Quercus alba L.</i>	<span style="color: red;">●</span> <span style="color: orange;">●</span> <b>Tamarack</b> <i>Larix laricina</i>	<span style="color: red;">●</span> <b>Eastern White Pine</b> <i>Pinus strobus L.</i>	<span style="color: red;">●</span> <b>White Spruce</b> <i>Picea glauca</i>

**Shrubs**

		
<span style="color: red;">●</span> <span style="color: orange;">●</span> <b>Common Witchhazel</b> <i>Hamamelis virginiana</i>	<span style="color: red;">●</span> <b>Striped Maple</b> <i>Acer pensylvanicum</i>	<span style="color: red;">●</span> <span style="color: orange;">●</span> <b>Staghorn Sumac</b> <i>Rhus typhina L.</i>

**Herbs & Perennials**

		
<span style="color: red;">●</span> <span style="color: orange;">●</span> <b>Canada Wild Ginger</b> <i>Asarum canadense L.</i>	<span style="color: orange;">●</span> <b>Wild Strawberry</b> <i>Fragaria virginiana</i> <i>Mill.</i>	<span style="color: orange;">●</span> <b>Woodland Strawberry</b> <i>Fragaria vesca L.</i>

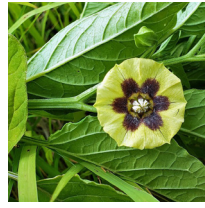
Herbs & Perennials



●  
**Aster**  
*Symphyotrichum*  
*spp.*



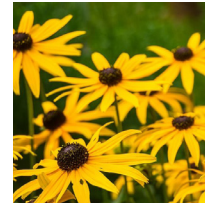
●  
**Clammy Ground-cherry**  
*Physalis heterophylla* Nees



● ●  
**Long-leaved Ground-cherry**  
*Physalis longifolia*



●  
**Woodland Sunflower**  
*Helianthus divaricatus*



● ●  
**Black-Eyed Susan**  
*Rudbeckia hirta*



●  
**Early Goldenrod**  
*Solidago juncea*



●  
**Zigzag Goldenrod**  
*Solidago caesia*



●  
**Bloodroot**  
*Sanguinaria canadensis*



●  
**Mayapple**  
*Podophyllum peltatum*



●  
**Blue Vervian**  
*Verbena hastata*



●  
**Northern Blueflag**  
*Iris versicolor*



●  
**Rugel's Plantain**  
*Plantago rugelii* Decne.

Vines



●  
**Foam Flower**  
*Tiarella cordifolia*



●  
**Common Milkweed**  
*Asclepias syriaca*



●  
**Riverbank Grape**  
*Vitis riparia* Michx.



●  
**Climbing Bittersweet**  
*Celastrus scandens* L.



●  
**Canada Bluejoint**  
*Calamagrostis canadensis*



●  
**Mountain Ricegrass**  
*Oryzopsis asperifolia*

Grasses & Sedges



●  
**Wild Rice**  
*Zizania palustris*



●  
**Sweet Flag**  
*Acorus americanus*



●  
**Northern Shorthusk**  
*Brachyelytrum aristosum*



● ●  
**Broad-leaved Cattail**  
*Typha latifolia* L.



●  
**Lake Sedge**  
*Carex lacustris*



●  
**Fox Sedge**  
*Carex vulpinoidea*