

An aerial site plan of Keswick Business Park, showing a grid of streets, parking lots, and landscaped areas with trees. The plan is overlaid on a blue background.

Town of Georgina

# Keswick Business Park

## Appendix A - Urban Design Guidelines

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**Town of Georgina**  
**Keswick Business Park Urban Design Guidelines - Final**

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**APPENDIX I: PLANT LISTS**

## **Design Guidelines for the Keswick Business Park**

### **1.0 Introduction**

The Secondary Plan and these Design Guidelines have evolved from a process that dealt with development issues from a pragmatic design-oriented perspective, with an understanding that within the Keswick Business Park Secondary Plan Area there must be a balance between regulation and flexibility to encourage alternative and innovative design solutions and to respond to changes in the employment land market over time. There are a variety of design principles that form the fundamental basis of these Design Guidelines. These principles have been used to develop the Business Park design and structure, illustrated on the Demonstration Plan, and in the preparation of the subsequent Design Guidelines. The fundamental Business Park design principles are:

- the Business Park must include a range and mix of employment generating, Business Park activity types;
- the Business Park must include a linked open space network that includes parks, environmental features and storm water management facilities;
- the existing environmental features must be protected from development and from the impacts of adjacent development;
- the structure of the Business Park must be based on a pattern of roads that maximizes connectivity and continuity both within the Business Park, and to the existing community of Keswick; and,
- all built-form within the Business Park will address public streets with facades providing quality design and detailing.

#### ***The Demonstration Plan***

The Demonstration Plan is a graphic representation of one potential build-out scenario that conforms with the intent of the Keswick Business Park Secondary Plan. It is based on locating the higher order Business Park uses, such as Business Park I and Business Park II, along the most visible edges (Highway 404, Woodbine Avenue and Glenwoods Avenue) helping to screen the lower order uses, such as Business Park III, that are located internally. The Business Park has open space blocks have been located at particular points in the road system that connects storm water management facilities, parks and natural features such as the Maskinonge River.

The Design Guidelines and the Demonstration Plan provide direction to both the public and private sectors and clarify the design intent of the municipality with regards to development. The Demonstration



**KESWICK BUSINESS PARK - DEMONSTRATION PLAN**  
Town of Georgina



## ***Approach***

- a) It is the intention of these Design Guidelines to provide aesthetic direction to both private sector developers and the Town for the ongoing development of the Keswick Business Park. It is the responsibility of the Town of Georgina to ensure that all development is reviewed in the context of these guidelines.
- b) The public realm will be the responsibility of the Town and includes:
  - public parks and open space linkages;
  - the public road right-of-ways;
  - storm water management facilities; and,
  - any other properties owned and/or used by the Town.
- c) The private realm includes all the lands owned by individuals and private companies. It will be their responsibility to develop and maintain their individual properties in conformity with the provisions of these Design Guidelines.
- d) These Design Guidelines will be implemented through the zoning by-law and through the site plan control provisions of the Planning Act.
- e) These Design Guidelines are to be adopted by Council. They may also be amended, from time to time, at the discretion of Council, without an Amendment to Secondar Plan.

## 2.0 Guidelines for the Private Realm

### 2.1 Business Park I

#### *Buildings*

- a) Building façades along the public streets shall be articulated with colour, material variations, windows and other treatments of the wall plane to provide a high quality of design, detail and variety.
- b) The design treatment of flanking façades visible from the road shall be equal to that of the front façade.
- c) Windows shall be encouraged on all façades that overlook streets and open spaces; reflective mirror glass shall not be used for windows at grade.
- d) Entrances to buildings shall be prominent and visible with entrance canopies, awnings and other architectural elements.
- e) Rooftop mechanical equipment shall be screened with materials that are complementary to the building.
- f) Green building technologies will be encouraged, including reference to Leadership in Environmental Design (LEED) as promoted by the Canada Green Building Council.
- g) Alternative on-site storm water management techniques will be encouraged subject to the approval of the Conservation Authority and the Town, including:
  - foundation drains should by pass storm water management ponds and outlet directly to the Maskinonge River through seepage outlets to enhance aquatic habitat benefits; and/or,
  - runoff from roof top areas on buildings adjacent to the Maskinonge River should be directed to infiltration galleries located within the buffer areas above the top-of-bank of the valley corridor.



#### *Loading and Parking*

- h) Loading and service areas shall not be located at the front or exterior side of the buildings.
- i) Loading and service areas shall be screened from view from the street, public open spaces, and adjacent residential areas.
- j) Parking areas should be located at the side or rear of the building, buffered with appropriate landscaping and visually set back from the street right-of-way.

- k) Parking areas should be designed in small sections and include lighting, substantial landscaping, and special paving to break up expanses of parking and to provide places for pedestrian connections.
- l) Parking areas should be screened from view from streets, open spaces, and adjacent residential areas with low fencing and planting.
- m) Runoff from parking lot areas that are prone to higher levels of contamination should be conveyed over land, where possible, to biofilters or swales and, where required, to storm sewers and storm water management ponds.

### ***Landscaping***

- n) The landscape treatment of individual properties have a role in creating the image of the entire employment area and therefore must be coordinated.
- o) The front yard setback shall be landscaped to define pedestrian walks, outdoor employee lounge areas, the main building entrance and to screen parking areas.
- p) Pedestrian circulation through parking lots, and from the street to building entrances shall be clearly defined with special paving, lighting and landscape treatment.
- q) Planting shall visually enhance individual sites, screen parking and loading areas – while enabling views of buildings – and create a consistent landscape treatment along streets.
- r) Landscape design shall relate to the architecture of the building with particular attention to entrances and windows, architectural massing, rhythm, detailing and sightlines.
- s) Buffer planting shall consist of a mix of indigenous evergreen and deciduous plant species of a suitable height and configuration to provide a visual screen between adjacent properties during all seasons.
- t) Trees, shrubs and groundcovers shall be planted at grade in wide, continuous planting beds that serve to define pods of parking and provide the primary pedestrian circulation.
- u) Planting beds shall be established to enable plant material to be massed to create a healthy and sustainable landscape.
- v) More detailed guidelines with respect to appropriate plant materials are provided in Section 2.4.

## 2.2 Business Park II Designation

### Buildings

- a) Building façades along the public streets shall be articulated with colour, material variations, windows and other treatments of the wall plane to provide a high quality of design, detail and variety.
- b) The design treatment of flanking façades visible from the road shall be equal to the that of the front façade.
- c) Windows shall be encouraged on all façades that overlook streets and open spaces; reflective mirror glass shall not be used for windows at grade.
- d) Entrances to buildings shall be prominent and visible with entrance canopies, awnings and other architectural elements.
- e) Rooftop mechanical equipment shall be screened with materials that are complementary to the building.
- f) Green building technologies will be encouraged, including reference to LEED - the U.S. Green Building Council.
- g) Alternative on site storm water management techniques will be encouraged, including:
  - foundation drains should by pass storm water management ponds and outlet directly to the Maskinonge River through seepage outlets to enhance aquatic habitat benefits; and or,
  - runoff from roof top areas on buildings adjacent to the Maskinonge River should be directed to infiltration galleries located within the buffer areas above the top-of-bank of the valley corridor.



### Gateways

- h) Buildings located at the entry roads to the Keswick Business Park from Woodbine Avenue are identified as Gateways and should be designed to include landmark buildings with consideration to minimizing setbacks, special landscape treatment, streetscaping, and unique building treatment.
- i) The massing and design of buildings at the identified Gateways should indicate the importance of the location. This includes higher buildings, higher roofs and unified architectural detailing. In addition, no parking shall be permitted between the building and the public street right-of-way.

- j) To facilitate the construction of the identified Gateways, partnerships among the Town, developers and/or service clubs shall be encouraged.

### ***Loading and Parking***

- k) Loading and service areas should not be located at the front or exterior side of the buildings.
- l) Loading and service areas should be screened from view from the street, public open spaces and adjacent residential areas.
- m) Parking areas should be located at the side or rear of the building and set back from the street right-of-way.
- n) Parking areas should be designed in small sections and include lighting, substantial landscaping, and special paving to break up expanses of parking and to provide places for pedestrian connections.
- o) Parking areas should be screened from view from streets, open spaces, and adjacent residential areas with low fencing and planting.
- p) Runoff from parking lot areas that are prone to higher levels of contamination should be conveyed over land, where possible, to biofilters or swales and, where required, to storm sewers and storm water management ponds.

### ***Landscaping***

- q) The front yard setback should be landscaped to define pedestrian walks, outdoor employee lounge areas, the main building entrance and to screen parking areas.
- r) Planting should visually enhance individual sites, screen parking and loading areas while enabling views of buildings and create a consistent landscape treatment along streets.
- s) Landscape design shall relate to the architecture of the building with particular attention to entrances and windows, architectural massing, rhythm, detailing and sightlines.
- t) Buffer planting should consist of a mix of indigenous evergreen and deciduous plant species of a suitable height and configuration to provide a visual screen between adjacent properties during all seasons.

- u) Trees, shrubs and groundcovers should be planted at grade in wide, continuous planting beds that serve to define pods of parking and provide the preliminary pedestrian circulation.
- v) More detailed guidelines with respect to appropriate plant materials are provided in Section 2.4.



### **2.3 Business Park III Designation**

#### ***Buildings***

- a) Building facades along the public streets should be articulated with colour, material variations, windows and other treatments of the wall plane to provide a high quality of design, detail and variety.
- b) Entrances to buildings should be prominent and visible with entrance canopies, awnings and other architectural elements.
- c) Rooftop mechanical equipment shall be screened with materials that are complementary to the building.
- d) Green building technologies will be encouraged, including reference to LEED - the U.S. Green Building Council.
- e) Alternative on site storm water management techniques will be encouraged, including:
  - foundation drains should by pass storm water management ponds and outlet directly to the Maskinonge River through seepage outlets to enhance aquatic habitat benefits; and or,
  - runoff from roof top areas on buildings adjacent to the Maskinonge River should be directed to infiltration galleries located within the buffer areas above the top-of-bank of the valley corridor.



#### ***Loading and Parking***

- f) Loading and service areas should not be located at the front of the buildings.
- g) Parking areas should be screened from view from any adjacent residential areas with fencing and planting.
- h) Runoff from parking lot areas that are prone to higher levels of contamination should be conveyed over land, where possible, to biofilters or swales and, where required, to storm sewers and storm water management ponds.

### ***Outdoor Storage***

- i) Outdoor storage areas that face public streets should be avoided. Where site planning constraints necessitate outside storage in visually prominent locations, they should be screened with architectural elements and/or berms and/or landscaping.

### ***Landscaping***

- j) Planting should visually enhance individual sites, screen parking and loading areas – while enabling views of buildings – and create a consistent landscape treatment along streets.
- k) The front yard setback should be landscaped to define pedestrian walks, outdoor employee lounge areas, the main building entrance and to screen parking areas.
- l) Landscape design shall relate to the architecture of the building with particular attention to entrances and windows, architectural massing, rhythm, detailing and sightlines.
- m) Buffer planting should consist of a mix of indigenous evergreen and deciduous plant species of a suitable height and configuration to provide a visual screen between adjacent properties during all seasons.
- n) Trees, shrubs and groundcovers should be planted at grade in wide, continuous planting beds that serve to define pods of parking and provide the preliminary pedestrian circulation.
- o) More detailed guidelines with respect to appropriate plant materials are provided in Section 2.4.

## **2.4 Private Realm Landscape Guidelines**

- a) Provide a variety of plant material including perennials, shrubs, coniferous and deciduous trees, and groundcovers with a hardiness zone rating of at least 5b.
- b) Provide a diversity of plant species that are chosen for their ecological compatibility.
- c) Choose plant material that is appropriate for the site conditions (soil, micro climate etc.).
- d) Choose plant material for seasonal variety, drought tolerance and salt tolerance.
- e) Locate plant material to conserve energy and modify temperature and wind extremes.
- f) Plant material shall be regionally grown and conform to the Canadian Standards for Nursery Stock.
- g) Trees must have a minimum caliper of 50 measured at 150 mm above the stem flare.
- h) Trees must be balled and burlaped.
- i) Shrubs must be container grown.
- j) Exotic or non-native species, which are considered evasive, shall not be used.



## 2.5 Signage

- a) Signage shall occur on the building and, only on Gateway sites, as ground related monument signs. Signs shall be integrated with the architecture of the building and the site landscape.
- b) Signage at the identified Gateway locations shall be within the public right-of-way and shall be developed and maintained by the municipality.
- c) Gateway signage shall identify the location of the Business Park, and announce arrival within it.
- d) Gateway signage can be free standing and/or part of an architectural element.
- e) Freestanding signs shall be located on private property, parallel to the street and set within a landscape setting.
- f) Rooftop signs shall be avoided.
- g) Signage shall compliment the architecture of the building(s) in its scale, materials, consistency and design.
- h) Consistency of approach to signage shall be applied in multi-tenant structures.
- i) Temporary freestanding signs shall not be permitted within the Business Park I or the Business Park II designations.



### **3.0 Guidelines for the Public Realm**

#### **3.1 General**

Appropriate landscaping shall be provided within the environmental protection areas, public road right-of-ways, storm water management facilities and public parks and open space linkages. For these areas the following guidelines shall apply.

- a) Provide a diversity of plant species that are chosen for their ecological compatibility (see Appendix I).
- b) A mix of tree species is most desirable to help provide resistance to insect and disease problems. Therefore, to promote diversity:
  - no more than four trees of one species or variety are to be planted on one side of the street in a single row;
  - no one species shall exceed 20% of the number of trees planted; and,
  - where conditions permit, a mix of coniferous and deciduous trees shall be planted.
- c) Choose plant material that is appropriate for the site conditions (soil, micro climate, environmental sensitivity)
- d) Choose plant material for seasonal variety, drought tolerance and salt tolerance.
- e) Locate plant material to conserve energy and modify temperature and wind extremes.
- f) Plant material shall be #1 nursery stock, conform to the Canadian Standards for Nursery Stock and be in good health with no bark scrapes, broken branches, insect or disease presence or excessive root pruning.

#### **3.2 Streetscape Landscaping**

- a) Landscaping within public road right-of-ways shall consist of street trees and manicured grass in the public boulevard. In addition, along Woodbine Avenue, low berms, fencing and ground cover vegetation may be utilized to help screen employment uses from the street.
- b) Street trees shall be located within the road right-of-way in the zone between the curb and sidewalk or curb and property line at least 1.5 metres from the edge of the curb or entrance driveway.

- c) Trees must be centred in the planting strip when the distance between the curb and the sidewalk is 2.5 metres or less.
- d) No tree is permitted where the distances between the curb and sidewalk is less than 2 metres.
- e) No trees shall be planted within a 2.5 metre radius of a fire hydrant, light standard, utility pedestal, transformer or water valve.
- f) No trees shall be located closer than 10 metres to a stop sign or traffic light.
- g) Street trees are to be planted 8 metres on centre. Closer spacing of up to 6 metres may be acceptable where utilities and services in the right-of-way limit the space available for trees.
- h) The following list constitutes acceptable street tree species for the Keswick Business Park. Alternative deciduous native species with a similar hardiness rating and a tolerance for of urban conditions may be submitted for approval.

<b>Latin Name</b>	<b>Common Name</b>
<i>Acer rubrum</i>	Red Maple
<i>Acer saccharum</i>	Sugar Maple
<i>Celtis occidentalis</i>	Common Hackberry
<i>Ginko biloba</i>	Ginko
<i>Gleditsia triacanthos</i>	Honeylocust
<i>Quercus macrocarpa</i>	Bur Oak
<i>Quercus borealis (rubra)</i>	Red Oak
<i>Tilia Americana</i>	Basswood
<i>Tilia cordata</i>	Little leaf linden

- i) Trees must have a caliper between 50 and 75 mm measured at 150 mm above the stem flare.
- j) All trees and shrubs must be guaranteed for a minimum of two growing seasons after the planting date. The growing season is considered to be May 1 to November 1.

### **3.3 Trails**

#### ***Trail System***

Integral to the overall plan for the Keswick Business Park is a system of trails that are designed with four objectives:

- To provide connections between the Business Park and the adjacent Keswick community

- To provide a linkage between the Business Park and the Maskinonge River corridor
- To afford internal connectivity, linking the various areas within the Business Park together
- To create the spine of a farther reaching recreational trail system along the length of the Maskinonge River corridor over the long-term.

The trail system is envisioned to perform both utilitarian and recreational functions, affording opportunities for leisure while providing a practical means of circulation for cyclists and pedestrians to commute to their place of employment from the local community. Because the trail system is envisioned to be an integral component of the practical infrastructure of the Business Park it must be constructed as such and not considered to be an afterthought or 'fringe benefit'. The following guidelines to direct the development of the trail system are set out with the objective of ensuring that the trail system is resilient, safe and implemented with a minimum of impact on the environment.

### ***Trail Hierarchy***

The trail network is proposed as a hierarchical system of trails that function as a cohesive unit to facilitate circulation by pedestrians and cyclists. The hierarchy of trails was defined based on the following:

- Anticipated level of use and degree of connectivity on the local and regional scales
- Requirements for safety in consideration of issues related to traffic volumes on adjacent roads and potential conflicts between trail users and vehicles
- Primacy of connections
- Sensitivity of the environment within which the trail is proposed to be located

In response, the trail system will be comprised of the following components:

- a) **Primary Trail** – This trail segment encompasses the length of trail located on the east side of Woodbine Avenue, providing the primary north/south linkage across the western edge of the Business Park and connecting the Park to all of the principal east/west linkages to the existing Keswick community.

- b) **Secondary Trail** – Secondary trails are the internal, off-road trails that are described in the discussion of the open space system. These are off-road trails that provide primary linkages within the Business Park.
- c) **Sidewalks** – Sidewalks will be installed on streets that are not proposed to be fitted with Primary or Secondary Trails. Sidewalks will be located on one side of the street with appropriate connections at intersections to facilitate proper circulation.
- d) **On-Road Trails** – These trails provide internal linkages throughout the Business Park but are situated on roads that are anticipated to convey relatively low volumes of traffic, minimizing potential user/vehicle conflicts.
- e) **Internal Trails** – These trails are generally associated with the proposed storm water management facilities and serve the dual purpose of enabling access to these facilities for maintenance purposes but may also serve to provide recreational opportunities and afford linkages to the larger trail system within the Business Park.
- f) **Maskinonge River Valley Trail** – While still functioning as a practical circulation route, this trail is envisioned as affording recreational opportunities for the residents of the Keswick community. This trail will parallel the Maskinonge River valley and is envisioned to become the initial component of a larger, regional trail system along the river corridor.

The following provides a description of each of the trail types set out above:

- a) **Primary Trail** – The Primary Trail will parallel the east side of Woodbine Avenue extending from Ravenshoe Road in the south to the Maskinonge River. Primary Trails will consist of a 3.0m wide asphalt surfaced trail with painted centreline to denote two-way traffic. The trail will be a component of the Woodbine Avenue streetscape and will be separated from Woodbine Avenue by a double row of trees. The trail will be identified by signage and bicycle racks will be provided at intersections with the transit system.
- b) **Secondary Trail** – Similar to the Primary Trails, Secondary Trails will be segregated from the road, however the trail will be comprised of a 2.4m wide asphalt surfaced trail. Signage will be utilized to delineate the trail. A single row of trees will separate the trail from the road.

- c) **Sidewalks** – Sidewalks will be constructed on all roads that are not served by Primary or Secondary Trails. Sidewalks will be located on one side of the road with connective linkages at intersections to facilitate practical circulation. Sidewalks will be constructed as a 1.5m wide concrete surface located within road rights-of-way.
- d) **On-Road Trails** – On-Road Trails afford practical linkages throughout the Business Park for cyclists. On-Road Trails will be delineated by a painted line situated 1.0m off the curb edge. Bicycle route signage will be installed at intersections and at 60m intervals to further delineate the alignment and location of off-road trails.
- e) **Internal Trails** – Internal Trails provide the linkages between the Primary, Secondary, and Valleyland Trails and afford additional recreational opportunities. These trails take several forms. When associated with stormwater management facilities, these trails will generally coincide with maintenance access routes and will be comprised of a 3.0m wide granular surface. However, when they are intended to afford access to a pond for recreational purposes (skating, etc.) these trails will be surfaced in asphalt to afford barrier-free access. Segments of trails with a gradient in excess of 5% will be surfaced in asphalt to ensure long-term resilience to erosion. Water bars will be installed at the junction of the asphalt segment and the downstream granular trail segment to mitigate erosion.
- f) **Maskinonge River Valley Trail** – This trail parallels the alignment of the Maskinonge River along the east side of the proposed Business Park. The trail is proposed to be located above the top-of-bank, within the proposed buffer between the valley corridor and the limit of development. The trail will be designed to conform to the following guidelines:
- Width: 2.4m surface
  - Surface: Generally granular however, asphalt is to be used where slopes exceed 5%
  - Clear Width: 4.4m including a 1.0m mowing/cleared strip on each side of the trail to maintain sightlines
  - Clear Height: 3.0m
  - Drainage: 100mm PVC pipes to be used to convey localized drainage below trail segments at low points. Stone water bars to be installed at points of crossfall and at the downstream intersection of asphalt and granular segments

- Accessibility: Trails to be designed to be generally barrier free. Vehicle access barriers to be installed at intersections with public roads.
- Signage: Orientation signage at intersections with road system; interpretive signage at key points of interest; trail markers at 60m intervals.
- Restoration: Embankments required to be graded to facilitate trail construction to be restored with upland seed mix comprised of native wildflowers and grasses and native shrub material

Contingent on levels of use, the trail system should be cleared of snow to facilitate safe winter use. Periodic monitoring should be undertaken to ensure areas of the trail that degrade over time are repaired promptly to minimize potential hazards to trail users.

### 3.4 Storm Water Management

- a) The storm water management strategy for the Keswick Business Park is founded on an approach that regards storm water as a resource rather than a waste by-product of development. Applying this approach, storm water management systems will be designed to treat runoff discharged from different sources in different ways, contingent on considerations such as degree of potential contamination, temperature and rate and duration of flow with the objective of maximizing potential benefits. Based on this approach:
- Storm water management ponds and wetlands should be designed to respond to their context within the landscape of the Business Park. Innovation in developing designs is encouraged to achieve environmental, social and aesthetic objectives; and,
  - Storm Water management infrastructure should be designed to facilitate efficient maintenance.
- b) Storm Water management ponds will be key features within the Business Park landscape, contributing to the appearance and ambience of the development while achieving functional objectives related to flow moderation and water quality improvement. Storm water management ponds will be designed as visual and ecological amenities that are integral elements of the open space system.



#### Ponds

- c) Ponds will be designed as multi-celled systems with a sediment forebay or alternative pre-treatment system and wet pond component and will be designed to achieve water quality improvement and quantity control targets set out by the Lake Simcoe Region Conservation Authority and the Town of Georgina.
- d) Ponds will include a permanent pool with an average depth of 1.2-1.5m and isolated deeper sections. Bathymetry will be varied and the length of the flow path from inlet to outlet maximized to enhance effectiveness and mitigate re-suspension of accumulated sediments. Ponds will achieve water quality targets by settling out sediments and contaminants, diluting storm water and arresting contaminants through biological uptake.
- e) Where ponds are envisioned to blend with the natural landscape, geometric forms and standard slope gradients will be avoided in favour of organic shapes and landform grading designed to replicate natural landforms in the area. Inlet and outlet structures will be concealed using a combination of planting, grading and natural stone.



- f) Ponds will not be fenced, but rather will be designed with trails, overlooks and interpretive signage so that they exist as part of the open space system. Where there is a need to discourage public access to areas around the perimeter of the ponds, living fences and barrier plantings will be utilized in place of fencing. Barrier plantings will be comprised of multiple rows of predominantly thorn bearing shrub species planted at a spacing of 0.6-0.9m contingent on species. Barrier plantings will be installed along the crest of steep slopes, adjacent deep-water areas and around inlet and outlet structures.
- g) Ponds will be planted with native vegetation with species situated according to microclimatic and soil moisture requirements. The pond fringe will be planted with a mixture of herbaceous and woody vegetation to enhance stability. The perimeter of the permanent pool will be planted with emergent, strand and submergent species to improve the aesthetics and enhance the performance of the facility. A list of species appropriate for each ecotone within storm water management ponds is provided in a Appendix I.
- h) For the linear ponds that are situated as central features in the road network, these storm water management ponds will be designed as architectural features with a form adopted from the surrounding landscape and built form. Inlet and outlet structures will be concealed. Pond fringe areas will be planted where appropriate in consideration of context. These ponds will be designed whenever possible to accommodate recreational uses such as skating and as such appropriate amenities will be included in the design and construction to facilitate safe public access to the waters' edge at various locations.

### ***Human-Made Wetlands***

- i) Wetlands will be integral and complementary components of the storm water management system designed to achieve storm water management objectives while enhancing the aesthetics and associated ecological integrity of the Business Park.
- j) Wetlands will be designed to achieve water quality improvement targets by filtering storm water through aquatic vegetation to remove pollutants through settlement and biological uptake.
- k) Wetlands will have a permanent pool with an average depth of 0.4-0.75m and will not have a defined flow path or slope to mitigate short-circuiting and maximize contact time.
- l) Wetlands will be directly planted with a mix of emergent, submergent and strand species to maximize diversity and enhance functional effectiveness. The depth of the extended detention component of wetlands will not exceed 1.5m to mitigate impact on the vegetation community.

- m) Wetlands will incorporate barrier plantings as required to mitigate public access to sensitive areas and ensure public safety where potentially hazardous conditions exist.
- n) Wetlands will be designed to conform with the guidelines set out for ponds in terms of construction and context, form and function. Wetlands will be planted with a mix of native emergent and submergent species and will include both open water and vegetated areas. A list of species is provided in Appendix I.

### **Swales**

- o) Swales will be utilized to convey runoff where grading and drainage considerations permit to enhance storm water quality, attenuate flows and enhance the aesthetic appearance of the Business Park.
- p) Swales will be designed to provide free drainage of the sub-base of the adjacent road or parking area.
- q) Swales will have a parabolic cross-section and will not be constructed with a 'V' bottom. Swales will have sideslopes of 3:1 (H:V) or less and where appropriate will be planted with native herbaceous species. Swales may adopt a sinuous planform where appropriate in the context of the landscape.

### **Biofilter Swales**

- r) Biofilter swales will be utilized in place of swales where conventional swales would be too deep because of grading, drainage or spatial constraints.
- s) Biofilter swales will be constructed as a rock filled infiltration/ filtration trench draining to a perforated pipe outlet. The surface of the biofilter can be dressed with riverstone, turf or plant material.
- t) Biofilter swale systems should include where appropriate a supplementary storm sewer system to mitigate the potential for blockage of the drainage system as a result of snow storage or ice damming.

### **Infiltration Galleries**

- u) Infiltration galleries will be utilized along the Maskinonge River valley to infiltrate runoff from roof top areas with the objective of maintaining shallow groundwater interflow patterns, enhance baseflow and maintain soil moisture levels within the existing wooded valley wall areas.
- v) Infiltration galleries will be located so as to be accessible for maintenance purposes and will be comprised of stone filled trenches. Overflow outlets will be provided to convey runoff

that exceeds the capacity of the gallery to the Maskinonge River.

### **3.5 Planting / Maskinonge River Valley Remediation**

- a) Vegetation, including trees, shrubs and groundcovers, as well as emergent and aquatic species will be a key component in the remediation of the Makinonge River Valley and in the design of storm water management facilities.
- b) Vegetation can be used to perform many functions beyond that of simply improving the aesthetics of storm water management ponds, wetlands and swales. Vegetation will be an important functional component by:
  - Improving water quality through filtration, arresting contaminants through uptake and mitigating potential resuspension of accumulated sediments;
  - Mitigating temperatures increases through shading;
  - Stabilizing valley edges, pond banks and areas prone to frequent fluctuations in water levels;
  - Reinforcing flow control structures, such as level spreaders, inlet and outlet swales and submerged beams;
  - Deterring public acces to specific area;
  - Enriching habitat connections and biodiversity;
  - Deterring colonization by nuisance waterfowl; and,
  - Mitigating erosion and stabilizing permanent facilities, as well as temporary facilities during the construction period.
- c) Characteristics of life cycle requirements of plant materials vary by species. Consequently, it is important that the unique attributes and requirements of each plant type be understood in order to maximize functional effectiveness over the long-term.
- d) Planting concepts for storm water management ponds will vary contingent on the context of the pond within the Business Park landscape. Generally, the ponds south of existing Glenwoods will be designed to adhere to a more natural aesthetic appearing as an extension of the Makinonge River valleylands. However, areas adjacent the roads may adopt a more urban landscape to complement the streetscape.
- e) The planting concept for the central storm water management pond will also be designed to respond to context.

- e) The planting concept for the linear central storm water management pond north of Glenwoods Avenue will also be designed to respond to context. The northeast pond will be planted to correspond with the character of the adjacent valleylands while the western ponds will exist as an extension of the Glenwoods Avenue streetscape and landscapes related to the adjacent development parcels.
- f) In all cases, river valley remediation and storm water management ponds will be planted utilizing native species that are indigenous to the bioregion. Commercial selections and cultivars of native species will not be permitted.
- g) Areas above the permanent pool water level of the storm water management ponds and within the buffers and valley of the Maskinonge River are to be planted with a combination of trees and shrubs in accordance with the following requirements:
- h) Plant Material Density - Required planting density varies relative to steepness of slope. The following table sets out the required minimum densities for various slope gradients:

<i>Slope</i>	<i>Required Density</i>	<i>Plants / m<sup>2</sup></i>
5:1	25%	1
4:1	50%	2
3:1	100%	4

Tree density shall be a minimum of 1 tree per 50m<sup>2</sup>, above the permanent pool perimeter within the limits of the storm water management pond block.

- i) Plant Material Sizing - The following are the minimum required sizes of plant material stated in accordance with Canadian Nursery Trades Association Standards:
  - Deciduous Trees – Minimum Calliper: 40mm
  - Coniferous Trees – Minimum Calliper: 1.8m
  - Deciduous or Coniferous Shrubs: 0.6m Height
- j) Shrub Material Spacing - The required spacing for shrub material is contingent on the proposed function of the planting within the landscape, generally shrubs shall be planted at a maximum spacing of 1.0m on centre, however the following application specific recommendations are provided:
- k) Barrier Planting - Minimum 2 rows of thorn bearing shrubs extending to 3 metres beyond the limit of the area of concern. Maximum spacing of 0.8 metres on centre with each row offset from the other.

- l) Planted Weirs - Continuous shrub planting with a spacing of 0.8 metres on centre across the width of the weir for the length of the crest.
- m) Pond/Valley Perimeter - A continuous band of shrubs and aquatic plants with a minimum width of 3 metres, roughly centred on the permanent pool elevation must be achieved. Minimum plant spacing shall be 1.0 metre on centre.
- n) Use of Bare Root, Live Stake, Harvested and Transplanted Stock - In addition to the container grown stock, there are a number of alternative methods of establishing the vegetation community that may be acceptable, contingent on site specific conditions and seasonal timing of construction. The following sets out the requirements for utilizing alternative planting methods.

Bare Root Stock - The use of bare root material is acceptable during the early spring and fall planting seasons as stock becomes available from nursery sources. Bare root stock must be planted immediately upon delivery to the site. A standard 2 year warranty will apply to bare root stock.

Live Stakes - Live stakes may be used to propagate a range of willow species, red osier dogwood and poplar. Live stakes must be installed immediately after harvesting or may be held in cold storage to extend the duration of the planting window. The source of the live stakes must be verified as consisting of native species prior to harvesting. Sources should be proximate to the site where possible. Live stake installations will be subject to a two year standard warranty. Live stakes which do not exhibit growth shall be replaced on a one for one basis with bare root or container grown stock during the planting season immediately following the date of live stake installation.

Transplanted Stock - In some situations, native trees, shrubs or aquatic plant material may be available for harvest and transplantation for use in a pond or wetland. This approach is particularly effective in establishing aquatic communities. Harvest and transplantation operations shall be undertaken in accordance with the following requirements:

- Species of vegetation proposed for transplantation should be confirmed at the source as native and free from invasive alien species in the understorey.
- Plant material proposed and relocated shall be confirmed as free from pests and disease.
- Plant material shall be transplanted in the appropriate season, with equipment of suitable size and in accordance with approved horticultural practices.

- Transplanted material will be subject to a standard two year warranty. Transplanted vegetation that does not survive shall be replaced with nursery grown stock of similar species in accordance with the minimum sizes specified above

Seeding - All disturbed areas are to be seeded with a mixture of native grasses, wildflowers and groundcovers. Refer to the seeding specification provided. Seed should be installed with straw mulch and an appropriate nursery crop. Seeding operations should be undertaken only when soil and meteorological conditions are appropriate. Seeded areas must be prepared with a minimum 100mm of topsoil and scarified prior to seeding. Uniform cover over seeded areas must be achieved and evidence of germination of a minimum of 60% of the species comprising the mix must be confirmed prior to assumption.

### ***Wetland Plantings***

- o) Wetlands will be constructed as integral components of the Business Park' storm water management system. As with storm water management ponds and the valley lands and buffers associated with the Maskinonge River, planting concepts for wetlands will vary in response to context. However, regardless of form, wetlands will be planted with a mix of native emergent, submergent and strand species appropriate to water depths, anticipated frequency and duration of inundation and soil composition. The perimeter of the wetland will be continuously planted to mitigate colonization by nuisance waterfowl and enhance shoreline stability. Within the wetland, nucleus plantings of plugs will be utilized at strategic locations to initiate colonization of the wetland over time.
- p) In all cases, wetlands will be planted with native species indigenous to the bioregion. A suite of lowland, emergent, strand and submergent species will be used to enhance diversity. Aquatic and submergent plants will be installed as plugs; fringe species may be installed as bare root stock or live stakes. All disturbed areas will be overseeded with a native seed mix as specified in a Appendix I.

### ***Aquatic Plantings***

- q) Areas below the permanent pool water level should be planted with emergent, submergent and strand species around the perimeter of the permanent pool, in pond facilities, and throughout the areas of the basin and wetland facilities.
- r) Plant Material Density - Aquatic plants are to be installed at the spacing specified below:

Wet Pond - Minimum 1.5m metre band around the perimeter of the permanent pool and forebay. Maximum spacing 1.0 metres on centre.

Wetland - Throughout wetland basin, below permanent pool elevation with a maximum spacing of 1.5 metres on centre.

- s) Planting Techniques - Aquatic plants may be installed as nursery-grown plugs or transplanted stock. The species composition and health of harvested stock for transplantation must be verified at the source. Stock collected in areas where invasive species such as Purple Loosestrife are present are not acceptable as a source for transplantation. Aquatic plant material shall be subject to a two-year standard warranty.
- t) A combination of low maintenance native grasses and shade tolerant wildflowers are the prime component of the understory plantings.
- u) Recommended seed mixture as follows - Natures Meadow groundcover mixture: for low maintenance  
 40% tall fescue ("Spartan's Hard Fescue")  
 40% fine fescue ("Sheeps Fescue")  
 20% wildflower blend
- v) Recommended Shrub Undertorey Plantings - Various shrubs and vines will also grow and survive in a state of health and vigour beneath moderately dense shade. Several lower growing shade tolerant woody shrubs and vines suitable for use as understory may include:

Botanical Name	Common Name	Height	Characteristics
<i>Symphoricarpos albus</i>	Common Snowberry	1-2m	Suckering
<i>Diervilla lonicera</i>	Dwarf Bush Honeysuckle	1m	Suckering
<i>Parthenocissus quinquefolia</i>	Virginia Creeper		Vine
<i>Rubus odoratus</i>	Fragrant Thimbleberry	1-2m	Suckering
<i>Rubus strigosus</i>	American Red Raspberry	1-2m	Suckering

Low shrub plantings for sunnier edges of buffers may include:

Botanical Name	Common Name	Height
<i>Potentilla fruitcosa</i>	Shrubby Cinquefoil	1-1.4m
<i>Spirea alba</i>	Meadowsweet	1-1.5m

### ***Maintenance and Security***

- w) The maintenance regimen for the Maskinonge River and for storm water management facilities will vary contingent on the context of the facility within the landscape of the Business Park. Valley lands and associated buffers and ponds that are designed to be an extension of the natural landscape will require a minimum of maintenance, while ponds that are an integral component of urban spaces will require a higher level of maintenance, similar to that which would be required to maintain the adjacent landscape.
  
- x) For natural areas, maintenance will be limited to the removal and replacement of failed plant material, pruning of dead limbs and removal of undesirable or invasive species. A 1.5m strip along both sides of all pathways should be mown to provide for clear sightlines along walkways.
  
- y) More urban spaces will require a higher level of maintenance including mowing of turf areas, pruning of vegetation for form and vigour and removal of species which may colonize the landscape. Generally, a dense band of riparian vegetation should be maintained around the permanent pool area of wetlands and ponds to deter colonization by nuisance waterfowl. However, the band of vegetation may not be necessary if other barriers, such as vertical banks or railing systems are built into the design.

## Appendix I

### Submergent

<b>Botanical Name</b>	<b>Common Name</b>
<i>Anacharis canadensis</i>	Common Waterweed
<i>Ceratophyllum demersum</i>	Coontail
<i>Elodea canadensis</i>	Canada Pondweed
<i>Nymphaea odorata</i>	Fragrant Water-lily
<i>Nymphaea tuberosa</i>	White Water-lily
<i>Polygonum amphibium</i>	Water Smartweed
<i>Pontederia cordata</i>	Pickerel Weed
<i>Potamogeton granimeus</i>	Grassy Pondweed
<i>Potamogeton natans</i>	Floating Leaved Pondweed
<i>Potamogeton pectinatus</i>	Sago Pondweed
<i>Spirodela polyrhiza</i>	Great Duckweed
<i>Vallisneria americana</i>	Tapegrass

## Emergent

<b>Botanical Name</b>	<b>Common Name</b>
<i>Acorus americanus</i>	Sweet Flag
<i>Alisma plantago-aquatica</i>	Broadleaf Water Plantain
<i>Calla palustris</i>	Water Arum
<i>Eleocharis obtusa</i>	Spike Rush
<i>Eleocharis palustris</i>	Marsh Spike Rush
<i>Hippuride vulgaris</i>	Common Mare's Tail
<i>Juncus effusus</i>	Soft Rush
<i>Juncus torreyi</i>	Torry's Rush
<i>Juncus canadensis</i>	Canada Rush
<i>Leersia oryzoides</i>	Rice Cut-grass
<i>Lobelia cardinalis</i>	Cardinal Flower
<i>Phragmites communis</i>	Reed Grass
<i>Polygonum amphibium</i>	Water Smartweed
<i>Potentilla palustris</i>	Marsh Cinquefoil
<i>Sagittaria latifolia</i>	Arrowhead; Duck Potato
<i>Sagittaria rigida</i>	Deep water Arrowhead
<i>Scirpus acutus</i>	Hardstem Bulrush
<i>Scirpus pungens</i>	Common Three-square
<i>Scirpus validus</i>	Softstem Bulrush
<i>Solidago graminifolia</i>	Grass-leaved Goldenrod
<i>Sparganium americanum</i>	Lesser Bur-reed
<i>Sparganium eurycarpum</i>	Giant Bur-reed
<i>Typha angustifolia</i>	Narrowleaf Cattail
<i>Typha latifolia</i>	Broadleaf Cattail
<i>Zizania aquatica</i>	Wild Rice

## Shoreline

<b>Botanical Name</b>	<b>Common Name</b>
<i>Asclepias incarnata</i>	Swamp Milkweed
<i>Aster novae-angliae</i>	New England Aster
<i>Aster pilosus</i>	Hairy Aster
<i>Aster puniceus</i>	Swamp Aster
<i>Aster umbellatus</i>	Flat Topped Aster
<i>Bidens cernua</i>	Bur-marigold
<i>Desmodium canadense</i>	Showy Tick-trefoil
<i>Equisetum arvense</i>	Scouring Rush
<i>Eupatorium maculatum</i>	Joe-pye Weed
<i>Glyceria borealis</i>	Northern Manna-grass
<i>Glyceria striata</i>	Fowl Manna-grass
<i>Impatiens pallida</i>	Pale Yellow Jewelweed
<i>Iris versicolor</i>	Blue-flag Iris
<i>Iris virginica</i>	Pale Blue-flag Iris
<i>Juncus articulatus</i>	Jointed Rush
<i>Juncus balticus</i>	Baltic Rush
<i>Juncus pelocarpus</i>	Brown-fruited Rush
<i>Juncus tenuis</i>	Path Rush
<i>Lobelia cardinalis</i>	Cardinal Flower
<i>Lobelia siphilitica</i>	Great Lobelia
<i>Lycopus americanus</i>	Water Horehound
<i>Lysimachia terrestris</i>	Swamp Candles
<i>Mimulus ringens</i>	Monkey Flower
<i>Monarda fistulosa</i>	Wild Bergamont
<i>Sarracenia purpurea</i>	Pitcher Plant
<i>Scirpus atrovirens</i>	Green Bulrush
<i>Scirpus cyperinus</i>	Wool Grass Bulrush
<i>Scirpus pendulus</i>	Pendulus Bulrush
<i>Scutellaria galericulata</i>	Marsh Skullcap
<i>Symplocarpus foetidus</i>	Skunk Cabbage
<i>Thalictrum polygamum</i>	Tall Meadow-rye
<i>Triadenum fraseri</i>	Marsh St. John's Wort

## Wetland Fringe

Botanical Name	Common Name
<i>Asclepias tuberosa</i>	Butterfly Milkweed
<i>Aster puniceus</i>	Purple Stem / Swamp Aster
<i>Caltha palustris</i>	Marsh Marigold
<i>Chelone glabra</i>	Turtlehead-White
<i>Chelone lyonii</i>	Turtlehead-Pink
<i>Elymus virginicus</i>	Virginia Wild Rye
<i>Eupatorium perfoliatum</i>	Boneset
<i>Gentiana andrewsii</i>	Closed Gentian
<i>Gentianella crinita</i>	Fringed Gentian
<i>Hypericum virginicum</i>	Marsh St. John's Wort
<i>Impatiens capensis</i>	Spotted Jewelweed
<i>Impatiens pallida</i>	Pale Yellow Jewelweed
<i>Iris versicolor</i>	Blue Flag Iris
<i>Iris virginica</i>	Pale Blue Flag Iris
<i>Lathyrus palustris</i>	Vetchling
<i>Lobelia kalmii</i>	Kalm's Lobelia
<i>Oenothera biennis</i>	Evening Primrose
<i>Rudbeckia hirta</i>	Black eyed Susan
<i>Schizachyrium scoparium</i>	Little Bluestem
<i>Solidago canadensis</i>	Canada Goldenrod
<i>Sorghastrum nutans</i>	Indian Grass
<i>Spartina pectinata</i>	Prairie Cordgrass
<i>Spiraea alba</i>	Narrow-leaved Meadowsweet
<i>Verbena hastata</i>	Blue Vervain
<i>Viola cucullata</i>	Marsh Violet

## Sedges

Botanical Name	Common Name
<i>Carex bebbii</i>	Bebb's Sedge
<i>Carex comosa</i>	Bottlebrush Sedge
<i>Carex crinita</i>	Fringed Sedge
<i>Carex hystericina</i>	Porcupine Sedge
<i>Carex pseudo-cyperus</i>	Cyperus-like Sedge
<i>Carex retrorsa</i>	Beaked Sedge
<i>Carex stipata</i>	Awl Fruited Sedge
<i>Carex stricta</i>	Tussock Sedge
<i>Carex vulpinoidea</i>	Fox Sedge
<i>Cyperus esculentus</i>	Yellow Nutsedge; Chufa
<i>Dulichium arundinaceum</i>	Three-way Sedge
<i>Eleocharis palustris</i>	Marsh Spike Rush
<i>Eleocharis obtusa</i>	Blunt Spike Rush
<i>Elymus canadensis</i>	Canada Wild Rye
<i>Elymus riparius</i>	Riverbank Wild Rye
<i>Elymus virginicus</i>	Virginia Wild Rye
<i>Equisetum arvense</i>	Scouring Rush
<i>Glyceria borealis</i>	Northern Manna Grass
<i>Glyceria striata</i>	Fowl Manna Grass
<i>Juncus articulatus</i>	Jointed Rush
<i>Juncus canadensis</i>	Canada Rush
<i>Juncus effusus</i>	Soft Rush
<i>Juncus nodosus</i>	Joint Rush
<i>Juncus torreyi</i>	Torry's Rush
<i>Leersia oryzoides</i>	Rice Cut Grass
<i>Scirpus acutus</i>	Hardstem Bulrush
<i>Scirpus atrovirens</i>	Green Bulrush
<i>Scirpus cyperinus</i>	Wool Grass Bulrush
<i>Scirpus fluviatilis</i>	River Bulrush
<i>Scirpus pungens</i>	Common Three Square
<i>Scirpus validus</i>	Softstem Bulrush
<i>Sorghastrum nutans</i>	Indian Grass
<i>Sparganium americanum</i>	Lesser or American Bur-reed
<i>Sparganium chlorocarpum</i>	Common Bur-reed
<i>Sparganium eurycarpum</i>	Giant Bur-reed
<i>Typha angustifolia</i>	Narrowleaf Cattail
<i>Typha latifolia</i>	Broadleaf Cattail

## Lowland Shrubs and Wildflowers (W)

Botanical Name	Common Name
<i>Alnus incana (rugosa)</i>	Speckled Alder
<i>Amelanchier laevis</i>	Allegheny or Smooth Serviceberry
<i>Aronia melanocarpa</i>	Black Chokeberry
<i>Cephalanthus occidentalis</i>	Buttonbush
<i>Clematis virginiana</i>	Virgin's Bower
<i>Cornus amomum</i>	Silky Dogwood
<i>Cornus racemosa</i>	Gray Dogwood
<i>Cornus (stolonifera) sericea</i>	Red Osier Dogwood
<i>Euonymus obavatus</i>	Running Euonymus or Strawberry Bush
<i>Juniperus communis</i>	Common Juniper
<i>Lindera benzion</i>	Spicebush
<i>Mertensia virginica</i>	Virginia Blue Bells (W)
<i>Myrica gale</i>	Sweet Gale
<i>Physocarpus opulifolius</i>	Ninebark
<i>Podophyllum peltatum</i>	May-apple (W)
<i>Potentilla fruticosa</i>	Shrubby Cinquefoil
<i>Pyrus coronaria</i>	Wild Crab Apple
<i>Rubus odoratus</i>	Flowering Raspberry
<i>Rubus strigosus</i>	Red Raspberry
<i>Salix amygdaloides</i>	Peach-leaved Willow
<i>Salix bebbiana</i>	Beaked Willow
<i>Salix candida</i>	Sage-leaved Willow
<i>Salix discolor</i>	Pussy Willow
<i>Salix eriocephala</i>	Woolly Headed Willow
<i>Salix exigua / interior</i>	Sandbar Willow
<i>Salix lucida</i>	Shining Willow
<i>Salix nigra</i>	Black Willow
<i>Salix petiolaris</i>	Slender Willow
<i>Sambucus canadensis</i>	American Elder
<i>Smilacina racemosa</i>	False Solomon's Seal (W)
<i>Solidago caesia</i>	Blue-stemmed Goldenrod (W)
<i>Solidago flexicaulis</i>	Zigzag Goldenrod (W)
<i>Spiraea alba</i>	Meadowsweet
<i>Spiraea latifolia</i>	Broad-leaved Meadowsweet
<i>Streptopus roseus</i>	Rose Twisted-stalk (W)
<i>Tiarella cordifolia</i>	Foamflower (W)
<i>Verbena urticifolia</i>	White Vervain (W)
<i>Viburnum cassinoides</i>	Witherod
<i>Viburnum lentago</i>	Nannyberry

## Lowland Trees

<b>Botanical Name</b>	<b>Common Name</b>
<i>Abies balsamea</i>	Balsam Fir
<i>Acer nigrum</i>	Black Maple
<i>Acer rubrum</i>	Red Maple
<i>Acer saccharinum</i>	Silver Maple
<i>Betula lutea</i>	Yellow Birch
<i>Betula papyrifera</i>	White Birch
<i>Carya cordiformis</i>	Bitternut Hickory
<i>Celtis occidentalis</i>	Hackberry
<i>Fagus grandifolia</i>	American Beech
<i>Fraxinus nigra</i>	Black Ash
<i>Fraxinus pennsylvanica</i>	Red Ash
<i>Juglans cinerea</i>	Butternut
<i>Juglans nigra</i>	Black Walnut
<i>Juniperus virginiana</i>	Easter Red Cedar
<i>Larix laricina</i>	Tamarack
<i>Picea glauca</i>	White Spruce
<i>Populus balsamifera</i>	Balsam Poplar
<i>Populus deltoides</i>	Eastern Cottonwood
<i>Prunus serotina</i>	Black Cherry
<i>Quercus bicolor</i>	Swamp White Oak
<i>Quercus macrocarpa</i>	Bur Oak
<i>Quercus palustris</i>	Pin Oak
<i>Salix nigra</i>	Black Willow
<i>Thuja occidentalis</i>	Eastern White Cedar
<i>Ulmus rubra</i>	Slippery Elm
<i>Ulmus thomasii</i>	Rock Elm

### **Woodland Edges and Fields - Shrubs**

<b>Botanical Name</b>	<b>Common Name</b>
<i>Alnus incana (rugosa)</i>	Speckled Alder
<i>Amelanchier canadensis</i>	Shadblow or Downy Serviceberry
<i>Aronia melanocarpa</i>	Chokeberry
<i>Cornus alternifolia</i>	Alternate Leaved Dogwood
<i>Cornus racemosa</i>	Gray Dogwood
<i>Cornus sericea</i>	Red Osier Dogwood
<i>Crataegus crusgalli</i>	Cockspur Hawthorn
<i>Crataegus mollis</i>	Downy Hawthorn
<i>Juniperus communis</i>	Common Juniper
<i>Physocarpus opulifolius</i>	Ninebark
<i>Prunus pensylvanica</i>	Pin Cherry
<i>Rhus aromatica</i>	Fragrant Sumac
<i>Rhus typhina</i>	Staghorn Sumac
<i>Rosa blanda</i>	Smooth Wild Rose
<i>Rubus allegheniensis</i>	Alleghany Blackberry
<i>Rubus odoratus</i>	Purple Flowering Raspberry
<i>Rubus strigosa</i>	Red Raspberries
<i>Sambucus canadensis</i>	American Elder
<i>Sambucus pubens</i>	Red-berry Elder
<i>Viburnum lentago</i>	Nannyberry
<i>Vitis riparia</i>	Riverbank Grape

## ***Upland Meadow / Wildflowers***

<b>Botanical Name</b>	<b>Common Name</b>
<i>Aquilegia canadensis</i>	Wild Columbine
<i>Asclepias syriaca</i>	Common Milkweed
<i>Aster cordifolium</i>	Heart-leaved Aster
<i>Aster ericoides</i>	Heath Aster
<i>Aster laevis</i>	Smooth Aster
<i>Aster macrophyllus</i>	Large-leaved Aster
<i>Aster serceus</i>	Silky Aster
<i>Astilbe biternate</i>	False Goatbeard
<i>Chrysanthemum leucanthemum</i>	Ox Eye Daisy
<i>Clintonia borealis</i>	Bluebead-lily
<i>Coreopsis lanceolata</i>	Lance-leaved Coreopsis
<i>Echinacea purpurea</i>	Purple Cone Flower
<i>Echium vulgare</i>	Viper's Bugloss
<i>Epilobium angustifolium</i>	Fireweed
<i>Equisetum japonica</i>	Scouring Rush
<i>Erythronium americanum</i>	Trout Lily
<i>Fragaria virginiana</i>	Common Strawberry
<i>Helianthus divaricatus</i>	Woodland Sunflower
<i>Iris cristata</i>	Iris-crested
<i>Iris verna</i>	Iris-vernal
<i>Lilium philadelphicum</i>	Wood Lily

## Upland Meadow / Wildflowers

Botanical Name	Common Name
<i>Aquilegia canadensis</i>	Wild Columbine
<i>Asclepias syriaca</i>	Common Milkweed
<i>Aster cordifolium</i>	Heart-leaved Aster
<i>Aster ericoides</i>	Heath Aster
<i>Aster laevis</i>	Smooth Aster
<i>Aster macrophyllus</i>	Large-leaved Aster
<i>Aster serceus</i>	Silky Aster
<i>Astilbe biternate</i>	False Goatbeard
<i>Chrysanthemum leucanthemum</i>	Ox Eye Daisy
<i>Clintonia borealis</i>	Bluebead-lily
<i>Coreopsis lanceolata</i>	Lance-leaved Coreopsis
<i>Echinacea purpurea</i>	Purple Cone Flower
<i>Echium vulgare</i>	Viper's Bugloss
<i>Epilobium angustifolium</i>	Fireweed
<i>Equisetum japonica</i>	Scouring Rush
<i>Erythronium americanum</i>	Trout Lily
<i>Fragaria virginiana</i>	Common Strawberry
<i>Helianthus divaricatus</i>	Woodland Sunflower
<i>Iris cristata</i>	Iris-crested
<i>Iris verna</i>	Iris-vernal
<i>Lilium philadelphicum</i>	Wood Lily
<i>Mitchella repens</i>	Partridge Berry
<i>Monarda fistulosa</i>	Wild Bergamot
<i>Polygonatum pubescens</i>	Solomon's Seal
<i>Ratibida pinnata</i>	Yellow Coneflower
<i>Rudbeckia hirta</i>	Black eyed Susan
<i>Smilacina stellata</i>	Starry False Solomon's Seal
<i>Solidago bicolor</i>	Silver-rod
<i>Solidago caesia</i>	Blue-stemmed Goldenrod
<i>Solidago juncea</i>	Early Goldenrod
<i>Solidago nemoralis</i>	Grey Goldenrod
<i>Solidago rugosa</i>	Rough-stemmed Goldenrod
<i>Spiraea alba</i>	Narrow-leaved Meadowsweet
<i>Spiranthes cernua</i>	Nodding Ladies'-tresses
<i>Trientalis borealis</i>	Star-flower
<i>Veronica officinalis</i>	Common Speedwell
<i>Veronicastratum virginicum</i>	Culver's Root

## Upland Shrubs

<b>Botanical Name</b>	<b>Common Name</b>
<i>Amelanchier alnifolia</i>	Saskatoon Berry
<i>Amelanchier sanguinea</i>	Roundleaf Serviceberry
<i>Amelanchier canadensis</i>	Downy Serviceberry
<i>Cornus racemosa</i>	Gray Dogwood
<i>Cornus rugosa</i>	Round-leaved Dogwood
<i>Crataegus mollis</i>	Downy Hawthorn
<i>Diervilla lonicera</i>	Bush Honeysuckle
<i>Hamamelis virginiana</i>	Witch Hazel
<i>Physocarpus opulifolius</i>	Ninebark
<i>Prunus virginiana</i>	Choke Cherry
<i>Ribes cynosbati</i>	Prickly Gooseberry
<i>Rhus aromatica</i>	Fragrant Sumac
<i>Rhus typhina</i>	Staghorn Sumac
<i>Rosa blanda</i>	Smooth Wild Rose
<i>Rubus allegheniensis</i>	Common Blackberry
<i>Rubus strigosus</i>	Red Raspberry
<i>Sambucus canadensis</i>	American Elder
<i>Sambucus pubens</i>	Red-berry Elder
<i>Shepherdia canadensis</i>	Buffaloberry
<i>Symphoricarpos albus</i>	Snowberry
<i>Viburnum acerifolium</i>	Maple-leaved Viburnum
<i>Viburnum dentatum</i>	Arrowwood
<i>Viburnum rafinesquianum</i>	Downy Arrowwood
<i>Zanthoxylum americanum</i>	Prickly Ash

### ***Upland Vines***

<b>Botanical Name</b>	<b>Common Name</b>
<i>Celastrus scandens</i>	Climbing Bittersweet
<i>Clematis verticillaris</i>	Purple Clematis
<i>Clematis virginiana</i>	Virgin's Bower
<i>Parthenocissus quinquefolia</i>	Virginia Creeper
<i>Vitis riparia</i>	Riverbank Grape

## ***Upland Trees***

<b>Botanical Name</b>	<b>Common Name</b>
<i>Acer nigra</i>	Black Maple
<i>Acer rubrum</i>	Red Maple
<i>Acer saccharinum</i>	Silver Maple
<i>Acer saccharum</i>	Sugar Maple
<i>Fagus americana</i>	American Beech
<i>Juniperus virginiana</i>	Eastern Red Cedar
<i>Fraxinus americana</i>	White Ash
<i>Ostrya virginiana</i>	Ironwood
<i>Picea glauca</i>	White Spruce
<i>Pinus serotina</i>	Red Pine
<i>Pinus strobus</i>	Eastern White Pine
<i>Pinus virginiana</i>	Chokecherry
<i>Populus deltoides</i>	Eastern Cottonwood
<i>Populus grandidentata</i>	Large-toothed Aspen
<i>Populus tremuloides</i>	Trembling Aspen
<i>Prunus pensylvanica</i>	Pin Cherry
<i>Prunus serotina</i>	Black Cherry
<i>Quercus alba</i>	White Oak
<i>Quercus rubra</i>	Red Oak
<i>Quercus velutina</i>	Black Oak
<i>Tilia americana</i>	American Basswood
<i>Tsuga canadensis</i>	Eastern Hemlock
<i>Ulmus thomasii</i>	Rock Elm