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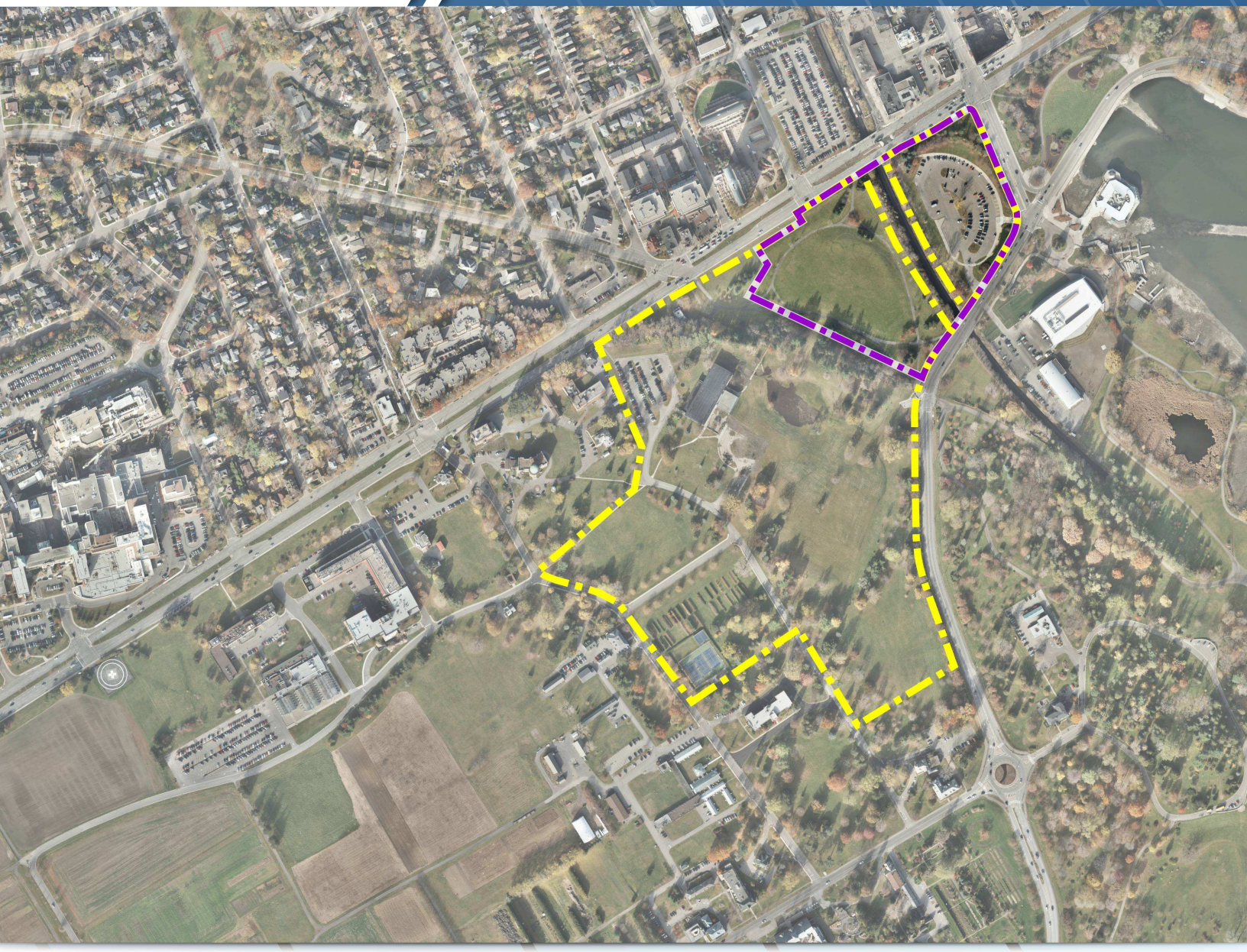

New Civic Development for The Ottawa Hospital

Vegetation Management/Conservation Strategy and Contractor Education Program

March 2022

PARSONS

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March 2022, Rev 3

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1.0 INTRODUCTION

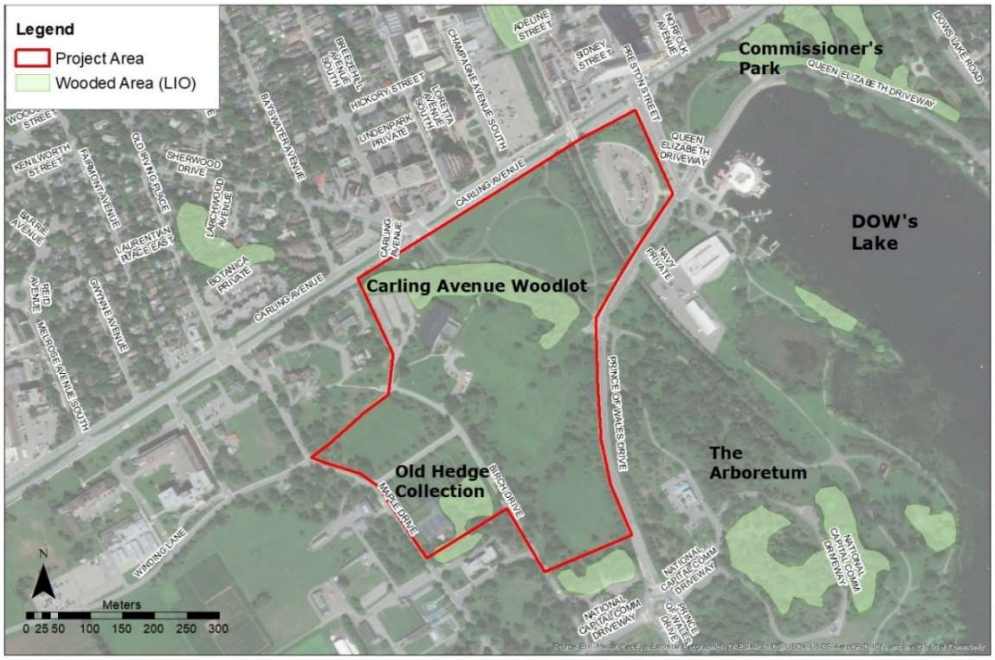
The Ottawa Hospital (TOH) is establishing a new Civic development (NCD) and replacing the ageing Civic Campus located at 1053 Carling Avenue. The NCD site is a diverse area located at the southwest corner of the intersection of Carling Avenue and Preston Street, on lands to the north and east of the Central Experimental Farm. The new site will have strong ties to transit (Trillium O-Train Line), Dow's Lake and Prince of Wales Drive, and the Central Experimental Farm. The NCD aims to demonstrate architectural and urban design excellence by respecting the historical, cultural and physical environment of the site.

As part of the activities required for the completion of the NCD (the "project"), removal of trees and shrubs will be required, as will the planting of trees, shrubs, and herbaceous vegetation to meet replacement and landscaping objectives associated with the project and assist in achieving and surpassing the tree canopy cover target of 40% (in 40 years) set for the site. As a condition of approval of the Master Site Plan for the new Civic development, and prior to the approval of any individual phase of development, a Vegetation Management/Conservation Strategy and Education Program was to be developed to provide information on the existing pre-construction vegetative conditions of the site, to provide guidance to site designers and contractors, and criteria to inform conservation and management of vegetation throughout the development, and to recommend best management practices and mitigations with regards to vegetation management and conservation throughout the site. The objective of this document is to provide recommendations and strategies to unify the approach to vegetation management and conservation throughout the design and construction of the New Civic Development, and to be referenced by TOH's consultants and contractors throughout the process. The ongoing operation and maintenance of landscaping on the NCD site will need to be developed once landscaping plans for each phase are complete, and in accordance with TOH's existing landscape maintenance contracts process.

1.1 Description of the Existing Vegetation

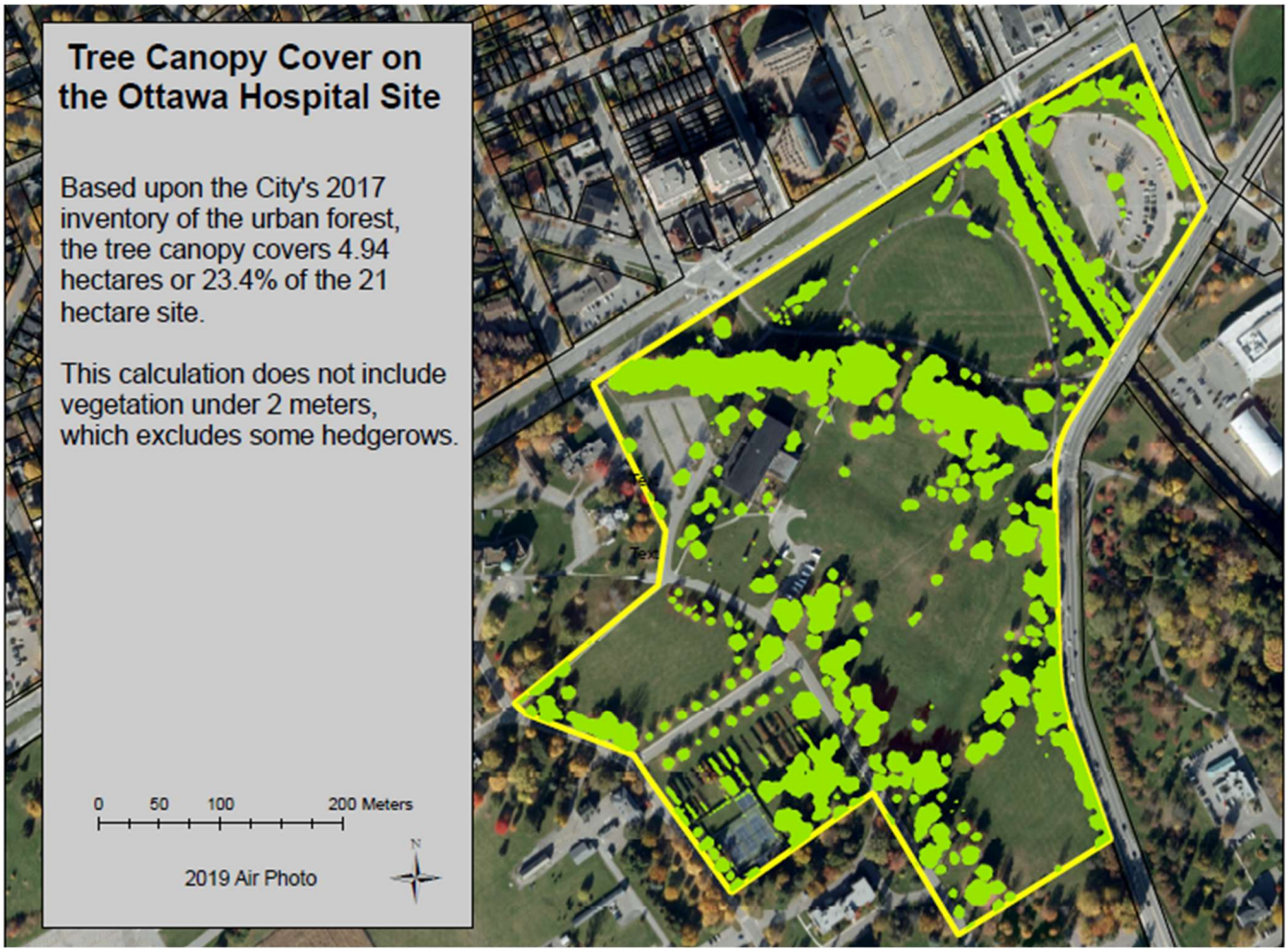
The NCD site is located in the urban core of the City of Ottawa and is located in proximity to a number of recreational and cultural landmarks including Dow's Lake and the Rideau Canal, Commissioner's Park, the Central Experimental Farm, and the Arboretum (**Figure 1**). The site measures approximately 20 hectares and is comprised of approximately 57% constructed open green space, 23% wooded area (primarily maintained), and 20% hardened landscape (buildings, infrastructure, parking lots) (Parsons 2021). Naturalized landscape features within the project area are limited to a narrow remnant woodlot at the northwestern corner of the property at Carling Avenue. This feature is referred to as the Carling Avenue Woodlot in this report, in order to differentiate it from manicured treed areas that dominate the study area. Additionally, the Old Hedge Collection (Heritage Hedge Collection) is located at the intersection of Maple and Birch Drives, and contains horticultural specimens maintained as heavily pruned hedges.

Figure 1:New Civic Development Site Context



The existing canopy cover of the site is 23.4% (**Figure 2**), including the canopies of trees and shrubs greater than 2m in height that are located within the NCD Site including the LRT corridor. It is the intention of the new Civic development to achieve an overall 40% canopy cover of the site within 40 years, in line with the City of Ottawa's canopy cover goals as described in the new Official Plan (City of Ottawa 2021). Recognizing the extent of the new Civic development, consideration is given for the replacement of trees provided off-site to contributing to the overall target for the site.

Figure 2: Existing Tree Canopy Cover on the New Civic Development Site (City of Ottawa)



1.2 Landscape Objectives for the New Civic Development

The intention of the landscape design of the NCD is to increase the canopy cover of the site from the existing 23% to 40% within 40 years, to enhance pollinator and wildlife habitat, and to complement the cultural and recreational values of the surrounding urban green space. This will be achieved through a planting plan that focuses on a diverse mix of primarily native species planted in ornamental beds, community gardens, treed greenspaces, and as boulevard trees throughout the site. As previously noted, offsite plantings will also be considered in order to achieve the canopy cover target and to provide screening along the edges of the site. Offsite locations will be considered as required at each phase of development in response to available space for relocations, site-screening, and the developing site-wide canopy plan. Off-site location ideally would include adjacent properties including the Central Experimental Farm, the Dominion Observatory Campus, the Dominion Arboretum, or other similar locations as deemed appropriate by approval authorities.

The inclusion of a green roof on the parking garage will serve as a continuation of the surrounding urban greenspace, and will feature a combination of groves which consist of spaced tree groupings with seating areas and low ground cover, woodland plantings which include a multi-layered canopy inspired by successional growth of native mixed wood forest communities, and thicket plantings which consist of densely planted small tree and tall shrub plantings to mimic an early successional woodland and edge habitats. The green roof will also include a dedicated Indigenous Garden space that will be designed in consultation with TOH's Indigenous Advisory Circle. A focus on native species including plants with Indigenous significance, and pollinator-focused planting strategies will create a green urban campus designed for both

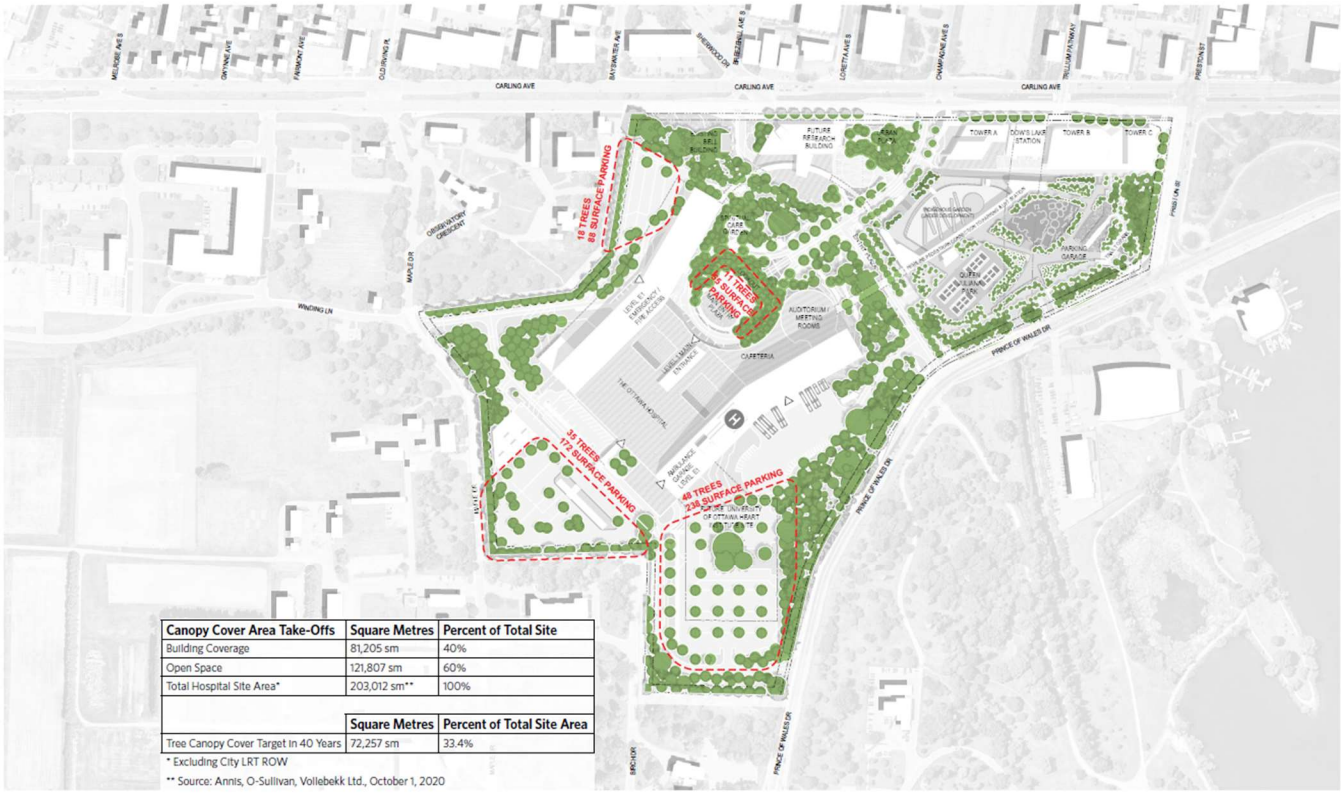
anthropogenic and wildlife-focused values. The landscape plan should be considered in concert with overall public and staff safety plans for green roof users.

1.3 Canopy Cover Plan

A Master Tree Canopy Cover Plan (**Figure 3**) was approved as part of the Site Plan Control and Federal Land Use and Design Approval for the Master Site Plan that illustrates an estimated layout of 30% canopy cover at-grade recognizing that additional cover may be achieved on the green roof of the parking garage as well as plantings off-site. The Master Tree Canopy Cover Plan represents a high level estimate. It is not the intention to quote forecasted sizes of canopies and specifics of future landscaping plans in this document

A Detailed Canopy Cover Plan will be provided at each Phase of the development to monitor the overall target for the site, and to update canopy cover estimations with species-specific values.

Figure 3: Master Site Plan Canopy Cover Plan



Both the Master Tree Canopy Cover Plan and each subsequest Detailed Tree Canopy Cover Plan will be integrated into long-term tracking and maintenance through a Long Term Tree Canopy Adaptive Management Plan (see Section 3.3.1) that will be used to track overall tree compensation.

2.0 BACKGROUND

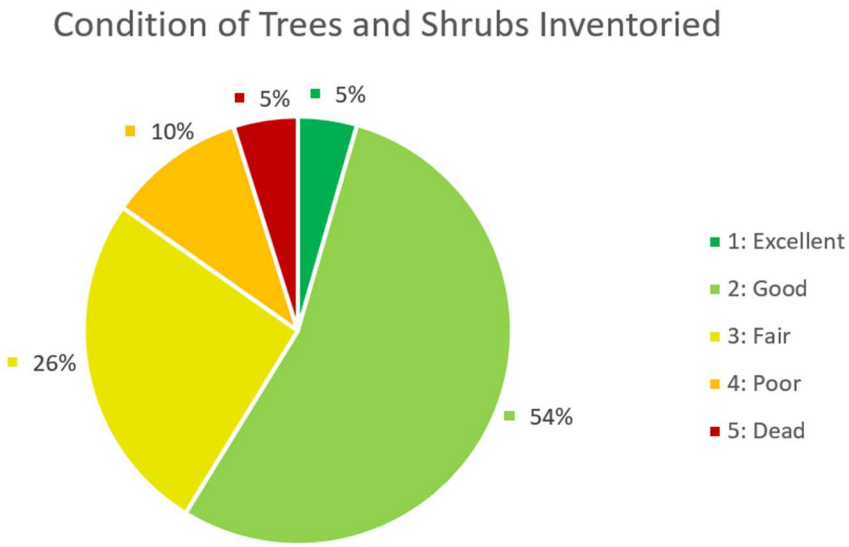
2.1 Existing Conditions

A total of 1587 trees and shrubs of all sizes were inventoried on and immediately adjacent to the NCD Site, and included a variety of native, introduced, and invasive species. Canopy cover accounts for 23% of the NCD site in the pre-development state.

2.1.1 Size and Condition of Trees and Shrubs

Trees and shrubs within the NCD site ranges from young trees and shrubs under 10 cm diameter at breast height (DBH) to large distinctive trees, representing a range of ages and maturity. The varied size and age of trees contributes to long term canopy coverage by staggering the age of maturity of trees throughout the site, which also helps to stagger the decline in the condition of trees that have passed their peak maturity. In addition to a staggered age and size class of trees, species diversity helps to stagger maturity and decline by including trees that mature at different ages and sizes and are not all susceptible to the same environmental stressors including pests, pathogens, and effects of climate change. Of the existing trees on site, 59% were observed to be in excellent or good condition, with 26% in fair condition, and 15% in poor (dying) or dead condition (**Figure 4**).

Figure 4: Count and Condition of Existing Trees and Shrubs

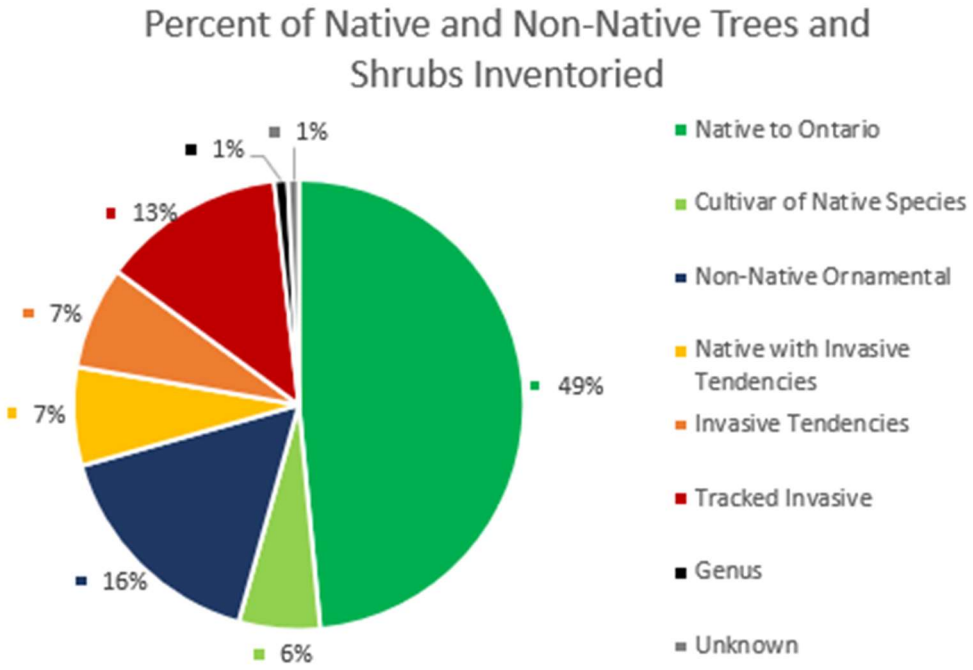


2.1.2 Diversity of Trees and Shrubs

Trees and shrubs inventoried on the NCD site include a combination of native and introduced vegetation, each representing approximately half of the trees and shrubs inventoried (**Figure 5**). A total of 96 species of woody vegetation were inventoried on the NCD site (**Appendix A**), with an additional six genera recorded but not identified to species. Species native to Ontario, including cultivars of native species and native species with invasive tendencies (e.g. Manitoba Maple, *Acer negundo*) accounted for 62% of the identified trees and shrubs, while non-native species including invasives accounted for 36%, and 2% were identified to genera or were unknown. A total of 315 trees and shrubs (20%) were identified as non-native species that are either tracked invasives or have invasive tendencies (see **Section 2.1.3**), and an additional 109 (7%) trees were Manitoba Maple (*Acer negundo*) which has been identified as a native species with invasive tendencies.

While native species are considered to have the highest ecological value, the proximity of the NCD site to the Central Experimental Farm and the Arboretum provide a horticultural context for many of the non-native species present. Non-native ornamentals that are not invasive include many unique and uncommon species to the Ottawa area (**Appendix A**).

Figure 5: Composition of Native and Non-Native Trees and Shrubs Inventoried on the New Civic Development Site



2.1.3 Invasive Species

Invasive species, as they pertain to the project, include tree, shrub, and herbaceous plant species that are regulated as prohibited or restricted under the *Ontario Invasive Species Act* (2015), as well as those identified as invasive and tracked by Ontario's Invading Species Awareness Program ([OISAP] 2021) and the Ontario Invasive Plant Council ([OIPC] 2021). These are introduced species which have adverse impacts on native flora and fauna, typically growing as a dominant monoculture, crowding out or producing chemicals to suppress the growth of other plant species. In addition to introduced species, certain species that are native to eastern North America have been identified as having invasive tendencies; these species are not expressly regulated or tracked as invasive species, however, are known to exhibit undesirable traits including dominating or suppressing the growth of nearby plants.

Of the tree and shrub species inventoried, there were seven tracked invasive species (13% of inventoried trees and shrubs), five non-native species with invasive tendencies (7% of inventoried trees and shrubs), and one native species with invasive tendencies (7% of inventoried trees and shrubs). Additionally, herbaceous invasive species observed included two restricted species, one tracked invasive species, and one native species with invasive tendencies (**Table 1**). Invasive pests and diseases were also noted.

Table 1: Invasive Species Observed in the New Civic Development Site

Common Name	Taxonomic Name	Regulation	Location and Abundance
TREES AND SHRUBS			
Amur Maple	*Acer ginnala*	Invasive Tendencies	94 inventoried, dominant planted species along Carling/Preston, occasional plantings throughout remainder of site
Black Locust	*Robinia pseudoacacia*	Tracked (OIPC), Native to Eastern North America	2 inventoried, isolated occurrences planted near Birch Avenue
European Black Alder	*Alnus glutinosa*	Tracked (OIPC)	1 inventoried, isolated planted tree along edge of NCD site
European Buckthorn	*Rhamnus cathartica*	Tracked (OISAP, OIPC)	44 inventoried, abundant in Carling Avenue Woodlot, LRT Corridor, and occasional throughout remainder of site
European Fly Honeysuckle	*Lonicera xylosteum*	Tracked (OISAP, OIPC)	1 inventoried, planted hedge in old hedge collection.

Common Name	Taxonomic Name	Regulation	Location and Abundance
Invasive Shrub Honeysuckles	*Lonicera tatarica, L. maackii, L. morrowii, L. x bella*	Tracked (OISAP, OIPC)	9 inventoried, common in LRT corridor, isolated occurrence throughout manicured areas
European Spindletree	*Euonymus europaeus*	Invasive Tendencies	5 inventoried, occasional occurrences in Carling Avenue Woodlot
Manitoba Maple	*Acer negundo*	Invasive Tendencies, Native to Eastern North America	109 inventoried, abundant/dominant in Carling Avenue Woodlot, LRT Corridor, and occasional throughout remainder of site
Norway Maple	*Acer platanoides*	Tracked (OIPC)	81 inventoried, abundant/dominant in Carling Avenue Woodlot, cultivars planted throughout manicured areas
Russian Olive	*Elaeagnus angustifolia*	Invasive Tendencies	12 inventoried, occasional planted along NCC Parking Lot, isolated occurrences throughout manicured areas
Scots Pine	*Pinus sylvatica*	Tracked (OIPC)	65 inventoried, common planted species throughout NCD site
Tree-of-Heaven	*Ailanthus altissima*	Invasive Tendencies	1 inventoried on site, on southwest edge of Carling Avenue Woodlot near manicured area
White Poplar	*Populus alba*	Invasive Tendencies	3 inventoried, occasional along southern edge of Carling Avenue Woodlot
HERBACEOUS AND VINING SPECIES			
Dog-strangling Vine	*Cynanchum rossicum and Cynanchum louiseae*	Restricted (OIPC)	Cynanchum species abundant/dominant in Carling Avenue Woodlot
Garlic Mustard	*Alliaria petiolata*	Tracked (OISAP)	Occasional/abundant along edges of Carling Avenue Woodlot, LRT Corridor, edges of plantings in manicured areas
PESTS AND PATHOGENS			
Emerald Ash Borer	*Agrilus planipennis 'Fairmaire'*	Regulated (CFIA D-03-08), Tracked (OISAP)	57 dead ash trees and 34 live ash trees inventoried, abundant throughout Carling Avenue Woodlot
LDD Moth	*Lymantria dispar dispar*	Regulated (CFIA D-98-09) Tracked (OISAP)	Egg masses, caterpillars, pupae, and adults observed in high numbers throughout NCD site

2.2 Tree Inventory

A tree inventory was undertaken in March 2021 to record trees and tall shrubs within the project area to determine impacts at the Master Site Plan level, in line with the City of Ottawa Tree Protection By-law (City of Ottawa 2021). Tree locations were recorded using a Bad Elf GNSS Receiver Pro with one meter accuracy under ideal conditions. The functional accuracy may be reduced due to site level conditions including weather, canopy cover, and satellite availability, therefore tree removals must be confirmed by a certified Arborist working with the design team via ground-truthing the limits of construction in advance of tree removals at each phase, after detailed designs are confirmed. Continuous monitoring should occur during site preparations and construction by a qualified professional to ensure that tree removal, injury, and protection measures are consistently applied and that each individual tree is tracked in order to prevent the accidental removal or injury of trees.

The following data were recorded for each tree:

- Location
- Species (common name and scientific name)
- Size measured in diameter at breast height (DBH)
- Number of stems
- Overall condition rating:
  1. Excellent
  2. Good
  3. Fair

4. Poor
5. Dead

- Condition notes including structural and biotic defects
- Critical root zone (CRZ) calculated as 10 cm for every 1 cm DBH

Where trees with more than one stem were observed, the DBH of the largest stem was recorded, and used to calculate the CRZ. Living trees with a DBH >30 cm are considered large diameter trees and are considered to be of notable size within the urban area, however all trees greater than 10 cm DBH are afforded the same protections on the NCD site under the Tree Protection By-Law (City of Ottawa 2020a). Trees with stems under 10 cm, shrubs, and shrub groupings were also surveyed, however are not subject to the City of Ottawa's Tree Bylaw protections.

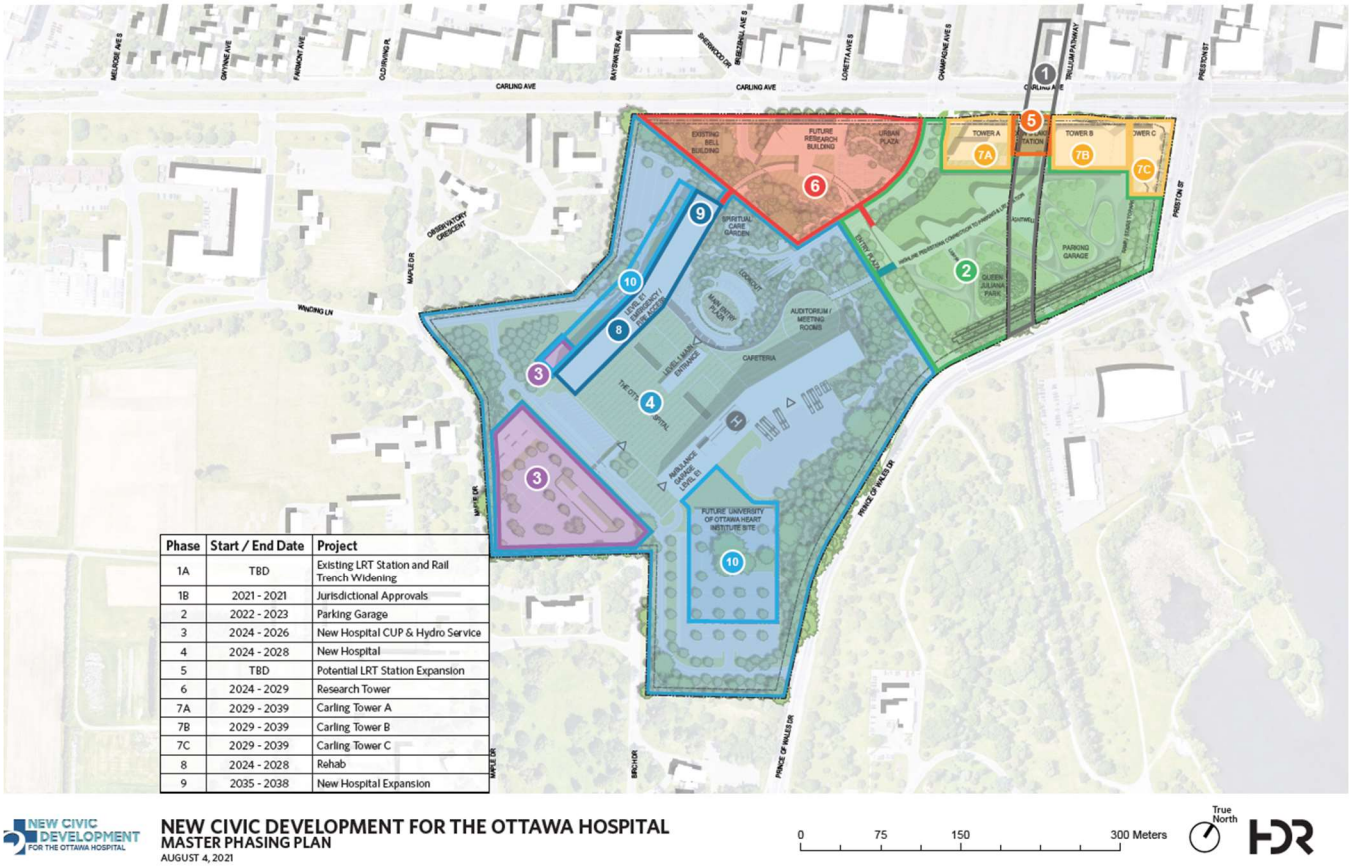
2.3 Removal Determination

Based on the anticipated project footprint, including the location of buildings and infrastructure for the Master Site Plan, trees and shrubs were assigned an anticipated action, based on their location in relation to the project footprint as identified at this early stage of design. Removal recommendations will be refined as the construction limits are identified, including the limits of site alteration (i.e., final project footprint, grading, utilities), and construction access and staging areas. The exact limits of site alteration and associated tree impacts will be identified at each phased Site Plan Control Approval and Federal Land Use and Design Approval and documented in an updated Tree Conservation Report.

- **Remove:** Trees or shrubs recommended for removal will include those located within or immediately adjacent (~1-3 m) to of the boundary of buildings and/or infrastructure, as well as those trees and shrubs where greater than 30% of the CRZ is impacted by construction limits.
  - Where trees are in excellent or good condition or other values are identified, greater than 30% of the CRZ is impacted, and the stem is not located immediately within the project footprint, design-based alternatives to removal should be considered (See **Section 3.1.1**).
- **Injure:** The CRZ of the tree or shrub is within the construction limits, and less than 30% of the CRZ is impacted. These trees are expected to require root or branch pruning within the CRZ.
  - Where the tree or shrub is located within or adjacent to identified construction limits that do not include defined areas of site alteration, protection of the CRZ should be maintained until the extents of site alteration are confirmed, to avoid unnecessary removals and soil compaction
- **Retain:** Tree or shrub is located outside of the construction limits and the full CRZ can be protected and/or avoided during construction. Inventoried trees and shrubs include some located outside of The Ottawa Hospital Lease Area (e.g., along Right-of-Way or in contiguous lawns) that will not be impacted by the project however, were included in the inventory as protection measures may be required depending on proximity to construction, site access, and staging areas.
- **Light Rail Transit (LRT) Trench:** Tree or shrub is located within the City of Ottawa LRT Right-of-way (ROW) and is anticipated to be removed as part of associated track twinning activities as part of the ultimate design for the corridor.
- **Previously Removed:** Tree or shrub was removed after the completion of the tree inventory as a result of other works (i.e., decommissioning of the former Sir John Carling Cafeteria Building, annual maintenance and hazard removals).

Removals are planned to occur in phases corresponding to the immediate construction areas required for each phase of development generally in accordance with the overall phasing plan for the new Civic development which will be updated as development proceeds (**Figure 6**). In some instances, trees identified for removal within a given phase may not be impacted by construction associated with the implementation of that phase. Additionally, trees identified for a later phase of removal may be removed during an earlier phase if required for construction access or staging. Exact tree removal requirements will be outlined in the updated Tree Conservation Report provided as part of each ongoing phased Site Plan Application and Federal Land Use and Design Approval. Retention or relocation of some trees may be possible with the implementation of mitigation measures and consideration of trees during detailed design (See **Section 3.1**).

Figure 6: Master Site Plan Phasing Plan



Phase	Start / End Date	Project
1A	TBD	Existing LRT Station and Rail Trench Widening
1B	2021 - 2021	Jurisdictional Approvals
2	2022 - 2023	Parking Garage
3	2024 - 2026	New Hospital CUP & Hydro Service
4	2024 - 2028	New Hospital
5	TBD	Potential LRT Station Expansion
6	2024 - 2029	Research Tower
7A	2029 - 2039	Carling Tower A
7B	2029 - 2039	Carling Tower B
7C	2029 - 2039	Carling Tower C
8	2024 - 2028	Rehab
9	2035 - 2038	New Hospital Expansion

3.0 VEGETATION MANAGEMENT/CONSERVATION STRATEGY

3.1 Tree Protection

3.1.1 Design-Based Tree Protection

Design-based tree protection will be considered in instances where a healthy tree and/or tree with commemorative, social, or horticultural value, is located near the edge of site alteration/construction limits and avoidance of impacts to the tree stem may be feasible. Retention of trees meeting design-based suitability criteria will be considered where feasible, on a case-by-case basis at the detailed design stage, and in consultation with the multidisciplinary design team. The locations of trees being considered for design-based protection, and the location of any trees identified as having commemorative, social, or horticultural value will be identified as part of each phased Site Plan Application and Federal Land Use and Design Approval.

Design-based tree protection may include:

- Avoidance of the tree by moving or altering the design (e.g., increasing slope, shifting a pathway, realignment of other infrastructure where feasible)
- Pruning the tree to remove major branches or stems associated with the impacted portion of the CRZ
- Engineered soils/fills to maintain health of CRZ if fill must be placed to elevate the grade within the CRZ
- Retaining walls to protect CRZ where excavation is required to lower the grade within the CRZ
- Protection of trees within construction access or staging areas that are not impacted by long term site alterations

While avoidance and design-based solutions may not be feasible for all trees along the edge of construction limits, consideration should be given to all trees that meet the identified suitability criteria, with excellent and good condition native trees and distinctive trees prioritized wherever feasible.

3.1.1.1 Criteria for Consideration for Design-based Protection

Trees located near the limits of site alteration may be suitable for retention where the tree is healthy and meets all criteria to warrant long-term retention:

1. Tree is within 3 m of grading limits, pathways, or surface-grade parking lots and/or greater than 30% of the CRZ overlaps with the construction limits and the CRZ cannot entirely be encompassed by the tree protection barrier
2. Tree is in Excellent or Good Condition
    a. Fair condition trees may be considered where tree shows healthy canopy vigour
    b. Tree has no significant injuries to the trunk or roots
3. Soil and topographic conditions are suitable for the potential design solutions, as determined at the detailed design stage
4. Large Diameter Trees (>30 cm DBH) and trees with commemorative, social, or horticultural value should take precedence, as appropriate, in consideration for design-based protection
5. Multi-stemmed trees may be considered for pruning of stems on the side of the tree facing impacts

Trees that are candidates for design-based protection will first be identified via desktop methods, followed by consultation with the design team to consider options. An on-site evaluation and consultation with the City of Ottawa's forestry staff may be required to confirm the feasibility of retention where works within the CRZ must occur, and to ensure that sufficient protection measures are in place to protect the tree throughout construction.

Additional protection measures that may be considered on a case-by-case basis include placing metal plates or a 20 cm deep layer of coarse mulch overlain by large sheets of ¾" or greater thickness plywood, in order to distribute pressure and avoid soil compaction. Following completion of activity in the area, the mulch should be spread to between 8-10 cm thick around the base of the tree.

3.1.2 Tree and Shrub Relocation and Transplanting

Relocation of trees and shrubs is encouraged, wherever feasible, to conserve suitable trees currently planted on the site. Benefits of relocation include reducing the cost of purchasing and installing new trees for replacement, as well as preserving the carbon sequestering potential of each tree relocated. Additionally, relocated trees may include trees larger than the typical sizes available for purchase and use in site landscaping, contributing to the mature canopy cover outlook sooner. The equipment used and cost of tree relocation is dependent on the size of the tree, with the maximum feasible size being 22.5 cm DBH (**Table 2**). Trees that are relocated may either be transplanted immediately or stored in baskets or "heeled in" for later planting as soon as possible, in coordination with City of Ottawa staff. Trees must be watered in advance of digging and should be mulched and watered regularly for a minimum of 3 years following transplanting or throughout the duration of storage (Manotick Tree Movers 2021).

Table 2: Tree Relocation Sizes and Equipment (Manotick Tree Movers 2021)

Tree Size	DBH (cm)	Equipment
Small Trees and Shrubs	< 8 cm	42" spade on 4WD backhoe
Young Trees	8 < 10 cm	48" spade on skidsteer track machine
Medium Trees	10 < 11 cm	60" spade on singe axle truck
Large Trees	11 < 22.5 cm	90" spade on tandem axle truck

To increase the likelihood that larger transplanted trees will survive, the recipient site should be permanent and should be determined in advance. If this is not possible, and if temporary storage is necessary, dig them up when they would naturally go into dormancy, e.g. mid- to late fall. Place them in a cool, shaded and moderately humid shelter that will keep them dormant until the next spring. Avoid pruning the plant shoots or roots after digging, even if segments look dead as these structures may revive after transplanting.

As well, root pruning the future root ball, preferably a minimum of 6 months in advance of transplanting and carried out in the fall, should be carried out whenever possible under the direction of an arborist or forester, or horticulturist with a minimum of 5 years of relevant experience with transplanting larger woody species in the same climate zone. During pruning, staging of the root pruning is preferable, where 1/3 of the roots that are 5 to 15 cm inside the future root ball should be cleanly severed at least 45 cm deep in stages that allow for a minimum of one month between prunings. If staging is not possible, there is still a preference for the roots to be pruned a minimum of 6 months in advance of transplanting, preferably in the fall. This will ensure that not all roots will be cut at one time, and it gives the plant a chance to adjust to the loss of parts of its root system before it is disrupted again for the actual transplant and reduces transplant shock. Root pruning should be combined with watering before and after to ensure that drought stress from a reduced root system is minimized. Reducing healthy portions of crown while root pruning has not been determined to consistently and significantly improve transplanting success, therefore it is not recommended.

3.1.2.1 Criteria for Consideration for Relocation and Transplanting

Criteria for selecting trees for relocation include:

1. Tree is under 22.5 cm DBH
    a. Trees measuring 23 cm DBH should be included at the desktop stage, to account for rounding to the nearest cm
2. Tree is in Excellent or Good Condition.
    a. Fair condition trees should be considered where tree shows healthy canopy vigour
    b. Tree has no significant injuries to the trunk or roots
3. Tree species is suitable for relocation, subject to feasibility as determined by an experienced tree mover
    a. Species that are typically not suited to relocation include: Beech, Red Oak, Larch. Additional species may be identified as unsuited to relocation by the tree mover on a case-by-case basis
    b. No invasive species as defined in **Section 2.1.3** will be relocated
4. Tree is located greater than 1.5 m from all underground utilities
5. Tree location is accessible to equipment
    a. A minimum of 3.5 m is required for truck access

   b. Tree must not be within 1.75 m of an existing building
   c. Tree and truck access must not be located within the CRZ of another tree unless that tree is to be removed as part of the project
6. Soil conditions are favorable for digging
   a. Up to 1.5 m of soil depth is required for 90" spade
   b. Substrate should not be rocky or heavily compacted

Trees that are candidates for relocation should first be identified via desktop methods, followed by an on-site evaluation to confirm the size and condition of the tree, and to confirm suitable soil conditions. A final evaluation should be carried out by an experienced tree mover, working in collaboration with the City of Ottawa staff, in advance of relocation in order to confirm suitability and account for any significant changes to tree condition between the time of assessment and relocation.

Relocation of trees must occur when the soil is in workable condition, and not frozen, in order to facilitate digging. In general, relocation should occur as near to dormancy as possible, with fall and spring months preferred, where soil conditions are suitable. Relocation activities should not occur in peak heat or drought conditions in the summer, and any trees relocated during the growing season will have additional watering requirements to ensure success.

3.2 Ecological Resilience

3.2.1 Snag Management

Standing dead trees, known as snags, as well as both living and dead cavity trees, provide habitat for wildlife including birds, bats, and other small mammals, as well as providing food sources for insectivorous species such as woodpeckers. In addition to their value for habitat, snags with intact root systems support healthy soils and contribute to slope stability by reducing erosion. Habitat for these species may be preserved and, in some cases, enhanced, by planning for the long-term retention of dead and dying trees (Burke et. al. 2011) where no threat is posed to human safety or to infrastructure. Within the NCD site, there is potential to enhance wildlife habitat through the retention of snags within the naturalized Carling Avenue Woodlot, however regard for human health and safety will take precedence in all management and maintenance decisions.

The existing conditions of the Carling Avenue Woodlot include an area of 0.8 hectares, with 4 cavity trees measuring a minimum of 25 cm DBH recorded. This is equivalent to a density of 5 cavity trees of 25 cm DBH or greater per hectare, which is below the ideal threshold of 10 cavity trees of 25 cm DBH or greater per hectare (Burke et. al. 2011, MNR 2011) to support species that depend on these features, however, meets the minimum threshold of 5 cavity trees per hectare recommended for snag management (Burke et. al. 2011). Ideally, cavity trees include a range of sizes and species, as well as both living and dead trees, with taller snags and cavity trees being preferred, as well as those of large DBH.

Retention of snags is recommended to focus on naturalized areas of the Carling Avenue Woodlot along the escarpment, and to avoid manicured greenspaces in close proximity to TOH buildings and infrastructure.

The following recommendations should be considered throughout the maintenance and removal of trees in appropriate, naturalized locations within the site:

- Maintain as many cavity trees and snags as possible. A minimum target of 5 snags per hectare (Burke et. al. 2011) is recommended as feasible
- Create snags by topping and/or removing potentially hazardous branches from structurally sound dead trees
  - Snags should be a minimum of 3 m in height, ideally greater than 6 m
- Remove only standing dead trees that may be considered a safety hazard
  - Dead trees that are assessed to have the potential to endanger a worker will be removed to ensure a safe workspace while vegetation management efforts are underway
  - Trees within fall distance of publicly accessible areas including pathways, roadways, and buildings
  - Trees that are unstable and/or show a significant lean
  - Trees that are not structurally stable
- Where dead trees are cut down, leave on site, where feasible, to operate as downed logs

- Dead trees within fall distance of the project and associated infrastructure should be removed if the fall distance cannot be reduced through topping
- Consideration for bat boxes, bat bark poles may be considered in areas not impacted by site development and oversight of the location and construction of any of these structures will be completed by a qualified biologist.

3.2.2 Climate Change

Climate change is expected to impact urban vegetation through a combination of factors including more extreme temperatures, droughts and other changes in precipitation, and the introduction of new pests and invasive plants. The long-term management of vegetation within the NCD site responds to potential impacts from climate change include:

- Diverse planting of native tree species will reduce the impact of species-specific pests and pathogens, and will stagger the age to maturity of trees
- Canopy cover increase on the NCD site from 23% to 40% will contribute to cooler air temperatures and provide shade for people and wildlife, as well as increasing the carbon sink provided by trees long-term
- Planting of species native to Ontario includes Carolinian species, known to thrive in a warmer climate, as well as species that tolerate extremes on the green roof
- Use of seed-grown and/or locally grown planting stock as available will contribute to the genetic biodiversity of plants throughout the site, as well as populating the site with locally adapted plants
- Direct seeding is encouraged where compatible with site conditions and landscaping targets (e.g. habitat enhancement in the Carling Avenue Woodlot, or native grass and wildflower seeding) in order to promote vegetative cover uniquely adapted to site-specific conditions

3.2.3 Soil Management

Soil health is a key component to the long-term survivability of trees and will support the growth needed to achieve the 40% canopy cover target over 40 years. Soil compaction is common among urban soils with a history of development and public use and is also likely to occur in areas used for contractor access, staging, and construction activities. The design has concentrated these areas within the footprint of later phases of development. Landscape Plans will provide details on soil management to alleviate concerns of compaction associated with existing conditions and with construction, and to ensure appropriate nutrient contents to support growth.

Soil health will be supported by the following:

- Tree protection fencing will be installed to protect the CRZ of living retained trees from compaction
- Appropriate soil volumes will be provided for new plantings as per City of Ottawa standards (City of Ottawa 2015)
- Soil amendments will be included in landscaping specifications and will contribute to healthy, microbially active soils
- Soil remediation/loosening/tilling will occur as required, in areas where compaction is identified as a concern to the health of future plantings, based on the growth-limiting bulk density (GLBD) or similar calculation of native soils
- The overall increase in tree canopy cover throughout the project area will contribute to improved rainwater infiltration and erosion prevention
- Organic matter within healthy soils contributes to carbon storage
- Topsoil will be stripped and stockpiled prior to excavation; amendments will be incorporated as required based on the existing soil conditions. Off-site topsoils are to be incorporated only if native soils are insufficient to meet the required planting volumes.
- Any access or staging areas that are not in continued use throughout the development will be remediated in the interim by applying cover seed.

3.2.4 Invasive Species Management

3.2.4.1 Priority Invasive Species

The removal of invasive tree species as a part of the project has the potential to provide a net environmental gain to the property, through reducing competition for native plant species and through replanting the area with a greater diversity of native canopy trees.

While numerous invasive species have been identified within the NCD site, Priority Invasive Species have been identified for targeted removal and management:

- European Buckthorn: Dominant understory throughout naturalized areas of the site, this species suppresses competition through shading and may impact seed germination through allelopathic chemicals secreted by the roots.
- Dog-strangling Vine (Black Dog-Strangling Vine and Dog Strangling Vine) Dominant groundcover throughout the Carling Avenue Woodlot, this species is an aggressive vine that can choke out and flatten competition. Additionally, Dog-strangling Vine is known to be mistaken for Milkweed (*Asclepias* sp.) by Monarch butterfly, however is an unsuitable host plant.
- Tree-of-Heaven: One mature tree is planted on the southwest side of the Carling Avenue Woodlot, however this tree is considered a priority for removal as there is potential for Tree-of-Heaven to become a common invasive species in Ottawa as it is in parts of Southern Ontario. Additionally, this species is a preferred host plant of Spotted Lantern Fly (*Lycorma delicatula*) which is an aggressive invasive insect at risk of entering Ontario.

Targeted invasive species removal will be carried out throughout the NCD site for these species as they are encountered through the phased site development as well as through targeted removal of these species where they occur in the Carling Avenue Woodlot. Removal and monitoring of priority invasive species will follow current best management practices (see Section 4.3) and is expected to occur in conjunction with tree removals throughout each of development. Ongoing monitoring and maintenance is recommended in order to maintain a landscape compatible with TOH's goals for human health and safety; long-term landscape maintenance plans will be developed by TOH and carried out by vendors. It is recommended that the Landscape Maintenance Plan include consideration of the continued management of these priority invasive species.

3.2.4.2 Other Species

Additional species that are identified as invasive in section 2.3.1 include Norway Maple, Manitoba Maple, Scots Pine, Amur Maple, and Russian Olive. These species are commonly planted in urban areas, and their individual benefits as canopy trees are considered to outweigh their invasive potential on the site. Therefore, these species will not be subject to targeted removals, however, will be replaced with native species over time. Areas where these species occur will be monitored over time, with dead and hazardous trees of these species removed as they reach the end of their lifespan. As these trees are removed, they will be replaced by native canopy trees, which will vary in age based on the staggered planting as trees naturally decline.

It was also noted that wild grape (*Vitis riparia*), an aggressive native vine, is found in large quantities on the site. Wild grape is native to Ontario and has numerous benefits for wildlife, however, exhibits aggressive growth habits that have the potential to suppress the intended canopy growth and reduce the longevity of trees. As such, control of this species should be considered alongside other species requiring management and removal. It is recommended that TOH's ongoing landscape maintenance practices consider control of wild grape where it is observed to be interfering with landscape objectives plantings.

3.3 Revegetation

Revegetation throughout the NCD site will occur in multiple stages throughout phased project implementation. Landscape Plans will be prepared to detail:

- Up-front plantings in suitable areas not impacted by later development activities
- Landscape plantings associated with each phase of development

- Habitat enhancement in naturalized areas of the NCD site impacted by invasive and non-native species
- Offsite plantings to assist in achieving canopy cover targets and to accommodate relocations as required, at each phase of development

The landscape plans will revegetate the site with the goal of improving and enhancing the vegetation on site through the following objectives:

- Increase the canopy cover of the site from the existing 23% to 40% within 40 years
- Provide leisure spaces in proximity to shade trees
- Enhance pollinator and wildlife habitat through the planting of native flowering, fruiting, and mast-producing species
- Plant primarily native wildflowers, shrubs, and trees, aiming for a net increase in the diversity of planted native species
- Include plants of indigenous significance, including plants used traditionally by Algonquin nations throughout the NCD site, as well as the creation of an Indigenous Garden in consultation with TOH's Indigenous Advisory Circle

3.3.1 Long Term Tree Canopy Adaptive Management Plan

A Long Term Tree Canopy Adaptive Management Plan is an on-going commitment that will be used to track overall tree compensation and growth of the NCD site canopy cover over phased development to monitor and adapt landscaping and maintenance plans to achieve the the 40% canopy cover in 40 years target. The plan will be informed by the use of city-wide aerial imagery and tree canopy data and on-going consultation/communication between TOH and approval agencies. It is recommended that the total canopy cover be assessed at each phase of development, or at a minimum, every 5 years over the 40 year target.

This ongoing assessment, to be prepared by TOH will include a summary of removals, relocations, and plantings that have occurred on the site, as well as the Detailed Canopy Cover of each phase as completed shown both individually, and together, as phases progress. This detailed review will allow TOH to identify opportunities for additional plantings on areas not subject to future development or work with adjacent landowners to find off-site areas to off-set the overall target for the TOH site including the Central Experimental Farm, the Dominion Observatory Campus, the Dominion Arboretum, or as otherwise approved by the approval authorities.

3.3.2 Landscape Maintenance

Long-term landscape maintenance programs will be identified by The Ottawa Hospital following approval of landscaping plans. TOH currently has a landscape maintenance program for each of its campuses. This includes:

- Retaining staff / contractors
- Pruning of trees and shrubs to promote proper health and growth, safety, and aesthetics
- Removal of garbage
- Inclusion of high-risk removal of trees where required
- Monitoring tree health throughout the summer
- Carrying out supplementary watering as required
- Designs are to consider installation of irrigation systems where feasible
- Soil amendments and addition of media as required
- Replacement of dead or overgrown plants
- Integrated Pest Management implementation based on monitoring results
- Annual Display plantings
- Mowing turf areas
- Removal of plant debris if required
- Replenishment of mulch on a yearly basis
- Site specific Invasive Species Management Plan

Long-term maintenance programs will be developed by TOH and carried out by vendors. It is anticipated that these plans will be prepared after the completion of construction and in line with TOH's contract procurement process. The Landscape Maintenance Plan will include the above maintenance objectives, as well as addressing site-specific maintenance and

monitoring requirements as they apply throughout the short, medium, and long term, with the goal of growing and maintaining a healthy tree canopy that will meet the 40% in 40 year canopy target, and continue to thrive throughout the continued operation of the hospital.

Short Term (0-5 years) Maintenance and Monitoring:

- Carried out throughout the ongoing development, and during warranty period of landscape plantings
- May be carried out under existing contracts on a case-by-case basis where maintenance and monitoring is required before the Long-Term Landscape Maintenance Plan has been prepared and approved
- Focus on the maintenance and establishment of landscape plantings including retained, relocated, and newly planted trees
- Pruning of trees and shrubs as required to support tree health and human safety (see **Section 4.1.3**)
- Monitor the health of new and retained trees and vegetation
- Regular watering of relocated trees throughout the first 5 years of planting
- Replacement of dead trees and shrubs (as per warranty)
- Invasive species maintenance and monitoring
- Develop a Green Roof Maintenance Plan to address medium- and long-term maintenance requirements of the parking garage structure
- Develop an Escarpment Maintenance Plan to address ongoing invasive/aggressive species control and monitoring, replacement of dead and dying trees, and the long-term maintenance of mature trees

Medium Term (5-10 years) Maintenance and Monitoring:

- Carried out after the completion of the site development in each phase, after landscape plantings are established and no longer covered by warranty
- Will be carried out by TOH's Landscape Maintenance Contractor
- Complete a canopy assessment at a minimum interval of every 5 years, to track the ongoing development of the 40% canopy cover in 40 years target
- Carry out additional plantings if and where required, based on updated canopy projections
- Pruning of trees and shrubs as required to support tree health and human safety (see **Section 4.1.3**)
- Consideration of conservation pruning as needed, to extend the longevity, health, and safety of mature trees
- Replacement of dead trees and shrubs
- Invasive species maintenance and monitoring
- Implement Green Roof Maintenance Plan
- Implement Escarpment Maintenance Plan

Long-Term (10-40 years) Maintenance and Monitoring:

- Carried out after planted tree canopies have begun to develop into a more substantial canopy cover
- Will be carried out by TOH's Landscape Maintenance Contractor, and updated in line with TOH's contract procurement process
- Complete a canopy assessment at a minimum interval of every 5 years, to track the ongoing development of the 40% canopy cover in 40 years target
- Carry out additional plantings if and where required, based on updated canopy projections
- Pruning of trees and shrubs as required to support tree health and human safety (see **Section 4.1.3**)
- Consideration of conservation pruning as needed, to extend the longevity, health, and safety of mature trees
- Replacement of dead trees and shrubs
- Invasive species maintenance and monitoring
- Implement Green Roof Maintenance Plan
- Implement Escarpment Maintenance Plan

4.0 CONSTRUCTION MITIGATION AND CONTRACTOR EDUCATION PROGRAM

4.1 Tree Protection During Construction

Details on protection measures, branch, and root pruning are provided below and general information for tree protection is provided in **Appendix C**.

4.1.1 Critical Root Zone and Barrier

The Critical Root Zone (CRZ) is a defined area around an existing tree wherein tree protection measures should be implemented if site disturbance is planned within the CRZ, or if there is a reasonable likelihood of inadvertent encroachment into the CRZ during site disturbance. The CRZ for the City of Ottawa is calculated as 10 cm from the trunk of a tree for every centimeter of trunk diameter. The arborist/forester may adjust this as required based on whether the tree is multi-stemmed, particularly sensitive to root disturbance, or certain situations such as if the roots are constrained by hard surfaces and the majority of roots would be expected to occur on the side where protection is required. Tree protection measures will be inspected by City of Ottawa and NCC forestry staff in advance of tree removals.

The Tree Protection By-law requires that anyone working near protected trees must, unless otherwise authorized by the City:

- Erect a 1.2 m high fence around the outer edge of the critical root zone CRZ of trees prior to beginning other site work, and maintain the fence until the work is complete;
- Not place any material or equipment within the CRZ of the tree;
- Not raise or lower the existing grade within the CRZ of a tree;
- Not extend any hard surface or significantly change landscaping within the CRZ of a tree;
- Not attach any signs, notices or posters to any tree, except as required by this by-law for trees to be removed;
- Not damage the root system, trunk or branches of any tree; and
- Ensure that exhaust fumes from equipment are not directed towards any tree's canopy.

Tree protection measures should follow recommendations found in the Tree Protection Specification (City of Ottawa 2021; **Appendix C**). These measures should be implemented for all trees to be retained, where impacts are expected within 6 m of the identified CRZ.

4.1.2 Root Pruning Practices

The following are standard Best Management Practices (BMPs) for root pruning:

- Root damage can be minimized by restricting equipment in the vicinity of the existing trees and limiting equipment and materials storage area within proximity to retained trees and shrubs. In general, roots 100 mm in diameter or larger should be considered structural roots. If there is any question about whether a tree's stability may be affected, a qualified Arborist should be consulted.
- Air spades or hydrovac should be used where exposure of roots is required.
- Root pruning should occur prior to the start of construction to prevent drying out of roots, increase root regeneration, and minimize damage to root systems during construction. Roots should be pruned to the limit of excavation and to a depth of 1 m or the maximum depth of root penetration (whichever is greater). All pruning should be done with clean, approved root-pruning equipment and under the supervision of a qualified Arborist.
- Any roots that are severed during construction should be cut cleanly to minimize decay and entry points for disease. If roots will be exposed for more than a few hours, they should be protected from drying with the application of mulch.
- Pruned root ends shall be neatly and squarely trimmed and the area shall be backfilled with clean native fill as soon as possible to prevent drying and promote root growth.
- The exposed roots shall not be allowed to dry out and an appropriate watering schedule shall be undertaken (e.g., water bi-weekly to field capacity between June 1st and September 15th) so that the roots maintain optimum soil moisture during construction and backfilling operations.

- **Measures to minimize root loss:** When it is necessary to excavate within the tree protection zone of trees and shrubs, pre-cutting of the roots must be carried out in order to avoid lifting or tearing the roots. This working method consists of slicing the ground and cutting the roots of trees and shrubs, for example using a concrete saw and then stripping the ground. The depth of the pre-cut must be at least 500 mm. If roots 50 mm in diameter or more are encountered at a depth of more than 500 mm, they should be cut cleanly with a sharp tool. Backfilling must be done with topsoil to a depth of no more than 500 mm. An NCC representative or a consultant arborist may request the application of an anti-desiccant agent to the foliage or take any other measure aimed at reducing evapotranspiration. For all trees and shrubs whose roots are exposed during work, the root system must be kept moist to avoid desiccation and death of the rootlets.

4.1.3 Branch Pruning Practices

The following are standard BMPs for branch pruning:

- Limbs that may interfere with construction, including those that may overhand the work area, should be pruned utilizing by-pass secateurs by a qualified Arborist. All pruning shall be completed as per the American National Standard (ANSI) A300 (Part 1) - Pruning (International Society of Arboriculture 2008).
- All limbs damaged or broken during construction should be pruned cleanly, utilizing by-pass secateurs in accordance with approved horticultural practices. Should there be a potential risk of transfer of disease from infected to non-infected trees; tools must be disinfected after pruning each tree by dipping in methyl hydrate. This practice is particularly important during periods of tree stress and when pruning many members of the same genera, within which a disease could be spread quickly (i.e., Verticillium Wilt on Maples or Fireblight on genera of the *Rosaceae* family).
- Pruning cuts should be reduction cuts wherever possible and made to a growing point such as a bud, twig, or branch of approximately 1/3 diameter of the branch being pruned.
- Removal cuts should not exceed 10% of the total cuts made on each individual tree, and cuts should be made just outside the branch collar (the swollen area at the base of the branch that sometimes has a bark ridge), and perpendicular to the branch being pruned rather than as close to the trunk as possible. This minimizes the site of the wound. No stubs should be left. Poor cut location, poor cut angle and torn cuts are not acceptable.
- Extensive pruning is best completed before plants break dormancy.
- Pruning should be limited to the removal of no more than 20% of the total bud and leaf bearing branches. Pruning should include the careful removal of:
  - Deadwood
  - Branches that are weak, damaged, diseased and those which will interfere with construction activity
  - Secondary leaders of conifers
  - Trunk and root suckers
  - Trunk waterspouts
  - Tight V-shaped or included bark in unions
  - Secondary or competing leaders to promote single stem structure in large canopy species.

4.2 Species at Risk

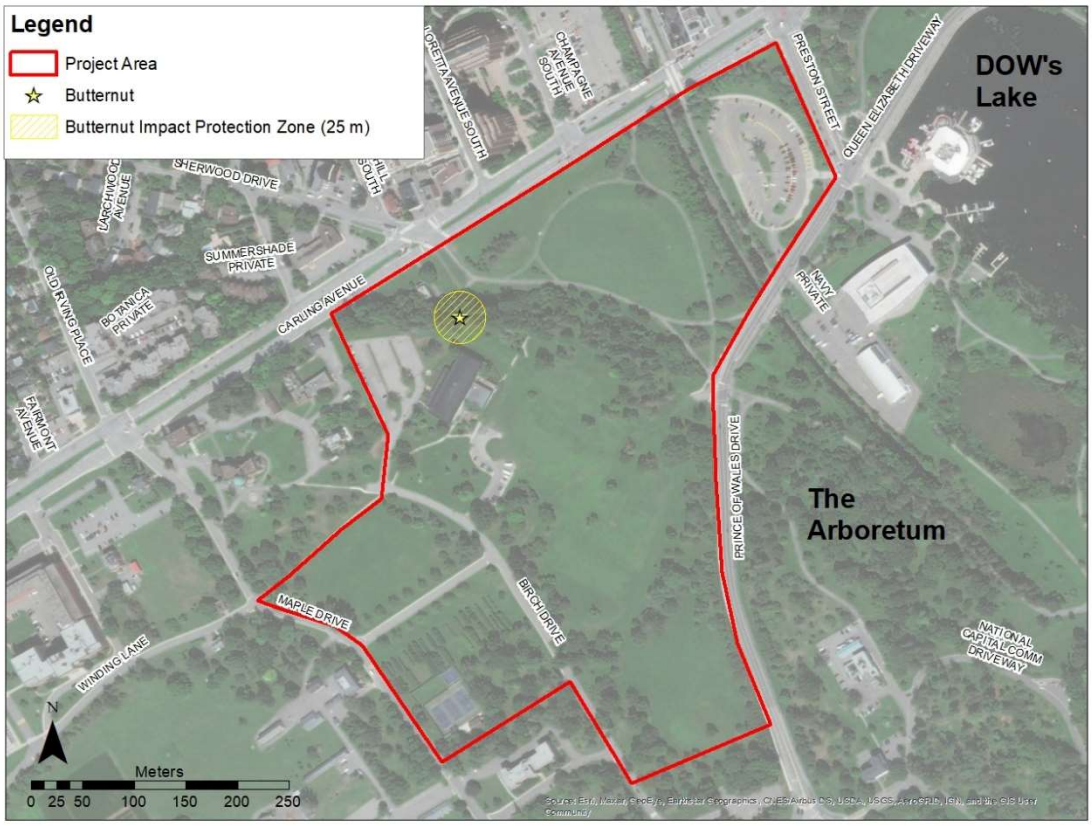
Two Species at Risk (SAR) plant species were identified within the NCD site, including Butternut (*Juglans cinerea*) as well as Kentucky Coffeetree (*Gymnocladus dioicus*). Additionally, trees within the site have the potential to provide habitat for SAR wildlife including birds and bats as well as not at risk birds protected under the MBCA.

4.2.1 Butternut

Butternut is listed as Endangered under the ESA (*Endangered Species Act, 2007)* and the SARA (*Species at Risk Act, 2002)*. One Butternut tree has been identified within the project area (**Figure 7**) and it is an objective of the project for the tree to be protected from impacts. The Ontario Butternut Recovery Strategy recommends a 25 m radius of suitable habitat be maintained surrounding individual Butternut trees based on the Site Occupancy Method for determining the area occupied by a tree at its maximum size at maturity (Poisson and Ursic 2013). This area should be protected from

soil compaction. The 25 m radius includes cultural woodland and manicured lawn, with the overall suitability of habitat within the woodland expected to improve through the removal of invasive species cover within the understory.

Figure 7: Location of Butternut Tree on New Civic Development Site



In addition to preserving suitable habitat surrounding the tree, the individual Butternut tree should be protected in line with City of Ottawa standards for tree protection during construction (see **Section 4.1.1**) including the placement of a barrier to protect the CRZ. The identified Butternut tree is located within the Carling Avenue Woodlot, between the areas identified for development during Phase 4 and Phase 6.

- A Butternut Health Assessment and Hybridity Assessment will be completed by a certified Butternut Health Expert in advance of Phase 4, in order to determine the health of the tree and establish whether the tree is a true Butternut.
- If impacts to the Butternut cannot be avoided or mitigated against, and the tree is not a hybrid, consultation with Environment and Climate Change Canada and/or the Ministry of the Environment, Conservation and Parks should be undertaken to determine requirements for permitting and/or compensation.

4.2.2 Kentucky Coffeetree

Kentucky Coffeetree is listed as Threatened under the ESA and the SARA. A total of 10 Kentucky Coffeetree were inventoried as planted trees throughout the NCD site. Under the ESA and the SARA, only wild-occurring specimens are subject to regulations and protection as SAR, therefore permitting under the ESA and the SARA is not required for the impact to, and removal of Kentucky Coffeetree as a result of the project. Kentucky Coffeetree has been identified as a suitable street tree and will be incorporated into the replanting plan.

4.2.3 Species At Risk Wildlife

Trees within the NCD site have the potential to provide habitat for SAR birds, bats, and pollinators such as foraging, roosting, and nesting habitat, as well as habitat for birds protected under the MBCA. Detailed SAR assessments and phase-specific mitigations will be provided at each phase of development; however all tree removals should be conducted outside of the identified sensitive timing windows for birds and bats (see **Section 4.4**). Additional mitigation measures associated with vegetation management and SAR include:

- All on-site staff should undergo environmental awareness training to be able to identify the potential SAR that may be encountered.
- Minimize vegetation clearing as much as possible. Replant with appropriate native species.
- If SAR are observed during site preparation, construction, or maintenance activities, Environment and Climate Change Canada (ECCC) should be contacted immediately, and operations modified to avoid any negative impacts to the species or their habitat until further direction is provided by ECCC.

4.3 Invasive Species Removal

4.3.1 Invasive Plant Species

Invasive species that have been identified as priority invasive species are to be removed as they are encountered through each phase of development, with targeted management practices carried out as part of future landscape maintenance commitments. The removal of dominant invasive plant species in the Carling Avenue Woodlot will be addressed with site-specific strategies provided at Phases 3 and 4 of the development. Invasive species that are not identified as priority invasive species on the NCD site will be removed gradually as required through ongoing site development and maintenance activities and will be replaced with appropriate native species.

The contractor should implement the Clean Equipment Protocol for Industry (OIPC 2016, **Appendix D**) to prevent the movement of or introduction of new invasive species. Where invasive species are found on site, removal and management plans should be consistent with federal standards under the Invasive Alien Species Strategy (Environment Canada 2004) and the Aggressive Invasive Alien Species Management Strategy for National Capital Commission Lands (Genivar 2013).

The following recommendations should be followed at each phase of development for the removal of invasive species as indicated in the Tree Removal and Preservation Plan included in each phased design package:

- Areas of invasive brush clearing will be identified in the site walk-through (clusters throughout LRT corridor and Carling Avenue Woodlot.
    - Prevent spread by moving from outside edge inwards; and
    - Strip areas with identified dominant invasive species last so that equipment does not track propagules or seeds into uncontaminated areas; OR
    - Implement Clean Equipment Protocol when moving from an invasive contaminated work area into a clean area
- Roots of woody invasives should be grubbed and removed in order to limit regeneration, where feasible without damaging the roots of retained vegetation.
- Herbicide application may be required to control certain invasive species. General recommendations are provided below, however a licensed professional must be consulted at the relevant phases of development to provide a plan for the safe application of herbicides and obtain any permits required for their use on the site. The requirement for herbicide applications will be noted in each phased Tree Removal and Protection Plan with individual plants or groupings identified as well as recommended methods of application, as required.
- European Buckthorn is the most common invasive species on site and removals of this species are anticipated to occur at each phase of development. A combination of methods will be applied to control buckthorn, including a targeted removal plan in the Carling Avenue Woodlot as part of Phases 3 and 4. In general, buckthorn will be cut and grubbed where encountered in tree removal areas located within the edge of disturbance as identified at each phase of development. A combination of mechanical and chemical controls are recommended to manage this species (Anderson 2016a).
    - Monitoring of regeneration, pulling of smaller shrubs, and mowing along the edge of naturalized areas will be carried out throughout the site to manage recurrence
    - Pulling should ideally be carried out from mid-October to mid-November, and when soil is moist or wet
    - Branches with berries should be removed and contained prior to pulling to prevent spreading seeds
    - Cut stems should be treated immediately with herbicide to prevent regeneration

Additional guidance includes best management practices as prescribed in A Landowner's Guide to Managing and Controlling Invasive Plants in Ontario (OIPC 2013), and The Landowner's Guide to Controlling Invasive Woodland Plants (Pridham 2009). Additionally, applicable species-specific best management practices include:

- Black Locust (*Robinia pseudoacacia* L.) Best Management Practices in Ontario (Warne 2016)
- Invasive Common (European) Buckthorn (*Rhamnus cathartica*) Best Management Practices in Ontario (Anderson 2016a)
- Invasive Dog-strangling Vine (*Vincetoxicum rossicum*) Best Management Practices in Ontario (Anderson 2016b)
- European Black Alder (*Alnus glutinosa*) Best Management Practices in Ontario (Anderson 2013)
- Garlic Mustard (*Alliaria petiolata*) Best Management Practices in Ontario (Anderson 2012)
- Invasive Honeysuckles (*Lonicera* spp.) Best Management Practices in Ontario (Sherman and Tassie 2014)
- Norway Maple (*Acer platanoides*) Best Management Practices in Ontario (Simkovic 2020)
- Scots Pine (*Pinus sylvestris*) Best Management Practices in Ontario (Marinich and Powell 2017)

4.3.2 Emerald Ash Borer

Canadian Food Inspection Agency (CFIA) Directive (D-03-08): Phytosanitary Requirements to Prevent the Introduction into and Spread within Canada of the Emerald Ash Borer (EAB) *Agrilus planipennis* (Fairmaire) applies to Ash (*Fraxinus* sp.) species observed on properties that are located within the EAB Regulated Areas of Canada (CFIA 2010b). This area covers all of south and central Ontario and western Quebec. Ash trees located on the site that require removal are subject to this directive.

Trees of the ash family (*Fraxinus* sp.) were found on site. Evidence of EAB infestation (e.g., tree mortality, crown dieback, insect entry holes) was observed. The CFIA restricts the movement of all Ash material including wood, bark, chips or bark chips from being transported outside of the Regulated Area. A Movement Certificate is required by the CFIA for any Ash material leaving the Regulated Area.

Ash are permitted to be chipped on site and/or removed or cut down and removed from site. Chipped Ash material that is to remain on site must be ground or chipped to a size of less than 2.5 cm in any two dimensions. All Ash material chipped or whole that is to be removed from site must be disposed of within the Regulated Areas of Canada. The City of Ottawa Trail Road Waste Facility is currently the only location in the Ottawa area to dispose of EAB infested ash trees. A Movement Certificate is not required to dispose of project related ash trees at the Trail Road Facility.

4.3.3 Dutch Elm Disease

CFIA Directive (D-97-07): Phytosanitary Requirements for the Importation from the United States and Domestic Movement of Elm Material (*Ulmus* spp. and *Zelkova* spp.) to Prevent the Introduction and Spread of Dutch Elm Disease *Ophiostoma ulmi* (Buisman) Nannf. and *Ophiostoma novo-ulmi* (Brasier) within Canada (CFIA 2010a), applies to Elm (*Ulmus* sp. and *Zelkova* sp.) species observed on properties that are located within the regulated areas of Canada. This directive has been revised to strengthen the phytosanitary requirements pertaining to the domestic movement and importation of some regulated commodities such as elm nursery stock from infested areas of Canada and the U.S.

Trees of the Elm family (*Ulmus* sp.) were found on site. Evidence of Dutch Elm Disease infestation (e.g., tree mortality, crown dieback, galleries and tunnels on exposed sapwood) was observed. The CFIA restricts the movement of all Elm material including propagative material, including nursery stock, and non-propagative material with bark attached such as logs, lumber, firewood, crates and isolated bark of all species, hybrids and horticultural cultivars of elm.

A Movement Certificate may be required from the CFIA for the movement of any Elm material infested with Dutch Elm Disease outside of the province. Elm infected with Dutch Elm Disease should be buried, debarked, burned or chipped (CFIA, 2010).

4.3.4 LDD Moth

CFIA Directive (D-99-09): Comprehensive Policy to Control the Spread of the LDD Moth (*Lymantria dispar dispar*) in Canada and the United States (CFIA 2020), as it relates to the project, applies to the import of and movement within Canada of nursery stock and forestry products with bark attached which can harbour any life stage of the LDD moth.

All nursery stock grown within regulated areas, and all non-propagative forest products with bark attached origniating from regulated areas, must be accompanied by a Movement Certificate issued by a CFIA inspector, before moving into non-regulated areas. The City of Ottawa is within the area regulated for LDD moth, and all life-stages of LDD moth were observed on the NCD site.

4.4 Timing Windows for Tree Removals

To minimize impacts to wildlife and ensure compliance of the *Migratory Birds Convention Act (MBCA), 1994,* the *Species at Risk Act (SARA) 2002* and the *Endangered Species Act (ESA), 2007*, the following is recommended:

- Time vegetation removal to occur between October 1 to March 31, which is outside of the breeding bird window (April 8 to August 31) and active bat season (April 1 to September 30).
- If vegetation removal is required during the breeding bird season, a nest sweep should be completed by a qualified biologist prior to construction to verify nesting activity, and to inspect for leaf-roosting bats. Vegetation clearing must take place within 48 hours of the inspection.
    - It is highly recommended that cavity trees are not removed during the active bat season, therefore these removals should be prioritized and scheduled accordingly. If removal of cavity trees must occur within the active bat season, Environment and Climate Change Canada (ECCC) and the Ministry of the Environment Conservation and Parks (MECP), should be contacted to confirm survey methods to avoid potential impacts to SAR bats.
- If an active nest or roost is found within the work area, at any time (including times outside of the typical nesting season), ECCC must be contacted for species protected under the MBCA and/or the SARA, and MECP must be notified for species protected under the ESA. Construction in the vicinity must cease until the young birds have fledged or the nest is otherwise abandoned. A setback from the nest (e.g., 30 m) should be identified and the area demarcated to ensure work does not occur within the setback limits. ECCC should be consulted to determine the setback limits.

5.0 SUMMARY

This document provides an overview of the background and existing conditions (**Section 2.0**) and Vegetation Management/Conservation Strategy for the retention, compensation, and enhancement of vegetative conditions on the NCD Site (**Section 3.0**), as well as mitigations and resources for contractors and vendors working with and in proximity to vegetation on the site (**Section 4.0**). Vegetation management for the NCD development will include the following strategies throughout planning, design, construction, and post-construction monitoring of each phase of development:

- A target of 40% canopy cover within 40 years has been identified for the site. Preservation of existing vegetation should be considered wherever feasible, based on recommended criteria for design-based protection of trees (see **Section 3.1.1**)
  - This will include one tree for every five parking spaces in areas near surface-grade parking lots
  - Offsite plantings may be considered towards achieving the 40% target (i.e. if 35% canopy cover can be achieved onsite, 5% may be comprised of offsite plantings). Offsite locations will be considered as required at each phase of development in response to available space for relocations, site-screening, and the developing site-wide canopy plan.
  - Retention and protection of trees and shrubs, particularly mature specimens wherever possible
- Relocation of trees under 23 cm DBH may be considered (see **Section 3.1.2**)
- Retention of suitable dead and declining trees outside of impact areas should be considered in order to create and maintain snags in support of wildlife habitat (see **Section 3.2**)
- Tree, shrub, and herbaceous species selected for planting plans should focus on a diverse mixture of primarily native species, and include species of indigenous significance and/or wildlife and pollinator values throughout the site (see **Appendix B**: Recommended Species List)
  - If non-native species are included in the planting plans, they must not include invasive species
  - A total of 43 tree and shrub species native to Ontario were recorded as part of the vegetation inventory. Planting plans should aim to increase the total number of native woody species present on the NCD site
  - Diverse plantings will consider the creation of a multi-layered canopy with a range of tree and shrub sizes as well as ages and rates of growth
  - Species of Indigenous significance will be incorporated into site-wide landscaping plans as well as in an Indigenous Garden located on the green roof
- Invasive species encountered within the construction limits at each phase of development should be removed and disposed of following current best management practices (see **Section 4.3**)
  - In order to limit overall canopy loss, targeted management and removals will only be carried out for identified Priority Invasives
  - For all other invasive trees and shrubs, including planted specimens, only those that will be impacted within the construction limits have been identified for removal
- Post-construction monitoring should be carried out to monitor the condition of planted and relocated trees (see **Section 3.3.2**), and to monitor the recurrence of invasive species (see **Section 3.2.4**).
- A Long-Term Tree Canopy Adaptive Management Plan will be prepared to monitor canopy growth over time (see **Section 3.3.1**)

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Appendix A: Inventoried Tree and Shrub Species List

Appendix A: Inventoried Tree and Shrub Species List

New Civic Development for the Ottawa Hospital

Vegetation Management/Conservation Plan

		Desireable Tree Species				Invasive Species			
Common Name	**Taxonomic Name**	**Unique and Uncommon**	**Native to Ontario**	**Cultivar of Native Species**	**Non-Native Ornamental**	**Native with Invasive Tendencies**	**Invasive Tendencies**	**Tracked Invasive**	**Restricted Invasive**
Alpine Currant	*Ribes alpinum*				X				
Alternate-leaved Dogwood	*Cornus alternifolia*		X						
American Beech	*Fagus grandifolia*		X						
American Mountain-ash	*Sorbus americana*		X						
American Sycamore	*Platanus occidentalis*	X	X						
American Witch Hazel	*Hamamelis virginana*	X	X						
Amur Cork Tree	*Phellodendron amurense*	X			X				
Amur Maple	*Acer ginnala*						X		
Apple sp.	*Malus sp.*			X					
Austrian Pine	*Pinus nigra*				X				
Basswood	*TIlia americana*		X						
Black Alder	*Alnus glutinosa*							X	
Black Birch	*Betula nigra*		X						
Black Cherry	*Prunus serotina*		X						
Black Elderberry	*Sambucus nigra*		X						
Black Locust	*Robinia pseudoacacia*							X	
Black Walnut	*Juglans nigra*		X						
Black Willow	*Salix nigra*		X						
Blue Douglas Fir	*Pseudotsuga menziesii*	X			X				
Broadleaf Linden	*Tilia platyphyllos*				X				
Butternut	*Juglans cinerea*	X	X						
Carolina Poplar	*Populus carolina*		X						
Chinese Prinsepia	*Prinsepia sinensis*				X				
Chokecherry	*Prunus virginiana*		X						
Colorado Blue Spruce	*Picea pungens*				X				
Common Ninebark	*Physocarpus opulifolia*		X						
Daimyo Oak	*Quercus dentata*	X			X				
Dawn Redwood	*Metasequoia glyptostroboides*	X			X				
Douglas Fir	*Pseudotsuga menziesii*				X				
Eastern Red-cedar	*Juniperus virginiana*		X						
Eastern White-cedar	*Thuja occidentalis*		X						
European Buckthorn	*Rhamnus cathartica*							X	
European Fly Honeysuckle	*Lonicera xylosteum*							X	
European Horse-chestnut	*Aesculus hippocastanum*				X				
European Larch	*Larix deciduosa*				X				
European Spindletree	*Euonymus europaeus*						X		
False cypress	*Chamaecyparis pisifera*				X				
Ginkgo	*Ginkgo biloba*				X				
Golden Eastern-white-cedar	*Thuja occidentalis*			X					
Golden-Twig Dogwood	*Cornus sericea*			X					
Green Ash	*Fraxinus pennsylvanica*		X						
Grey Dogwood	*Cornus racemosa*		X						
Hackberry	*Celtis occidentalis*		X						
Hardy Rubber-tree	*Eucommia ulmoides*	X			X				
Harlequin Maple	*Acer platanoides*				X				
Hawthorn sp.	*Crataegus sp.*								
Hazel sp.	*Corylus sp.*								
Heartnut	*Juglans ailantifolia*				X				
Hedge Cotoneaster	*Cotoneaster lucidus*				X				
Honeylocust	*Gleditsia triacanthos*		X						
Honeysuckle sp.	*Lonicera sp*				X				
Japanese Lilac	*Syringa reticulata*				X				
Katsura	*Cercidiphyllum japonicum*				X				
Kentucky Coffeetree	*Gymnocladus dioicus*	X	X						

Korean Mountain-ash	*Sorbus alnifolia*				X				
Liaodong Oak	*Quercus liaotungensis*	X			X				
Lilac sp.	*Syringa sp.*				X				
Littleleaf Linden	*TIlia cordata*				X				
Magnolia var.	*Magnolia x.*	X			X				
Manchurian Oak	*Quercus fabri*	X			X				
Manitoba Maple	*Acer negundo*					X			
Mountain Ash sp.	*Sorbus sp.*								
Mugo Pine	*Pinus mugo*				X				
Northern Catalpa	*Catalpa speciosa*		X						
Norway Maple	*Acer platanoides*							X	
Norway Spruce	*Picea abies*				X				
Oak sp.	*Quercus sp.*								
Ohio Buckeye	*Aesculus glabra*		X						
Pin Oak	*Quercus palustris*				X				
Pine sp.	*Pinus sp.*								
Pitch Pine	*Pinus rigida*		X						
Proctor's Magnolia	*Magnolia x. proctoriana*	X			X				
Red Maple	*Acer rubrum*		X						
Red Oak	*Quercus rubra*		X						
Red Osier Dogwood	*Cornus sericea*		X						
Red Pine	*Pinus resinosa*		X						
Resin Birch	*Betula neoalaskana*		X						
Russian Olive	*Elaeagnus angustifolia*						X		
Scarlet Willow	*Salix alba*			X					
Scots Pine	*Pinus sylvestris*							X	
Serbian Spruce	*Picea omorika*	X			X				
Serviceberry sp.	*Amelanchier sp.*		X						
Shagbark Hickory	*Carya ovata*	X	X						
Siberian Elm	*Ulmus pumila*				X				
Siberian Peashrub	*Caragana arborensis*				X				
Silver Maple	*Acer saccharinum*		X						
Staghorn Sumac	*Rhus typhina*		X						
Sugar Maple	*Acer saccharum*		X						
Swiss Stone Pine	*Pinus cembra*				X				
Tamarack	*Larix laricina*		X						
Tatarian Honeysuckle	*Lonicera tatarica*							X	
Tree of Heaven	*Ailanthus altissima*						X		
Trembling Aspen	*Populus tremuloides*		X						
Tulip Tree	*Liriodendron tulipifera*	X	X						
Viburnum sp.	*Viburnum sp.*								
Wayfaring Bush	*Viburnum lantana*				X				
White Elm	*Ulmus americana*		X						
White Oak	*Quercus alba*		X						
White Pine	*Pinus strobus*		X						
White Poplar	*Populus alba*						X		
White Spruce	*Picea glauca*		X						
Willow Oak	*Quercus phellos*	X			X				
Wingnut	*Pterocarya stenocarpa*	X			X				
Yew sp.	*Taxus sp.*								
Unknown									

Appendix B: Recommended Species List for Planting Plans

Appendix B: Recommended Species List

New Civic Development for the Ottawa Hospital
Vegetation Management/Conservation Plan

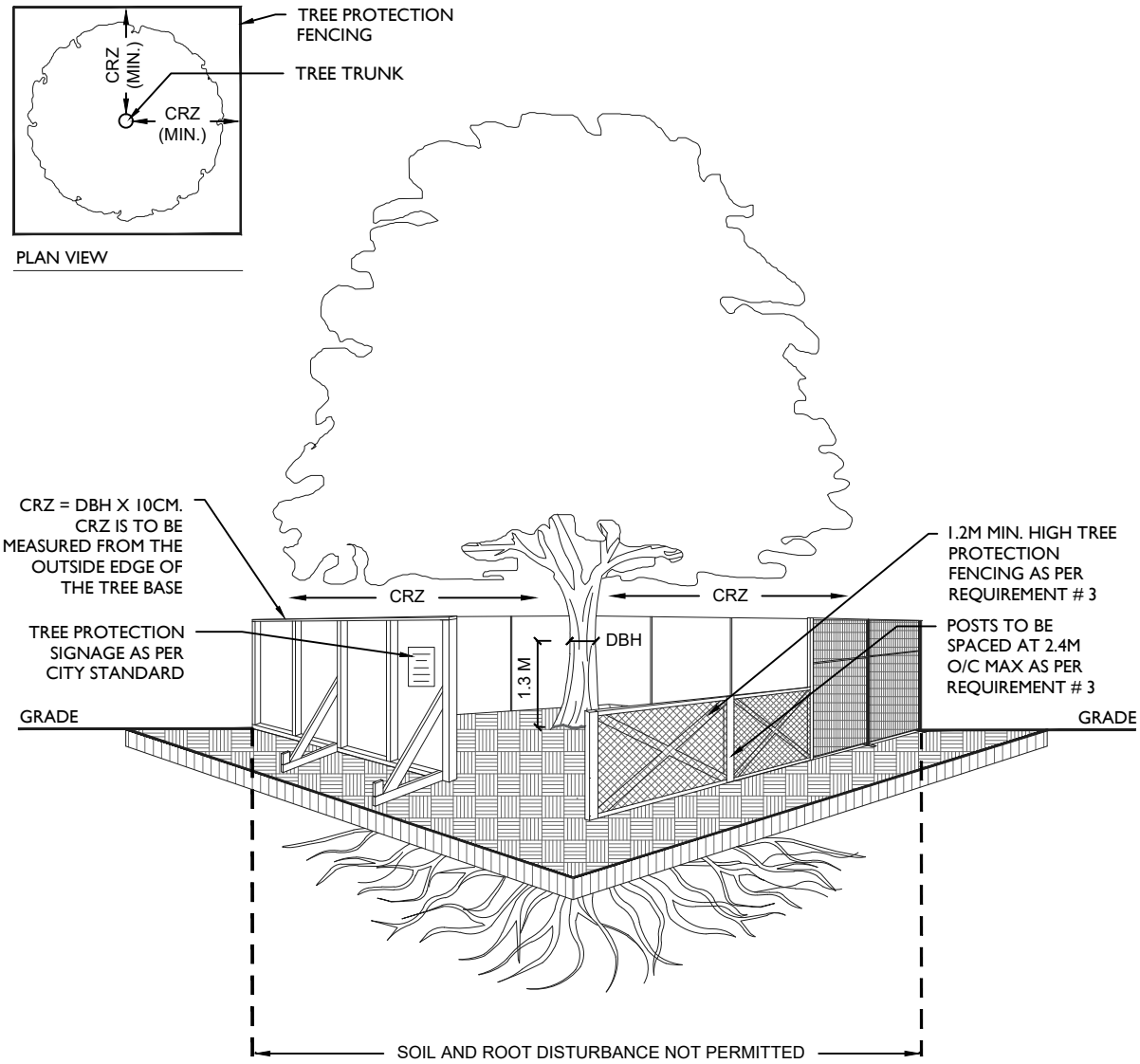
Disclaimer: Please note that the following recommended species do not represent all species that may be considered in Landscaping Plans throughout development. Species selection at each phased site plan will consider the appropriate native species to meet landscaping conditions and objectives as they apply to the NCD development.

Common Name	Taxonomic Name	Native to Ontario	Cultivar of Native Species	Non-Native Ornamental	Indigenous Significance	Wildlife Forage	Wildlife Habitat	Pollinator Forage	Pollinator Host	SAR Vegetation	Suitable to Warming Climate	Thrives in Extremes	Winter Interest
Balsam Fir	*Abies balsamifera*	X			X	X	X						x
Vine Maple	*Acer circinatum*			X							X		
Striped Maple	*Acer pensylvanicum*	X			X	X			X			x	x
Red Maple	*Acer rubrum*	X			X	X	X	X	X				
Silver Maple	*Acer saccharinum*	X			X	X	X	X	X				
Sugar Maple	*Acer saccharum*	X			X	X	X	X	X				
Black Maple	*Acer saccharum ssp. nigrum*	X			X	X	X	X	X				
Mountain Maple	*Acer spicatum*	X			X	X	X	X	X			x	
Ohio Buckeye	*Aesculus glabra*	X				X		X	X		X		
Smooth Serviceberry	*Amelanchier laevis*	X			X	X		X	X			x	
Serviceberry sp.	*Amelanchier sp.*	X			X	X		X	X			x	
False Indigo	*Amorpha fruticosa*	X						X	X		X		
Chokeberry	*Aronia melanocarpa*	X			X	X		X	X		X	x	
Pawpaw	*Asimina triloba*	X			X	X				X	X		
Cherry Birch	*Betula lenta*	X				X			X	X			
Resin Birch	*Betula neoalaskana*	X				X			X				
Black Birch	*Betula nigra*	X				X			X				
Gray birch	*Betula populifolia*	X				X			X				
Dwarf Birch	*Betula pumila*	X				X			X				
Paper Birch	*Betula papyrifera*	X			X	X			X				
Musclewood	*Carpinus caroliniana*	X				X			X	X	X		
Bitternut Hickory	*Carya cordiformis*	X				X			X		X		
Pignut Hickory	*Carya glabra*	X				X			X		X		
Shagbark Hickory	*Carya ovata*	X				X	X		X		X		
Northern Catalpa	*Catalpa speciosa*	X					X	X	X				
New Jersey Tea	*Ceanothus americanus*	X						x	x				
Hackberry	*Celtis occidentalis*	X				x							
Eastern Redbud	*Cercis canadensis*	X						x	x		x		
Sweetfern	*Comptonia peregrina*	X				x	x	x	x			x	
Alternate-leaved Dogwood	*Cornus alternifolia*	X				x		x	x		x		
Grey Dogwood	*Cornus racemosa*	X				x		x	x				
Red Osier Dogwood	*Cornus sericea*	X			x	x		x	x				x
American Hazel	*Corylus americana*	X				x		x	x				
Hawthorn	*Crataegus sp.*	X	X		x	x	x	x	x				
Leatherwood	*Dirca palustris*	X			x			x					
American Beech	*Fagus grandifolia*	X				x	x						x
Ginkgo	*Ginkgo biloba*			X									
Honeylocust	*Gleditsia triacanthos*	X	X								x		
Kentucky Coffeetree	*Gymnocladus dioicus*	X						x		x	x		

American Witch Hazel	*Hamamelis virginana*	X			x	x		x	x		x	x	x
Mountain Holly	*Ilex mucronata*	X				x			x			x	x
Canada Holly	*Ilex verticillata*	X				x			x			x	x
Butternut	*Juglans cinerea*	X								x			
Black Walnut	*Juglans nigra*	X			x	x			x		x	x	
Eastern Red-cedar	*Juniperus virginiana*	X			x						x	x	x
European Larch	*Larix decidua*			X									
Tamarack	*Larix laricina*	X			x		x					x	
Spicebush	*Lindera benzoin*	X			x	x	x	x	x		x		
Tulip Tree	*Liriodendron tulipifera*	X						x	x		x		
Cucumber Tree	*Magnolia acuminata*	X						x	x	x	x		
Sweet Crabapple	*Malus coronaria*	X			x	x		x	x		x		
Apple sp.	*Malus sp.*			X									
Ironwood	*Ostrya virginiana*	X				x			x		x		
Common Ninebark	*Physocarpus opulifolia*	X						x	x		x		
White Spruce	*Picea glauca*	X			x	x	x				x	x	x
Black Spruce	*Picea mariana*	X			x	x	x					x	x
Jack Pine	*Pinus banksiana*	X			x	x	x					x	x
Red Pine	*Pinus resinosa*	X			x	x	x						x
Pitch Pine	*Pinus rigida*	X			x	x	x						x
White Pine	*Pinus strobus*	X			x	x	x						x
American Sycamore	*Platanus occidentalis*	X			x	x	x		x		x		x
Carolina Poplar	*Populus carolina*	X							x		x		
Trembling Aspen	*Populus tremuloides*	X			x		x		x				
Canada Plum	*Prunus nigra*	X			x	x		x	x		x		
Pin Cherry	*Prunus pensylvanica*	X			x	x		x	x		x		
Black Cherry	*Prunus serotina*	X			x	x		x	x		x		
Chokecherry	*Prunus virginiana*	X			x	x		x	x		x		
White Oak	*Quercus alba*	X			x	x	x	x	x		x		
Bur Oak	*Quercus macrocarpa*	X			x	x	x	x	x		x	x	
Red Oak	*Quercus rubra*	X			x	x	x	x	x		x		
Fragrant Sumac	*Rhus aromatica*	X			x	x		x	x		x	x	
Staghorn Sumac	*Rhus typhina*	X			x	x		x	x		x	x	x
Flowering Raspberry	*Rubus odoratus*	X				x		x	x		x		
Black Willow	*Salix nigra*	X			x			x	x		x		
Black Elderberry	*Sambucus nigra*	X			x	x		x	x		x		
Sassafras	*Sassafras albidum*	X			x	x		x	x		x		
Canada Buffaloberry	*Shepherdia canadensis*	X			x	x		x	x		x	x	x
American Mountain-ash	*Sorbus americana*	X			x	x		x	x		x		
Snowberry	*Symphoricarpos albus*	X	X			x			x		x		x
Canada Yew	*Taxus canadensis*	X			x						x	x	x
Eastern White-cedar	*Thuja occidentalis*	X			x						x	x	x
Basswood	*TIlia americana*	X			x	x	x	x	x		x		
Eastern Hemlock	*Tsuga canadensis*	X			x	x	x				x		x
White Elm	*Ulmus americana*	X	X				x		x		x	x	

Lowbush Blueberry	*Vaccinium angustifolium*	X	X		x	x		x	x			x	
Highbush Blueberry	*Vaccinium corymbosum*	X	X		x	x		x	x			x	
Hobblebush	*Viburnum lantanoides*	X				x		x	x		x		
Wild Raisin	*Viburnum nudum*	X				x		x	x		x		
Nannyberry	*Virburnum lentago*	X				x		x	x		x		

Appendix C: City of Ottawa Tree Protection Specifications



TREE PROTECTION REQUIREMENTS:

1. PRIOR TO ANY WORK ACTIVITY WITHIN THE CRITICAL ROOT ZONE (CRZ = 10 X DIAMETER) OF A TREE, TREE PROTECTION FENCING MUST BE INSTALLED SURROUNDING THE CRITICAL ROOT ZONE, AND REMAIN IN PLACE UNTIL THE WORK IS COMPLETE.
2. UNLESS PLANS ARE APPROVED BY CITY FORESTRY STAFF, FOR WORK WITHIN THE CRZ:
   - DO NOT PLACE ANY MATERIAL OR EQUIPMENT - INCLUDING OUTHOUSES;
   - DO NOT ATTACH ANY SIGNS, NOTICES OR POSTERS TO ANY TREE;
   - DO NOT RAISE OR LOWER THE EXISTING GRADE;
   - TUNNEL OR BORE WHEN DIGGING;
   - DO NOT DAMAGE THE ROOT SYSTEM, TRUNK, OR BRANCHES OR ANY TREE;
   - ENSURE THAT EXHAUST FUMES FROM ALL EQUIPMENT ARE NOT DIRECTED TOWARD ANY TREE CANOPY.
   - DO NOT EXTEND HARD SURFACE OR SIGNIFICANTLY CHANGE LANDSCAPING
3. TREE PROTECTION FENCING MUST BE AT LEAST 1.2M IN HEIGHT, AND CONSTRUCTED OF RIGID OR FRAMED MATERIALS (E.G. MODULOC - STEEL, PLYWOOD HOARDING, OR SNOW FENCE ON A 2"X4" WOOD FRAME) WITH POSTS 2.4M APART, SUCH THAT THE FENCE LOCATION CANNOT BE ALTERED. ALL SUPPORTS AND BRACING MUST BE PLACED OUTSIDE OF THE CRZ, AND INSTALLATION MUST MINIMISE DAMAGE TO EXISTING ROOTS. (SEE DETAIL)
4. THE LOCATION OF THE TREE PROTECTION FENCING MUST BE DETERMINED BY AN ARBORIST AND DETAILED ON ANY ASSOCIATED PLANS FOR THE SITE (E.G. TREE CONSERVATION REPORT, TREE INFORMATION REPORT, ETC). THE PLAN AND CONSTRUCTED FENCING MUST BE APPROVED BY CITY FORESTRY STAFF PRIOR TO THE COMMENCEMENT OF WORK.
5. IF THE FENCED TREE PROTECTION AREA MUST BE REDUCED TO FACILITATE CONSTRUCTION, MITIGATION MEASURES MUST BE PRESCRIBED BY AN ARBORIST AND APPROVED BY CITY FORESTRY STAFF. THESE MAY INCLUDE THE PLACEMENT OF PLYWOOD, WOOD CHIPS, OR STEEL PLATING OVER THE ROOTS FOR PROTECTION OR THE PROPER PRUNING AND CARE OF ROOTS WHERE ENCOUNTERED.

THE CITY'S TREE PROTECTION BY-LAW, 2020-340 PROTECTS BOTH CITY-OWNED TREES, CITY-WIDE, AND PRIVATELY-OWNED TREES WITHIN THE URBAN AREA. PLEASE REFER TO WWW.OTTAWA.CA/TREEBYLAW FOR MORE INFORMATION ON HOW THE TREE BY-LAW APPLIES.

ACCESSIBLE FORMATS AND COMMUNICATION SUPPORTS ARE AVAILABLE, UPON REQUEST

Ottawa

TREE PROTECTION SPECIFICATION

TO BE IMPLEMENTED FOR RETAINED TREES, BOTH ON SITE AND ON ADJACENT SITES, PRIOR TO ANY TREE REMOVAL OR SITE WORKS AND MAINTAINED FOR THE DURATION OF WORK ACTIVITIES ON SITE.

SCALE:	NTS
DATE:	MARCH 2021
DRAWING NO.:	1 of 1

Appendix D: Clean Equipment Protocol for Industry

Clean Equipment Protocol for Industry – Summary

Invasive species are plants, animals and microorganisms that have been accidentally or deliberately introduced into areas beyond their normal range, that out compete native species. Invasive species are a major threat to Ontario's natural areas, and are very costly to deal with once established.

Invasive species can be spread to new areas by contaminated mud, gravel, soil and plant materials on vehicles and machinery.

The best practice is to prevent the spread of invasive species. By inspecting and cleaning equipment and following some simple guidelines, the risk of spreading invasive plants is greatly reduced.

- Identify invasive plants and plan activities accordingly (i.e. schedule work in areas without invasive plants first, leaving infested areas til the end, to reduce the risk of unintentionally moving plants into a new area).
- Record & report sightings of invasive plants
  (Invading Species hotline at **1-800-563-7711** or online **www.invadingspecies.com/report/** or **www.eddmaps.org/Ontario**)
- Inspect vehicles and machinery before and after entering sites or conducting work along roadways & waterways.

How to Inspect

Before leaving the site, inspect the vehicle thoroughly inside and out for where dirt, plant material and seeds may be lodged or stuck to interior and exterior surfaces. Remove and clean any guards, covers or plates that are easy to remove.

Pay attention to the underside of the vehicle, radiators, spare tires, foot wells and bumper bars. If clods of dirt, seed or other plant material are found, remove immediately and discard where the contamination occurred or in the garbage.

When Cleaning is required

- Safely locate the vehicle and equipment away from any hazards, ensure engine is off and the vehicle or equipment is immobilized.
- Clean the vehicle/equipment in an appropriate area where contamination and seed spread is not possible (or limited).

  The site should be:

  - » Mud free, gravel covered hard surface, or, if this is not available, a well maintained grassy area.
  - » Gently sloping to assist in draining water and material away from the vehicle or equipment. Care should be taken to ensure that localized erosion will not be created.
  - » At least 30m away from any watercourse, water body and natural vegetation.
  - » Large enough to allow for adequate movement of larger vehicles and equipment.

Continued...

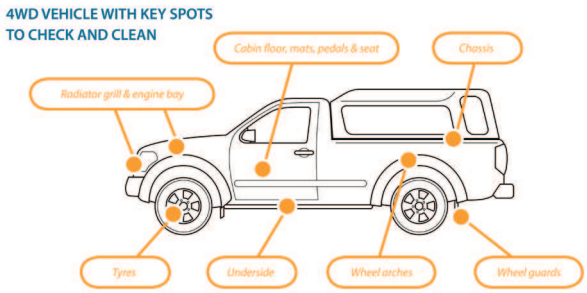
Equipment Required

- [ ] A pump and high pressure hose OR High pressure water unit
- [ ] Air compressor and blower OR Vacuum
- [ ] Shovel
- [ ] Pry bar
- [ ] Stiff brush or broom

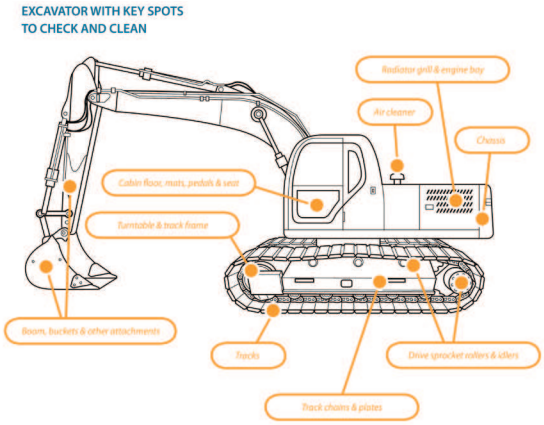
Final Inspection Checklist

- [ ] No clods of dirt should be visible after cleaning.
- [ ] Radiators, grills and the interiors of vehicles should be free of accumulations of seed, soil, mud and plant material parts including seeds, roots, flowers, fruit and or stems.

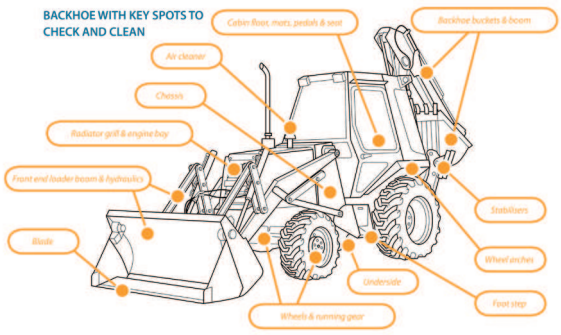
2WD and 4WD Vehicles



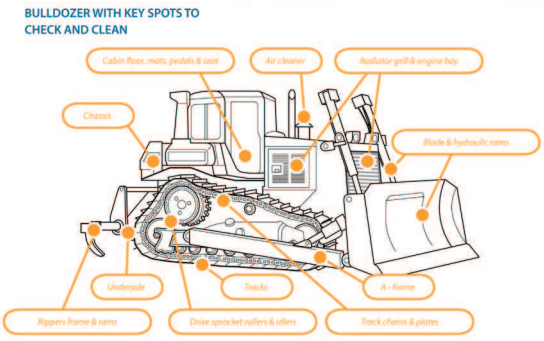
Excavator



Backhoe



Bulldozer



Invasive Species Centre
Catalyst for research and response

Ontario

Peterborough County Stewardship

Ontario Invasive Plant Council