Appendix A

SRPI.20.039

David Dunlap Observatory Park

Phase 2 South-West Detailed Woodland Restoration and Implementation Plan

July 17, 2020

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Toronto and Region Conservation for The Living City®

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1.0 Executive Summary

The Phase 2 South-West Woodland Restoration and Implementation Plan outlines a number of activities proposed by Toronto and Region Conservation Authority (TRCA) to improve the natural landscape of the David Dunlap Observatory Park (DDO Park) property owned by the City of Richmond Hill (herein referred to as 'the City').

Funds for this project were acquired through an Ontario Municipal Board (OMB) compensation settlement for a development on the former eastern portion of the DDO property and are to be used for the development of a self-sustaining native forest community and the enhancement of existing woodlands at the City-owned property, now called the David Dunlap Obervatory Park (DDO Park).

TRCA completed a baseline study of the entire DDO Park, including the Phase 2 area's natural features in 2017, identifying opportunities for restoration and enhancement. Wetland restoration opportunities were identified along with opportunities to remove/manage invasive species, create new woodland communities, improve hydrologic function, and create new habitat features.

After assessing these opportunities and consulting with City of Richmond Hill staff, TRCA is proposing to undertake works that would achieve the following objectives:

- The creation of **2.5 ha of new woodland** by reforesting portions of the previously farmed land;
- The **restoration of 1.5 ha** of land, primarily through invasive species management and monitoring;
- The creation of **wildlife habitat features**;
- **Hydrologic improvements on 0.60 ha** of land to restore natural conditions;
- An overall **increase in native species** composition, resulting in increased forest cover, improved forest health, and overall ecosystem resilience to climate change effects.

This document lays a plan for the completion of that work over the next 5 years (2020-2024). Detailed descriptions of the work are provided, along with timelines and budgets.

The total value of the proposed budget to complete this work within the scheduled timeframe is $243,493.32. This amount includes $53,963.02 contributed by TRCA, $10,000 from the City of Richmond Hill's Community Stewardship Program, and $179,530.30 from the City's DDO Park compensation settlement funds.

2.0 Introduction

2.1 History of David Dunlap Park Restoration Plan

The DDO Park restoration is in the area located north of Wilfred Court and Fern Avenue, and immediately west of Bayview Avenue in Richmond Hill. On April 12, 2012, City Council approved an OMB mediated settlement for the development application associated with the DDO Park site. As part of this settlement it was agreed that Richmond Hill would receive compensation from the developer to use towards the development of self-sustaining native forest community creation (8.41 ha) and the enhancement of woodlands preserved on the DDO Park site (24.46 ha). The TRCA was highlighted in the OMB settlement as a partner in the restoration plan development and implementation of the woodland creation, enhancements, and management.

The value and scope of compensation was determined based on several policy documents and plans including the Provincial Policy Statement, the DDO Master Environmental Servicing Plan (MESP), and the DDO Lands Conservation Management Plan, among others. The intent of the compensation requirement has been incorporated into a more detailed DDO Park Master Plan which was approved by City Council in September 2016. The Settlement and DDO Park Master Plan have provided guidance for developing this multi-year restoration strategy for the woodland creation and management within the Phase 2 area.

As referenced in the OMB settlement (Section 8, subsection (i)), the intent of the compensation money is to create 8.41 ha of new self-sustaining, native forest communities and to manage and enhance 24.46 ha of existing woodlands within the retained DDO Park. This is to compensate for removal of woodlands within the settlement area and to address negative impacts to existing woodlands arising from the approved development. This Phase 2 area plan has been developed to detail the implementation of a woodland creation strategy for 2.5 ha of land, and a restoration strategy for 1.5 ha of land designated as culturally significant in the *David Dunlap Observatory Lands: Conservation Management Plan* (City of Richmond Hill, 2010). The plan outlines required hazard and ash tree management (cutting), invasive species management, and woodland enhancement and creation through naturalization plantings. The plan also outlines optional activities for wildlife habitat creation which would rely on a separate funding source to implement.

2.2 Baseline Study

In 2017, the Toronto and Region Conservation Authority (TRCA) and the City of Richmond Hill established a partnership to undertake a detailed study and analysis of the DDO Park. The main goal of the partnership was to develop a baseline of the natural features existing within the park and a plan for restoring them (David Dunlap Observatory Property Natural Feature Baseline Assessment and Prioritization Report, 2017). This baseline study included desktop analysis using a variety of GIS layers, LiDAR data and ArcHydro models that were available to TRCA staff, and a review of relevant background documents including the Master Environmental Servicing Plan provided by The City of Richmond Hill. TRCA staff conducted site assessments to ground truth and collect detailed data of the existing natural features. During these site visits, staff also catalogued any potential restoration opportunities within the park, which would allow for the creation of a master list of restoration opportunities that could be incorporated into future planning.

2.3 Restoration Opportunities

During the desktop analysis of the collected data, potential wetland restoration opportunities were identified. To the southeast of the ring road there is the potential to restore a small lowland wetland through some minor site grading and exploratory excavation to find and sever any remaining tile drainage connections that may exist. This would disrupt the subsurface drainage and allow the water to pool in shallow graded pockets on the surface which could then be planted throughout with a variety of native lowland tree and shrub species creating a lowland forested wetland habitat.

The DDO Park is within a heavily urbanized area. Typical of the forests growing in this type of environment, the existing forested and treed areas are generally in a state of degradation. This can be primarily attributed to the colonization of invasive species and general lack of forest management activities. Invasive species management requires many years of persistence and commitment to be effective. The opportunity exists at DDO Park to minimize the size and spread of invasive species populations, as well as prevent the new introduction of invasive species into areas that currently have few invasive species present. It should be noted that many of the invasive species populations that are found in DDO Park are well established and have likely occupied the site for many years. Therefore, the reduction and prevention of spread were considered priorities when developing the restoration plan to achieve successful invasive species management.

2.4 Objectives

Upon careful consideration of the restoration opportunities and discussions with City of Richmond Hill natural environment staff, this Phase 2 South-West Detailed Woodland Restoration and Implementation Plan has been developed. The plan uses data collected through the natural feature baseline study as well as forest inventory and restoration opportunities assessment data to present a detailed restoration and implementation plan for the south-west portion of the DDO Park property (Figure 1).

This plan has five (5) primary objectives to be completed over a five-year period (2020-2024):

1. The creation of **2.5 ha of new woodland** by reforesting portions of the previously farmed land;
2. The **restoration of 1.5 ha** of land primarily by invasive species management and monitoring;
3. The creation of **wildlife habitat features**;
4. **Hydrologic improvements on 0.60 ha** of land to restore natural conditions;
5. An overall **increase in native species** composition, resulting in increased forest cover, improved forest health, and overall ecosystem resilience to climate change effects.

This restoration plan outlines the approach for restoring the Phase 2 area and includes timelines, budgets, and implementation and monitoring strategies. All budget amounts are in 2020 dollars based on TRCA cost estimates and are competitive with industry standards.

Figure 1 outlines the boundaries of the proposed Phase 2 activities, including the upland and lowland naturalization plantings, invasive species management work, and the hydrologic improvements. The proposed location of the temporary staging area and vehicular access to the restoration site are indicated in Figure 2. It must be noted that these are suggested areas and can potentially be altered prior to any restoration activities that are scheduled to start in fall of 2020.

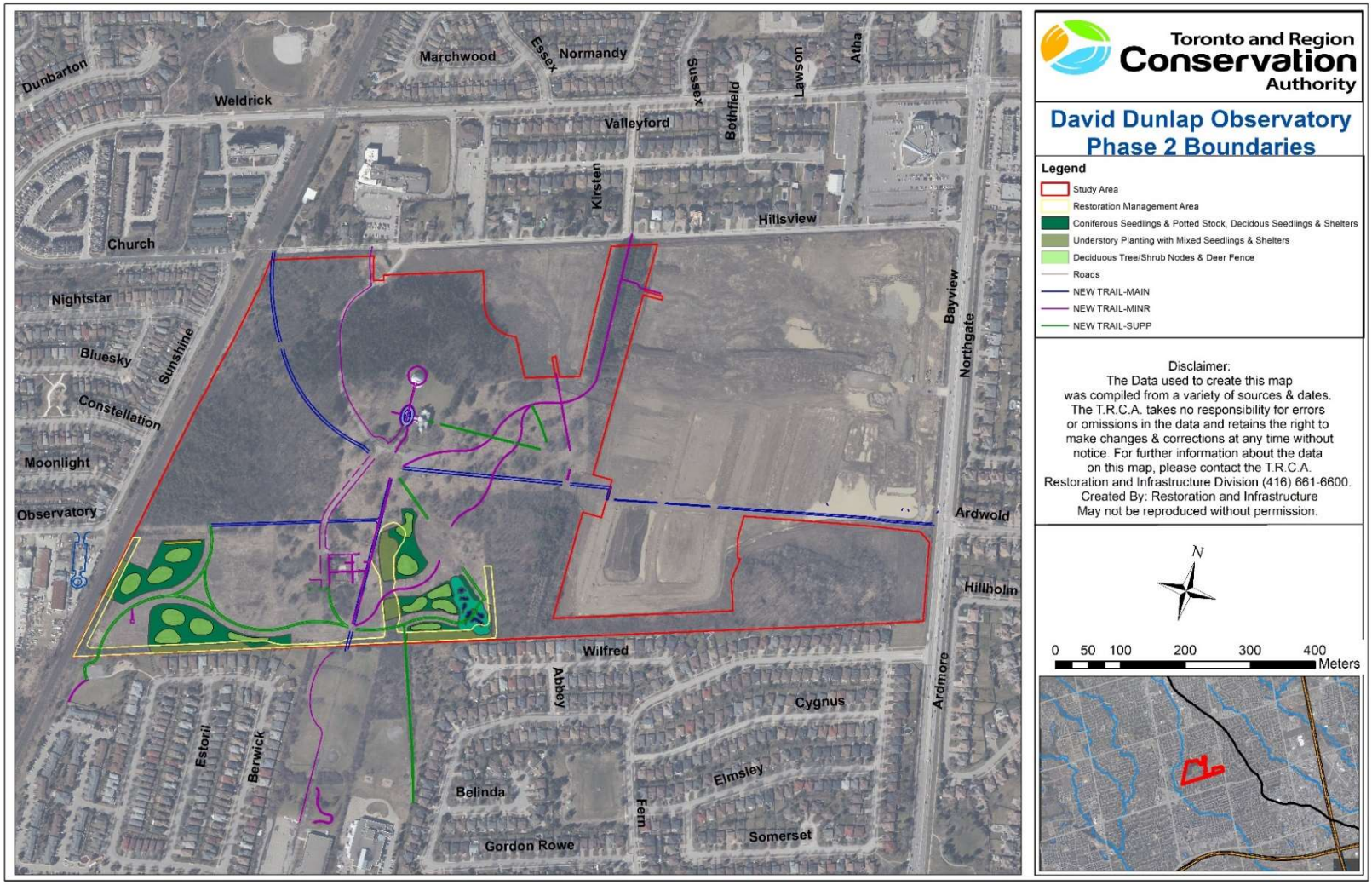


Figure 1. David Dunlap Observatory Phase 2 Boundaries

Disclaimer: The data used to create this map was compiled from a variety of sources & dates. The TRCA takes no responsibility for errors or omissions in the data and retains the right to make changes & corrections at anytime without notice. For further information about the data on this map, please contact the TRCA Restoration and Infrastructure Division. (416) 661-6600.

Figure 2. Staging Area and Site Access Locations

3.0 Restoration and Implementation Plan

Phase 2 will consist of several different restoration and enhancement activities that will be completed. The following is a list of the specific activities:

- Hazard tree removals
- Invasive species management
- Hydrologic improvements
- Site preparation (mowing)
- Deer fencing
- Planting
- Assessments and monitoring
- Adaptive management

Detailed descriptions of each of these activities can be found in sections 4-7 of this report and can be seen in Figures 3, 4 and 5.

3.1 Timelines

Table 1 outlines the proposed timelines for all works that will be completed during the duration of the Phase 2 implementation. Hazard tree removal is the priority to make the area safe for surrounding residents, infrastructure, and further restoration and planting activities. A hazard tree inventory was conducted to prepare the Phase 2 Plan and several hazard trees were identified that will need to be removed prior to any restoration work. At the same time, this work will also include all removals and treatment of any invasive species within and adjacent to the Phase 2 boundary. Most of the larger woody material that will be removed can be utilized for log tangles to create wildlife habitat features within each planting area. It is recommended that buckthorn and Manitoba maple be removed and disposed of off-site to reduce the potential re-introduction of seeds and to provide access for restoration planting efforts and re-growth. The cost of this has been included in the proposed budget.

The initial invasive species management activities, including removal and herbicide treatment, will begin in Year 1 (fall 2020). It is recommended that invasive species be managed over the course of 3 years in order to provide adequate control, limit competition for the new plantings, and ultimately to produce a more biodiverse and healthier ecosystem in the restored areas. A monitoring and adaptive management framework is important for the success of the overall site restoration and is discussed further below in Section 6 (Detailed Description: 5-Year Monitoring and Maintenance Plan).

The hydrologic improvement works will be scheduled for fall of 2020. Excavation works are only being proposed in the eastern-most location of the three originally proposed locations for fall 2020. Work in the eastern location (Figure 5) will include minor excavation and grading prior to lowland tree and shrub plantings throughout. There will also be habitat structures and nesting boxes installed within the Phase 2 boundary to enhance wildlife habitat. The details of the hydrologic improvements, habitat structures and the scope of work can be found in Section 7 of this document.

In fall 2020, the site preparation for plantings will include mowing the Phase 2 planting areas in order to reduce initial grass competition and to provide ease of access for deer fence installation in year 2. The City of Richmond Hill will be responsible for mowing the open field areas only. Deer exclusion fence nodes will be installed by TRCA staff throughout the five planting areas. Since the surrounding area is heavily populated with deer, it is highly recommended that 10-foot deer fence nodes be installed throughout each area in order to protect the deciduous trees and shrubs from deer browse and rub damage. It is suggested that the deer fence remain in place for at least 10 years to allow the trees and shrubs an opportunity to establish. It is also important to note that the City of Richmond Hill will have ownership of the deer fence and will be responsible for the removal of the fence and T-bars once the plants are established.

It is recommended that RH staff delineate (flag) the proposed new trails adjacent to the planting areas prior to the commencement of planting to ensure an adequate buffer can be maintained so that plantings will not be impacted by future trail works.

The Year 2 Spring upland and lowland plantings will include potted trees and shrubs and a variety of tree seedlings. The deciduous trees and shrubs will be planted in the fenced-in nodes and the potted coniferous trees will be planted in clusters outside of the fence throughout each planting area. The seedlings will be planted in the open areas and in the understory of the existing hedgerows. The detailed planting plan and species selection is outlined in Section 5 of this document. Furthermore, in order to protect the deciduous seedlings from deer browse, tree shelters will be installed and should remain around the seedlings for up to 10 years. The City of Richmond Hill will also have ownership of the tree shelters and will be responsible for the removal of the shelters once the trees reach a free-to-grow stage.

Once all the plantings have been completed, each area will be watered during the spring and summer of Year 2. It is recommended that the plantings be watered at least 4 times during this first growing season.

Invasive species and planting survival assessments will be conducted during the summer and/or fall season each year until Year 5. This will include monitoring the treated areas, the health and growth of the newly planted trees and shrubs and repairing any damaged fence and/or tree shelters. TRCA will provide an annual update of the assessment results to the City of Richmond Hill.

DDO Phase 2: Restoration and Management Timeline																								
Forest Management	Year 1				Year 2				Year 3				Year 4				Year 5				Year 10			
	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
Hazard tree cutting and removal																								
Invasive Treatment - Buckthorn (Basal & Foliar)																								
Invasive Treatment - Manitoba Maple (Cut Stump)																								
Invasive Treatment - DSV (Foliar)																								
Invasive Treatment - Phragmites (Cut Stump)																								
Invasive Species Assessment																								

Restoration/Planting	Year 1				Year 2				Year 3				Year 4				Year 5				Year 10			
	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
Hydraulic Improvements																								
Planting Preparation - Mowing																								
Installation of Deer fence																								
Trail Areas adjacent to Planting Areas Delineated																								
Upland & Lowland Planting - Potted Stock																								
Upland & Lowland Planting - Seedlings/ Tree Shelters																								
Watering (4 times/site)																								
Planting Assessment																								
Infill Planting																								
Deer Fence Monitoring																								
Deer Fence & Tree Shelter Removal																					Refer to section 6.2 Plantings & Post-care			
Habitat Structure - Perch Pole																								
Habitat Structures- Log tangles																								
Nest Box Installation																								

TRCA Staff
City of Richmond Hill Staff

Table 1. Phase 2 Restoration and Management Timelines

3.2 Multi-Year Restoration Budget

Based on the scheduled activities, Table 2 highlights the costs associated with the recommended actions for enhancements to the Phase 2 area. The proposed budget has flexibility and can be further adjusted based on the desired level of invasive species control, hazard tree removal, deer fence installation, and the size and number of planted trees and shrubs. Budget costs were derived by the TRCA Restoration and Infrastructure Division based on TRCA staff rates and costs for materials and supplies. These amounts are based on 2020 pricing, are comparable to industry standards, and assume a 1.4% annual inflation rate.

Table 2. Recommended Multi-year Restoration Budget for Phase 2

Recommended Multi-year Restoration Budget for Phase 2								
	Year 1	Year 2	Year 3	Year 4	Year 5	RH CSP Contribution†	TRCA Contribution	Total RH Capital Cost
Phase 2 Hazard Tree and Buckthorn Cutting	$15,108.60							$15,108.60
Phase 2 Branch and Brush Removal	$9,126.00							$9,126.00
Invasive Species Treatment and (DSV, Buckthorn and Phragmites) Removals	$14,892.04	$13,824.97	$13,824.97					$42,541.98
Planting Site Preparation (Deer Fence Installation)		$17,182.00						$17,182.00
Spring Planting		$87,603.75				$10,000.00	$3,963.02*	$73,640.73
Fall Contingency/Infill Planting			$21,900.94				$20,000.00	$1,900.94
Watering Services		$6,000.00						$6,000.00
Invasive species /Planting Assessment		$1,622.40	$2,332.20	$2,332.20	$2,332.20			$8,619.00
Lowland Forest Hydrologic Improvements and Habitat Installation							$30,000.00	
Subtotal	$39,126.64	$112,270.10	$18,058.11	$2,332.20	$2,332.20		$53,963.02	$174,119.25
*Cost of inflation***		$1,571.78	$505.63	$97.95	$130.60			$2,305.96
Total with inflation	$39,126.64	$113,841.88	$18,563.74	$2,430.15	$2,462.80			$176,425.21
Taxes (1.76%)	$688.63	$2,003.62	$326.72	$42.77	$43.35			$3,105.08
Grand Total	$39,815.26	$115,845.50	$18,890.46	$2,472.92	$2,506.15	$10,000.00	$53,963.02	$179,530.30

*Plant material and labour cost for planting 135 compensation trees from Patterson Creek Sanitary Infrastructure Protection Project

**Based on a yearly inflation rate of 1.4%

†Richmond Hill Community Stewardship Program contribution for Year 2 Planting

All prices above are based on 2020 costs

4.0 Detailed Description: Forest Enhancement and Management

4.1 Hazard/Ash Tree Cutting

Several hazard trees were inventoried that were within striking distance of potential targets in the Phase 2 restoration area. Tree height x 1.5 was the distance from a target that was used as the threshold for determining which trees were hazards. Hazards were also identified where they present a safety risk to staff working at the edge of the forest during restoration or forest management activities.

Logs and brush resulting from the felling of trees will be cleared to create space for planting in the Phase 2 planting areas (See Figure 4). Useable ash logs >10 cm top diameter will be repurposed by TRCA and used as habitat structures within the naturalization planting areas. Small branches and buckthorn will be chipped and disposed of at the Miller Organic Waste site on Bloomington Road. Wherever possible staff will mitigate the immediate hazard the tree poses, by removing the top and leaving a 2m - 3m "peg". This will act as an enhanced wildlife feature, providing raptor perching sites and habitat for insects and other organisms.

The felling and removal of hazard trees will not be subject to the York Region Forest Conservation By-law, as the By-law allows forest management to be undertaken in accordance with good arboricultural/forestry practices (including hazard tree removal).

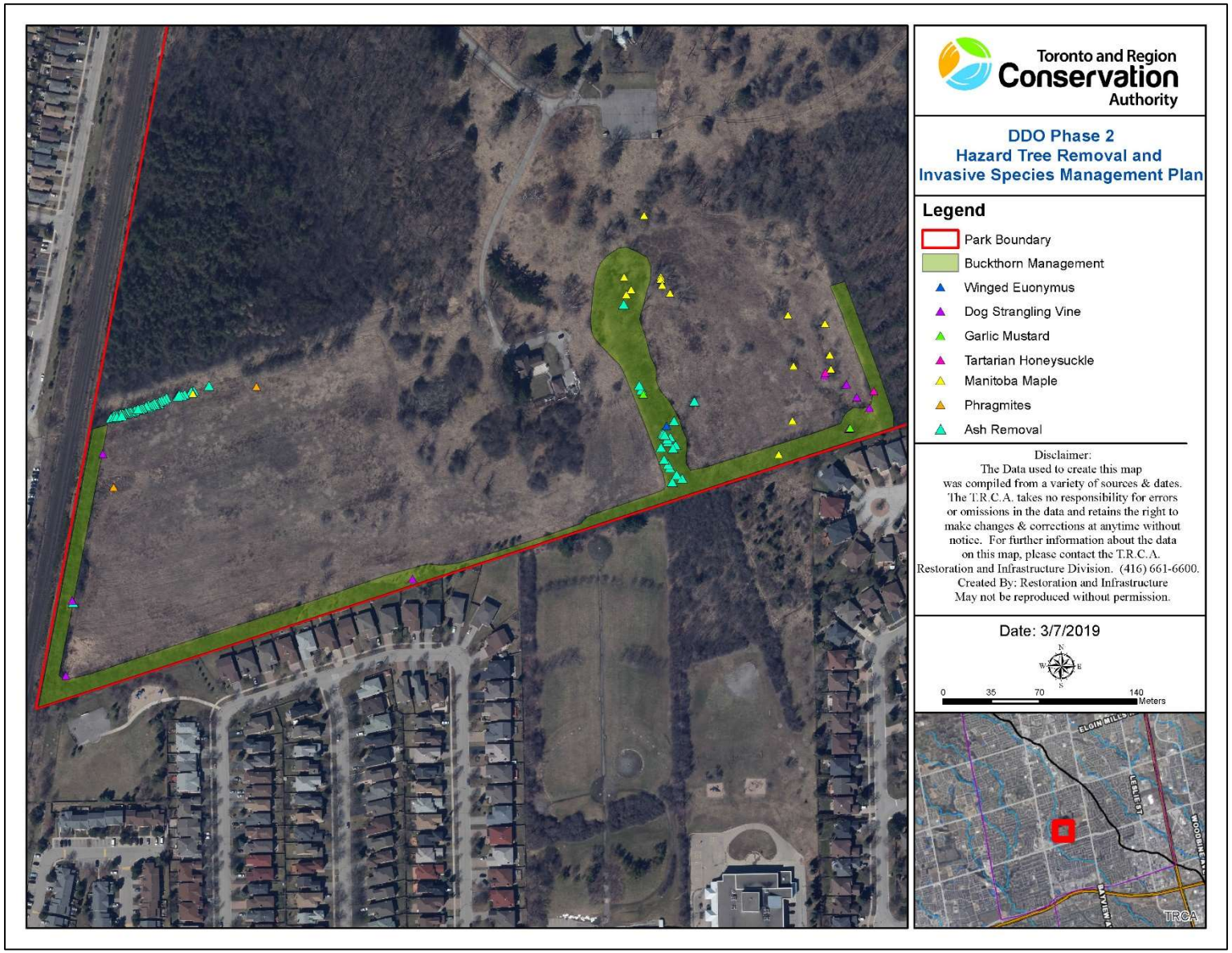


Figure 3. DDO Phase 2 Hazard Tree Removal and Invasive Species Management Plan

4.2 Budget for Hazard Tree Cutting and Removals

Table 3. Hazard Cutting Budget

Forest Management Activities				
Activity	Area (ha)	Year	# of Trees	Estimate
Hazard Tree Cutting	1.61	Fall 2020	121	$10,038.60
Buckthorn Cutting				$5,070.00
Total			121	$15,108.60

Table 4. Log removal and brush chipping Budget

Forest Management Activities				
Activity	Proposed Area (ha)	Year	# of Trees	Estimate
Log and brush removal	1.61	Fall 2020	85	$9,126.00
Total				$9,126.00

Table 5. Invasive Species and Planting Assessments Budget

Invasive species, planting assessment and Survival Survey				
Activity	Proposed Area (ha)	Year	# of Trees	Estimate
Invasive species, planting assessment and Survival Survey	2.5	Summer 2021	n/a	$1,622.40
		Summer 2022		$2,332.20
		Summer 2023		$2,332.20
		Summer 2024		$2,332.20
Total				$8,619.00

4.3 Invasive Species Management

Common buckthorn, dog strangling vine, Manitoba maple and phragmites are all found on the DDO Park property within the Phase 2 restoration areas in large numbers (there are other invasive species such as garlic mustard, Tartarian honeysuckle, and winged euonymus that are in smaller, less threatening densities. These will be targeted at the same time as the other invasive species and generally do not require their own budget). TRCA is proposing that common buckthorn, dog strangling vine, Manitoba maple and phragmites be controlled, as they can have a significant impact on the growth of newly planted trees and are recognized by the Ontario Weed Act as noxious weeds. The Ontario Pesticides Act and Ontario Regulation 63/09 provide a natural resources exception which will enable chemical control of these invasive plants at DDO Park.

A natural resources exception exists for the use of prohibited pesticides (Class 9 pesticides) to manage, protect, establish, or restore a natural resource. This exception allows the use of prohibited herbicides for control of invasive plants within the Phase 2 area. Conservation Authorities can apply or hire a licensed contractor to apply prohibited herbicides without a written letter from the MNRF. Herbicides will be applied in accordance with all label directions. TRCA complies with all federal and provincial legislation when applying herbicides.

Common buckthorn is by far the most prevalent invasive species within the Phase 2 area. The recommended approach for control and removal involves the application of an herbicide product (Triclopyr) to the cut stump of each stem. This will result in a nearly 100% die-off of the buckthorn

currently present. This is recommended to be undertaken at the same time as the hazard tree cutting and removal for operational efficiency. The cut buckthorn material will be chipped, transported off-site, and disposed of at the Miller Waste facility on Bloomington Road. Throughout the Phase 2 area smaller buckthorn stems will be treated with Garlon RTU®, using the basal bark application method to ensure these plants do not become seed producers in the future. In those areas that are along forested edges it is recommended that staff treat all buckthorn approximately 5m from the field edge into the existing forest.

The seed bank for buckthorn will remain in the soil and can be viable for 5 years. The seeds are likely to grow after the canopy is opened up following the hazard tree removal and soil disturbance from planting, therefore it is recommended that 3 years of follow-up foliar (Glyphosate) spray for seedlings occurs in order to control as much of the initial buckthorn resurgence as possible. Additional herbicide applications may be required following site monitoring.

The Manitoba maple stumps will be treated with an herbicide (3% Glyphosate) at the time of the buckthorn removal and tree cutting. One application on the cut-stump will ensure 100% die-off and prevent any stump sprouts during the growing season. Manitoba maples seedlings that germinate within the planting areas should be treated with herbicide before they become seed bearing.

Dog-strangling vine should be targeted with a foliar application of an herbicide (4-5% Glyphosate) 2 times per year (late spring/summer, and fall) to kill the whole plant and prevent regrowth. The seed source for dog strangling vine will remain and can be viable for 5 years in the soil. Five years of control is recommended for DSV, however, budgetary constraints allow for only 3 years of control. Additional management may be considered following site monitoring and if budgets allow.

There is a small patch of invasive Phragmites located on the west side of Phase 2, nearest the train tracks (see Figure 3). This is a very difficult invasive to control and forms dense underground rhizomes that spread rapidly. Studies in the U.S. have indicated that Phragmites has extremely low seed viability and persistence in the soil, when compared to other invasive species. However, disturbance of a site will stimulate the spread. As part of any good Integrated Pest Management program (IPM), it is recommended that two control methods be implemented for the best results. These are (1) stem cutting and removal of biomass (disposed of in the proper manner) and (2) herbicide treatment. Stem cutting must occur throughout the growing season, preferably before seed heads are produced, this will deplete the root system reserves prior to herbicide application. Care must be taken to ensure that there is no soil disturbance resulting in distribution of seed or rhizomes during cutting, causing the phragmites to spread. Following stem cutting, an herbicide (4-5% glyphosate) should be applied to the small re-sprouts as they germinate (in late July early August). This IPM management technique needs to occur over several years until the seed bank is depleted and the rhizomes are dead. Richmond Hill staff will be responsible for the cutting of phragmites stems in Year 1 and Year 2. Coordination between TRCA and Richmond Hill staff will be required to ensure that the herbicide treatment is conducted immediately following the stem cutting and removal of the biomass to ensure the efficacy of the treatment.

Future control efforts should be implemented as part of regular park management in order to keep the area from becoming densely invaded again. A return of these invasive species would negatively affect the natural regeneration and ecological quality of the site. Wherever possible, invasive species treatments should be concurrent. However, due to the use of different herbicides for different species this may not always be possible.

4.4 Invasive Species Management Budget

The following tables outline the breakdown of the budget as it pertains to each invasive species independently. Table 7 outlines the costs for managing only buckthorn and Manitoba maple; Table 8 outlines the costs for dog strangling vine; and Table 9 outlines the costs for phragmites management. The overall costs for invasive species treatment and removals is $42,541.98.

Table 6. Buckthorn and Manitoba Maple Management Budget for Phase 2

Buckthorn 2020			
Species	Area (ha)	Cost /ha	Cost + inflation
Buckthorn (Basal bark)	1.61	$1,800.00	$2,938.57
Staff Time			$5,877.14
2020	**Total**		**$8,815.72**
Buckthorn and Manitoba maple 2021 -2022			
Species	Area (ha)	Cost /ha	Cost
Buckthorn/Manitoba maple	1.61	$1,725	$2,777.57
Staff Time			$5,555.14
Foliar application	*Subtotal*		*$8,332.72*
Two Years	Total	subtotal x2	$16,665.43
2021-2022	**Total**		**$16,665.43**

Table 7. DSV Management Budget for Phase 2

DSV 2020					
Species	Area (ha)	*Predicted Quantity*	Cover	Cost /ha	Cost
Dog Strangling Vine	1.61	Occassional	10.0%	$1,600.00	$1,636.06
Staff Time (3 days x 2)					$3,272.13
Foliar application					$4,908.19
Application to be applied 2 times per year			2021	subtotal x2	$4,908.19
Application to be applied 2 times per year			2022	subtotal x2	$4,908.19
2021-2022				**Grand Total**	**$9,816.38**

Table 8. Phragmites Management Budget for Phase 2

Phragmites 2020		
Species	Area (ha)	Cost
Phragmites (foliar)	0.09	$146.02
Staff Time (3 days x2)		$438.05
2020	Total	$584.06
Phragmites 2020 -2021		
Species	Area (ha)	Cost
Phragmities	0.09	$146.02
Staff Time (3 days x2)		$438.05
Foliar application		$584.06
FoliarTwo years 2021-2022	**subtotal x2**	**$1,168.13**

5.0 Detailed Description: Naturalization Plantings

The planting plan presented below is based on current and anticipated site conditions within the Phase 2 area. Figure 4 provides an overview of each planting area (T1 to T5), including the recommended trees and shrubs as well as quantities and stock type. The final planting prescription will be based on stock availability in the Spring of Year 2.

The naturalization plantings will have a combination of both lowland and upland species. Each species will be planted in the appropriate locations based on soil moisture requirements. For example, the lowland areas will be planted with riparian species that do well in moist poorly drained soils. Whereas, the upland plantings will include species that require moderate to well drained soils.

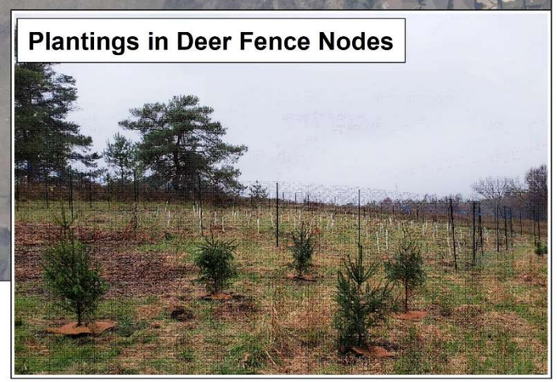
In the Spring of Year 2, a variety of potted trees and shrubs will be planted throughout each planting compartment. Only the deciduous trees and shrubs will be planted within the deer fence nodes, and the

potted coniferous trees will be planted in clusters outside the fence nodes. The trees and shrubs will be planted using standard spacing of 3 meters for trees and 1 meter for shrubs. Each species will be planted in clusters of 5 to 10. The post-planting activities will include installing rodent guards on all deciduous trees and coco fiber mats on all the potted material. The coco fiber mats are recommended for suppressing grass competition and retaining moisture around the trees and shrubs.

A variety of seedlings will be planted in both the open field and within the understory of the existing hedgerows. The seedlings will be planted using standard spacing of 2 meters. Tree shelters will be installed on all the deciduous trees and will remain on the trees for up to 10 years.

A total of 1,000 shrubs and 4,310 deciduous and coniferous trees will be planted throughout T1 – T5 in the spring of Year 2.Once the planting has been completed, each planting area will be watered 4 times throughout the Year 2 growing season.

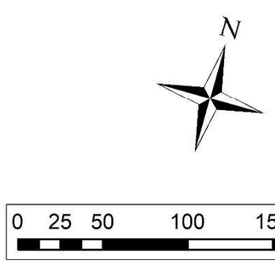
The infill plantings will be based on survival assessments conducted each fall until Year 5. If the survival rate is less than 75%, additional planting will be completed in order to maintain the required tree density.



DDO Phase II - Spring Year 2 - DRAFT

Toronto and Region Conservation Authority

Common Name	Botanical Name	Size/ Condition	T1	T2	T3	T4	T5	Total Quantity
			8046m^2	10802 m^2	3763 m^2	4979 m^2	5429 m^2	
DECIDUOUS (Potted stock)								
Silver Maple	*Acer saccharinum*	125 - 150 cm Potted	30	40	15	30	25	140
Red Maple	*Acer rubrum*	125 - 150 cm Potted	30	15	10	25		80
Sugar Maple	*Acer saccharum*	125 - 150 cm Potted		25	10	15	20	70
White Birch	*Betula papyrifera*	125 - 150 cm Potted	15	25	10	15	20	85
Black Cherry	*Prunus serotina*	125 - 150 cm Potted		25		15	20	60
Bur Oak	*Quercus macrocarpa*	125 - 150 cm Potted	30	40	10	30	10	120
White Oak	*Quercus alba*	125 - 150 cm Potted	30	15	10	15	10	80
Red Oak	*Quercus rubra*	125 - 150 cm Potted		15			30	45
Black Walnut	*Juglans nigra*	125 - 150 cm Potted	15	15		15		45
Bitternut Hickory	*Carya cordiformis*	125 - 150 cm Potted	15	15				30
Hackberry	*Celtis occidentalis*	125 - 150 cm Potted	30	25	10	30	10	105
Sassafrass	*Sassafrass albidum*	126 - 150 cm Potted		5			5	10
Sycamore	*Platinus occidentalis*	127 - 150 cm Potted			5	5		10
Trembling Aspen	*Populus tremuloides*	125 - 150 cm Potted	30	15		30		75
		SUBTOTAL	225	275	80	225	150	955
SHRUBS (Potted stock)								
Serviceberry	*Amelanchier spp.*	40-60 cm Potted	45	30	20	30	20	145
Silky Dogwood	*Cornus amomum*	40-60 cm Potted	30	20	10	15		75
Grey Dogwood	*Cornus racemosa*	40-60 cm Potted	30	20		15	20	85
Red Osier Dogwood	*Cornus sericea*	40-60 cm Potted	30	20	20	30		100
Ninebark	*Physocarpus opulifolius*	40-60 cm Potted	45	15		15	10	85
Am Hi-Bush Cranberry	*Viburnum trilobum*	40-60 cm Potted	15	15	10	15		55
Common Elderberry	*Sambus canadensis*	40-60 cm Potted	15	15	10	15		55
Nannyberry	*Viburnum lentago*	40-60 cm Potted	30	15	10	30		85
Chokeberry	*Aronia x prunifolia*	40-60 cm Potted	60	20	10	15	20	125
Chokecherry	*Prunus virginiana*	40-60 cm Potted	30	20			20	70
Fragrant Sumac	*Rhus aromatica*	40-60 cm Potted	30	15	10		20	75
American Hazel	*Corylus americana*	40-60 cm Potted	20	15			10	45
		SUBTOTAL	380	220	100	180	120	1000
CONIFEROUS (Potted stock)								
White Pine	*Pinus strobus*	2g Pot	75	100	20	40	60	295
White Spruce	*Picea glauca*	2g Pot	75	100	20	40	60	295
White Cedar	*Thuja occidentalis*	2g Pot	50	50	20	25		145
Tamarack	*Larix laricina*	2g Pot	75	50	20	25		170
		SUBTOTAL	275	300	80	130	120	905
CONIFEROUS (Seedlings)								
White Spruce	*Picea glauca*	30 - 40 cm	100	250	50	100	125	625
White Pine	*Pinus strobus*	30 - 40 cm	125	250	50	75	125	625
White Cedar	*Thuja occidentalis*	30 - 40 cm	100	50		25		175
Tamarack	*Larix laricina*	30 - 40 cm	125	100	50	50		325
Eastern Hemlock	*Tsuga canadensis*	30 - 40 cm			50			50
		SUBTOTAL	450	650	200	250	250	1800
DECIDUOUS (Seedlings)								
Red Maple	*Acer rubrum*	30 - 40 cm	25	25	25			75
Silver Maple	*Acer saccharinum*	30 - 40 cm	25	25				50
Sugar Maple	*Acer saccharum*	30 - 40 cm	25	50	25	25	25	150
White Birch	*Betula papyrifera*	30 - 40 cm		25				25
Bitternut Hickory	*Carya cordiformis*	30 - 40 cm	25	25	25	25		100
Black Cherry	*Prunus serotina*	30 - 40 cm	25	25		25	25	100
White Oak	*Quercus alba*	30 - 40 cm		25				25
Bur Oak	*Quercus macrocarpa*	30 - 40 cm	25	25		25		75
Red Oak	*Quercus rubra*	30 - 40 cm		25			25	50
		SUBTOTAL	150	250	75	100	75	650
Deciduous Seedling Tree Shelters		SUBTOTAL	150	250	75	100	75	650
Rodent Guards		SUBTOTAL	225	275	80	225	150	955
Coco Mats		SUBTOTAL	880	795	260	535	390	2860
		TOTAL	1480	1695	535	885	715	5310



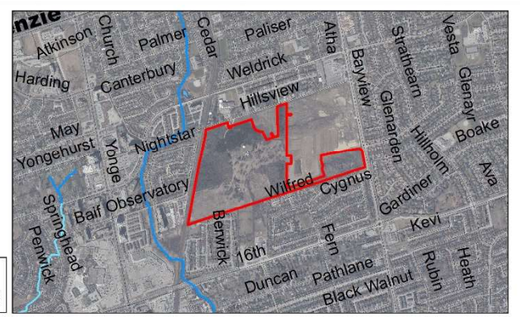


Figure 4. Detailed Multi-Year Planting Plan

5.1 Planting Budgets

Table 9 includes the total cost of deer fence installation for 13 nodes throughout T1 to T5. The materials include 10-foot deer fence, T-bars, and zip-ties.

Table 9. Site Preparation – Deer Fence Installation

Planting Site Preparation				
Activity	Planting Area	Number of fence Nodes	Year	Estimate
Deer Fence Installation	T1 - T5	13	Year 2: Spring	$17,182.00
Total				$17,182.00

Table 10 includes the total cost of watering each planting area 4 times during Year 2 spring/summer season.

Table 10. Watering Services

Post Planting Care				
Activity	Planting Area	Proposed Area (ha)	Year	Estimate
Watering Service (4 times)	T1 - T5	3.3	Year 2: Spring - Summer	$6,000.00
Total				$6,000.00

Table 11 outlines the planting budget that is based on 2020 prices and could change depending on stock availability during the time of planting. Any required changes to the proposed planting plan will be made to stock species and type (i.e. bareroot, container etc.), but total costs will remain within the existing available planting budget. The infill planting budget will also depend on the results of the planting assessment. 25% of the original planting budget has been set aside as infill contingency should replanting need to occur in the fall of year 3 or spring of year 4.

Table 11. Spring Year 2 Planting Details

DDO Phase II - Spring Year 2 - DRAFT

Common Name	Botanical Name	Size/ Condition	T1	T2	T3	T4	T5	Total Quantity	Price
			8046m^2	10802 m^2	3763 m^2	4979 m^2	5429 m^2		
DECIDUOUS (Potted stock)									
Silver Maple	*Acer saccharinum*	125 - 150 cm Potted	30	40	15	30	25	140	$3,500.00
Red Maple	*Acer rubrum*	125 - 150 cm Potted	30	15	10	25		80	$2,000.00
Sugar Maple	*Acer saccharum*	125 - 150 cm Potted		25	10	15	20	70	$1,750.00
White Birch	*Betula papyrifera*	125 - 150 cm Potted	15	25	10	15	20	85	$2,125.00
Black Cherry	*Prunus serotina*	125 - 150 cm Potted		25		15	20	60	$1,500.00
Bur Oak	*Quercus macrocarpa*	125 - 150 cm Potted	30	40	10	30	10	120	$3,000.00
White Oak	*Quercus alba*	125 - 150 cm Potted	30	15	10	15	10	80	$2,000.00
Red Oak	*Quercus rubra*	125 - 150 cm Potted		15			30	45	$1,125.00
Black Walnut	*Juglans nigra*	125 - 150 cm Potted	15	15		15		45	$1,125.00
Bitternut Hickory	*Carya cordiformis*	125 - 150 cm Potted	15	15				30	$750.00
Hackberry	*Celtis occidentalis*	125 - 150 cm Potted	30	25	10	30	10	105	$2,625.00
Sassafrass	*Sassafrass albidum*	126 - 150 cm Potted		5			5	10	$250.00
Sycamore	*Platinus occidentalis*	127 - 150 cm Potted			5	5		10	$250.00
Trembling Aspen	*Populus tremuloides*	125 - 150 cm Potted	30	15		30		75	$1,875.00
		SUBTOTAL	225	275	80	225	150	955	$23,875.00
SHRUBS (Potted stock)									
Serviceberry	*Amelanchier spp.*	40-60 cm Potted	45	30	20	30	20	145	$2,175.00
Silky Dogwood	*Cornus amomum*	40-60 cm Potted	30	20	10	15		75	$1,125.00
Grey Dogwood	*Cornus racemosa*	40-60 cm Potted	30	20		15	20	85	$1,275.00
Red Osier Dogwood	*Cornus sericea*	40-60 cm Potted	30	20	20	30		100	$1,500.00
Ninebark	*Physocarpus opulifolius*	40-60 cm Potted	45	15		15	10	85	$1,275.00
Am Hi-Bush Cranberry	*Vibernum trilobum*	40-60 cm Potted	15	15	10	15		55	$825.00
Common Elderberry	*Sambus canadensis*	40-60 cm Potted	15	15	10	15		55	$825.00
Nannyberry	*Vibernum lentago*	40-60 cm Potted	30	15	10	30		85	$1,275.00
Chokeberry	*Aronia x prunifolia*	40-60 cm Potted	60	20	10	15	20	125	$1,875.00
Chokecherry	*Prunus virginiana*	40-60 cm Potted	30	20			20	70	$1,050.00
Fragrant Sumac	*Rhus aromatica*	40-60 cm Potted	30	15	10		20	75	$1,125.00
American Hazel	*Corylus americana*	40-60 cm Potted	20	15			10	45	$675.00
		SUBTOTAL	380	220	100	180	120	**1000**	$15,000.00
CONIFEROUS (Potted stock)									
White Pine	*Pinus strobus*	2g Pot	75	100	20	40	60	295	$7,375.00
White Spruce	*Picea glauca*	2g Pot	75	100	20	40	60	295	$7,375.00
White Cedar	*Thuja occidentalis*	2g Pot	50	50	20	25		145	$3,625.00
Tamarack	*Larix laricina*	2g Pot	75	50	20	25		170	$4,250.00
		SUBTOTAL	275	300	80	130	120	**905**	$22,625.00
CONIFEROUS (Seedlings)									
White Spruce	*Picea glauca*	30 - 40 cm	100	250	50	100	125	625	$1,562.50
White Pine	*Pinus strobus*	30 - 40 cm	125	250	50	75	125	625	$1,562.50
White Cedar	*Thuja occidentalis*	30 - 40 cm	100	50		25		175	$437.50
Tamarack	*Larix laricina*	30 - 40 cm	125	100	50	50		325	$812.50
Eastern Hemlock	*Tsuga canadensis*	30 - 40 cm			50			50	$125.00
		SUBTOTAL	450	650	200	250	250	**1800**	$4,500.00
DECIDUOUS (Seedlings)									
Red Maple	*Acer rubrum*	30 - 40 cm	25	25	25			75	$187.50
Silver Maple	*Acer saccharinum*	30 - 40 cm	25	25				50	$125.00
Sugar Maple	*Acer saccharum*	30 - 40 cm	25	50	25	25	25	150	$375.00
White Birch	*Betula papyrifera*	30 - 40 cm		25				25	$62.50
Bitternut Hickory	*Carya cordiformis*	30 - 40 cm	25	25	25	25		100	$250.00
Black Cherry	*Prunus serotina*	30 - 40 cm	25	25		25	25	100	$250.00
White Oak	*Quercus alba*	30 - 40 cm		25				25	$62.50
Bur Oak	*Quercus macrocarpa*	30 - 40 cm	25	25		25		75	$187.50
Red Oak	*Quercus rubra*	30 - 40 cm		25			25	50	$125.00
		SUBTOTAL	150	250	75	100	75	**650**	$1,625.00
Deciduous Seedling Tree Shelters		SUBTOTAL	150	250	75	100	75	**650**	$12,350.00
Rodent Guards		SUBTOTAL	225	275	80	225	150	**955**	$1,193.75
Coco Mats		SUBTOTAL	880	795	260	535	390	**2860**	$6,435.00
		TOTAL	**1480**	**1695**	**535**	**885**	**715**	**5310**	$87,603.75
								Contingency/ infill planting	$21,900.94
		GRAND TOTAL							**$109,504.69**

5.2 Volunteer and Community Planting Opportunities

This plan describes planting activities to be undertaken by TRCA's crews, but opportunities do exist for volunteer and community involvement. As implementation progresses, volunteer and community plantings could help to augment the TRCA plantings in areas of high visibility (e.g. along trails or at entrances). These could be coordinated by City staff, or through TRCA's community engagement programs. The budget for this plan also includes $10,000 from the City of Richmond Hill's existing Community Stewardship Program partnership with TRCA. These funds will help contribute to the implementation of the planting plan in Figure 4.

6.0 Detailed Description: 5-Year Monitoring and Maintenance Plan

As part of an effective adaptive management approach to managing the Phase 2 restoration, annual invasive species and planting health monitoring is recommended for 3 years following the implementation of the management recommendations. This will allow for adaptive management if part of the management regime needs to be altered.

6.1 Hazard Tree Removal

Hazard tree removals will be completed in Years 1 and 2. Once the removals are completed it is suggested that another hazard tree inventory take place in Year 3. This is to ensure that additional hazards have not developed over the 2-year timeframe. This inventory and associated costs can be incorporated into one of the follow-up invasive species monitoring or planting survival survey assessments.

6.2 Plantings and Post-Care

The phase 2 plantings will be completed in the spring of Year 2. Follow up planting assessments should occur in the summer/fall season of Year 3 to determine the survival rate. If planting assessments indicate that there is less than a 75% survival rate, then infill planting should take place to supplement the area. Contingency funds have been set aside in the budget for infill planting should they be necessary. Once the initial plantings have been completed in the spring of Year 2, watering services will be provided 4 times throughout the summer season. During the annual survival assessment, the deer fence nodes will be monitored and any damage to the fence or tree shelters will be repaired. The removal of the deer fence is to be completed by the City of Richmond Hill. Due to the high population of deer on the property it is recommended that the deer fence remain in place for 10 years. At this stage the trees should be well established and mature enough to be resilient to the pressures of deer browse or rub activity.

6.3 Invasive Species Management

Invasive species monitoring should begin in Year 1 and occur each year during the summer to track the success of the recommended control measures. This will allow for adaptive management should it be required. This report recommends five years of control measures for dog strangling vine, to control and potentially eliminate the seed source. Buckthorn and Phragmites control are also recommended for 3 years as they are pervasive and could impact the success of new plantings. 3 years of control using a Glyphosate foliar application is recommended for each of the species to address the latent seed source within the soil.

7.0 Detailed Description: Lowland Forest Plantings and Hydrologic Improvements

7.1 Proposed Scope

Wetland restoration opportunities were identified on site through orthophotography interpretation, analysis of LiDAR data, and ArcHydro models. The lowland pocket being proposed for implementation is planned for the fall of Year 1 (Figure 5) and is in the middle of the property along the southern fence line. It has a subtle swale that collects surface drainage from the fields to the north and drains out through a catch basin located at the low point on a private residence in the neighbouring subdivision. Work at this location involves excavation to uncover and sever any potential sub surface drainage that may exist from past agricultural uses. Combined with minor shallow grading to create changes in the microtopography which will result in a more diverse habitat and vegetation community. This excavation will not increase retention of water on the site but will provide large areas for it to settle and pool, providing breeding and foraging opportunities for local wildlife. Following construction, native lowland tree and shrubs will be planted throughout to restore a lowland forested wetland habitat with shallow vernal pools that will become shaded and fill with leaf litter as the site matures.

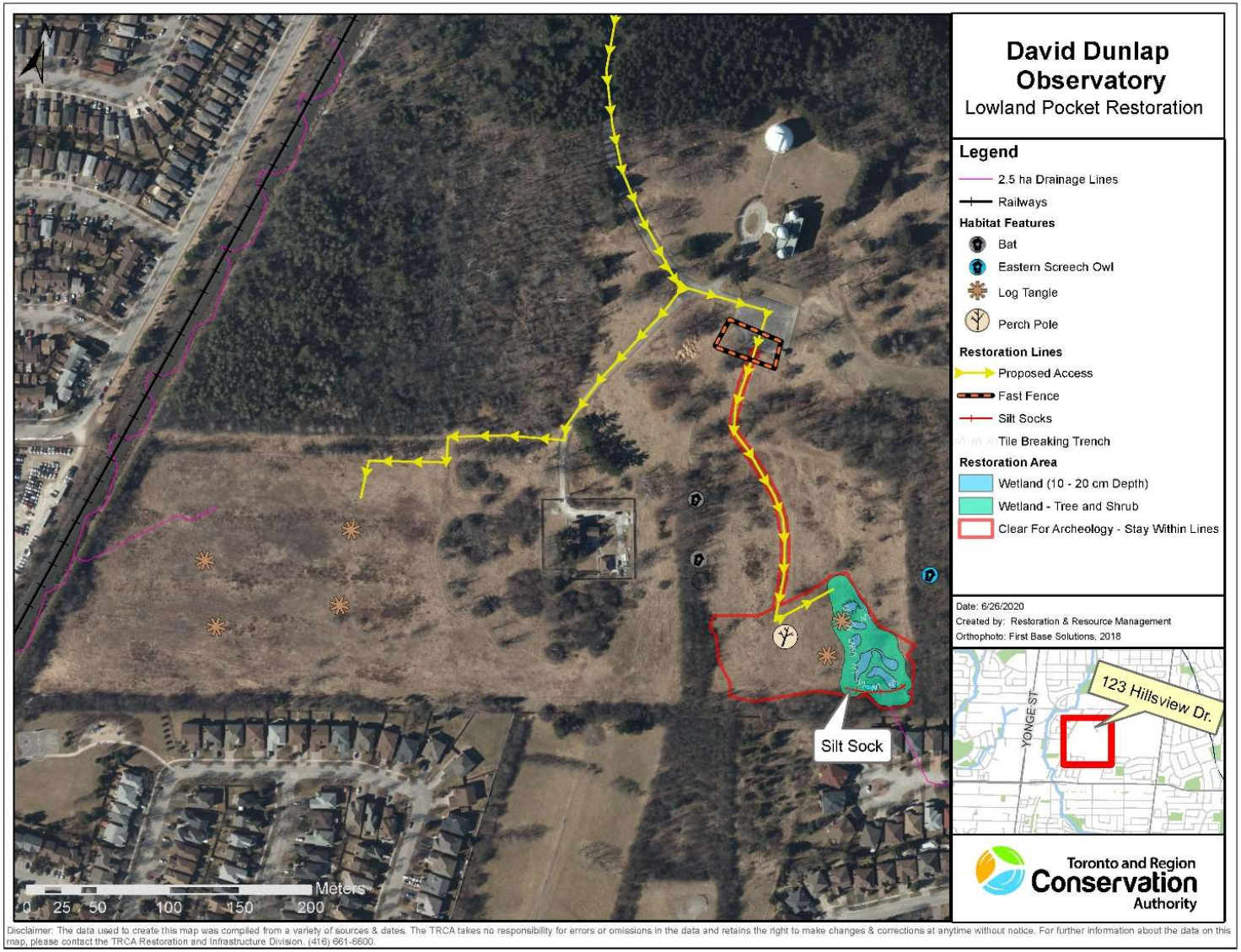


Figure 5. DDO Lowland Pocket Restoration

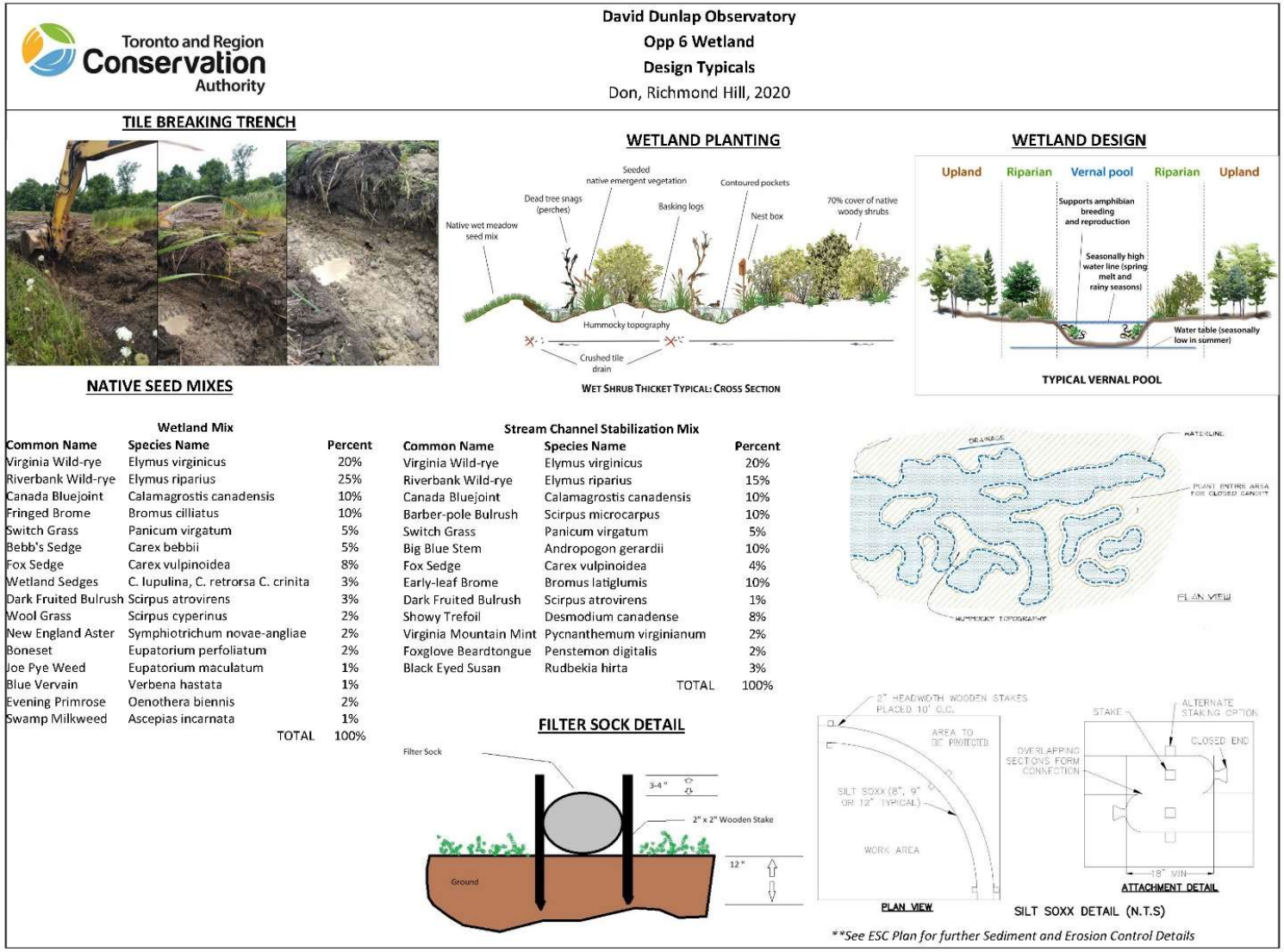


Figure 6. DDO Lowland Pocket Restoration Design Typical

7.1.1. Potential Construction Impacts and Proposed Mitigation

Potential impacts associated with this project include soil and sediment disturbance during construction, and potential release of deleterious substances (i.e., sediment, petroleum products) to the aquatic environment. Mitigation to address these potential impacts should include:

- Erosion and Sediment Control (ESC) measures to be installed prior to undertaking work, and left in place until site has stabilized following construction;
    - We will be installing ESC (a small silt sock) at the bottom end of the wetland restoration site to ensure that no sediment escapes the construction area. The ESC will remain on site until the vegetation establishes and sediment is no longer a concern. At this point the silt sock can be cut open and removed leaving only the natural wood mulch material inside behind on site. See Figure 5 for exact location.

- Ongoing inspection, maintenance, and repair of ESC measures to be undertaken throughout the duration of construction;
- Utilize adaptive management approach to ESC based on site conditions during construction;
- Ensure contingency ESC materials are available onsite to implement as required;
- Work to be conducted under favourable weather conditions;
- Construction material, excess material, and removed debris shall be stored away from the watercourse and its banks and stabilized with ESC as appropriate;
- All equipment maintenance and refueling shall be controlled to prevent any discharge of petroleum products;
- A passive approach should be taken to clearing the work area of fish and wildlife, whereby fish and wildlife should be allowed to naturally disperse from the work area prior to complete isolation and any unwatering activities (Fish and Wildlife permits will still be required);
- All disturbed earth materials should be stabilized with appropriate cover (i.e., seed and erosion control blanket) as soon as possible following the significant completion of works; and,
- In the event that the Site Supervisor determines controls are unacceptable, those operations which are causing the entry of deleterious material to the watercourse shall cease until such time that improvements to existing measures, or additional measures are implemented.

7.2 Large Woody Debris and Nest Box Installation

Large pieces of wood or large woody debris (LWD), as it is commonly called, play a very important role in the implementation of habitat restoration projects. LWD is used several ways to restore terrestrial and aquatic habitats. One of the most common uses of LWD is the creation of “habitat piles” which are typically a collection of LWD of various sizes placed in heaps randomly throughout a terrestrial restoration site. Habitat piles provide valuable habitat for small mammals, songbirds, reptiles and amphibians. LWD can also be strategically placed in wetlands or watercourses to provide perching, loafing and basking areas

for birds, reptiles, and amphibians. LWD can also be installed to replicate a standing tree or snag to provide habitat for raptors and other birds.

Effective ecological restoration is deeply rooted in TRCA's Living City Vision. Two key pillars of the TRCA's strategic plan are:

- to help increase the ecological integrity of greenspace and its associated biodiversity; and,
- helping to create sustainable and conscious communities that live within and around these greenspaces.

As we begin to rethink the opportunities and potential functions of the existing and created green spaces throughout the Greater Toronto Area, we have come to realize the potential in many of these natural landscapes. By providing these areas with increased access to cavity nesting species, the result is an immediate boost to the areas biodiversity and ecological function. TRCA partners with all the municipalities of the GTA as well as its neighboring conservation authorities to help create a regional network of ecological governance. The addition of nest boxes throughout the GTA helps to bring communities closer to nature through the addition of potential locations for wildlife to inhabit within city limits. The increased potential for urban biodiversity also brings an increase in the interaction between urban society and the wildlife that has historically occupied these areas. It is through interactions such as these that relationships of strong responsible governance over greenspaces are built, helping to ensure their longevity and ongoing ecological integrity.

Large Woody Debris Criteria

- No invasive species (e.g. European buckthorn, white poplar, tree-of-heaven)
- No brush (eg, tree crowns or material less than 10cm dbh) unless approved by Project Manager/Site Supervisor on case-by-case basis.

Logs

- Minimum 10cm diameter; minimum 2m long

7.2.1 Proposed Scope of woody debris and nest box installations

The proposed scope of the woody debris placement will at this time be limited to the areas indicated for planting in Year 2. The woody material that will be produced from hazard tree removals on the Phase 2 site will be moved via tractor or skidsteer by TRCA staff to the appropriate planting locations. Once moved to the appropriate locations the woody material will be placed strategically placed to ensure it replicates natural habitat for local wildlife.

The nest box installations will take place in various areas throughout DDO Park to line up with best management practices for each type of box being installed. The owl box is required to be placed near the edge of an existing woodlot, to provide shelter, but also close access to open areas for hunting. While the raptor pole needs to be in more open meadow to provide potential raptors with a suitable hunting ground for small mammals. The bat boxes will also be installed in areas of existing forest cover near where snag trees currently exist or have been removed to increase the potential for bats finding and using them for shelter.

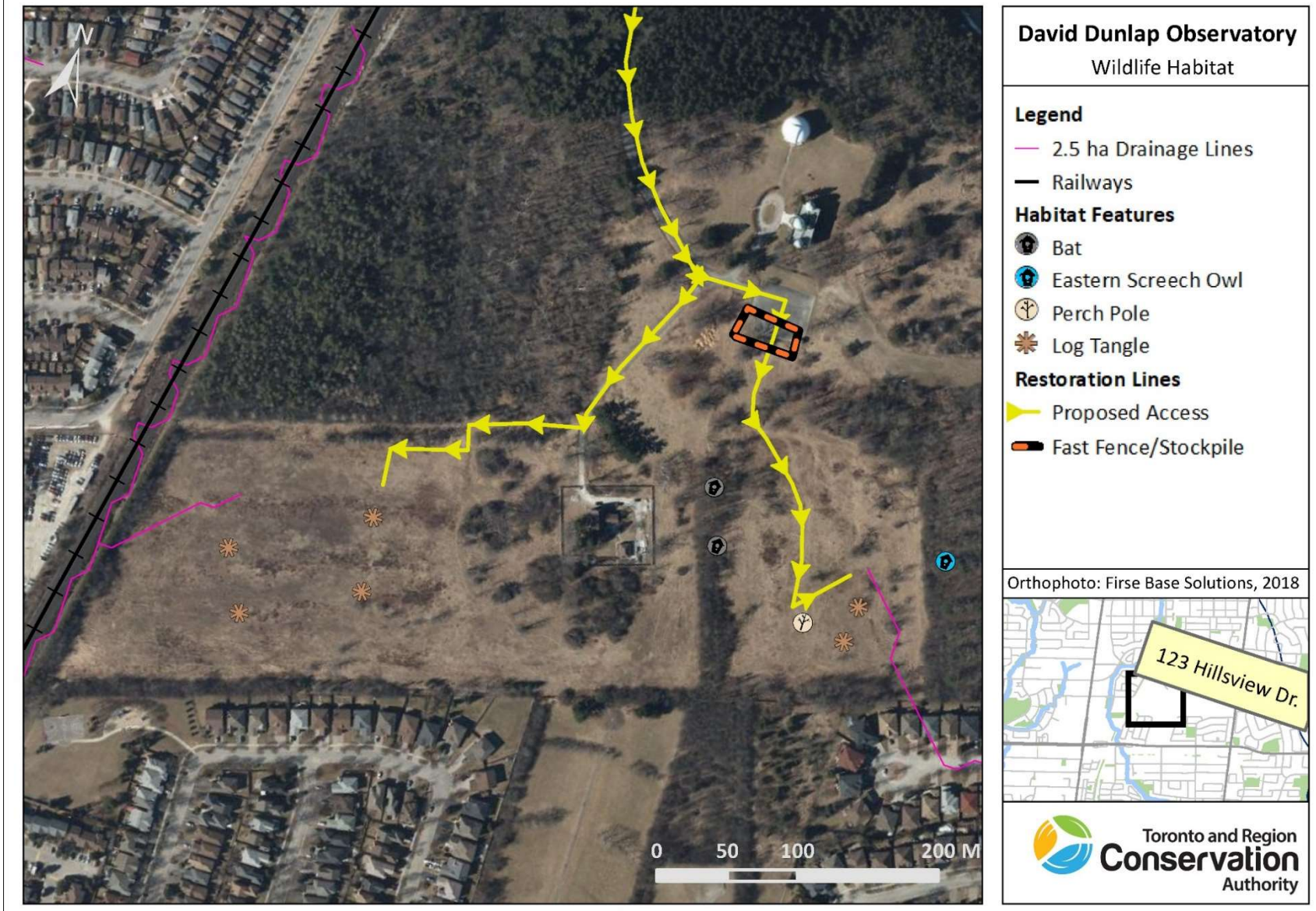


Figure 7. DDO Wildlife Habitat Placement

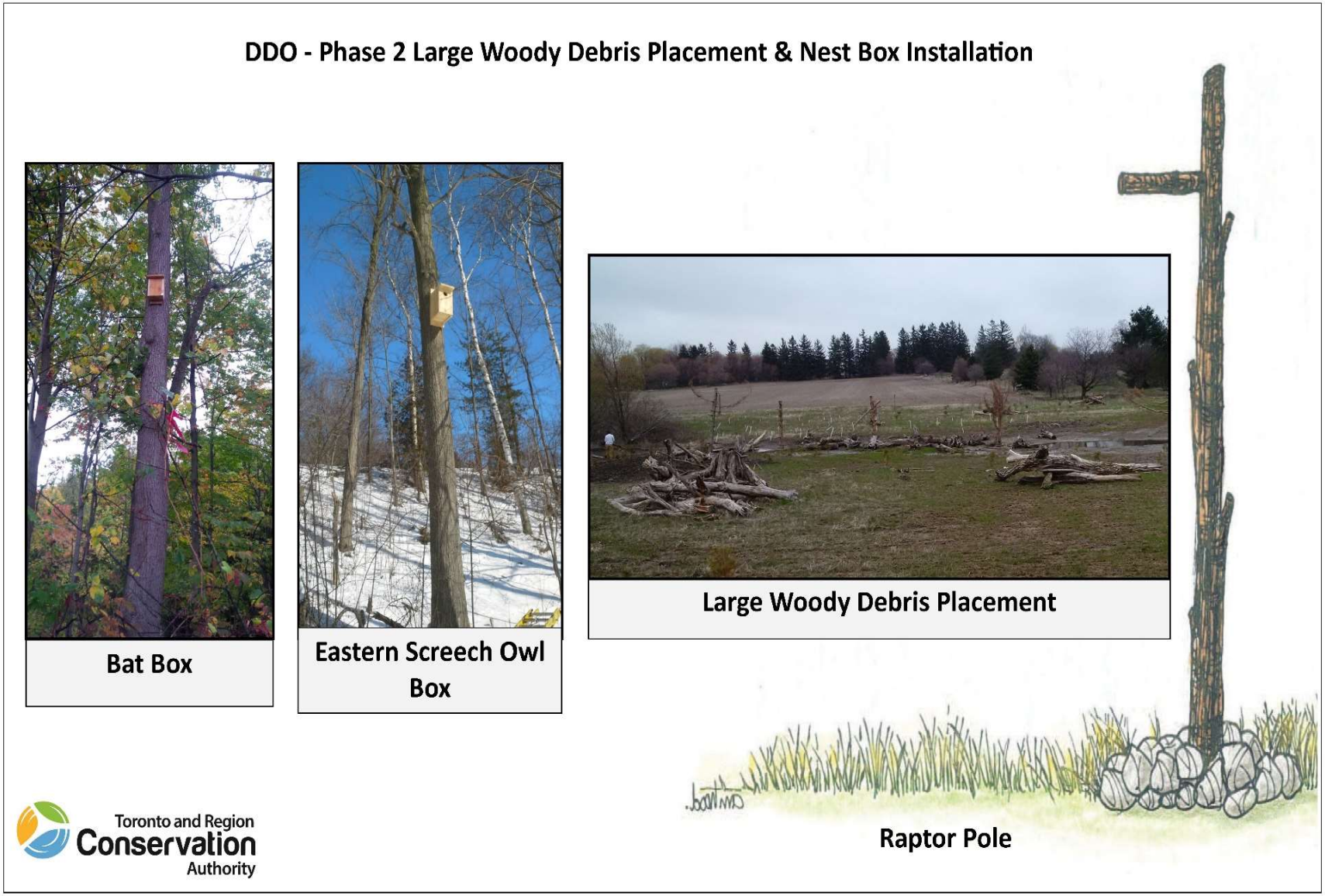


Figure 8. DDO Wildlife Habitat Placement – Typical

7.2.2 Regular and Strategic Nest Box Monitoring

The job of installing a nest box is not complete after its installation at a particular site. Regular monitoring is important to be able to determine the state of repair, productivity, and overall success of the nest box. However, as the TRCA installs an ever-increasing number of nest boxes from a year to year basis, the task of monitoring every single box installed is no longer feasible. It is because of this that a strategic monitoring approach has been adopted in order to identify key trends in box use within their associated habitats. The monitoring data collected helps determine which combinations of box and habitat type work the best (ie, How productive was a songbird box in a Pine Plantation vs Meadow vs Wetland? Productivity of wood duck boxes installed on water vs edge of forest near water? etc). By checking box productivity (eggs shells, nest material, dead young, etc) we can make reasonable assumptions on which species are using our boxes and how successful/productive they were throughout various habitat types and locations. We can then analyze this data in order to identify any trends that might exist, helping us to refine our installation best management practices.

A number of different factors determine the total number of boxes that can be monitored annually. However, available funding is the single largest factor in this decision. While ideally, the monitoring of a set group of nest boxes should be included in the budget of a restoration project site, there are many situations where the box is installed off of budgeted restoration sites or situations where the funding is finite and can run out. This leaves a situation where a box has no available funding for monitoring. At this point the box should be grouped into a pool of boxes monitored through annual regional funding or in some cases left to private landowners, volunteers, and “friends of” organizations to carry on with upkeep. If funding is available through the restoration site itself the box(s) can be monitored with more frequency using those funds but this is not a cost that is built into the original installation price.

To help with monitoring efforts TRCA have been developing a Survey 123 application for mobile devices that would allow for volunteers to monitor boxes from a distance strictly through visual observations. The monitoring instructions are outlined on the application itself to walk them through what is required, and they can record their findings which are then sent back to TRCA. This method helps increase monitoring efforts and provides valuable feedback for the nestbox program. Restricting the monitoring to visual observations from a distance is necessary to ensure there will not be any interference with wildlife using the boxes or accidental injury to any volunteers.

Another crucial aspect of our monitoring protocol is to identify boxes in a poor state of repair. Nest boxes that are in a poor state of repair can harm bird populations both directly by causing injury or entrapment and also indirectly by reducing or eliminating their nesting success. It is important to identify these boxes as soon as possible in order to fix or replace the boxes accordingly. This has become increasingly more difficult to do as the number of boxes increases annually. As a result, we try to revisit a minimum of 1% of our installation sites across all watersheds every year. These monitoring sites are chosen by age, ideally looking at each installation site in three-year intervals. This ensures that our efforts are spread out evenly across all watersheds, in order to make sure the oldest boxes are being maintained (as they are likely the

boxes which need replacement or repairs). The average lifespan of a nest box can vary drastically, but in most cases is 7-10 years depending on the habitat it is placed in and its exposure to the elements. It is because of this reason that we chose the rationale to monitor installation sites every three years, allowing multiple chances to extend the boxes lifespan for as long as possible. To assist in tracking these boxes TRCA records their installation coordinates in an online database and these coordinates can be provided to Richmond Hill for their own tracking and monitoring. While natural cavities do not require regular maintenance, it is our duty to ensure that the boxes we have installed are maintaining their integrity. When nest boxes have reached the end of their lifespan and need removal, the site can be re-assessed by TRCA and if necessary, more nest boxes could be purchased for installation provided funding is available.

8.0 Permitting Requirements

8.1 Conservation Management Designations and Impact Management

Three Cultural Heritage Features (CHF) are identified in the *David Dunlap Observatory Lands: Conservation Management Plan* that fall within or near the Phase 2 area: (1) larch tree-line along original laneway from Yonge Street, (2) fence rows, and (3) specimen plantings (see Figure 9).

All the activities outlined in this plan retain and/or enhance these CHFs and are in line with the desired interventions for each CHF as outlined in table 2.4.1 of the *Conservation Management Plan*. However, as per Heritage Richmond Hill Staff Report PRS.14.145, permits are still required to implement some of these actions. The process for acquiring a permit consists of preparing a staff report outlining the proposed activities. This report should first go to Heritage Richmond Hill to seek recommendation that council approve the activities outlined in the report, and then the report should go to Council to seek approval.

The table below outlines the proposed activities in this restoration and implementation plan and how they relate to each CHF. It has been noted in the far-right column whether these activities will require a permit and which ones require clarification.

Table 12: List of Proposed Activities That May Impact CHFs

CHF	Activity	Permit Required?
Fence Rows	Remove invasive vegetation	No
Fence Rows	Plant new vegetation within CHF	Unclear
Fence Rows	Plant new vegetation within 5m buffer	Yes
Specimen Trees	Remove invasive species	No
Specimen Trees	Plant new specimen trees	Yes
Specimen Trees	Plant vegetation within buffer to block views	Yes
Fence Rows	Install wildlife habitat (ie. Bird/bat boxes) – optional activity	Unclear

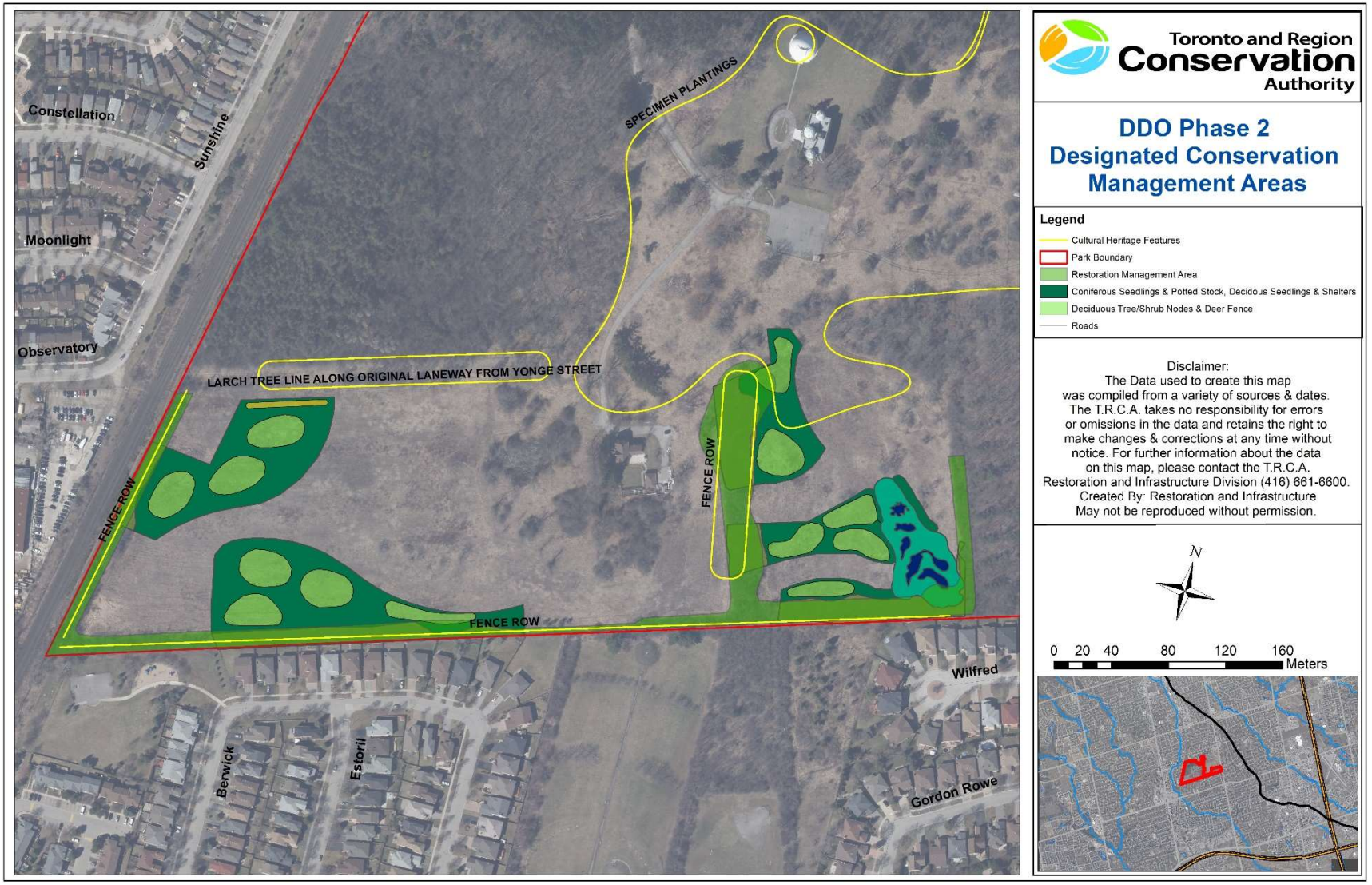


Figure 9. DDO Phase 2 Designated Conservation Management Areas

9.0 Constraints and Considerations

The main constraints and considerations around the restoration of the Phase 2 area of the DDO Park property include the need for Heritage Permits and community support. Access to the Phase 2 site will be through the main observatory entrance off Hillsview Drive.

9.1 Permission and Permits

Based on Heritage Richmond Hill's evaluation of the proposed restoration activities in close proximity or within the identified CHFs located in the DDO Phase 2 Restoration area, a permit may be required to complete the hazard and ash removals, invasive species removals and treatments, and plantings. No hydrological modifications requiring a TRCA O. Reg. 166/06 will be completed within the Phase 2 restoration site. TRCA has had the proposed project reviewed by the Ministry of Environment, Conservation and Parks (MECP) and was given approval to proceed with no concerns. TRCA will also conduct a review of the proposed restoration and implementation plans with other internal business units (e.g. ecology, planning, monitoring, property, etc.) to ensure that it meets professional standards. Coordination with Richmond Hill Community Services, Recreation Division will also be required and may impact timing of the proposed works.

9.2 Community Support and Communication Plan

Success of the restoration of the Phase 2 area will be aided by the involvement of the surrounding community. It is recommended that Richmond Hill develop and implement a public communication plan, outlining the types of activities that will be occurring during the restoration work and the key messages the community should hear. Ongoing communication with local residents will also help to engage the segment of the community that is willing and eager to become stewards of DDO Park. Any opportunities to incorporate Community Stewardship groups and/or the local community in restoration activities such as invasive species removal and/or planting should be explored by Richmond Hill.

The following is a list of restoration activities and potential concerns that TRCA recommends RH address in its communication plan. A focus of all communications activities should be on explaining the overall benefit of the restoration work.

Table 13: Activities to be Addressed in Communication Plan

Restoration Activity	Potential Community Concerns (Real and/or Perceived)	Key Messages
Hazard tree removal	Loss of trees Noise (chainsaws, chippers) Destruction of habitat Sightlines/Privacy	- Educate about the overall project benefits and long-term objectives - Educate about native vs. invasive species - Highlight the # of new trees and area of new habitat being created - Warn public to maintain safe distance from work activities
Invasive species work	Removal of plants Use of herbicides Destruction of habitat	- Educate about the overall project benefits and long-term objectives - Educate about native vs. invasive species - Highlight the # of new trees and area of new habitat being created - Warn public to maintain safe distance from work activities
Tree Planting	Loss of meadow habitat/open areas	- Still maintaining meadow/open areas throughout DDO Park
Wetland Creation	Drainage Concerns (immediate neighbours) Heavy equipment (noise and landscape alterations) Increase in mosquitoes	- Notify neighbours of proposed works, expected benefits and long-term objectives. - Warn them about potential for unsightly equipment and noise during periods of active construction. - Educate public about healthy ecosystems and the role of insects in the food web.

10.0 Summary

The DDO Phase 2 South-West Detailed Woodland Restoration and Implementation Plan presents a detailed plan and budget for effectively implementing the following enhancement activities between 2020-2024:

- Forest Enhancement and Management
    - Hazard tree removals
    - Invasive species management
- Naturalization Plantings
- Lowland Forest Plantings and Hydrologic Improvements
- Habitat Feature Installations
    - Large woody debris and nest boxes

Using the available compensation funds agreed to through the OMB settlement, the implementation of this plan would provide ecological enhancements that address environmental stressors/impairments such as hazard trees and invasive species, with an aim to improve long term forest health and biodiversity at the site. The restoration recommendations outlined in this document directly address these impairments in an effort to restore the Phase 2 area to a healthier and more resilient self-sustaining forest community meeting the needs outlined for the use of the compensation funds.