SAVANTA
A GEI Company

Environmental Impact Study Addendum

Riverfront Residential

DECEMBER 2019

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Riverfront Residential
Niagara Falls, ON

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1.0 INTRODUCTION AND PURPOSE OF ADDENDUM

This Environmental Impact Study (EIS) Addendum was originally prepared in September 2019 to address comments on the January 2019 Riverfront Residential EIS (January 2019 EIS; Savanta 2019) provided by the Region of Niagara (the Region; dated April 11, 2019) and the Niagara Peninsula Conservation Authority (NPCA; dated May 8, 2019). This EIS Addendum was subsequently revised in December 2019 to address preliminary comments from the Region of Niagara and NPCA, both received on November 15, 2019, as discussed at a meeting with both agencies on November 20, 2019.

Prepared as part of a Zoning Bylaw Amendment application for the proposed Riverfront Community, this Addendum should be reviewed in conjunction with the January 2019 EIS, and preceding documents including:

- Environmental Impact Study Addendum, Riverfront Community OPA (Savanta 2018);
- Environmental Impact Study, Riverfront Community OPA (September 2017 EIS; Savanta 2017); and
- Characterization and Environmental Impact Study, Thundering Waters Secondary Plan (2016 EIS; Dougan & Associates 2016).

This Addendum provides additional information and addresses comments principally related to:

- Significant Woodlands;
- Ecological Linkages and Corridors;
- Significant Wildlife Habitat;
- Species at Risk;
- Hydrology and Hydrogeological Existing Conditions;
- Low Impact Development mitigation measures;
- Impact Assessment;
- Ecological Restoration; and
- Ecological Monitoring.

Certain figures from the January 2019 EIS have been updated to illustrate the results of this Addendum. Revised and/or new figures are provided in **Appendix A**.

2.0 CHANGES TO DRAFT PLAN

As a result of agency comments, a number of changes have been made to the Draft Plan of Subdivision, dated August 14, 2019 (**Appendix B**) for the Riverfront Residential community, including:

- Decrease in the size (-0.19 ha) and alteration of the shape of Block 7 (Open Space);
- Removal of former Block 8 (Open Space) and replacement with an extension of Block 2 (Residential);
- Removal of the extension of Street C to Dorchester Road;
- Blocks 22 and 23 have been combined into a single Block 17 (Other Land Owned by Applicant) since the Street C extension that previously divided the two Blocks has been removed;
- Removal of former Block 11 (Utility/Service) with the area incorporated into new Block 11 (Environmental Protection Area);
- Removal of former Block 25 (Utility/Service) with the area incorporated into new Block 10 (Environmental Protection Area);
- Former Block 24 (Other Lands Owned by Applicant) has been eliminated and the area has been incorporated into new Block 11 (Environmental Protection Area); and
- Removal of dedicated Blocks for SWM Ponds (i.e., former Blocks 10 and 14), although potential locations for SWM Ponds are shown on the revised Concept Plan.

These changes to the Draft Plan also necessitated revisions to the servicing plans, including revised stormwater, water and wastewater requirements, as documented in Wood (2019).

This EIS Addendum discusses, where appropriate, changes to potential impacts on natural heritage features associated with the revised Draft Plan and servicing plans (Wood 2019).

3.0 SIGNIFICANT WOODLANDS

The following sections address technical comments on Ecological Land Classification (ELC) and identification of Significant Woodlands and provide additional information on potential impacts, including changes to the proposed Draft Plan that have implications on woodland communities.

3.1 Ecological Land Classifications

The following sections address several technical questions provided by the Region regarding vegetation communities on the Subject Lands. The Region also requested an ELC card for Woodland Analysis Polygon 21 (as shown on the Woodland Analysis – Stem Density Assessment Polygons figure in Appendix C of the January 2019 EIS), which was inadvertently omitted from the January 2019 EIS. The card for this community was provided to the Region on April 15, 2019 and is included in **Appendix D** of this EIS Addendum.

3.1.1 Woodland and Cultural Thicket Delineations

As noted in the January 2019 EIS, Savanta completed woodland stem density studies in 2018 to confirm the boundaries of woodlands on the Subject Lands and this work resulted in seven vegetation community refinements, as depicted in ELC mapping in the January 2019 EIS. Refinements included:

- Two Mineral Cultural Woodland (CUW1) areas were revised to Mineral Cultural Thicket (CUT1) discussed further below, including
    - CUW1 adjacent to the southwest corner of the Riverfront Residential lands; and
    - CUW1 in the southern portion of the area adjacent to Chippawa Parkway;
- The central CUT1 was revised to be a mix of cultural thicket and Cultural Meadow (CUM1), where cultural meadow was the predominant form, to more accurately reflect the nature of this community;
- A CUT1 in the southeastern portion of the Subject Lands was revised to be a CUM1 community based on lack of sufficient density of shrubs;
- Two CUT1 communities were revised to CUW1 communities based on presence of sufficient density of trees, including
    - adjacent to the eastern boundary; and
    - in the south-central portion of the Subject Lands;
- The Green Ash Mineral Deciduous Swamp (SWD2-2) adjacent to the southwest corner of the Riverfront Residential lands was changed to a Cultural Woodland (CUW1) and a complex of Cultural Thicket (CUT1) and Swamp Thicket (SWT2), as discussed further below; and
- A CUT1 community in the northern portion of the Riverfront Residential area was changed to a Fresh-Moist Poplar Deciduous Forest (FOD8-1) as discussed further below.

Vegetation communities that were revised from the March 2018 EIS Addendum to the January 2019 EIS Addendum are indicated on **Figure 2** (**Appendix A**). Vegetation community descriptions for several of the communities where refinements were made are provided in the following paragraphs.

The primary change in ELC mapping was the change of some areas of Mineral Cultural Woodland (CUW1) to Mineral Cultural Thicket (CUT1) due to ongoing ash dieback. The following community

description is specific to the cultural thickets that were previously mapped as cultural woodland. Identified as a candidate for ELC refinement due to the pervasive impact of Emerald Ash Borer (*Agrilus planipennis*) on the Subject Lands, these communities were reviewed on site to determine if suitable canopy cover remained sufficient to map these features as woodland, or if an alternative code was now more suitable. Where a change in classification was recommended, the communities exhibited significant ash dieback (i.e., overall tree canopy cover was less than 25%) and corresponding increased cover of Common Buckthorn (*Rhamnus cathartica*), Grey Dogwood (*Cornus racemosa*) and Hawthorn species (*Crataegus* spp.). All three of these species were typically present in most Cultural Thicket communities, though relative abundances varied. Associate shrubs also commonly included Bell's Honeysuckle (*Lonicera x bella*), Chokecherry (*Prunus virginiana*), as well as scattered occurrences of young tree species, such as Green Ash (*Fraxinus pennsylvanica*), and White Elm (*Ulmus americana*). Herbaceous species commonly included Wild Strawberry (*Fragaria virginiana*), Enchanter's Nightshade (*Circaea canadensis*), Graceful Sedge (*Carex gracillima*), Virginia Smartweed (*Persicaria virginiana*), White Avens (*Geum canadensis*), Heal-all (*Prunella vulgaris*), as well as asters and goldenrods.

The secondary change in ELC mapping was with respect to Woodland Analysis Polygon 21, where the original ELC polygon in this area was Green Ash Mineral Deciduous Swamp (SWD2-2). Green Ash was previously the dominant canopy species but has declined significantly over the years due to Emerald Ash Borer. The resulting increase in sunlight penetration has likely increased the frequency of Hawthorn and Common Buckthorn species, altered the local micro-climate, and influenced hydrology through increased evapotranspiration. As observed in 2018, the cover of live ash in the canopy was generally less than 30%, which along with the overall infrequency of wetland species (in both the shrub layer and herbaceous layer), resulted in a change of classification from SWD2-2 to Cultural Woodland (CUW1) and a mix of Cultural Thicket and Swamp Thicket (CUT1/SWT2). A larger proportion of this community was dominated by Hawthorn and Buckthorn with facultative upland herbaceous species, the composition of which did not meet the Ontario Wetland Evaluation System 50/50 criteria for wetland community designation. A complex of wetlands remained present, however, the shrub layer often consisted of Red-osier Dogwood (*Cornus sericea*) and willow (*Salix spp.*) shrubs in association with facultative wetland and obligate wetland herbaceous species.

A CUT1 community in the northern portion of the Subject Lands was changed to a Fresh-Moist Poplar Deciduous Forest (FOD8-1) on the basis of sufficient density of tree species for it to be considered a forested community. This forest area consists of a moist young forest dominated by Trembling Aspen, with associates of Bur Oak and Green Ash. A dense tall shrub layer of Common Buckthorn, Grey Dogwood and Red-osier Dogwood is present in the understory.

3.1.2 Savannah Communities

Savanta did consider the potential for savannah communities, including both Tallgrass Savannah (TPS) and Cultural Savannah (CUS1), as defined in the ELC Manual (Lee et al. 1998), to be present on the Subject Lands during the woodland studies completed in 2018. Savannah communities contain between 25% and 35% tree cover, while Tallgrass Savannah has an understory of prairie grasses and forbs and these communities are considered a rare vegetation type in Ontario. Those rare Tallgrass Savannah communities typically develop in sandy soils in the Carolinian forest region. These features occur in southwestern Ontario, along some Lake Huron shores, and along Lake Erie. Tallgrass Savannah communities do not appear to have historically occupied the Subject Lands, nor are they currently present (NPCA 2010; Oldham 2017). Cultural Savannahs consist of the same tree cover, but do not have prairie grass and forb understory and are not considered to be a rare community in Ontario.

The Cultural Thicket on the Subject Lands does not meet the definition of Tallgrass Savannah in Ontario. Generally, distinguishing cultural savannahs, which require 25-35% tree cover, is difficult to determine visually, given the narrow range of cover required. Portions of the Subject Lands may meet the tree cover threshold associated with Cultural Savannahs, however Savanta's vegetation ecologists more typically identify savannahs in areas with much less dense shrub layers (compared to the dense thicket nature of the areas on the Subject Lands) that more closely mimic native tall grass savannahs. As a result, given the difficulty of field verification of this narrow range of tree cover, and the lack of rarity status for Cultural Savannah in Ontario, none have been identified, with areas being split between Cultural Woodland and Cultural Thicket.

3.2 Significant Woodlands Identification

Significant woodlands within the study area were assessed within the January 2019 EIS in accordance with the policies of the Natural Heritage Reference Manual (NHRM; MNR 2010) and the Niagara Region Official Plan (ROP). Per Policy 7.B.1.5 of the ROP, the assessment considered where woodlands overlap with Environmental Protection Areas (Policy 7.B.1.3) or Environmental Conservation Areas (Policy 7.B.1.4) as identified in Schedule C of the ROP.

The Region noted (Comment 2) that the assessment should consider not just those identified EPA and ECA within Schedule C, but also the underlying features which lead to the identification of EPA and ECA, as noted within Policies 7.B.1.3 and 7.B.1.4. These would include provincially significant wetlands, Life Science Areas of Natural and Scientific Interest (ANSI), significant habitat of endangered and threatened species, significant wildlife habitat, significant habitat of species of concern, other evaluated wetlands, and significant valleylands, amongst other features. In consideration of these criteria, additional woodlands are considered to be significant woodlands under the ROP, as shown on **Figure 3** (**Appendix A**).

3.3 Impact Assessment Considerations

Following re-classification of the significant woodlands as described above in section 2.2, and in consideration of the updated Draft Plan, the amount of Significant Woodland removal required by the proposed development was re-assessed. The total amount of significant woodland proposed for removal is now 6.86 ha, which represents a decrease of 0.41 ha from the amount of woodland removal required in the January 2019 EIS (7.27 ha), primarily due to removal of former Block 11 from the Draft Plan (with the area incorporated into the adjacent Environmental Protection Area, now referred to as Block 11) and Draft Plan changes to provide 15 m wetland buffers instead of the originally proposed 10 m buffers adjacent to some features. The extent of removal from significant woodlands is shown on **Figure 3** (**Appendix A**).

As noted within the January 2019 EIS, the majority of these removals are proposed from cultural woodland communities that are severely impacted by Emerald Ash infestation and invasion by Common Buckthorn. The assessment of impacts associated with removals from these communities as described within section 7.3 of the Riverfront Residential EIS remains accurate and complete. To supplement the assessment of potential impacts on residual portions of the woodland due to the proposed woodland removals, Savanta has completed an assessment of the ecological function and value of the residual woodland areas, based on the Natural Heritage Reference Manual (MNR 2010) significant woodland evaluation criteria. This assessment is provided in **Table 2** (**Appendix C**). The results of the assessment demonstrate that the residual portions of the Significant Woodland on and adjacent to the Subject Lands will continue to meet criteria for significance and that removal of some significant woodland will not have a negative impact on the overall important functions that will remain in the residual woodland, which is dominated by diverse wetland communities that are

generally unimpacted by invasive species that predominate through the cultural woodlands proposed for removal.

The draft plan does propose removals from a small Fresh-Moist Poplar Deciduous Forest (FOD8-1) located within the northern extent of the Riverfront Residential community. The Region (Comment 4) requested further discussion on this specific community. Dougan & Associates (2016) describes this community as a small 0.44 ha community that,

> *included a young Eastern Cottonwood* (Populus deltoides) *canopy with American Elm* (Ulmus Americana)*, and an understory of Common Buckthorn, Gray Dogwood* (Cornus racemosa)*, and Highbush Cranberry (*Viburnum opulus ssp trilobum*). The groundcover was indicative of relatively moist soils, and included sedges (*Carex gracillima, C. leptonervia*), Rushes (*Juncus dudlyei, Juncus tenuis*), Red-tinged Bulrush (*Scirpus microcarpus*), and Purple Loosestrife* (Lythrum salicaria)*. Creeping Spike-rush (*Eleocharis palustris*), a rare species in Niagara Region, was also found within this polygon.*

The 20 m buffer proposed for the adjacent PSW (SWD1) will preserve approximately 0.18 ha of this community (subject to confirmation of potential LID requirements within the buffer), resulting in a total removal of 0.26 ha from the FOD8-1 forest unit.

This woodland type is not considered rare or endangered in the province, and the ecological quality of the community is already impaired by the presence of invasive/exotic species (such as Common Buckthorn and Purple Loosestrife). As noted, Creeping Spike-rush is considered to be a rare species in Niagara Region, though it is a common and widespread (S5) species within the province as a whole. This species is most commonly associated with marsh communities, and other open environments, and therefore would not be dependent on the FOD8-1 community for provision of suitable habitat conditions. Prior to construction, a survey will be completed to determine the precise location of the species. As a perennial rhizomatous plant, this species is considered to be well suited for transplant into other suitable habitats in the restoration plan as needed. Further, opportunities to include Creeping Spike-rush within the native plant nursery will be examined to potentially enhance the presence of this species on and adjacent to the Subject Lands.

This unit has been included within the Area Sensitive Breeding Bird Significant Wildlife Habitat polygon (see section 5.3 and **Figure 4h**, **Appendix A**), although removal of a portion of the woodland unit has no impact on the overall availability of Area Sensitive Breeding Bird habitat.

Woodland restoration (type 1 Common Buckthorn Treatment, as detailed in the Conceptual Ecological Restoration Plan in the January 2019 EIS) is proposed for the residual portion of this woodland unit. This will result in removal of existing invasive species and in-fill plantings of native tree and/or shrubs. Overall, the ecological function within the retained portion of the woodland unit will be enhanced over the long-term due to the proposed ecological restoration measures. This will assist in enhancing the buffer function for the adjacent PSW provided by the FOD8-1 unit.

Overall, while removal of 6.86 ha of wooded area that currently meets the definition of a Significant Woodland is proposed, Savanta continues to be of the opinion, as noted in the January 2019 EIS, that the proposed removal will not result in any negative impact on the woodland. This opinion is based on the nature and functions of the woodland proposed for removal (i.e., primarily cultural woodlands heavily impacted by Emerald Ash Borer that have been invaded by dense invasive buckthorn species). The proposed woodland creation and enhancement measures are anticipated to result in an overall increase in woodland function on the Subject Lands. It is therefore our opinion that the proposed development satisfies Niagara Region Official Plan Policy 7.B.1.11.

3.3.1 Impacts of Street A on Significant Woodlands

As discussed with the Region, Street A is a critical component to the first stage of development of the western portion of the Riverfront Residential community, as such, may proceed in advance of other portions of the area (e.g., portions of Blocks 2 and 4). Street A encroaches into 193 m^2 (0.02 ha) of Significant Woodlands, as shown specifically on **Figure 3** (**Appendix A**). The remainder of the Street A right-of-way avoids Significant Woodlands.

This small area of proposed woodland removal consists of the edge of a Cultural Woodland (CUW) community where it borders with a Cultural Thicket (CUT). As noted in section 3.1.1, these cultural woodland communities are heavily impacted by Emerald Ash Borer and have been invaded by dense shrub growth dominated by invasive buckthorn species. While this area continues to meet criteria to be considered a woodland and therefore, Significant Woodland, removal of 193 m^2 from this small woodland lobe is not anticipated to have any negative effect on the overall woodland community. This area does not meet criteria to be considered any other type of protected natural feature (e.g., Significant Wildlife Habitat).

3.3.2 Woodland Restoration Considerations

The Conceptual Ecological Restoration Plan (CERP; **Appendix E**) identifies woodland restoration and enhancement measures to strengthen and protect the residual woodland on the Subject Lands. Restoration will consist of the following:

- Woodland restoration areas: 8.06 ha;
- Permanent native meadow restoration areas: 2.79 ha;
- Created open wetlands: 0.16 ha (final size to be determined through refinement at the stormwater management plan stage based on water availability to sustain each wetland); and
- Buffer plantings on other lands owned by the applicant: 1.75 ha.

As discussed in section 8.3.5, LID measures are proposed for installation in some wetland buffers to assist in maintaining water balance and water quality. Areas of buffers that have had LID measures installed will not develop woodland vegetation over time, although invasive species removal will occur within the footprint of LID measures. Wood has indicated that LID measures are anticipated to occupy no more than 2% of the overall buffer area. Therefore, the presence of LID measures within buffers designated for woodland restoration may result in minor changes to the overall amount of woodland restoration identified above. Following completion of the final design of LID requirements, the CERP will be reviewed and additional woodland restoration/enhancement areas on or adjacent to the Subject Lands will be identified to address any areas that won't be restored/enhanced due to LID measures. Ultimately, the restoration/enhancement area quantities identified in the CERP will remain consistent, although the locations may change, depending on final LID requirements.

4.0 ECOLOGICAL LINKAGES AND CORRIDORS

The following sections address technical comments on ecological linkages and wildlife movement corridors.

4.1 Ecological Linkage

The September 2017 EIS considered the enhancement of existing linkages, where appropriate, and integration of linkages in the context of existing and future infrastructure, in the recommendation of an NHS system for the Subject Lands.

The recommended NHS incorporated a linkage through the Riverfront Residential Area that connects the larger components of the Provincially Significant Wetlands north of the rail line, south to the Welland River and ultimately to the green spaces across the river for those species able to cross that feature. A further linkage is provided through the open space beside the railway tracks that will provide a linkage in a south-westerly direction.

These two linkage corridors will provide movement and connection opportunities for a range of wildlife around and through the Riverfront Residential Area. Further, connections through these pathways will provide crossing opportunities at the most proximal points to existing natural features opposite the Welland River, minimizing travel distances.

The January 2019 EIS considered a maintained easement through the naturalized corridor (i.e., former Block 11) to support sub-surface infrastructure (i.e., watermain, etc.). The current draft plan has eliminated the requirements for this infrastructure which will allow for the existing vegetation cover within this area to be maintained to provide for a generally continuous naturalized north-south corridor. A pedestrian trail is proposed (see Wavefront Planning & Design 2019) within the former Block 11 area to provide a pedestrian linkage between Blocks 4 and 12. The pedestrian trail remains conceptual and will be sited and designed to minimize potential impacts on vegetation and drainage within this area. The trail design should incorporate the following mitigative features to prevent impacts on wildlife movement within the corridor:

- The width of the trail and associated vegetation removal should be minimized to the extent possible;
- The trail should be sited to avoid mature trees and minimize impacts to other trees;
- The trail should be surfaced with mulch or other soft material and should be at grade to permit wildlife to cross the trail and prevent impacts on surface water drainage;
- Cyclists should be prevented from using the trail to minimize potential impacts on wildlife; and
- The trail should be located to minimize impacts on surface water drainage (e.g., avoiding the depression in the ground in this area, as discussed in section 7.1.1).

The corridor width will vary in association with the size of the core features contained within, but will generally be wider than 100 m with the exception of a short (< 100 m) section between two of the deciduous swamp units where the width will narrow to approximately 50 m. Minimum widths between 50 and 100 m are in line with those recommended for corridors whose primary function will be to provide movement corridor for various species (Environment Canada 2013). This corridor alignment was designed in consideration of the species assemblages most likely to use the corridor to move between the natural heritage features on and adjacent to the Subject Lands, as described below:

- Amphibians – Given the nature of the slough forest wetland present on the Subject Lands, with wetted breeding habitats interspersed with upland forest summer habitats, broad movements

across the landscape from breeding to non-breeding habitats are not anticipated. As a result, movements are more likely to be associated with dispersal between breeding habitats, or juvenile dispersal from natal ponds. In addition, as wetland communities are the predominant habitat type within the corridor, it will provide refuge or foraging habitats for species dependent on those community types. As a result, the core function of the linkage corridor connecting these features would be to provide an appropriate movement corridor for these species. Given the relatively short distance between wetland communities within the corridor, a vegetated corridor with an average width of 50 m is considered appropriate to support this habitat type.

- Reptiles – Several species of snakes and turtles were recorded during the baseline investigations completed to date, including Midland Painted Turtle, Snapping Turtle, Eastern Garter Snake, Eastern Milksnake, Red-bellied Snake and Dekay's Brown Snake. These species are common to urban/natural environment interfaces or are associated primarily with forest edge/meadow habitats, such that the 50 m minimum-width movement corridor would be expected to function effectively for movement across the short, local distances on the Subject Lands.
- Mammals – The majority of mammal species detected to date are common within urban environments, and therefore movement through the corridor would be unimpaired. Species of bats would not be dependent on the corridor for movement and would be expected to continue to move broadly across the Subject Lands. Similarly, many of the species detected during the baseline studies are common in urban environments (raccoons, squirrels, chipmunks), and would be expected to move freely throughout the residential community in search of foraging opportunities provided in association with urban areas.
- Birds – With the narrow separations provided between natural features within the corridor, the corridor would not be designed to provide any function for bird species, which are known to cross open distances between features located in close proximity to each other.

Additional connections through the Riverfront Residential Area were considered, however further linkages would provide no measurable improvement in connectivity between natural heritage features, or material benefit to wildlife. Though many wildlife species are expected to continue to move through the Riverfront Residential Area, these species are expected to be doing so in association with foraging opportunities provided by the urban environment therein, and provision of movement corridors or wildlife passages within the community would not be effective.

4.2 Wildlife Passage Mitigation

Road mortality surveys completed to date have consistently found the location of highest risk to be situated on Chippawa Parkway, at the southern limit of the proposed north-south naturalized corridor. Upgrades to Chippawa Parkway that will be completed by the City of Niagara Falls will be subject to a separate environmental assessment process, and it has been previously recommended that consideration within that process be given to installation of ecopassages at this location. It is recommended that to be effective, the following measures would need to be considered:

- Ecopassages should be primarily designed to facilitate movement of amphibians and reptiles (given observed mortality levels), and therefore should be completed in consideration of recommendations for these species identified within relevant guidelines (such as CVC 2017);
- Given the clear sensitivity of this location, it is recommended that multiple ecopassages be installed (i.e. spaced approximately 100 m apart along the terminus of the movement corridor); and
- Ecopassages should be installed along with exclusionary fencing. It is recommended that exclusionary fencing should be placed along the entire length of the terminus of the movement

corridor adjacent to Chippawa Parkway, and should extend approximately 150 m north along the western edge of the naturalized corridor to ensure that wildlife moving along the feature are directed back towards the ecopassages. Exclusionary fencing along the southern extent of Chippawa Parkway should also be considered to direct wildlife towards the entrances along that portion of the corridor.

An additional ecopassage should be considered along Dorchester Road adjacent to the northern end of the Riverfront Residential lands, where amphibian road mortality was observed. This ecopassage should be designed, if feasible, for mid-sized mammals that would be more likely to use this corridor.

While the ultimate design and implementation of movement corridors on Chippawa Parkway and Dorchester Road as outlined above should be completed by the City of Niagara Falls as part of the Class Environmental Assessment process for road upgrades, it may be necessary to implement temporary wildlife passage measures associated with minor road upgrades (e.g., new intersections leading into the community) being completed by GR (CAN), depending on the timing of the City-led road improvements. This should be considered at the detailed design stage for road improvements being completed by GR (CAN). Road elevation increases may be necessary to install wildlife eco-passages, so if the upgrades being contemplated by GR (CAN) present an opportunity or requirement to increase road grade in certain locations where road mortality risk is highest, installation of eco-passages (even if of a more temporary nature) should be considered to mitigate road mortality until such time as the full road upgrades are completed by the City.

4.3 Wildlife Road Mortality

Wildlife road mortality results completed by Savanta to date have shown that the majority of wildlife passage across the existing road network within the study area (i.e. Chippawa Parkway/Dorchester Road) appears to occur at the location of the proposed naturalized corridor through the Riverfront Residential Area. Implementation of the proposed wildlife passage mitigation previously described in section 4.2 above is expected to result in reduced road mortality at this location when compared to baseline conditions where such features are not available.

Road mortality within the internal roads of the Riverfront Residential Area would be expected to occur, however species likely to be impacted by this mortality would be those commonly associated with urban environments, such as squirrels, skunks, raccoons, opossums, etc.

5.0 SIGNIFICANT WILDLIFE HABITAT

The following sections provide information to address comments from the Region and NPCA regarding Significant Wildlife Habitat (SWH). Savanta continues to be of the opinion that, as stated in the January 2019 EIS, the proposed development is not anticipated to have any negative impact on Significant Wildlife Habitat, provided the proposed Great Plains Ladies'-tresses transplant program is successful.

5.1 Woodland Amphibian Breeding Habitat

The Region and NPCA requested further amphibian breeding information on three specific wetland communities present within the Riverfront Residential Study Area; two SWD4-1 communities, and a SWD2-2 community.

The two SWD4-1 communities are situated within the proposed Natural Heritage System for the project. As they are situated entirely outside of the project footprint, and separated from other woodland communities, these two communities are treated as Candidate Woodland Amphibian Breeding SWH, as has been the case for the other wetland communities surrounding the Riverfront Residential Area, with the limits of these communities established by the limits of the associated SWD4-1 ecosites (see **Figure 4a**, **Appendix A**). Mitigation measures identified in this EIS Addendum and previous EIS documents (Savanta 2017; Savanta 2018; Savanta 2019) to protect the wetlands is anticipated to be sufficient to protect the amphibian breeding habitat within them.

Targeted amphibian surveys were completed at the SWD2-2 community. These surveys are described in section 5.1.1 below.

5.1.1 2019 Amphibian Survey Results

Amphibian monitoring surveys at the SWD2-2 unit consisted of an early season egg mass survey, a diurnal call count survey (to target Western Chorus Frog given their prevalence within the local area), and two subsequent nocturnal call count surveys. Call count surveys were completed in accordance with the requirements of the Marsh Monitoring Program, with the exception of the modification to target diurnal Western Chorus Frog activity.

The monitoring location is shown on **Figure 4a** (**Appendix A**), while the results of the survey at this feature are presented in **Table 3** (**Appendix C**). Field data sheets are provided in **Appendix D**.

The results of the survey identified an estimated 17 individual Western Chorus Frog, and 4 individual Gray Treefrog; as a result, this feature exceeds the significant wildlife habitat criteria of more than 20 individual frogs with more than 2 of the listed species detected. As a result, the SWD2-2 community meets SWH requirements. As the feature is isolated from other swamp or forest communities, the limits of this SWH habitat corresponds with the limits of the SWD2-2 community (as shown on **Figure 4a**, **Appendix A**).

5.2 Bat Maternity Colony Habitat

The Region requested further information on the bat acoustic monitoring program. **Tables 4** and **5** (**Appendix C**) summarize the dates and weather conditions associated with bat acoustic monitoring studies conducted in 2018 and **Figure 14** (**Appendix A**) identifies the acoustic monitoring locations. As shown on the figure, there were three sets of monitoring stations established: primary, secondary and tertiary. Primary stations were the acoustic monitoring stations established in vegetation community types that could be candidate Maternity Colony SWH (i.e., forest and swamp communities)

in close proximity to the proposed development. The Secondary monitoring locations were those established in potential candidate community types, but that existed further away from the proposed development. The tertiary monitoring stations were established in cultural woodland and cultural thicket communities. These community types are not eligible to be considered candidate SWH or species at risk bat habitat, and the monitoring completed in these communities was primarily to provide a fulsome understanding of bat use of the Subject Lands. The results of the studies are summarized in **Table 6** (**Appendix A**).

5.3 Area Sensitive Bird Breeding Habitat

Figure 4h (**Appendix A**) has been revised to include the FOD8-1 and SWD2-2 units within the outer limits of this feature as part of the SWH. The addition of these units had no impact on the extent of interior forest breeding habitat available at 200 m from the edge of the feature (i.e. total available area remains approximately 0.1 ha). As a result, removal of a small component of the FOD8-1 unit will have no impact on the extent of area-sensitive bird breeding habitat available on and adjacent to the Subject Lands.

5.4 Great Plains Ladies' Tresses

Figure 4c (**Appendix A**) shows the extent of Great Plains Ladies' Tresses occurrences as described within the January 2019 EIS. Given the large area of the CUM1/CUT1 unit in which the species was observed, mapping the entire unit was determined not to provide an accurate depiction of the occupied/potential habitat for the species. Most plants were observed in dry old-field meadow on sand and gravel patches. This type of habitat is relatively limited within the overall CUM1/CUT1 habitats comprising the ELC unit within which the plants were found and differentiation of these ELC types is difficult. Therefore, the entire ELC polygon (i.e., the entire CUM1/CUT1 polygon) is not considered to be suitable habitat for this species. As with other SWH types, the mapping of the habitat does not include a buffer from the identified habitat.

Proposed transplant locations for the Great Plains Ladies' Tresses are identified on the revised **Figure 3** from the Conceptual Ecological Restoration Plan (provided in **Appendix E** of this EIS Addendum). These transplant locations, shown as Native Meadow Restoration Areas NM1 (the primary transplant zone) and NM3 (which will also be suitable for transplant) will permit transplant of all Great Plains Ladies' Tresses identified on the Subject Lands.

To the extent that construction phasing and timing permit, the smaller populations of Great Plains Ladies' Tresses present to the west of the proposed Street A location should be relocated prior to relocating the larger population to the east of Street A. This will permit the success of these smaller scale transplants to be monitored and the transplant process to be refined as necessary, prior to undertaking the larger scale transplant of the main population.

5.5 Shrub/Early Successional Breeding Bird Habitat

The Region requested further information on the possibility of the CUM/CUT complex through the Riverfront Residential Area being considered shrub/early successional breeding bird habitat. This was considered within the September 2017 EIS (section 4.3.3), and it was determined that the feature should not be considered significant wildlife habitat. The SWH criteria schedule (MNRF 2015) for this habitat type states that this habitat type should be associated with sites that are abandoned fields or pasturelands. The Subject Lands did not originate from that use and therefore do not meet the habitat criteria. However, in accordance with the recommendations provided within both the 2016 EIS and September 2017 EIS, the detailed habitat restoration plan will consider the incorporation of open

shrubland areas containing native species as a means of providing alternate habitat for species dependent on this transitional habitat type.

6.0 SPECIES AT RISK

An updated Information Gathering Form (IGF) was submitted to the Ministry of Environment, Conservation and Parks (MECP) on March 29, 2019. This IGF built upon the original IGF that was submitted to the Ministry of Natural Resources and Forestry (MNRF) on January 23, 2018. The revised March 2019 IGF included additional information to address MNRF comments (dated April 30, 2018) and also incorporated the results of additional ecological studies completed on the Subject Lands in 2018.

A response was received from the MECP on May 23, 2019. In order to protect the location of specific Endangered and Threatened species on or in proximity to the Subject Lands, the MECP's letter has not been included in this EIS Addendum. MECP has concluded that no authorization under the *Endangered Species Act, 2007* will be required for Barn Swallow (*Hirundo rustica*).

MECP requested that additional information be provided regarding:

- Clarification on the presence/absence of Kentucky Coffee Tree (*Gymnocladus dioicus*);
- Locations of Dense Blazing Star and potential impacts on Dense Blazing Star (*Liatris spicata*); and
- Roosting and foraging habitat for Little Brown Myotis (*Myotis lucifugus*) and Northern Myotis (*Myotis septentrionalis*).

Savanta submitted a revised IGF to address MECP's comments on November 29, 2019. Specifically, with respect to MECP's comments, the revised IGF:

- Provided clarification that the previous observation of Kentucky Coffee Tree outside the Riverfront Residential area by Dougan and Associates (2016) was not a confirmed field identification, and it was only identified as a potential individual; subsequent confirmation of the occurrence was not made by Dougan and Associates. No individuals of this species were observed during targeted surveys completed by Savanta within the area of the original Dougan and Associates potential observation during appropriate seasonal periods to confirm identification of this species. Therefore, this species is determined to be absent;
- Noted that Dense Blazing Star individuals and suitable habitat are located outside the proposed Riverfront Residential area. Given the separation from the development, as well as restriction of suitable habitat conditions for this species to the existing observed locations, adverse effects on the species are not anticipated; and
- Confirmed the proposed development will result in the removal of 0.27 ha of potential Endangered bat roosting habitat from within the FOD8-1 community, as well as some foraging habitat in the cultural thickets and meadows adjacent to the retained roosting habitat in the NHS. Given the extent of both foraging and roosting habitat identified within the proposed NHS on and adjacent to the Subject Lands, the direct removals are not anticipated to have an adverse effect on the species and availability of habitat to support life functions. Mitigation (e.g., timing restrictions) will be implemented to prevent adverse effects on individuals.

Based on the results of the assessment in the revised IGF, it is not anticipated that any permits under the *Endangered Species Act, 2007* will be required for the Riverfront Residential development. Final confirmation from the MECP will be provided to the Region for reference.

7.0 HYDROLOGY AND HYDROGEOLOGY

The January 2019 EIS did not include any specific discussion in regard to existing surface water hydrology and groundwater hydrogeology on the Subject Lands. Discussion on these aspects has been previously provided in the September 2017 EIS and the Functional Servicing Study (Amec Foster Wheeler 2016).

Some additional information regarding hydrology and hydrogeology has been collected since these reports were prepared. Hydrogeological information has been collected by Wood (2019) as part of geotechnical investigations completed throughout the Subject Lands. Site investigations were also completed in June 2019, and with the Region and NPCA on July 2, 2019, to review surface water drainage features on the Subject Lands.

These various information sources have been assembled to provide a comprehensive discussion of existing hydrological and hydrogeological conditions on the Subject Lands within this EIS Addendum, as described in the following sections.

7.1 Surface Water

As shown in **Figure 15** (**Appendix A**), there are no watercourses within the proposed Riverfront Residential Development Area, although there are two watercourses within the Natural Heritage System on the Subject Lands (WC1 and WC2) and two watercourses within 120 m of the Subject Lands (Conrail Drain and the Welland River). In addition, a surface water drainage feature not previously discussed within any project-related documentation (DF-1; **Figure 15**, **Appendix A**) is present on the Subject Lands. Each of these features is discussed in more detail in the following sections.

7.1.1 WC1

Watercourse 1 (WC1) is a short (212 m) open-channel reach that originates at an historical remnant concrete culvert outfall, which is believed to convey flows from a network of legacy pipes that drain surface water, via inlets and broken sections, from the elevated northern and central portions of the Subject Lands. As shown on **Figure 15** (**Appendix A**), based on a combination of historical (1934) aerial imagery review and site observations, it appears possible that the buried pipe originates near the northern portion of the Subject Lands (Barrett, pers. comm. 2019). A buried pipe inlet has been observed at this location.

As noted in the comments provided by the Region and NPCA, there is an approximately 5 m deep, by 10 m wide depression in the ground located approximately 425 m southeast of the inlet location and this appears to line up directly with the inlet and the outlet to the open channel portion of WC1, which is located approximately 110 m further southwest from the exposed pipe location. This depression may be associated with the buried pipe discharging to WC1. The Region has noted that their staff have observed surficial and sub-surficial flow entering the depression, which is located between wetland communities in Blocks 10 and 11. Similar observations have been made by members of the project consulting team. Therefore, this depression may be important to maintaining discharge from wetlands in Block 11, as well as maintaining existing water balance in WC1.

The open channel portion of WC1 downstream from the culvert outfall flows intermittently and drains south into the Welland River, south of Chippawa Parkway. The culvert beneath Chippawa Parkway is a 900-mm diameter corrugated steel plate (CSP) culvert, which has been observed to be partially submerged due to backwater from the Welland River (Amec Foster Wheeler 2016). WC1 downstream from the culvert outfall was observed to be flowing in early April 2015, with a depth of approximately

10 cm and by June 11, 2015, the water level had decreased to several centimeters (Dougan & Associates 2016). The feature was dry in October 2015.

The 2-year return period peak flow at Chippawa Parkway was calculated by Amec Foster Wheeler (2016) to be 0.63 m^3/s, while the 100-year flow was calculated (using rainfall data from NPCA) to be 2.08 m^3/s.

7.1.2 WC2

Watercourse 2 (WC2; also referred to as the Eastern Tributary) is located east of the Subject Lands. The watercourse appears to originate within Thundering Waters Golf Club lands. An approximately 70 m long portion of the upper reach of the watercourse is piped, with a 100 m long reach downstream from the piped area having been previously channelized and protected with rip rap. However, the lower approximately 815 m of this watercourse, which drains to the Welland River is naturally meandering within a small, vegetated valley system. The bankfull depth and width upstream from Chippawa Parkway were noted by Amec Foster Wheeler (2016) to be 0.2 m and 2.3 m, respectively. The watercourse flows beneath Chippawa Parkway through a 1200-mm diameter concrete culvert (Amec Foster Wheeler 2016).

The watercourse was observed to be flowing during all site investigations completed by Dougan & Associates (2016) in 2015. The 2-year return period peak flow at Chippawa Parkway was calculated by Amec Foster Wheeler (2016) to be 0.98 m^3/s, while the 100-year flow was calculated (using rainfall data from NPCA) to be 3.14 m^3/s. Amec Foster Wheeler (2016) noted that the watercourse valley effectively contains the 100-year flood flow in the feature, with no floodplain extending onto the adjacent tablelands.

This watercourse has a total drainage area of approximately 115 ha, which includes runoff from approximately 40 ha of the eastern portion of the Subject Lands and adjacent lands owned by GR(CAN) and approximately 75 ha of land from the upstream golf course and adjacent industrial lands owned by others (Amec Foster Wheeler 2016).

7.1.3 Conrail Drain

The Conrail Drain is a deep, straight, artificial channel, lined with rip-rap along its entire length. It originates from drainage north of McLeod Road north of the Subject Lands and ultimately discharges to the OPG Power Canal. The overall drainage area of the feature is approximately 365 ha, with 298 ha originating from upstream of the Subject Lands (Amec Foster Wheeler 2016). The feature was observed to contain some flow during all field investigation periods in 2015, although in many sections, low flows were interstitial. The 2-year return period peak flow at Dorchester Road was calculated by Amec Foster Wheeler (2016) to be 9.30 m^3/s, while the 100-year flow was calculated (using rainfall data from NPCA) to be 23.31 m^3/s. Amec Foster Wheeler (2016) noted that the drain effectively contains the 100-year flood flow in the feature, with no floodplain extending onto the adjacent tablelands.

7.1.4 Welland River

The lower reach of the Welland River is located within 120 m of the Subject Lands. Under natural conditions, the Welland River would have discharged to the upper Niagara River. However, this reach (also referred to as the Chippawa Channel) has been historically altered through dredging to divert flows from the Niagara River towards the adjacent Power Canal to supply downstream hydroelectric

power generation facilities. The reach adjacent to the Subject Lands is wide (approximately 120 m) and generally swiftly flowing, when water is being diverted from the Niagara River.

7.1.5 Other Surface Water Drainage Features

As noted in the comments from the Region and NPCA, there is an additional surface water drainage feature (referred to as DF-1 on **Figure 15**, **Appendix A**) originating in the large central wetland on the Subject Lands (in the southern portion of Block 11), flowing through the proposed development area (Block 12) and eventually draining (via overland flow) to the southern end of WC1 on the Subject Lands. The feature was reviewed with staff from NPCA and the Region on July 2, 2019. The majority of the feature appears to be an anthropogenically excavated linear channel, that is visible on aerial imagery from 1934. The original purpose of the excavated channel is unknown. Presently, it serves to convey water on an intermittent basis out of the southern portion of the wetland in Block 11. The feature was observed to have low magnitude flow in mid-June 2019 but was generally dry during the July 2 site investigation. The feature loses definition at the lower end, where it dissipates into a small portion of the wetland in Block 10 and appears to eventually flow overland to WC-1 just upstream from the culvert at Chippawa Parkway. Based on lack of channel definition at the downstream end, the feature does not appear to provide direct fish habitat.

Based on the anthropogenic origin of the excavated drainage channel and the lack of channel definition at the downstream end of the excavated portion, with no direct conveyance channel connection to WC1, the feature should not be considered a Regulated watercourse by NPCA.

7.2 Hydrogeology

Wood (2019) has analyzed the key findings of geotechnical investigations completed between 2016 and 2019 with respect to hydrogeology of the Subject Lands. The findings show that the native soils on the Subject Lands are generally clayey silt and silty clay, which are fine grained soils with low permeability. Wood (2019) indicated that these native soils, which are located beneath higher permeability fill soils throughout the central portion of the Subject Lands would act as an aquitard, with surface water infiltrates into the fill soils becoming perched on the native soils. Wood indicated that these native soils are not expected to contribute significantly to shallow groundwater on the Subject Lands.

8.0 OTHER IMPACT ASSESSMENT CONSIDERATIONS

The following sections provide additional information and discussion to support the assessment of impacts on natural heritage features provided in the January 2019 EIS in order to address specific comments provided by the Region and NPCA.

8.1 Buffers

Buffer widths and the functions of buffers on the Subject Lands have been discussed in extensive detail in both the September 2017 EIS and the January 2019 EIS. A detailed rationale for buffer widths presented on an individual feature by feature basis was prepared and updated versions are presented within **Tables 8a-b** and **9a-b** (**Appendix C**). As this information has previously been presented, this section will provide a summary of the factors that were considered in the establishment of the proposed buffer widths, as well as the proposed functions of the buffers on the Subject Lands.

Previous EIS documentation (Savanta 2017; Savanta 2018 and Savanta 2019) has outlined the rationale for wetland buffers ranging from 10 to 20 m, depending on the nature of the feature. However, NPCA policies require that lot lines maintain a minimum 15 m buffer from wetlands. Although Savanta continues to be of the opinion that the originally proposed 10 m buffers would provide suitable protection for the features (when combined with other mitigation), the minimum buffer generally proposed by the Draft Plan is 15 m in order to address NPCA policies. Therefore, the proposed development plan for the Riverfront Residential Area incorporates variable buffers of 15 m and 20 m (**Figure 10a**, **Appendix A**), from individual features as outlined below:

- Limited/marginal to moderate ecological function = 15 m buffer:
  - Small and narrow ash-dominated wetland communities currently in a state of transition due to ash die-back;
  - Smaller wetlands with either no locally rare plant species or limited numbers known to not be highly sensitive, and showing evidence of drier conditions throughout the year;
  - Communities with existing exotic species present or in a state of transition due to ash die-back;
  - Communities with low numbers of locally rare species;
- High ecological function = 20 m buffer:
  - The SWD1 community was determined to have the greatest ecological function (interior forest, old growth forest stands, etc.) and also contains the highest diversity of plant species with known sensitivity to locally rare plants.

The buffers identified above will ensure that the functions of the existing natural heritage features are protected from the effects of the proposed development. To preserve the identified functions, the buffers provide a role to:

- Limit anthropogenic encroachment (residents, domestic animals, etc.) into the natural heritage features;
- Screen the features from human disturbance through residual vegetation or tree/shrub planting within the buffers;
- Filter surficial runoff into vegetation communities to improve water quality and reduce contamination;

- Provide locations for the establishment of Low Impact Development measures that will preserve water inputs to wetland communities;
- Protect the features from exotic/invasive species establishment; and
- Restore woodland communities where exotic/invasive species (i.e., buckthorn) currently predominate on the landscape.

As discussed in section 8.3.5, LID measures are proposed for installation in some buffer areas to assist in maintaining water balance and water quality in adjacent wetlands. The detailed design of these LID measures will be completed at the overall detailed design stage, since it requires detail on storm sewer depths, individual lot grading and local catchment area and coverage (Wood 2019; **Appendix F**). Based on the conceptual LID measure example provided by Wood (**Appendix F**), LID measures are expected to take up 2% or less of the overall wetland buffer areas. The individual LID measure example provided in **Appendix F** occupies approximately the first 7.5 m of the overall 15 m buffer, with the remaining buffer area subject to restoration per the Conceptual Ecological Restoration Plan (**Appendix E**). The LID measure will be vegetated to the extent possible. During detailed design, preference will be given to LID measures that are maintained within the outer 5 m of the buffer. Therefore, LID measures will occupy a small percentage of the overall buffer area.

Further, even where LID measures are installed in buffers, the overall local buffer function is not anticipated to be negatively impacted by the presence of the LID measure. These LID measures will not encourage anthropogenic encroachment and may actually discourage human use of the area, due to the topographical variation they provide. Landscaping around the LID measures can target use of species that will further discourage pedestrian access (e.g., shrubs). These LID measures will continue to provide surface water runoff mitigation and will protect the adjacent feature from exotic invasive species establishment. Overall, the use of small LID measures spaced periodically throughout wetland buffers is not anticipated to have any negative overall impact on the function of the buffer.

It is important to note that buffers alone cannot protect natural heritage features from the impacts identified above. Buffers must function in conjunction with a range of mitigation measures; for example, rear-yard fencing, a trail system that provides regulated access, and distribution of homeowner materials around the importance of the adjacent natural heritage features are of equal importance as the buffer in respect of limiting anthropogenic encroachment into the feature. The complete list of mitigation measures that will function to protect the natural heritage features in conjunction with the buffers discussed herein is identified in section 7 of the January 2019 EIS.

The buffers identified are considered to be sufficiently protective of adjacent natural features, when taking into consideration other mitigation, the sensitivity of the feature and the function of the proposed buffer.

8.1.1 Proposed Buffer Reductions

Reduced buffers (i.e., <15 m) are proposed in three locations (identified as Areas 1, 2 and 3), as shown on **Figure 10b** (**Appendix A**). Each of these proposed buffer reductions are discussed in the following sections.

Area 1

Within Area 1, a maximum buffer reduction of 6 m is proposed (resulting in a minimum buffer width of 9 m) to accommodate the Street F ROW, which consists of a cul-de-sac in this location. The proposed encroachment would have an overall area of 107 m^2. No grading or any other temporary or

permanent site alteration associated with development will occur in the buffer beyond the identified road ROW. No LID measures (as discussed in section 8.3.5) would be proposed within close proximity (i.e., within 30 m, subject to confirmation during detailed design) to the proposed buffer reduction area.

The area of the proposed buffer reduction is currently occupied by the disturbed area associated with an ATV trail and a small portion of Cultural Woodland. As noted in the Conceptual Ecological Restoration Plan (**Appendix E**), the remaining area of the buffer will be subject to Type 1 Buckthorn treatment, which will involve hand cutting of buckthorn stems with a local herbicide treatment to minimize potential for effects on the adjacent wetland. Native shrubs and trees will be planted in canopy areas opened up by Buckthorn removal. Overall, the proposed buffer restoration measures are anticipated to result in a long-term improvement in vegetation and habitat diversity within the buffer, expansion of the woodland and reductions in the potential for invasive species to expand into woodland/wetland areas.

The cul-de-sac right of way within the buffer is anticipated to consist of the road surface itself (with a curb and gutter cross section) and landscaped boulevard. No direct runoff from the road surface to the wetland or buffer will occur, with all runoff being collected in the storm sewer network and conveyed to a SWM Pond for treatment, as this particular area has not been identified as one where the adjacent development area will be draining to the wetland to maintain water balance. Therefore, the buffer is not required to provide any water quality or quantity functions to address runoff from the development area.

Vegetation restoration within the buffer will provide long-term buffer functions including mitigating pedestrian access into the buffer and adjacent wetland feature.

Overall, the proposed buffer reduction is not anticipated to impair the function of the remaining buffer to protect the ecological and hydrological functions of the adjacent wetland. Given that a portion of the existing buffer location is currently dominated by disturbed area associated with ATV use, and that use will cease following development, buffer functions are anticipated to be enhanced over the long-term compared to current conditions.

Area 2

Within Area 2, a maximum buffer reduction of 2.5 m is proposed (resulting in a minimum buffer width of 12.5 m) to accommodate mixed-use development within Block 13. The proposed encroachment would have an overall area of 23 m^2 within the buffer. No grading or any other temporary or permanent site alteration will occur in the buffer beyond the identified Block 13 lot line. No LID measures (as discussed in section 8.3.5) would be proposed within close proximity (i.e., within 30 m, subject to confirmation during detailed design) to the proposed buffer reduction area.

The area of the proposed buffer reduction is currently occupied by a Cultural Thicket. As noted in the Conceptual Ecological Restoration Plan (**Appendix E**), the remaining area of the buffer will be subject to Type 2 Buckthorn treatments to fully remove buckthorn from the buffer area. The area will then be restored to provide native meadow habitat to develop a diverse, resilient and self-supporting open vegetation community. Overall, the proposed buffer restoration measures are anticipated to result in a long-term improvement in vegetation and habitat diversity within the buffer and reductions in the potential for invasive species to expand into the adjacent wetland areas

Within Block 13, stormwater will be collected, treated and conveyed to the adjacent Watercourse 2 (Eastern Watercourse) valley to assist in maintaining water balance within the wetlands associated with the valleylands. It is anticipated that one LID structure would be required, but it would be located

at least 30 m away from this buffer reduction area. No stormwater runoff will be conveyed from the development area to the reduced buffer area. Lot line fencing adjacent to the reduced buffer area will be completed to minimize the potential for pedestrian access into the buffer and adjacent feature.

Overall, the proposed buffer reduction of 2.5 m is not anticipated to impair the function of the remaining buffer to protect the ecological and hydrological functions of the adjacent wetland.

Area 3

Within Area 3, a maximum buffer reduction of 4.3 m is proposed (resulting in a minimum buffer width of 11.7 m) to accommodate the Street E right of way (ROW), with an overall area of encroachment of 104 m^2. The Street E alignment is constrained by a requirement for the road entrance on Chippawa Parkway to be located at least 200 m from the Street A entrance, as well as the radius of curvature required to ensure adequate sightlines. As a result of these constraints, a minor encroachment into the buffer is proposed. No grading or any other temporary or permanent site alteration will occur in the buffer beyond the identified road ROW. No LID measures (as discussed in section 8.3.5) would be proposed within close proximity (i.e., within 30 m, subject to confirmation during detailed design) to the proposed buffer reduction area.

The area of the proposed buffer reduction is currently occupied primarily by a Cultural Thicket vegetation community, dominated by invasive buckthorn. As noted in the Conceptual Ecological Restoration Plan (**Appendix E**), this area of the buffer will be subject to a mix of Type 1 and Type 2 Buckthorn Treatments. Type 1 treatment will occur within 7.5 m of the wetland boundary and will consist of hand cutting of buckthorn stems with a local herbicide treatment to minimize potential for effects on the adjacent wetland. Native shrubs and trees will be planted in canopy areas opened up by Buckthorn removal. The Type 2 treatment, consisting of heavy equipment clearing of Buckthorn followed by herbicide treatment, roto-tilling and revegetation with a native community, will occur from 7.5 m from the wetland limit to the edge of the buffer. Overall, the proposed buffer restoration measures are anticipated to result in a long-term improvement in vegetation and habitat diversity within the buffer, expansion of the woodland and reductions in the potential for invasive species to expand into woodland/wetland areas.

The road right-of-way within the buffer is anticipated to consist of the road surface itself (with a curb and gutter cross section) and potentially a sidewalk and landscaped boulevard. No direct runoff from the road to the wetland will occur, with all runoff being collected in the storm sewer network and conveyed to a SWM Pond for treatment, as this particular area has not been identified as one where the adjacent development area will be draining to the wetland to maintain water balance. Therefore, the buffer is not required to provide any water quality or quantity functions to address runoff from the development area.

Vegetation restoration within the buffer will provide long-term buffer functions including mitigating pedestrian access into the buffer and adjacent wetland feature.

Overall, the proposed buffer reduction is not anticipated to impair the function of the remaining buffer to protect the ecological and hydrological functions of the adjacent wetland.

8.2 Phasing

A detailed development and site alteration phasing plan will be required to ensure potential temporary impacts on natural heritage features on the Subject Lands due to construction are addressed throughout the construction process. Phasing considerations should include, but not be limited to, the following:

- Phasing of site vegetation clearing to minimize potential for erosion and sedimentation issues (i.e., vegetation removal and ground disturbance in a phased manner to maximize the use of existing vegetation cover to prevent erosion while construction is occurring in other areas);
- Phasing of site alteration, including vegetation removal and grading, and potential impacts on temporary water balance to wetlands and watercourses throughout the construction period. Mitigation considerations can include use of temporary stormwater collection, treatment and dispersal facilities at targeted areas throughout the construction area to ensure that adequate volumes of clean stormwater continue to be provided to wetlands at strategic locations requiring water from adjacent overland flow during certain times of year. The results and recommendations from future detailed monthly feature-based water balance assessments will be incorporated into the phasing plan as necessary;
- Phasing of invasive species treatments from residual woodlands and buffer areas in relation to adjacent site disturbance and buffer plantings to maximum buffer function during sensitive time periods (e.g., when large scale grading may be occurring adjacent to natural features);
- Phasing of vegetation removals and major earthworks to address wildlife timing constraints (e.g., Migratory bird nesting periods and bat roosting periods);
- Phasing of site clearing to minimize potential negative impacts on wildlife habitat use throughout the site.

8.3 Hydrology Impacts

8.3.1 Drainage Feature DF-1

As discussed in Section 7, a surface water drainage feature not previously discussed in any project related documentation, was noted on the Subject Lands by the Region and NPCA. The feature has been reviewed by the project consulting team and assessed with staff from the Region and NPCA in July 2019. Based on the anthropogenic origin of this feature (i.e., it is primarily a linear excavated channel) and lack of a defined channel connecting the downstream end of this feature to any other wetland or watercourse, this feature should not be considered a Regulated watercourse. Flow exiting the downstream end of the excavated channel disperses by overland flow into the surrounding area, and depending on flow volume, may enter Watercourse 1, just upstream from the Chippawa Parkway culvert.

The primary function of the anthropogenic feature appears to be conveyance of flow out of the southern portion of the wetland in Block 11. As such, this drainage may serve an important role in maintaining water balance in this portion of the wetland. Surface water from DF-1 does not appear to be important to maintain water balance in Watercourse 1 or the adjacent wetland, given that if overland flow from the lower end of DF-1 does enter the watercourse/wetland, it does so just upstream from the Chippawa Parkway culvert and the area downstream from the culvert is backwatered by the Welland River, and therefore, not dependent on flow from Watercourse 1.

Given that the drainage feature runs through the proposed development area in Block 12, its removal is recommended. However, through the detailed design process, measures will be identified to address this surface water drainage to ensure that suitable wetland drainage from Block 11 is maintained post-development. Such measures could potentially include piping or realignment of the conveyance feature from the outlet at the edge of the wetland (i.e., within the wetland buffer) or construction of a new outlet to drain the wetland and maintain water balance.

8.3.2 WC1

As discussed in Section 7, WC1 appears to be fed by a network of legacy drainage pipes on the Subject Lands, since the open-channel portion of WC1 originates from a buried pipe outlet. The inlet of this pipe may be located within the wetland in Block 8, as shown on **Figure 15** (**Appendix A**), although this has not been confirmed. However, assuming this inlet in Block 8 directs flow to WC1, it may have some importance in maintaining water balance in the open-channel portion of WC1. The buried pipe originating at the wetland in Block 8 likely runs through Block 2 and as such, will be removed during development and site alteration in Block 2. This would potentially reduce the existing drainage area of WC1, although this drainage area is entirely anthropogenically created due to historical infrastructure on the Subject Lands. As part of the detailed water balance assessment in the next stage of the development process, potential impacts associated with removal of this drainage area from the WC1 catchment area will assessed and mitigation to maintain water balance in WC1 will be identified.

As discussed in Section 7, there is a depression in the ground within the southern portion of Block 11 that appears to receive overland flow from the adjacent wetland. The depression may be associated with a buried pipe that discharges to the upstream end of WC1 (**Figure 15**, **Appendix A**). Based on the location of this depressional feature, it may be important in maintaining water balance in the adjacent (upstream) wetland in Block 11, as well as water balance in the open channel portion of WC1 downstream from the culvert outlet (assuming the feature does indeed direct flow into the buried pipe discharging to WC1).

This depression is located within the NHS in Block 11 and will not be altered. Therefore, drainage from the local catchment area, which likely includes the adjacent wetland, will continue to flow to the depression and likely, given stated assumptions on the depression, will continue to flow to the open-channel portion of WC-1 to maintain water balance in this watercourse. No buried infrastructure is proposed to cross the NHS area where the depression is located, so no impacts on the depression or any associated buried drainage pipes are anticipated to occur. A pedestrian trail will likely run through this area of the NHS, but it will be sited to avoid the depression.

8.3.3 Shallow Groundwater

Geotechnical investigations, including groundwater monitoring, were completed on the Subject Lands by Wood, with the results noted in Wood (2019). Based on the data obtained, Wood (2019) concluded that the wetlands on the Subject Lands are not reliant on groundwater and are instead sustained by surface water.

The detailed water balance assessment that will be completed at the next stage of the development will identify mitigation measures, including LIDs and other mitigation required to meet water balance targets necessary to maintain suitable wetland hydrology, which may include overall site-wide infiltration targets. This will also include an assessment of potential impacts associated with site alteration and development on the Subject Lands, with mitigation identified accordingly.

8.3.4 Wetland Catchments and Water Budget Refinement

As shown in **Figure 16** (**Appendix A**), Wood (2019) has refined the wetland catchment mapping to address the presence of additional wetland inlet and outlet locations not considered during the high-level assessment completed previously (and included in the January 2019 EIS). Wood (2019) noted that wetland feature may have multiple outlets, particularly during larger, less frequent storm events when water levels in wetlands are higher. However they noted that for the purposes of the current

assessment, in recognition that wetlands are likely sustained by surface water runoff during more frequent, lower magnitude events, wetland hydrological connections have been established based on the lowest grade adjacent to each feature, as determined through analysis of LIDAR mapping of the Subject Lands.

Wood has also refined the water balance assessment to address the changes in wetland catchments. The water balance assessment is provided in Wood (2019) and the results are summarized here and in Table 11 from the January 2019 EIS (provided in **Appendix C** of this EIS Addendum).

The water budget assessment completed by Wood (2019) was based on the current land use plan and conceptual grading plan and used the Rational Method to identify the annual volume of stormwater that would be conveyed to each wetland feature under existing and post-development conditions. The water budget assumes that existing hydrological connections between wetlands will be maintained post-development.

The results of the revised water budget assessment indicate that the differences in annual water runoff volume to each wetland feature are within a maximum of 4% of the existing conditions (**Table 11**, **Appendix C**). As noted in **Table 11** (**Appendix C**), the calculated changes in annual runoff volumes are anticipated to maintain suitable inundation requirements for the dominant species within each wetland community.

A feature-based water balance on a monthly basis will be required at the detailed design stage to fully evaluate potential changes in water balance, identify mitigation requirements and complete a fulsome assessment of potential impacts on wetlands (if any). This will include an assessment to ensure that seasonal water volumes to wetland features are maintained to sufficient levels to ensure that existing wetland community types are maintained. Even though annual runoff volumes may be maintained, there may be differences on a seasonal basis, such as increased runoff volumes in the summer, which need to be addressed through mitigation, since some wetland types may not be tolerant of increased surface water outside of typical spring inundation periods.

As noted in **Table 11** (**Appendix C**) and Wood (2019), seasonal water balance considerations to be addressed at detailed design include, but are not necessarily limited to:

- Identifying opportunities to provide additional surface water input to the two open aquatic features (W1A and W4) to increase opportunities to support turtle overwintering habitat, since these features have been observed to dry up under existing conditions. Conveyance LIDs may be used to direct additional water to these features to enhance habitat conditions;
- Within Oak Mineral Deciduous Swamps (SWD1), Green Ash Mineral Deciduous Swamps (SWD2-2) and Mineral Thicket Swamp (SWT2), infiltration LIDs are recommended to reduce the surface water runoff volume to these features during the summer months; and
- Within the Willow Mineral Deciduous Swamp (SWD4-1), a combination of conveyance and infiltration LIDs have been recommended to support more frequent inundation with a relatively shorter dry season.

Once the seasonal water balance assessment (in the absence of mitigation) has been completed, mitigation measures, potentially including grading changes and a variety of conveyance and infiltration LIDs will be identified to ensure that seasonal water balance requirements are maintained for each wetland community type. A general discussion on LID measures is provided in Wood (2019), as well as in section 8.3.5 and **Appendix F**. As noted by Wood (2019), clean water drainage is the preferred source of water to be direct to wetlands, however, local road drainage is also anticipated to be required to meet water volume requirements. Road drainage will need to be treated prior to

discharge to wetlands, since it may contain higher volumes of salt and other urban contaminants. Treatment could potentially include LID measures with salt tolerant vegetation or a 2-cell system, with further mitigation potentially including implementation of a salt management plan within the community to reduce the use of salt in the winter (Wood 2019). Opportunities to eliminate the use of salt within catchments draining to wetlands should be considered as a mitigation to prevent water quality impacts on receiving wetlands.

8.3.5 Low Impact Development Measure Impacts

As noted in the January 2019 EIS and Wood (2019), LID measures are proposed to mitigate impacts on water balance in wetland features and provide water quality treatment from portions of the development area, prior to water being discharged to adjacent wetlands/natural features. The final locations and design of LID measures will be identified during future design phases. However, it is likely that some LID measures will be installed within buffers to contribute surface water to adjacent wetlands to maintain existing surface water inflow pathways post-development.

Appendix F contains a Memo prepared by Wood that provides additional conceptual level information on the potential design of LID measures that could be constructed in buffers. The Memo outlines a conceptual treatment train approach consisting of capture of local road runoff (and potentially front-yard runoff, depending on final lot grading) in the storm sewer network, use of an Oil-Grit Separator (OGS) within the road right-of-way to provide primary treatment and use of an energy dissipation and polishing treatment system within the buffer. The LID measure in the buffer would consist of a small, excavated depression basin (approximately 9 m wide by 7 m long, by 0.8 m in depth) at the storm sewer outlet at the edge of the buffer. The dissipation basin would be constructed of a mix of rock and earth, with planted vegetation that would be expected to cover the majority of the structure over time.

The base of the depression would consist of filter media and low flow discharges would be anticipated to infiltrate through the media and into the ground. Higher discharge flows would be expected to spill out of the depression, with a rock level-spreader at the downstream end to promote dispersed discharge into the buffer and ultimately to the adjacent wetland. This particular LID measure example results in approximately 7.5 m of the overall 15 m buffer being occupied by the LID measure, although the LID measure is only 9 m wide and therefore, only occupies a very small component of the overall buffer adjacent to this wetland. Wood has estimated that LID measures will occupy approximately 2% or less of the overall wetland buffer area, subject to detailed design.

Installation of LID measures within buffers could potentially cause impacts on the form and function of the buffers, and mitigation to minimize potential impacts should be addressed during detailed design of the LID measures. Design considerations should include:

- Minimizing the size of LID measures to maximize the amount of vegetated area within buffers;
- Preference will be given to LID measure designs that minimize the depth of encroachment into the buffer to be 5 m or less;
- Providing vegetated LID measures to the extent possible to maximum buffer function and incorporating specific vegetation forms/species into LID measure design to enhance buffer function (e.g., discouraging public access/use of buffers and access into adjacent natural features); and
- Locating LID measures as close as possible to the outside edge of buffers to minimize construction disturbance in proximity to the natural feature, maximum long-term vegetation between the LID measure and the feature edge and minimize potential encroachment into the buffer associated with any potential future maintenance of LID measures.

As noted in **Appendix F**, annual maintenance requirements for LID measures in buffers would only involve annual inspection and minor trash clean-out; no major maintenance to the LID measures (e.g., sediment clean-out) would be anticipated to be required for 20+ years. Therefore, LID measure maintenance is not expected to have negative impacts on buffer form and function in the short-term (~20 years). Long-term LID measure clean-out requirements may result in slightly more substantial disruption within the buffer, although within the 20+ year timeframe until such maintenance would be anticipated to be required, buffer vegetation will be well established and minor disruption for localized maintenance would not be expected to have a negative impact on the overall functioning of the buffer.

8.4 Fish Habitat

The January 2019 EIS indicated that a watermain crossing of the Eastern Tributary (WC2) would be required to connect the proposed Riverfront Residential area to an existing watermain on Don Murie Street (crossing location depicted on **Figure 15**, **Appendix A**) and that the installation may occur via open cut or directional drilling methodologies. While the design and construction methodology details will not be advanced until the detailed design stage, the construction methodology has now been confirmed to be directional drilling. Therefore, no open-cut installation is proposed at this crossing location. The potential impacts and mitigation associated with directional drill installation of the watermain beneath WC2, as identified in the January 2019 EIS (section 7.6 and Table 7) will continue to apply.

As noted in the Region's comments on the January 2019 EIS, previous iterations of various infrastructure requirement reports have identified other potential activities that could impact fish habitat in WC2 and the Conrail Drain, including infrastructure crossings and local watercourse realignments. However, none of these activities are proposed as part of the current Zoning By-law application covered by this EIS and are therefore not included in this discussion. Should these activities be proposed as part of future development applications, they will be assessed at that time.

9.0 ECOLOGICAL RESTORATION

NPCA and the Region had a number of comments regarding the proposed Conceptual Ecological Restoration Plan (CERP). Revisions to the restoration plan and other changes with respect to mitigation include:

- The CERP included in the January 2019 EIS suggested that woody plantings would occur within the first 5 to 7.5 m of the buffer. However, to ensure that wetland function is maintained to the extent possible over the initial period following buckthorn management activities, woody plantings will occur throughout the buffer in all areas where buckthorn management has opened the canopy. Woody plantings will not occur in areas where LID measures may be proposed in the buffer, although this is anticipated to occupy 2% or less of the overall buffer area. The final buffer planting plan will be prepared during future design stages when LID plans have been finalized.
- A phased approach to relocation of Great Plains Ladies'-Tresses will be undertaken, with the three small populations west of Street E transplanted first, with success monitored. Relocation of the remaining larger population east of Street E will be completed with refinements to the transplant process implemented, if necessary, based on observations from the first round of transplants.
- All rear yards that face ecological buffers will have no gates. Consideration will be given, through consultation with the City, to putting the requirement for no rear yard gates in these areas on the property title. Additional mitigation will include the preparation of a landowner brochure to educate future residents of the sensitivity of the surrounding natural areas and the importance of not directing water (e.g., draining swimming pools) to natural areas, not dumping yard and residential waste into the natural area, keeping pets indoors and staying on designated trails.

An updated version of the CERP is included in **Appendix E**.

9.1 Potential Impacts of Ecological Restoration

As identified in the CERP (**Appendix E**), buckthorn removal is proposed throughout many of the wetland buffer areas on the Subject Lands as part of the overall ecological restoration package intended to result in long-term enhancements in habitat diversity and ecological function, due to removal of invasive species and planting of native species.

However, over the short-term, removal of buckthorn could potentially cause negative impacts on the adjacent wetlands, particularly in Type 2 removal areas where most vegetation will be removed, over a period of 2 to 4 years. As identified in section 3.1 of the CERP (**Appendix E**), mitigation is proposed to minimize the potential for negative impacts including:

- Type 1 restoration will involve hand removal of buckthorn in more sensitive areas (e.g., within 20 m of the SWD1 wetland and within 7.5 m of the SWD4-1 wetlands) instead of heavy machinery use which results in a greater area of disturbance;
- Where larger openings are created in Type 1 removal areas, mulch or leaf litter will be applied to minimize competition for newly planted vegetation; this mulch will also assist in preventing erosion in areas of the opened canopy until such time as planted vegetation takes over this function;
- Type 2 restoration will only occur in the outside 7.5 m of the buffer in order to avoid complete vegetation removal within 7.5 m of the more sensitive SWD4-1 and SWD1 swamp communities;
- A Tree Saving Plan will be completed by a qualified arborist within the Type 2 treatment areas

to identify eligible native trees that are feasible to retain, and measures that should be employed to ensure their retention;
- Approved erosion and sediment control (ESC) fencing should be installed at the edge of the adjacent Type 1 treatment area (where existing, native vegetation is to be retained) prior to initiation of the Type 2 treatment;
- The integrity of the ESC measures must be regularly monitored, particularly following storm events; and
- A cover crop will be installed in all Type 2 areas following each buckthorn treatment to assist with native groundcover establishment as well as to provide short term erosion control and habitat functions until the long-term vegetation community starts to establish.

Therefore, while the proposed ecological restoration measures will result in substantial disturbance within some buffer areas, the proposed mitigation is anticipated to be effective in:

- Preventing runoff of sediment laden water to the wetland; and
- Providing some short-term habitat functions within the disturbed area (to complement the habitat within the undisturbed adjacent wetland/woodland features) until the long-term community takes over.

10.0 ECOLOGICAL MONITORING

The January 2019 EIS identified monitoring requirements during the construction and post-construction periods in section 8 and Table 7. In their comments, the Region requested additional information on the proposed monitoring plan. For the purposes of the monitoring plan, monitoring components will include

- Baseline monitoring (prior to commencement of construction);
- Compliance monitoring during construction;
- Post-construction effectiveness monitoring; and
- Post-construction performance monitoring.

The following sections provide additional information on ecological monitoring to address the Region's comments, while a detailed monitoring plan should be required as a Condition of Draft Plan Approval.

10.1 Baseline Ecological Monitoring

Baseline ecological monitoring is conducted to confirm the current status of ecological communities occurring on the Subject Lands prior to the commencement of construction of the proposed development. Baseline monitoring has been conducted between 2015 and 2019, as summarized in **Table 1** (**Appendix C**). Components of the baseline ecological monitoring conducted to date have included:

- Amphibian call surveys;
- Amphibian egg mass surveys;
- Salamander movement surveys;
- Vernal pool habitat assessments;
- Wildlife road mortality surveys;
- Turtle nesting surveys;
- Turtle basking and hatchling surveys;
- Snake emergence surveys;
- Breeding bird surveys;
- Winter raptor surveys;
- Woodland raptor stick nest surveys;
- Targeted Acadian Flycatcher breeding surveys;
- Milkweed abundance surveys;
- Bat habitat assessment;
- Acoustic bat surveys;
- Botanical inventories (spring, summer and fall);
- Rare plant surveys;
- ELC mapping;
- Woodland canopy cover and stem density surveys;
- Wetland delineation and verification;
- Wetland hydrology (staff gauge) monitoring; and
- Wetland soil core sampling and analysis.

The results of these various baseline monitoring activities have been used to identify the natural features that currently exist on the property and will be used to establish the baseline ecological conditions for comparison with results of construction and post-construction monitoring surveys.

As part of the Detailed Monitoring Plan to be prepared following approval of the Zoning by-law Amendment application, a thorough data gap analysis will be conducted to confirm that suitable baseline data has been collected at repeatable monitoring stations using standardized survey protocols within retained and/or restored natural features within the NHS. Should any data gaps be identified, they will be filled prior to commencement of any construction related disturbances within 120 m of the particular feature.

10.2 Compliance Monitoring During Construction

The purpose of compliance monitoring during construction is to verify that mitigation measures are adhered to (e.g., ecological timing constraints) and to ensure that mitigation measures are effective. The proposed compliance monitoring program identified in the January 2019 EIS includes the following elements:

- Sediment and erosion control monitoring;
- Adherence to in-water work timing windows; and
- Adherence to timing restrictions to prevent impacts on migratory birds.

Other construction compliance monitoring measures may be necessary, and these will be identified in the Detailed Monitoring Plan.

10.3 Post-Construction Monitoring

A number of post-construction ecological monitoring requirements were identified in the January 2019 EIS (Section 8 and Table 7). Post-construction monitoring includes effectiveness/performance monitoring to verify that mitigation/restoration activities have had the intended ecological effect (e.g., maintaining or enhancing habitat, supporting particular wildlife life history functions, achieving intended buffer functions, effectiveness of the proposed north-south natural heritage corridor) and success monitoring to confirm that planted vegetation material has met the survival requirements (typically completed in accordance with standard landscape architecture industry standards.

The Detailed Monitoring Plan will outline the purposes of the post-construction monitoring program, locations to be monitored, protocols to be followed, and frequency/duration of the post-construction monitoring program.

11.0 OTHER CONSIDERATIONS

The following sections address other specific comments on the January 2019 EIS, as provided by NPCA and/or the Region.

11.1 Significant Valleylands

The January 2019 EIS identified the valleylands associated with the Eastern Tributary, located to the east of the Subject Lands as a candidate Significant Valleyland, since although the valleyland met some criteria for significance, as outlined in the NHRM (MNR 2010), it is highly altered in the upper reaches, the naturalized reach is relatively small and it is not known to contain unique communities or high community or species diversity. The January 2019 EIS acknowledged that more fulsome inventories would be required to confirm significance of this valleyland.

However, the Region (Comment 21) indicated the valleyland associated with the Eastern Tributary should be considered significant, based on the landform and functions it provides, including linkage habitat between the Welland River and areas north of Chippawa Parkway, and habitat for species of concern.

Therefore, for the purposes of this Addendum, the Eastern Tributary valleylands have been identified as Significant Valleylands. **Appendix A** includes the following figures from the January 2019 EIS, which have been revised to identify this valleyland as significant:

- **Figure 6** (Significant Natural Heritage Features per Section 2.1 of PPS, 2014); and
- **Figure 9** (Natural Heritage Feature Summary).

The potential impacts, proposed avoidance and mitigation measures and net effects of the proposed development on this valleyland, as outlined in the January 2019 EIS do not require any revisions as a result of confirmation of this feature as a Significant Valleyland.

11.2 Trails

A conceptual trails plan for the overall Riverfront Community, which includes the Riverfront Residential Area south of the railway corridor that is the subject of this EIS Addendum, was prepared by Wavefront Planning and Design (2019). This plan remains conceptual in nature and will be subject to further assessment during future planning stages. In addition, several components of the plan are anticipated to be the responsibility of the City of Niagara Falls and as such, will be assessed and designed in accordance with City procedures.

The proposed trails concept plan (Wavefront Planning and Design 2019) includes a pedestrian walkway through the Natural Heritage System between Blocks 4 and 12. Mitigation measures to prevent impacts on the wildlife movement corridor in this area are provided in section 4.1 and these should be considered as the trail design is advanced in future stages of the development process.

The proposed trails concept plan (Wavefront Planning and Design 2019) includes a Multi-use Path within the Chippawa Parkway and Dorchester Road right-of-ways, which run adjacent to or within several PSW units. The trail in this location would be the responsibility of the City of Niagara Falls and has been excluded from the scope of this EIS Addendum.

Potential future upgrades to existing trails within the Natural Heritage System on the Subject Lands, including within several PSW units, are shown on the trails concept plan (Wavefront Planning and

Design 2019). These potential future trail upgrades are not considered to be within the scope of the current planning application and would need to be considered during future design phases.

A proposed trail upgrade along the railway corridor is also proposed to provide a pedestrian linkage out to Dorchester Road, through the proposed Block 7 open space. This trail will be located to avoid ecological restoration areas associated with Great Plains Ladies'-tresses relocation sites and mitigation (e.g., fencing, strategic vegetation planting) will be implemented to minimize the potential for public access from trails into these areas.

12.0 CONCLUDING REMARKS

This EIS Addendum has been prepared as a supplement to the January 2019 EIS to address comments provided by the Region and NPCA. Additional responses to comments from each agency are provided in the comment-response matrices that will be included with the resubmission package to the City of Niagara Falls. This EIS Addendum also addresses changes that have been made to the proposed Draft Plan for the Riverfront Residential Community.

The January 2019 EIS concluded that development on the Subject Lands could be completed without negative effects on the natural heritage features and associated functions. The results of analysis conducted for this EIS Addendum demonstrate that this previous conclusion remains accurate and valid.

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APPENDICES

Appendix A – Figures (Revised and New)

Appendix B – Revised Draft Plan

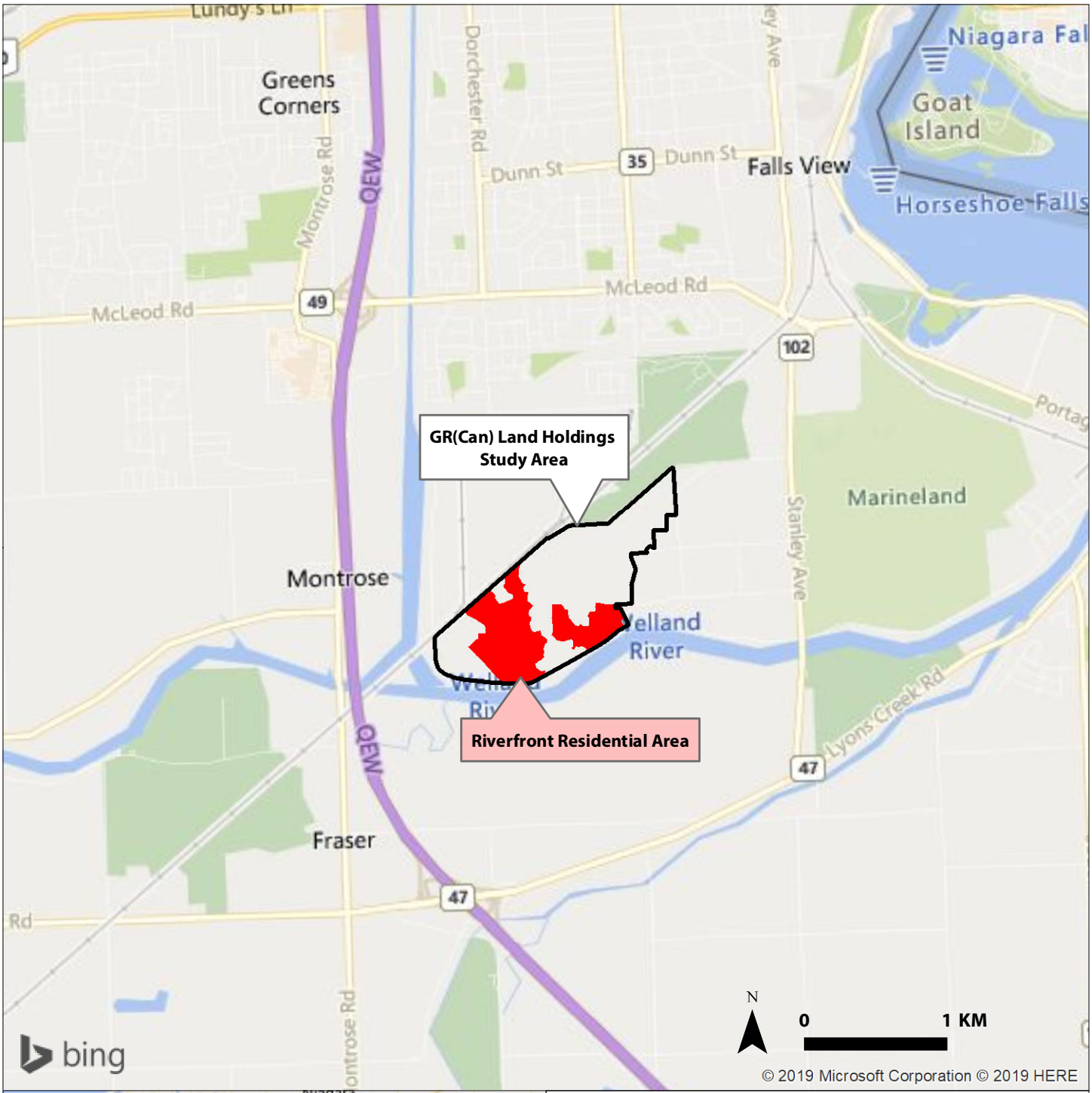
Appendix C – Tables (Revised and New)

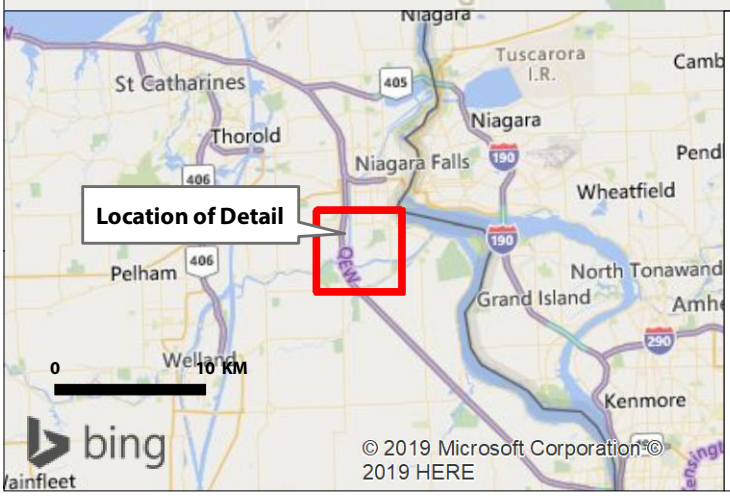
Appendix D – Ecological Data

Appendix E – Conceptual Ecological Restoration Plan

Appendix F – Conceptual LID Information (Wood)

Appendix A – Figures





Riverfront Residential Block Plan Environmental Impact Statement

Figure 1
Location of Subject Lands

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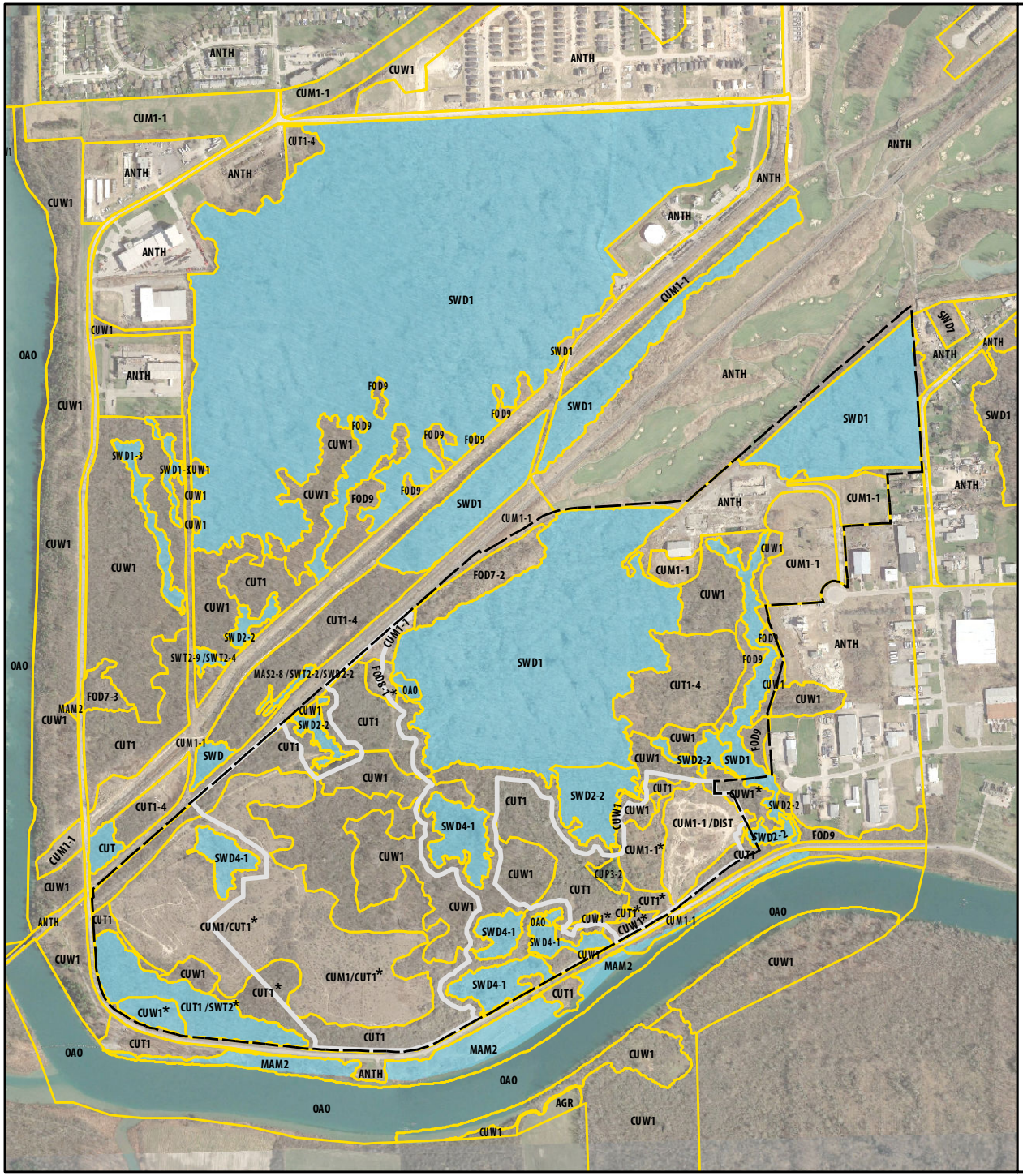
Path: S:\9024 - SAV 7602 Riverfront Community\gis\mxd\2019 07 24 EIS report figures\Figure 1 Location of Subject Lands.mxd Date Saved: July 24, 2019



Study Area

Riverfront Residential

Ecological Land Classification (updated area within/ adjacent to Riverfront Residential, Savanta 2018)

Provincially Significant Wetland (MNRF)

* Communities where ELC Code was revised from that shown in March 2018 EIS Addendum.

Vegetation Community (ELC Code)

AGR, Agricultural
ANTH, Anthropogenic
CUM1-1, Dry - Moist Old Field Meadow
CUM1/CUT1, Mineral Cultural Thicket
CUP3-2, White Pine Coniferous Plantation
CUT, Cultural Thicket
CUT1, Mineral Cultural Thicket
CUT1-4, Gray Dogwood Deciduous Cultural Thicket
CUW1, Mineral Cultural Woodland
FOD7-2, Fresh – Moist Green Ash Lowland Deciduous Forest
FOD7-3, Fresh – Moist Willow Lowland Deciduous Forest
FOD8-1, Fresh – Moist Poplar Deciduous Forest
FOD9, Fresh – Moist Oak – Maple – Hickory Deciduous Forest
MAM2, Mineral Meadow Marsh
MAS2-8, Rice Cut-grass Mineral Shallow Marsh
OAO, Open Aquatic
SWD, Mineral Deciduous Swamp
SWD1, Oak Mineral Deciduous Swamp
SWD1-3, Pin Oak Mineral Deciduous Swamp
SWD2-2, Green Ash Mineral Deciduous Swamp
SWD4-1, Willow Mineral Deciduous Swamp
SWT2, Mineral Thicket Swamp
SWT2-2, Willow Mineral Deciduous Thicket Swamp
SWT2-4, Buttonbush Mineral Deciduous Thicket Swamp
SWT2-9, Grey Dogwood Mineral Deciduous Thicket Swamp

Riverfront Residential Block Plan Environmental Impact Statement

Figure 2
Vegetation Commmunities and Provincially Significant Wetlands

0 100 Meters

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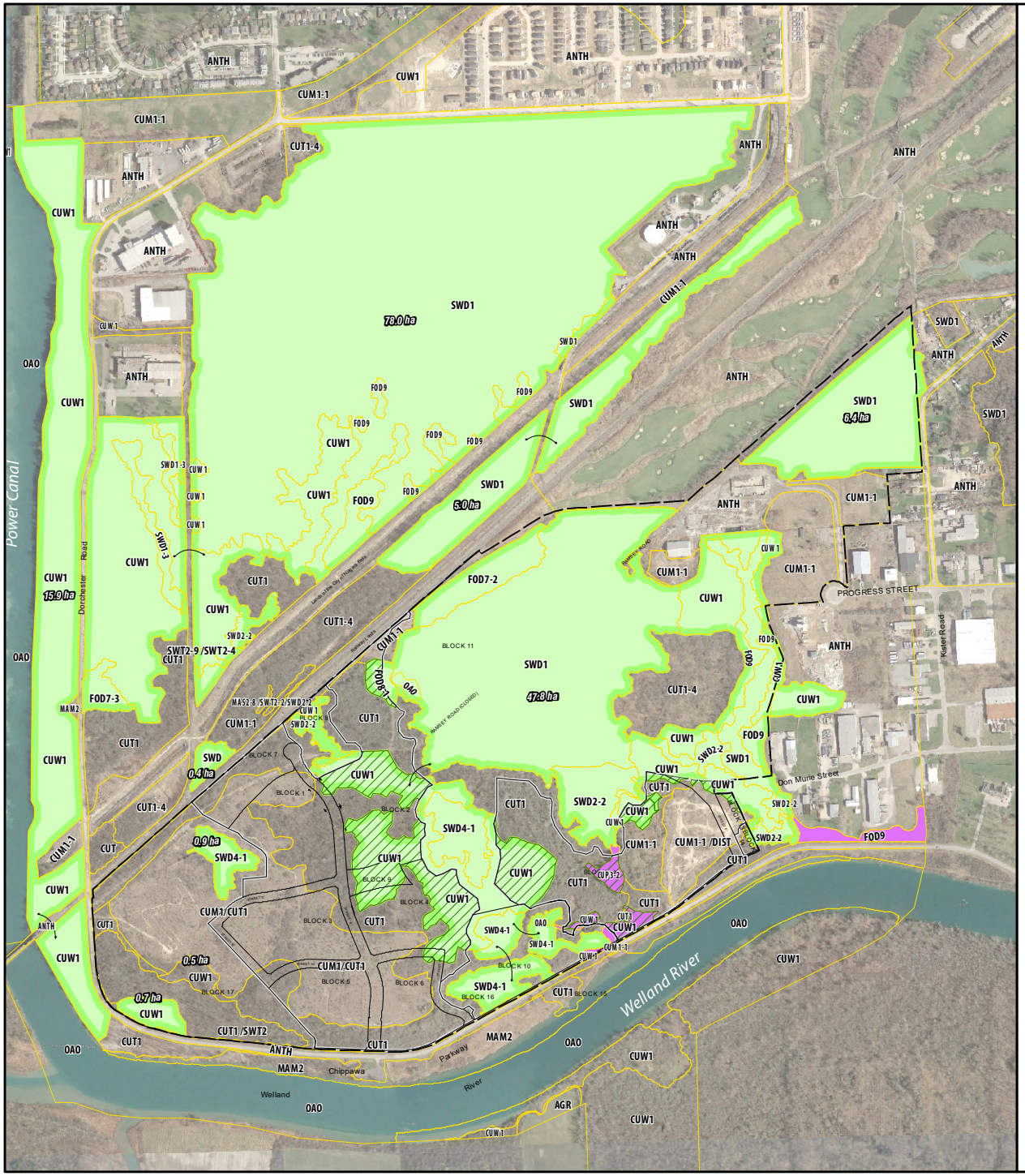

Study Area

Riverfront Residential

Ecological Land Classification (updated area within/ adjacent to Riverfront Residential, Savanta 2018)

Significant Woodland (Niagara Region Official Plan, 2014 and NHRM, 2010)

Non-significant Treed Patch (<40m av. width)

Significant Woodland Removed By Development (6.86 ha)

Vegetation Community (ELC Code)

AGR, Agricultural
ANTH, Anthropogenic
CUM1-1, Dry - Moist Old Field Meadow
CUM1/CUT1, Mineral Cultural Thicket
CUP3-2, White Pine Coniferous Plantation
CUT, Cultural Thicket
CUT1, Mineral Cultural Thicket
CUT1-4, Gray Dogwood Deciduous Cultural Thicket
CUW1, Mineral Cultural Woodland
FOD7-2, Fresh – Moist Green Ash Lowland Deciduous Forest
FOD7-3, Fresh – Moist Willow Lowland Deciduous Forest
FOD8-1, Fresh – Moist Poplar Deciduous Forest
FOD9, Fresh – Moist Oak – Maple – Hickory Deciduous Forest
MAM2, Mineral Meadow Marsh
MAS2-8, Rice Cut-grass Mineral Shallow Marsh
OAO, Open Aquatic
SWD, Mineral Deciduous Swamp
SWD1, Oak Mineral Deciduous Swamp
SWD1-3, Pin Oak Mineral Deciduous Swamp
SWD2-2, Green Ash Mineral Deciduous Swamp
SWD4-1, Willow Mineral Deciduous Swamp
SWT2, Mineral Thicket Swamp
SWT2-2, Willow Mineral Deciduous Thicket Swamp
SWT2-4, Buttonbush Mineral Deciduous Thicket Swamp
SWT2-9, Grey Dogwood Mineral Deciduous Thicket Swamp

Riverfront Residential Block Plan Environmental Impact Statement

Figure 3
Significant Woodlands

Draft Plan: August 14, 2019

0 100 Meters

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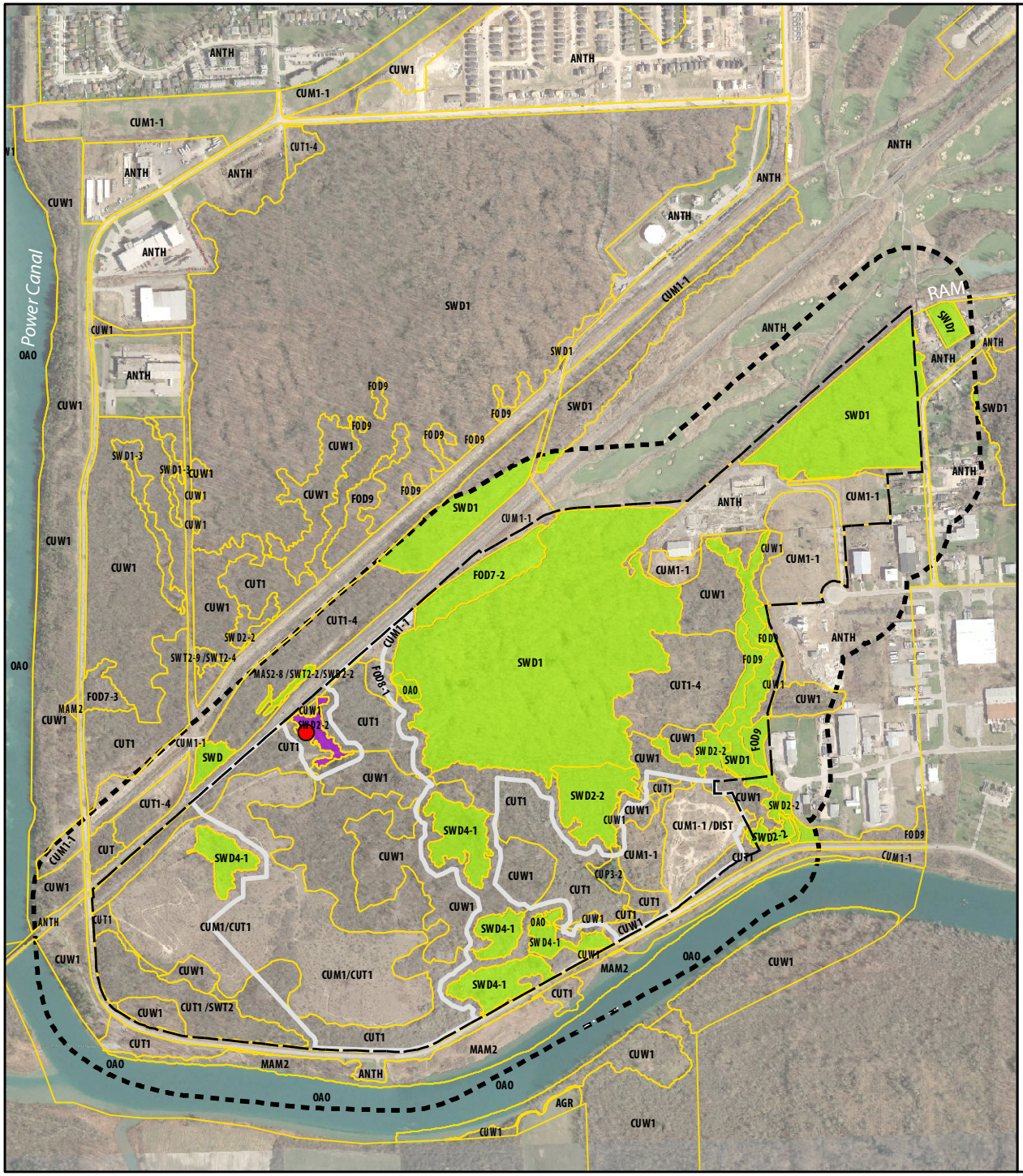
Path: S:\9024 - SAV 7602 Riverfront Community\gis\mxd\2019 12 04 EIS report figures\Figure 3 Significant Woodlands.mxd REVISED: December 4, 2019



Study Area

Riverfront Residential

Adjacent Lands (120 m from Study Area)

Ecological Land Classification (updated area within/ adjacent to Riverfront Residential, Savanta 2018)

2019 Amphibian Survey Station

Woodland Amphibian Breeding Significant Wildlife Habitat

Confirmed

Candidate

Vegetation Community (ELC Code)

AGR, Agricultural
ANTH, Anthropogenic
CUM1-1, Dry - Moist Old Field Meadow
CUM1/CUT1, Mineral Cultural Thicket
CUP3-2, White Pine Coniferous Plantation
CUT, Cultural Thicket
CUT1, Mineral Cultural Thicket
CUT1-4, Gray Dogwood Deciduous Cultural Thicket
CUW1, Mineral Cultural Woodland
FOD7-2, Fresh – Moist Green Ash Lowland Deciduous Forest
FOD7-3, Fresh – Moist Willow Lowland Deciduous Forest
FOD8-1, Fresh – Moist Poplar Deciduous Forest
FOD9, Fresh – Moist Oak – Maple – Hickory Deciduous Forest
MAM2, Mineral Meadow Marsh
MAS2-8, Rice Cut-grass Mineral Shallow Marsh
OAO, Open Aquatic
SWD, Mineral Deciduous Swamp
SWD1, Oak Mineral Deciduous Swamp
SWD1-3, Pin Oak Mineral Deciduous Swamp
SWD2-2, Green Ash Mineral Deciduous Swamp
SWD4-1, Willow Mineral Deciduous Swamp
SWT2, Mineral Thicket Swamp
SWT2-2, Willow Mineral Deciduous Thicket Swamp
SWT2-4, Buttonbush Mineral Deciduous Thicket Swamp
SWT2-9, Grey Dogwood Mineral Deciduous Thicket Swamp

Riverfront Residential Block Plan Environmental Impact Statement

SIGNIFICANT WILDLIFE HABITAT

Figure 4a
Amphibian Breeding Habitat (Woodland)

0 100 Meters

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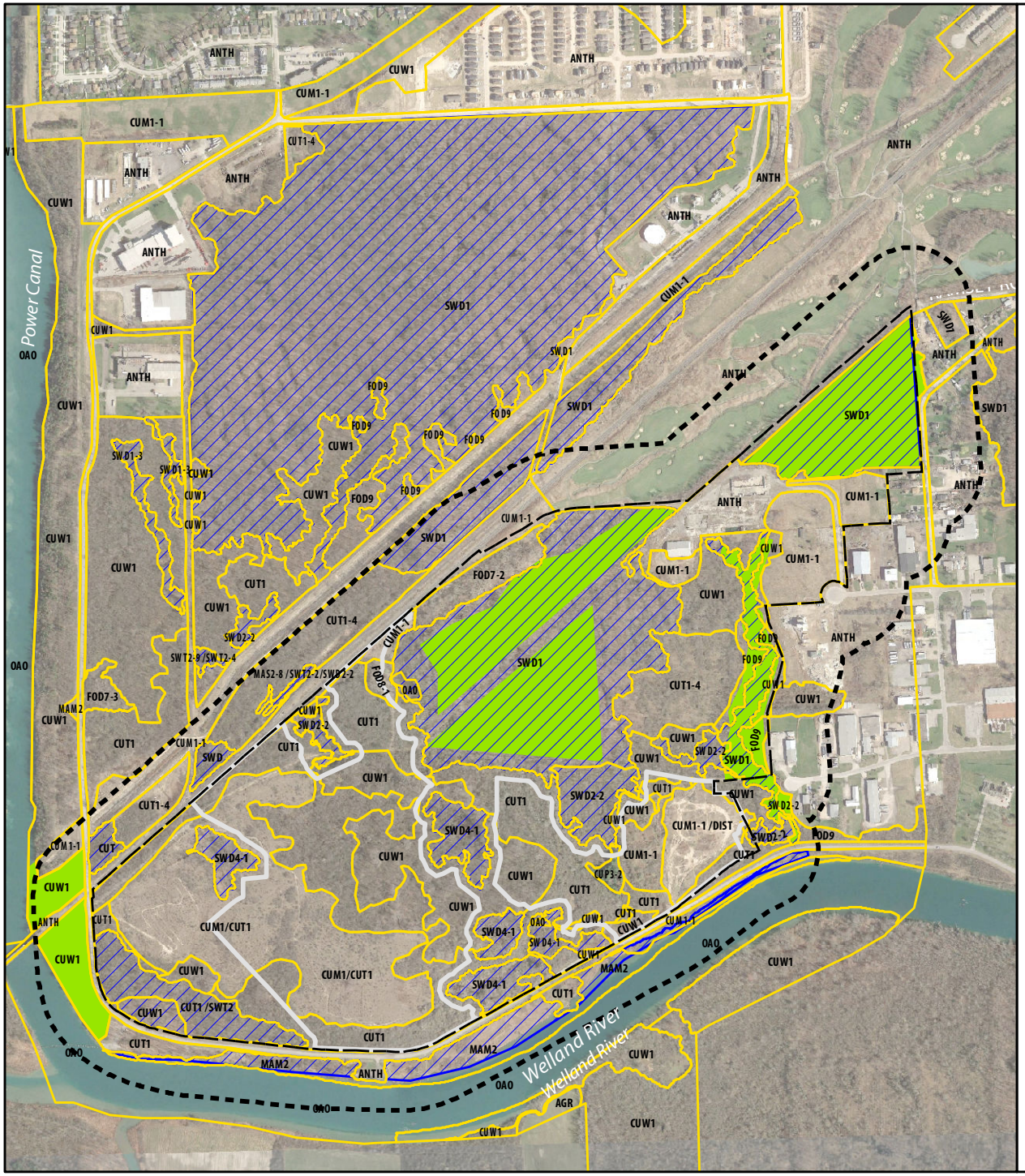
Path: S:\9024 - SAV 7602 Riverfront Community\gis\mxd\2019 07 24 EIS report figures\Figure 4a SWH Amphibian Breeding Habitat (Woodland).mxd REVISED: September 4, 2019



Study Area

Riverfront Residential

Adjacent Lands (120 m from Study Area)

Ecological Land Classification (updated area within/ adjacent to Riverfront Residential, Savanta 2018)

Provincially Significant Wetland (MNRF)

Rare Vegetation Communities (Older growth forest polygons)

Vegetation Community (ELC Code)

AGR, Agricultural
ANTH, Anthropogenic
CUM1-1, Dry - Moist Old Field Meadow
CUM1/CUT1, Mineral Cultural Thicket
CUP3-2, White Pine Coniferous Plantation
CUT, Cultural Thicket
CUT1, Mineral Cultural Thicket
CUT1-4, Gray Dogwood Deciduous Cultural Thicket
CUW1, Mineral Cultural Woodland
FOD7-2, Fresh – Moist Green Ash Lowland Deciduous Forest
FOD7-3, Fresh – Moist Willow Lowland Deciduous Forest
FOD8-1, Fresh – Moist Poplar Deciduous Forest
FOD9, Fresh – Moist Oak – Maple – Hickory Deciduous Forest
MAM2, Mineral Meadow Marsh
MAS2-8, Rice Cut-grass Mineral Shallow Marsh
OAO, Open Aquatic
SWD, Mineral Deciduous Swamp
SWD1, Oak Mineral Deciduous Swamp
SWD1-3, Pin Oak Mineral Deciduous Swamp
SWD2-2, Green Ash Mineral Deciduous Swamp
SWD4-1, Willow Mineral Deciduous Swamp
SWT2, Mineral Thicket Swamp
SWT2-2, Willow Mineral Deciduous Thicket Swamp
SWT2-4, Buttonbush Mineral Deciduous Thicket Swamp
SWT2-9, Grey Dogwood Mineral Deciduous Thicket Swamp

Riverfront Residential Block Plan Environmental Impact Statement

SIGNIFICANT WILDLIFE HABITAT

Figure 4b
Rare Vegetation Communities

0 100 Meters

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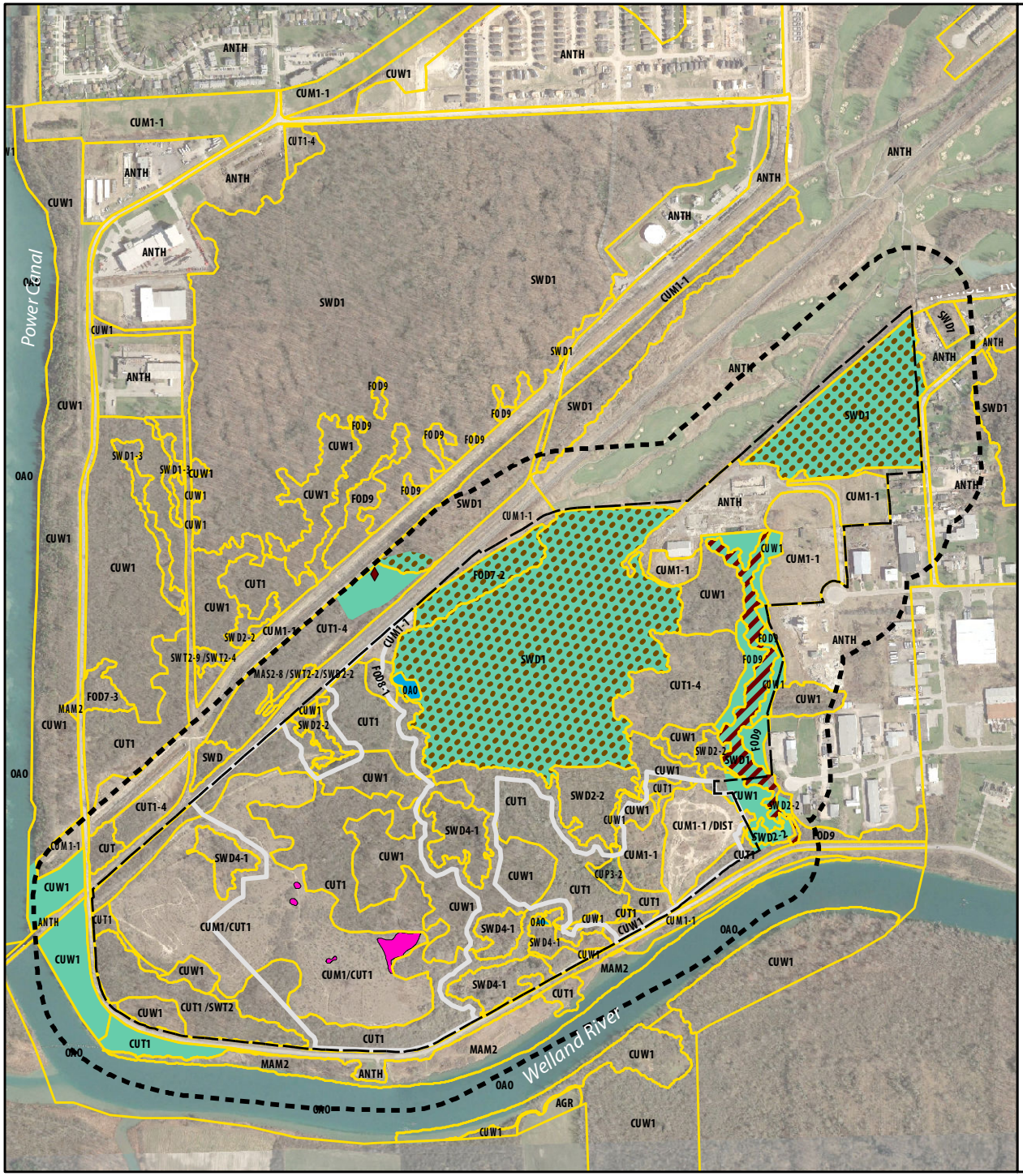

Study Area

Riverfront Residential

Adjacent Lands (120 m from Study Area

Ecological Land Classification (updated area within/adjacent to Riverfront Residential, Savanta 2018)

Provincially Rare Plant Locations (specimens) Outisde SWH Polygons

- Gleditsia triacanthos (Honey-locust)

Rare Species SWH Polygons

- Great Plains Ladies'-tresses (concentrations)
- Honey-locust
- Schreber's Aster
- Snapping Turtle
- Wood Thrush and Eastern Wood-Pewee

Vegetation Community (ELC Code)

AGR, Agricultural
ANTH, Anthropogenic
CUM1-1, Dry - Moist Old Field Meadow
CUM1/CUT1, Mineral Cultural Thicket
CUP3-2, White Pine Coniferous Plantation
CUT, Cultural Thicket
CUT1, Mineral Cultural Thicket
CUT1-4, Gray Dogwood Deciduous Cultural Thicket
CUW1, Mineral Cultural Woodland
FOD7-2, Fresh – Moist Green Ash Lowland Deciduous Forest
FOD7-3, Fresh – Moist Willow Lowland Deciduous Forest
FOD8-1, Fresh – Moist Poplar Deciduous Forest
FOD9, Fresh – Moist Oak – Maple – Hickory Deciduous Forest
MAM2, Mineral Meadow Marsh
MAS2-8, Rice Cut-grass Mineral Shallow Marsh
OAO, Open Aquatic
SWD, Mineral Deciduous Swamp
SWD1, Oak Mineral Deciduous Swamp
SWD1-3, Pin Oak Mineral Deciduous Swamp
SWD2-2, Green Ash Mineral Deciduous Swamp
SWD4-1, Willow Mineral Deciduous Swamp
SWT2, Mineral Thicket Swamp
SWT2-2, Willow Mineral Deciduous Thicket Swamp
SWT2-4, Buttonbush Mineral Deciduous Thicket Swamp
SWT2-9, Grey Dogwood Mineral Deciduous Thicket Swamp

Riverfront Residential Block Plan Environmental Impact Statement

SIGNIFICANT WILDLIFE HABITAT

Figure 4c
Rare Species

0 100 Meters

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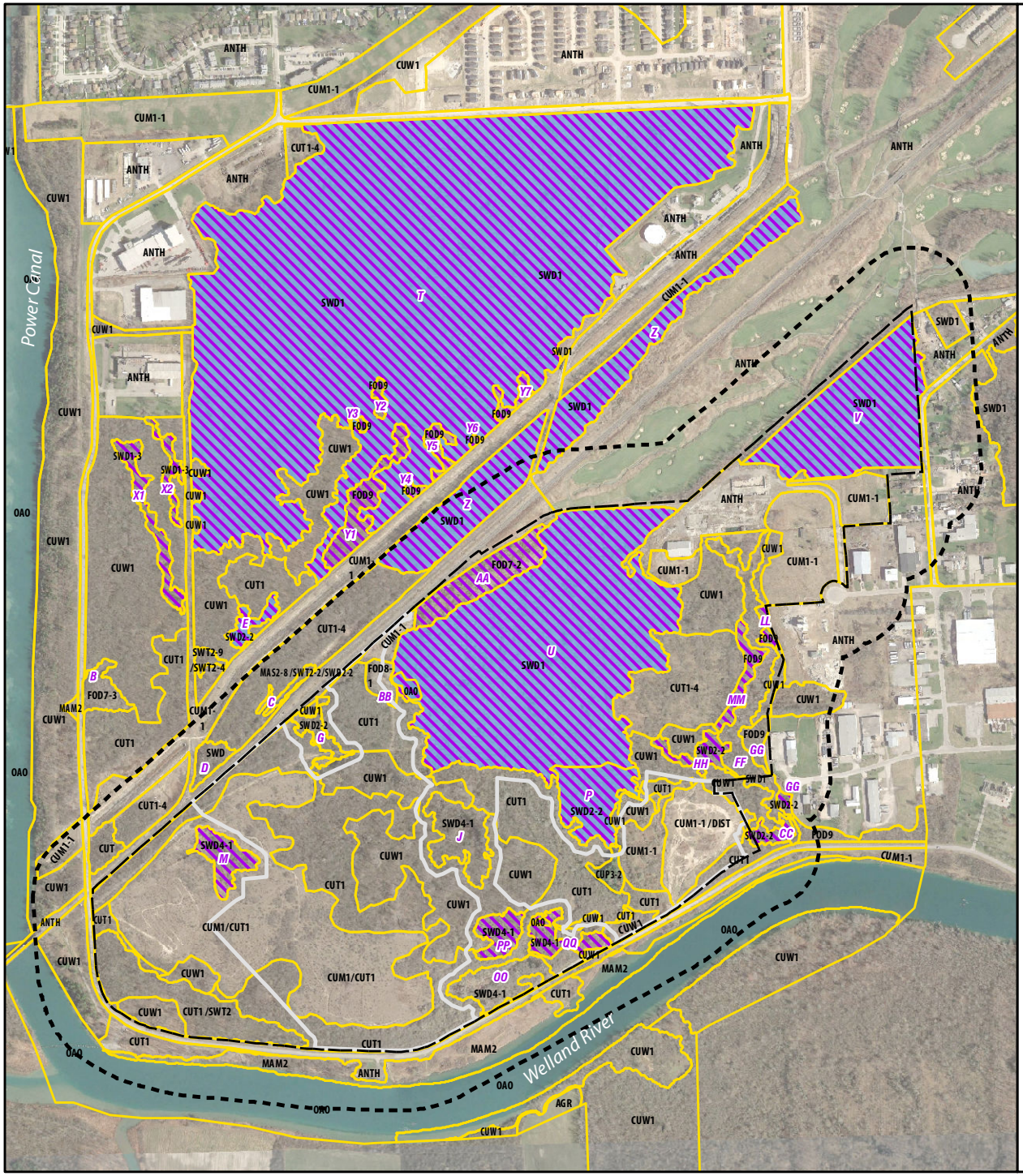

Study Area

Riverfront Residential

Adjacent Lands (120 m from Study Area)

Ecological Land Classification (updated area within/ adjacent to Riverfront Residential, Savanta 2018)

Candidate Bat Significant Wildlife Habitat Polygon for Assessment

Confirmed Bat Maternity Significant Wildlife Habitat

Vegetation Community (ELC Code)

AGR, Agricultural
ANTH, Anthropogenic
CUM1-1, Dry - Moist Old Field Meadow
CUM1/CUT1, Mineral Cultural Thicket
CUP3-2, White Pine Coniferous Plantation
CUT, Cultural Thicket
CUT1, Mineral Cultural Thicket
CUT1-4, Gray Dogwood Deciduous Cultural Thicket
CUW1, Mineral Cultural Woodland
FOD7-2, Fresh – Moist Green Ash Lowland Deciduous Forest
FOD7-3, Fresh – Moist Willow Lowland Deciduous Forest
FOD8-1, Fresh – Moist Poplar Deciduous Forest
FOD9, Fresh – Moist Oak – Maple – Hickory Deciduous Forest
MAM2, Mineral Meadow Marsh
MAS2-8, Rice Cut-grass Mineral Shallow Marsh
OAO, Open Aquatic
SWD, Mineral Deciduous Swamp
SWD1, Oak Mineral Deciduous Swamp
SWD1-3, Pin Oak Mineral Deciduous Swamp
SWD2-2, Green Ash Mineral Deciduous Swamp
SWD4-1, Willow Mineral Deciduous Swamp
SWT2, Mineral Thicket Swamp
SWT2-2, Willow Mineral Deciduous Thicket Swamp
SWT2-4, Buttonbush Mineral Deciduous Thicket Swamp
SWT2-9, Grey Dogwood Mineral Deciduous Thicket Swamp

Riverfront Residential Block Plan Environmental Impact Statement

SIGNIFICANT WILDLIFE HABITAT

Figure 4d
Bat Maternity Colony

0 100 Meters

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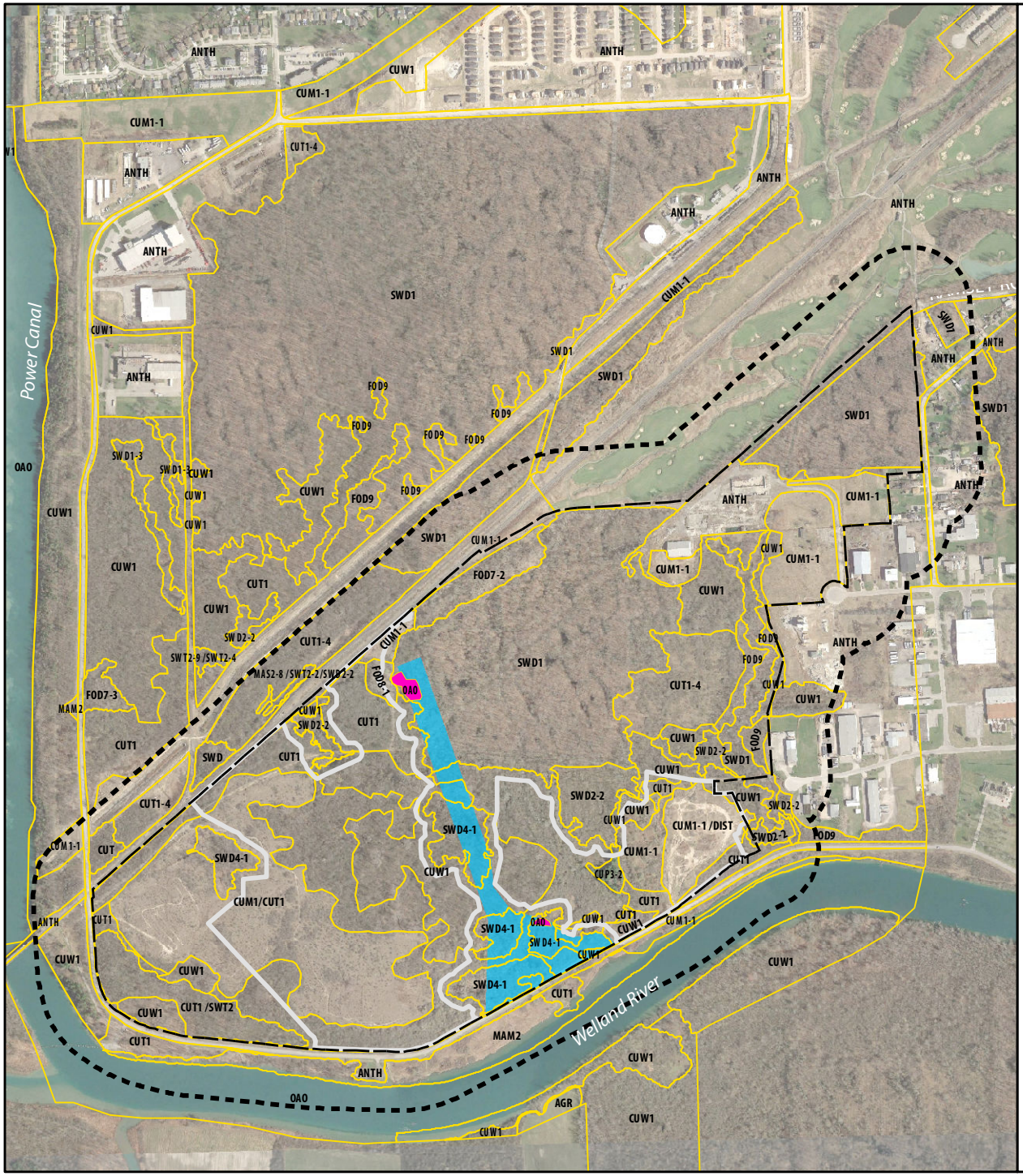

Study Area

Riverfront Residential

Adjacent Lands (120 m from Study Area)

Ecological Land Classification (updated area within/ adjacent to Riverfront Residential, Savanta 2018)

Wetland Amphibian Breeding Significant Wildlife Habitat and Turtle Overwintering Significant Wildlife Habitat

Amphibian Movement Corridor Significant Wildlife Habitat

Vegetation Community (ELC Code)

AGR, Agricultural
ANTH, Anthropogenic
CUM1-1, Dry - Moist Old Field Meadow
CUM1/CUT1, Mineral Cultural Thicket
CUP3-2, White Pine Coniferous Plantation
CUT, Cultural Thicket
CUT1, Mineral Cultural Thicket
CUT1-4, Gray Dogwood Deciduous Cultural Thicket
CUW1, Mineral Cultural Woodland
FOD7-2, Fresh – Moist Green Ash Lowland Deciduous Forest
FOD7-3, Fresh – Moist Willow Lowland Deciduous Forest
FOD8-1, Fresh – Moist Poplar Deciduous Forest
FOD9, Fresh – Moist Oak – Maple – Hickory Deciduous Forest
MAM2, Mineral Meadow Marsh
MAS2-8, Rice Cut-grass Mineral Shallow Marsh
OAO, Open Aquatic
SWD, Mineral Deciduous Swamp
SWD1, Oak Mineral Deciduous Swamp
SWD1-3, Pin Oak Mineral Deciduous Swamp
SWD2-2, Green Ash Mineral Deciduous Swamp
SWD4-1, Willow Mineral Deciduous Swamp
SWT2, Mineral Thicket Swamp
SWT2-2, Willow Mineral Deciduous Thicket Swamp
SWT2-4, Buttonbush Mineral Deciduous Thicket Swamp
SWT2-9, Grey Dogwood Mineral Deciduous Thicket Swamp

Riverfront Residential Block Plan Environmental Impact Statement

SIGNIFICANT WILDLIFE HABITAT

Figure 4e Amphibian Breeding (Wetland), Turtle Overwintering, and Amphibian Movement Corridor

0 100 Meters

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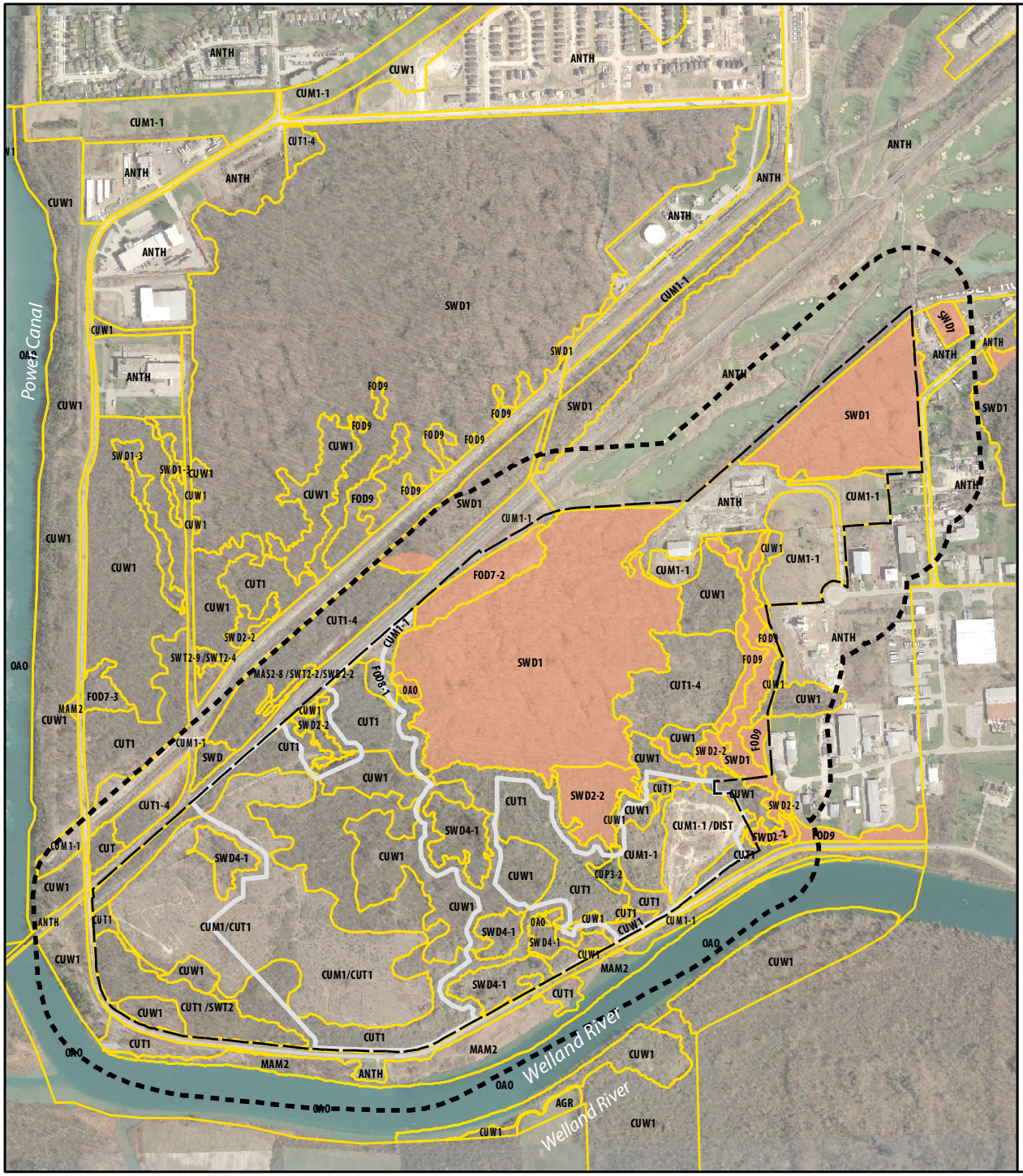

Study Area

Riverfront Residential

Adjacent Lands (120 m from Study Area)

Ecological Land Classification (updated area within/ adjacent to Riverfront Residential, Savanta 2018)

Deer Winter Congregation Areas

Vegetation Community (ELC Code)

AGR, Agricultural
ANTH, Anthropogenic
CUM1-1, Dry - Moist Old Field Meadow
CUM1/CUT1, Mineral Cultural Thicket
CUP3-2, White Pine Coniferous Plantation
CUT, Cultural Thicket
CUT1, Mineral Cultural Thicket
CUT1-4, Gray Dogwood Deciduous Cultural Thicket
CUW1, Mineral Cultural Woodland
FOD7-2, Fresh – Moist Green Ash Lowland Deciduous Forest
FOD7-3, Fresh – Moist Willow Lowland Deciduous Forest
FOD8-1, Fresh – Moist Poplar Deciduous Forest
FOD9, Fresh – Moist Oak – Maple – Hickory Deciduous Forest
MAM2, Mineral Meadow Marsh
MAS2-8, Rice Cut-grass Mineral Shallow Marsh
OAO, Open Aquatic
SWD, Mineral Deciduous Swamp
SWD1, Oak Mineral Deciduous Swamp
SWD1-3, Pin Oak Mineral Deciduous Swamp
SWD2-2, Green Ash Mineral Deciduous Swamp
SWD4-1, Willow Mineral Deciduous Swamp
SWT2, Mineral Thicket Swamp
SWT2-2, Willow Mineral Deciduous Thicket Swamp
SWT2-4, Buttonbush Mineral Deciduous Thicket Swamp
SWT2-9, Grey Dogwood Mineral Deciduous Thicket Swamp

Riverfront Residential Block Plan Environmental Impact Statement

SIGNIFICANT WILDLIFE HABITAT

Figure 4f
Deer Winter Congregation Areas

0 100 Meters

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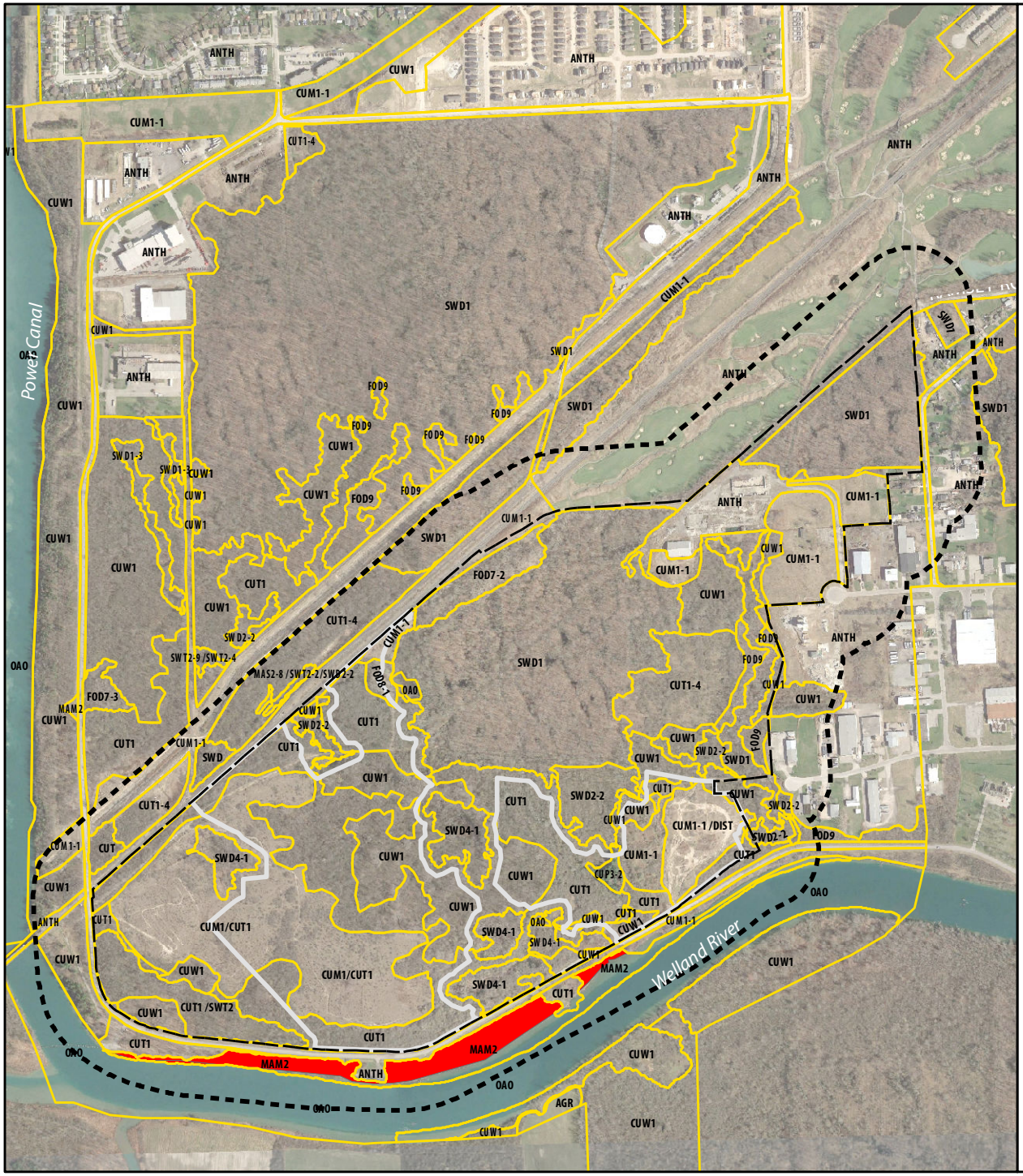

Study Area

Riverfront Residential

Adjacent Lands (120 m from Study Area)

Ecological Land Classification (updated area within/ adjacent to Riverfront Residential, Savanta 2018)

Candidate Turtle Nesting Area

Vegetation Community (ELC Code)

AGR, Agricultural
ANTH, Anthropogenic
CUM1-1, Dry - Moist Old Field Meadow
CUM1/CUT1, Mineral Cultural Thicket
CUP3-2, White Pine Coniferous Plantation
CUT, Cultural Thicket
CUT1, Mineral Cultural Thicket
CUT1-4, Gray Dogwood Deciduous Cultural Thicket
CUW1, Mineral Cultural Woodland
FOD7-2, Fresh – Moist Green Ash Lowland Deciduous Forest
FOD7-3, Fresh – Moist Willow Lowland Deciduous Forest
FOD8-1, Fresh – Moist Poplar Deciduous Forest
FOD9, Fresh – Moist Oak – Maple – Hickory Deciduous Forest
MAM2, Mineral Meadow Marsh
MAS2-8, Rice Cut-grass Mineral Shallow Marsh
OAO, Open Aquatic
SWD, Mineral Deciduous Swamp
SWD1, Oak Mineral Deciduous Swamp
SWD1-3, Pin Oak Mineral Deciduous Swamp
SWD2-2, Green Ash Mineral Deciduous Swamp
SWD4-1, Willow Mineral Deciduous Swamp
SWT2, Mineral Thicket Swamp
SWT2-2, Willow Mineral Deciduous Thicket Swamp
SWT2-4, Buttonbush Mineral Deciduous Thicket Swamp
SWT2-9, Grey Dogwood Mineral Deciduous Thicket Swamp

Riverfront Residential Block Plan Environmental Impact Statement

SIGNIFICANT WILDLIFE HABITAT

Figure 4g
Turtle Nesting Areas

0 100 Meters

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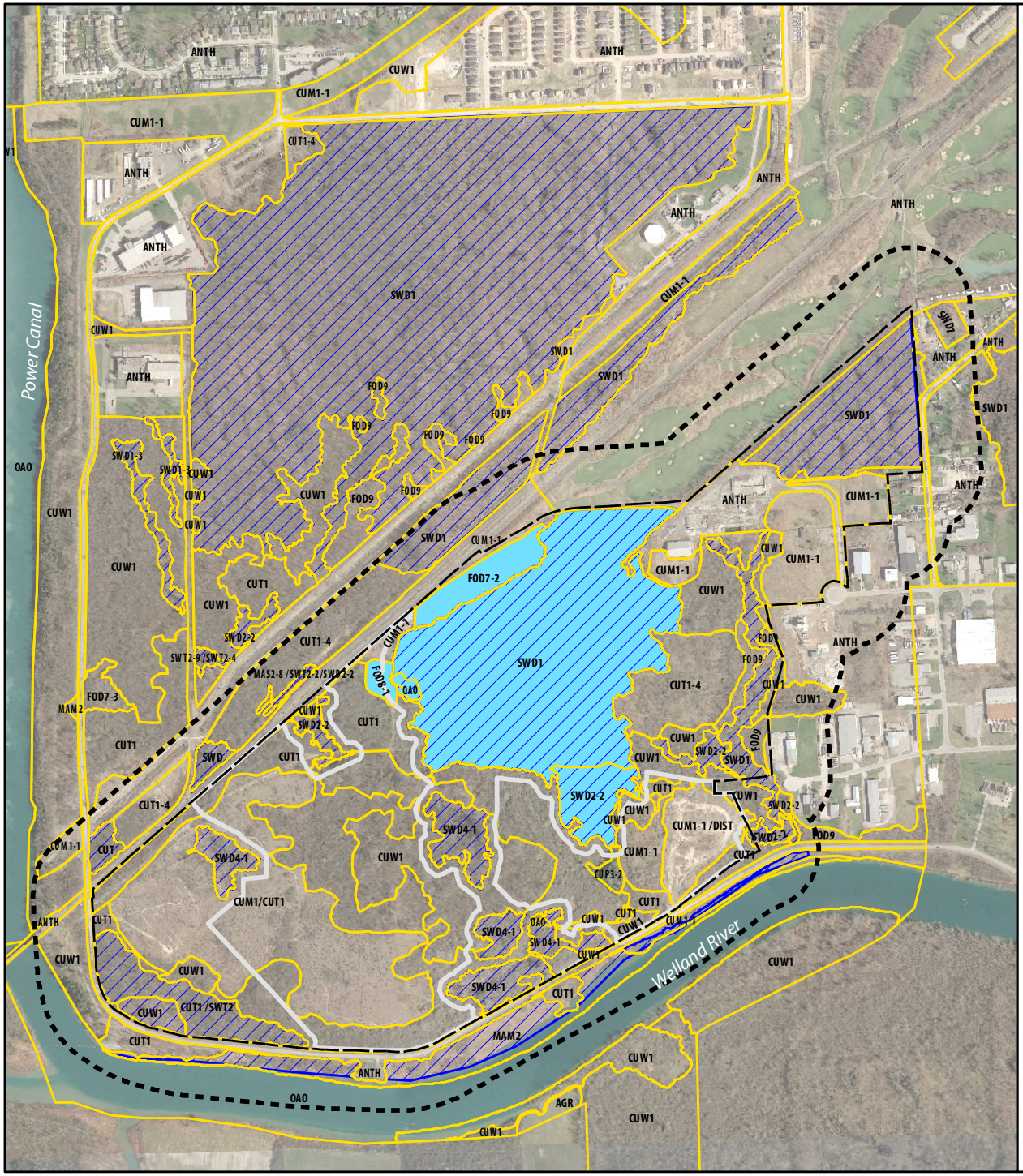

Study Area

Riverfront Residential

Adjacent Lands (120 m from Study Area)

Ecological Land Classification (updated area within/ adjacent to Riverfront Residential, Savanta 2018)

Provincially Significant Wetland (MNRF)

Woodland Area-Sensitive Bird Breeding Habitat

Vegetation Community (ELC Code)

AGR, Agricultural
ANTH, Anthropogenic
CUM1-1, Dry - Moist Old Field Meadow
CUM1/CUT1, Mineral Cultural Thicket
CUP3-2, White Pine Coniferous Plantation
CUT, Cultural Thicket
CUT1, Mineral Cultural Thicket
CUT1-4, Gray Dogwood Deciduous Cultural Thicket
CUW1, Mineral Cultural Woodland
FOD7-2, Fresh – Moist Green Ash Lowland Deciduous Forest
FOD7-3, Fresh – Moist Willow Lowland Deciduous Forest
FOD8-1, Fresh – Moist Poplar Deciduous Forest
FOD9, Fresh – Moist Oak – Maple – Hickory Deciduous Forest
MAM2, Mineral Meadow Marsh
MAS2-8, Rice Cut-grass Mineral Shallow Marsh
OAO, Open Aquatic
SWD, Mineral Deciduous Swamp
SWD1, Oak Mineral Deciduous Swamp
SWD1-3, Pin Oak Mineral Deciduous Swamp
SWD2-2, Green Ash Mineral Deciduous Swamp
SWD4-1, Willow Mineral Deciduous Swamp
SWT2, Mineral Thicket Swamp
SWT2-2, Willow Mineral Deciduous Thicket Swamp
SWT2-4, Buttonbush Mineral Deciduous Thicket Swamp
SWT2-9, Grey Dogwood Mineral Deciduous Thicket Swamp

Riverfront Residential Block Plan Environmental Impact Statement

SIGNIFICANT WILDLIFE HABITAT

Figure 4h Woodland Area - Sensitive Bird Breeding Habitat

0 100 Meters

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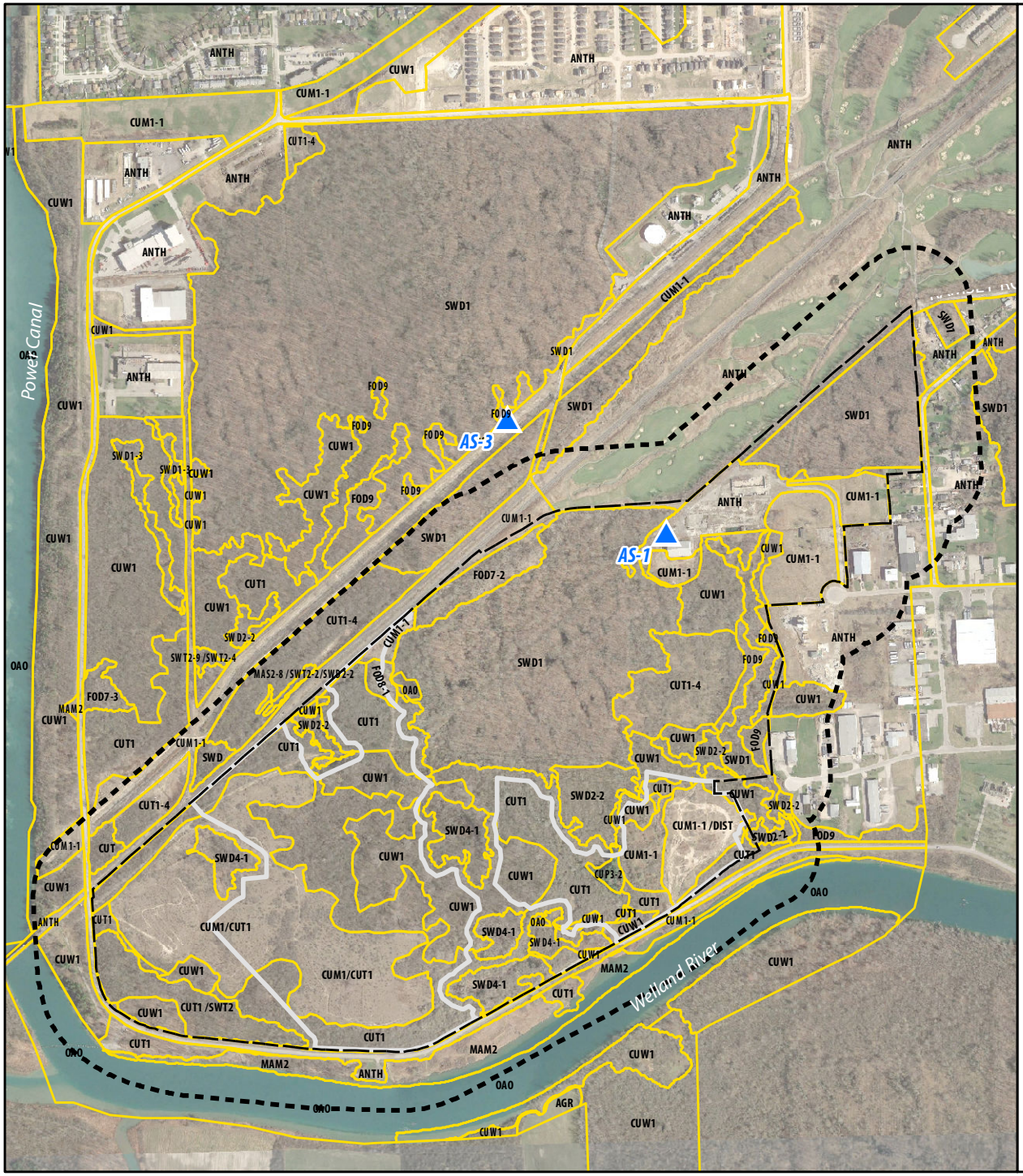

Study Area

Riverfront Residential

Adjacent Lands (120 m from Study Area)

Ecological Land Classification (updated area within/ adjacent to Riverfront Residential, Savanta 2018)

Reptile Hibernacula

Vegetation Community (ELC Code)

AGR, Agricultural
ANTH, Anthropogenic
CUM1-1, Dry - Moist Old Field Meadow
CUM1/CUT1, Mineral Cultural Thicket
CUP3-2, White Pine Coniferous Plantation
CUT, Cultural Thicket
CUT1, Mineral Cultural Thicket
CUT1-4, Gray Dogwood Deciduous Cultural Thicket
CUW1, Mineral Cultural Woodland
FOD7-2, Fresh – Moist Green Ash Lowland Deciduous Forest
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FOD8-1, Fresh – Moist Poplar Deciduous Forest
FOD9, Fresh – Moist Oak – Maple – Hickory Deciduous Forest
MAM2, Mineral Meadow Marsh
MAS2-8, Rice Cut-grass Mineral Shallow Marsh
OAO, Open Aquatic
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SWD4-1, Willow Mineral Deciduous Swamp
SWT2, Mineral Thicket Swamp
SWT2-2, Willow Mineral Deciduous Thicket Swamp
SWT2-4, Buttonbush Mineral Deciduous Thicket Swamp
SWT2-9, Grey Dogwood Mineral Deciduous Thicket Swamp

Riverfront Residential Block Plan Environmental Impact Statement

SIGNIFICANT WILDLIFE HABITAT

Figure 4i
Snake Hibernacula

0 100 Meters

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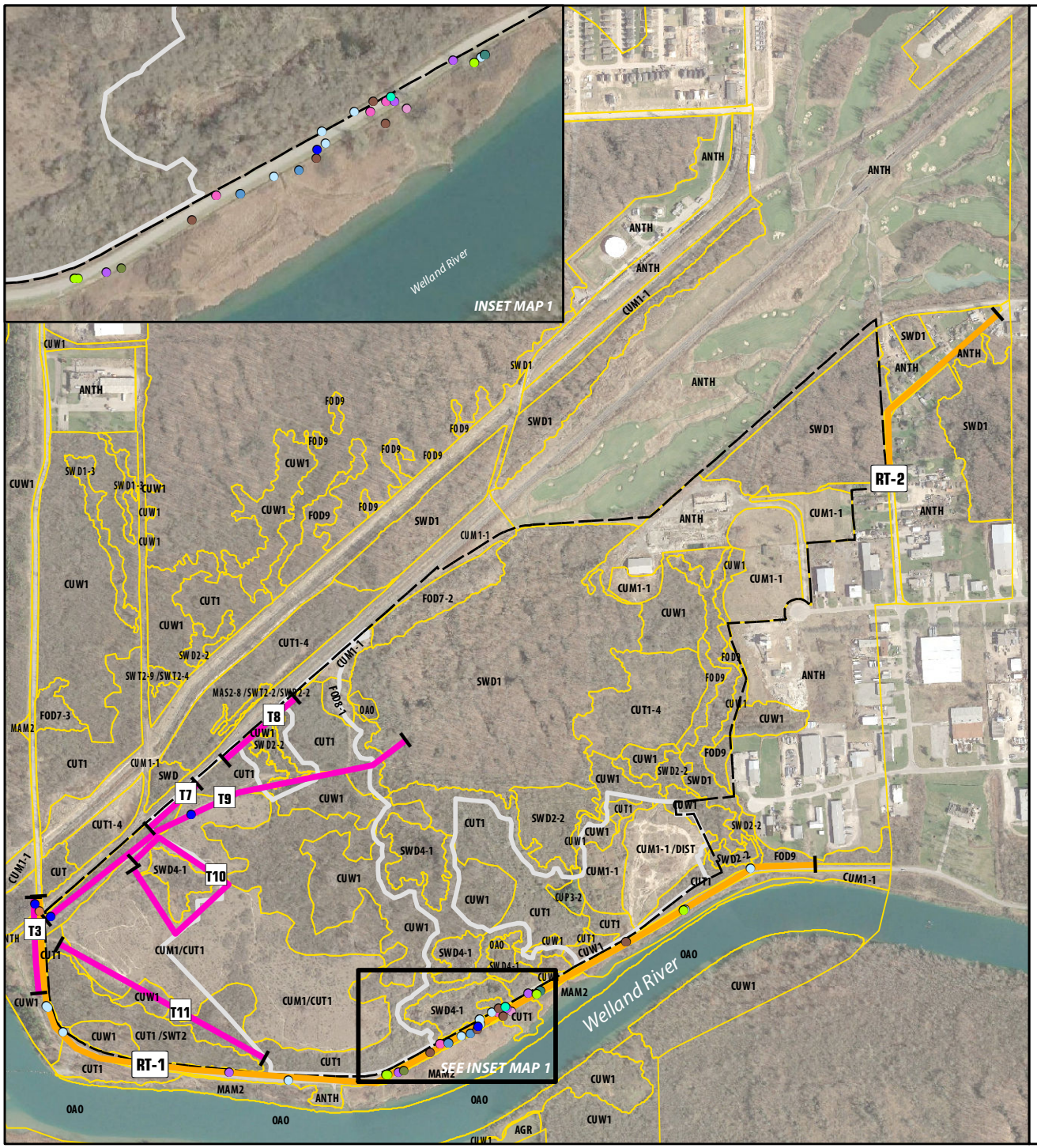

Study Area
Riverfront Residential
Ecological Land Classification (updated area within/ adjacent to Riverfront Residential, Savanta 2018)
Wildlife Road-Crossing Transect
Salamander Movement Transect

SPECIES

- American Goldfinch
- American Toad
- Blue-spotted Salamander
- Bullfrog
- Dekay's Brownsnake
- Eastern Gartersnake
- Green Frog
- Midland Painted Turtle
- Northern Leopard Frog
- Unidentified Snake Species
- Unidentified Bird Species
- Unidentified Frog Species
- Western Chorus Frog

Vegetation Community (ELC Code)

AGR, Agricultural
ANTH, Anthropogenic
CUM1-1, Dry - Moist Old Field Meadow
CUM1/CUT1, Mineral Cultural Thicket
CUP3-2, White Pine Coniferous Plantation
CUT, Cultural Thicket
CUT1, Mineral Cultural Thicket
CUT1-4, Gray Dogwood Deciduous Cultural Thicket
CUW1, Mineral Cultural Woodland
FOD7-2, Fresh – Moist Green Ash Lowland Deciduous Forest
FOD7-3, Fresh – Moist Willow Lowland Deciduous Forest
FOD8-1, Fresh – Moist Poplar Deciduous Forest
FOD9, Fresh – Moist Oak – Maple – Hickory Deciduous Forest
MAM2, Mineral Meadow Marsh
MAS2-8, Rice Cut-grass Mineral Shallow Marsh
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SWD1-3, Pin Oak Mineral Deciduous Swamp
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SWT2, Mineral Thicket Swamp
SWT2-2, Willow Mineral Deciduous Thicket Swamp
SWT2-4, Buttonbush Mineral Deciduous Thicket Swamp
SWT2-9, Grey Dogwood Mineral Deciduous Thicket Swamp

Riverfront Residential Block Plan Environmental Impact Statement

Figure 5
Wildlife Movement Survey Results (2017, 2018)

0 100 Meters

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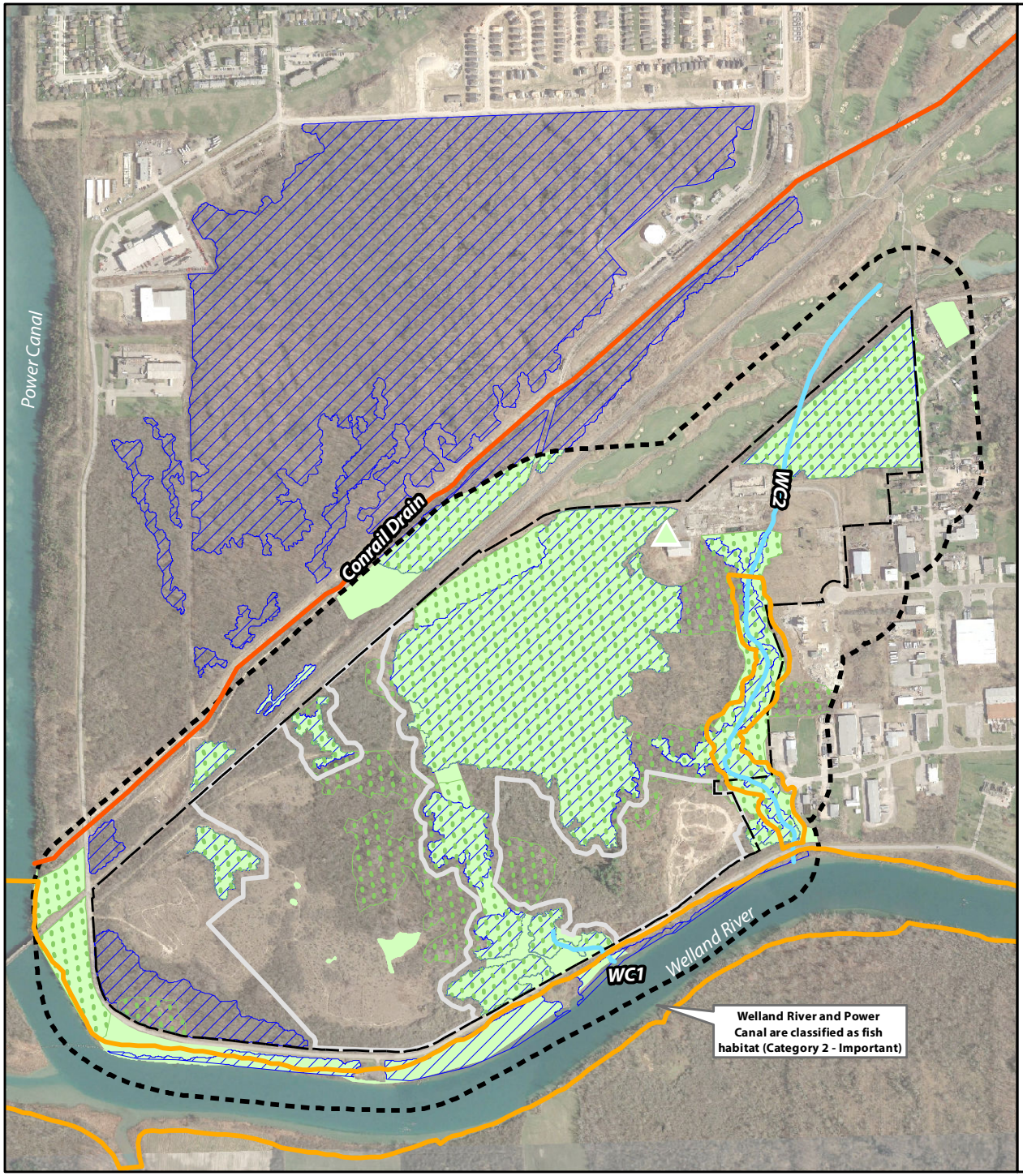

Study Area
Adjacent Lands (120 m from Study Area)
Riverfront Residential
Fish Habitat (Category 2 - Important)
Fish Habitat (Category 3 - Marginal)
Significant Woodland
Provincially Significant Wetland (MNRF)
Significant Valleyland
Significant Wildlife Habitat (Candidate and Confirmed)

Locations of endangered and threatened species are considered sensitive data that is provided only to MNRF, through the Information Gathering Form process.

Riverfront Residential Block Plan Environmental Impact Statement

Figure 6
Significant Natural Heritage Features (Per Section 2.1 of PPS, 2014)

0 100 Meters

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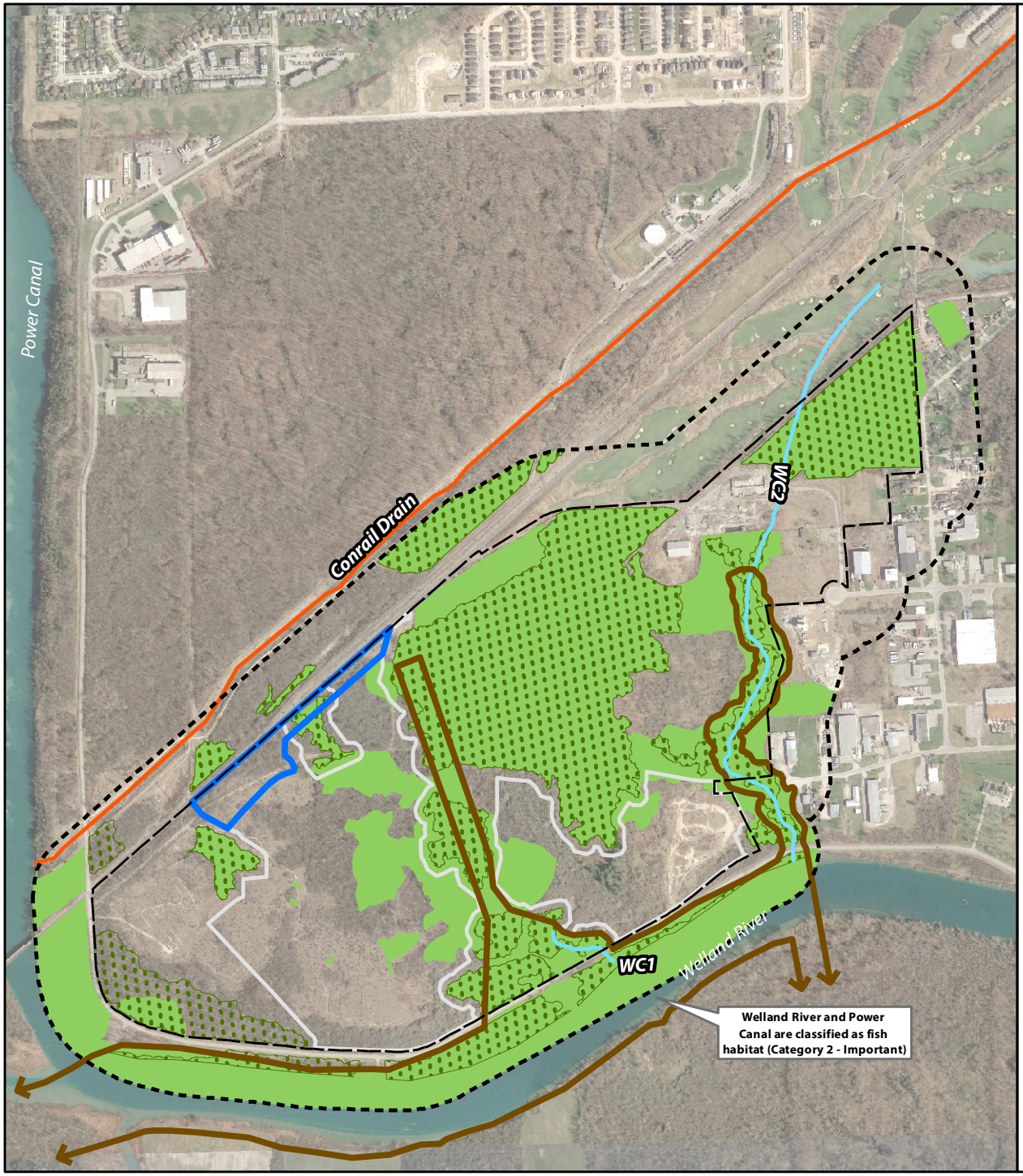

Study Area

Adjacent Lands (120 m from Study Area)

Riverfront Residential

Environmental Conservation Area (includes Significant Woodlands, SWH (Candidate and Confirmed) and Significant Valleylands - refer to Figure 9 for details)

Environmental Protection Area (includes PSWs - refer to Figure 9 for details)

Fish Habitat (Category 2 - Important)

Fish Habitat (Category 3 - Marginal)

Potential Natural Heritage Corridors

Anthropogenic Linkage Corridor (Open Space Designation)

Note: Species at Risk habitat is also included under the Region's EPA designation. SAR habitat polygon locations are considered sensitive data that is shared with MNRF through the Information Gathering Form process. Locations are not mapped in this EIS.

Riverfront Residential Block Plan Environmental Impact Statement

Figure 7
Niagara Region Core Natural Heritage System Features

0 100 Meters

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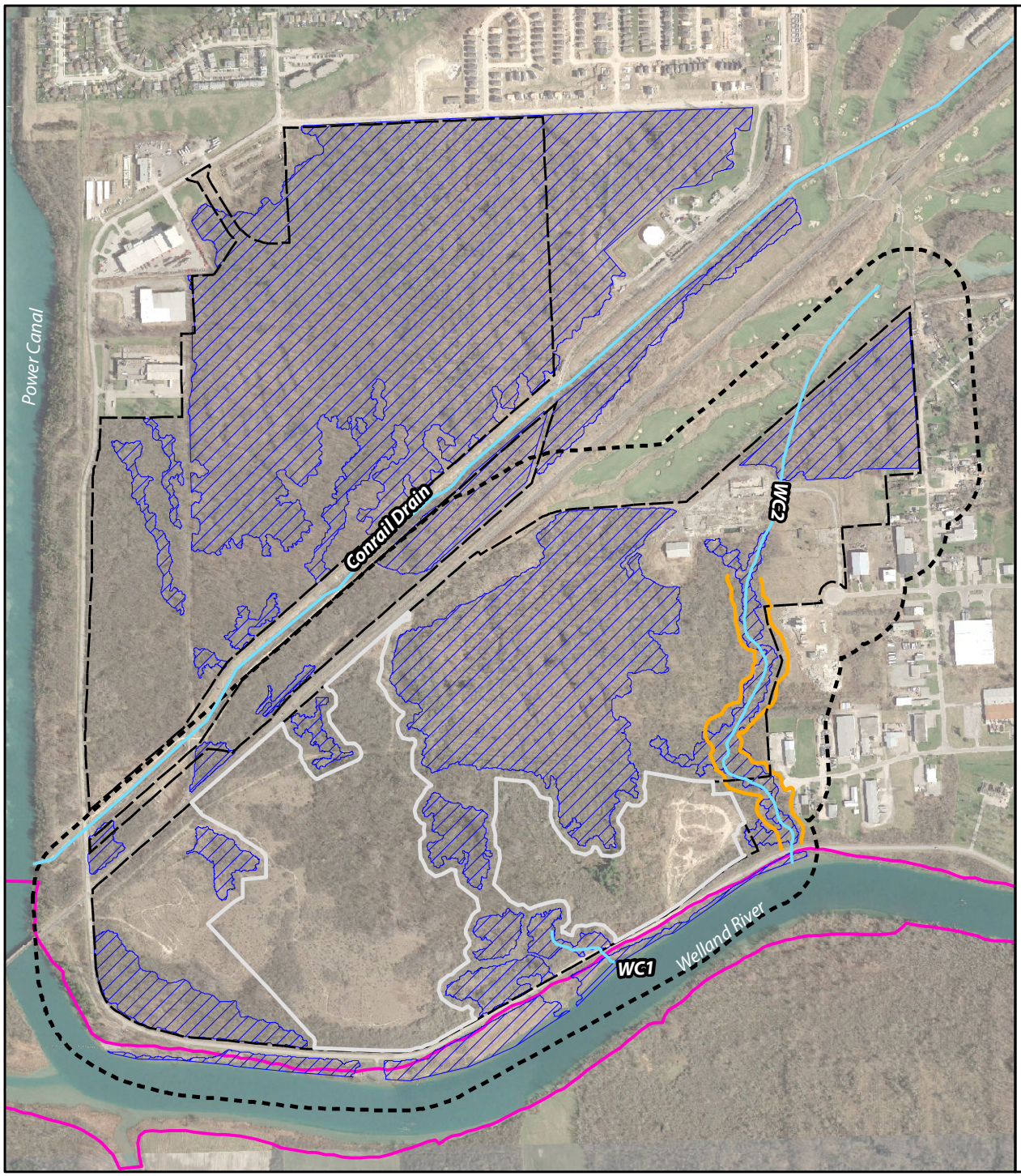

Study Area
Adjacent Lands (120 m from Study Area)
Riverfront Residential
Provincially Significant Wetland (MNRF)
Regional Floodplain (NPCA)
Valley Top of Slope (NPCA)
Watercourse

Riverfront Residential Block Plan Environmental Impact Statement

Figure 8
NPCA Regulated Features

0 100 Meters

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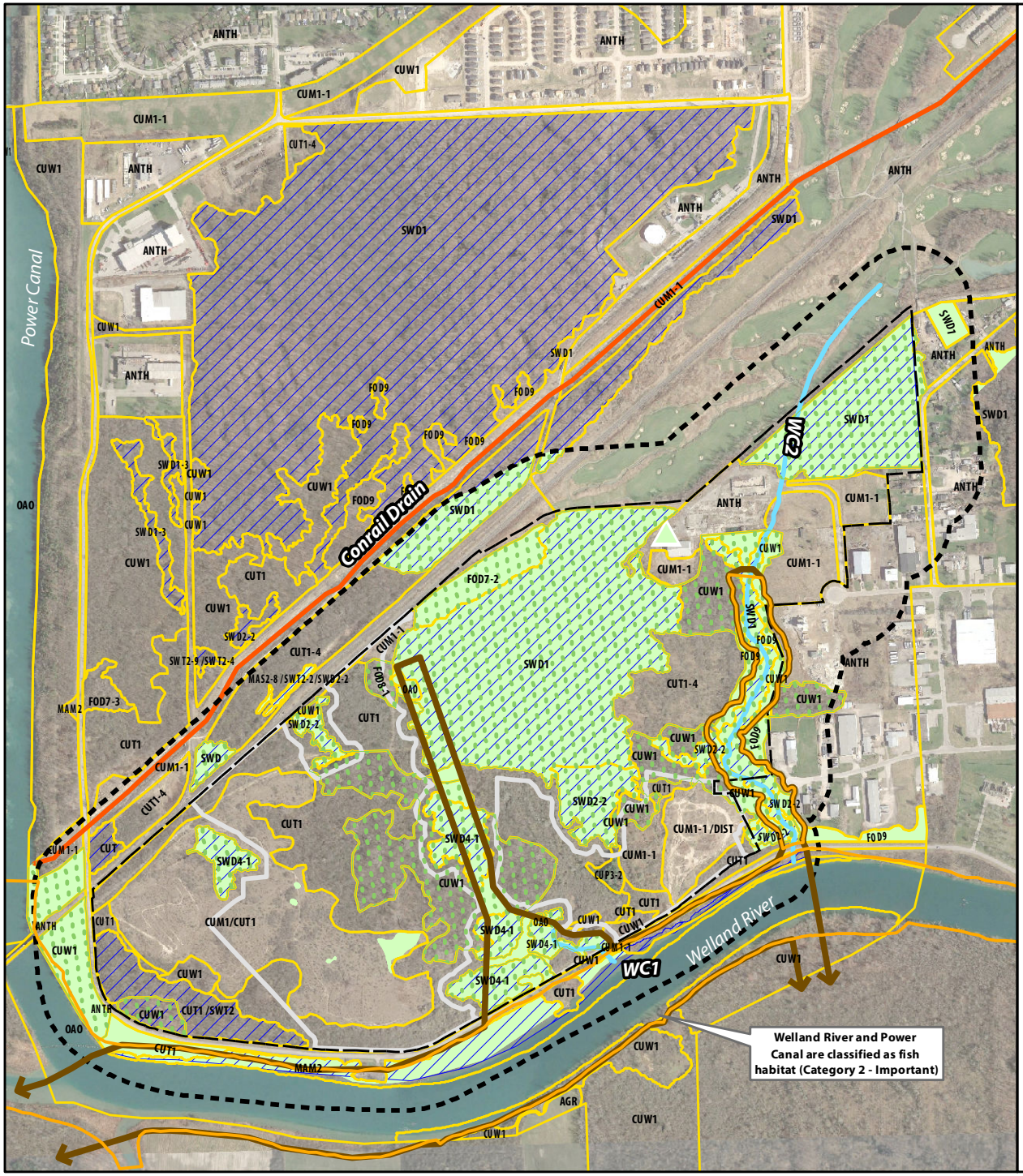

- Study Area
- Adjacent Lands (120 m from Riverfront Residential)
- Riverfront Residential
- Ecological Land Classification (updated area within/ adjacent to Riverfront Residential, Savanta 2018)
- Significant Woodland (Niagara Region Official Plan, 2014 and NHRM, 2010)
- Provincially Significant Wetland (MNRF)
- Significant Valleyland
- Fish Habitat (Category 2 - Important)
- Fish Habitat (Category 3 - Marginal)
- Potential Natural Heritage Corridors
- Significant Wildlife Habitat (Candidate and Confirmed)
  - Bat Maternity Colonies SWH
  - Woodland Area-Sensitive Breeding Bird SWH
  - Woodland Breeding Amphibian SWH (Candidate and Confirmed)
  - Amphibian Movement Corridor SWH
  - Wetland Breeding Amphibian SWH
  - Turtle Overwintering SWH
  - Turtle Nesting SWH
  - Snake Hibernacula SWH
  - Deer Wintering SWH
  - Rare Vegetation Community (including Older Growth Woodland) SWH
  - Rare Species SWH (Eastern Wood-Pewee, Wood Thrush, Snapping Turtle, Schreber's Aster, Honey-locust, Great Plains Ladies' - tresses)

Riverfront Residential Block Plan Environmental Impact Statement

Figure 9
Natural Heritage Feature Summary

0 100 Meters

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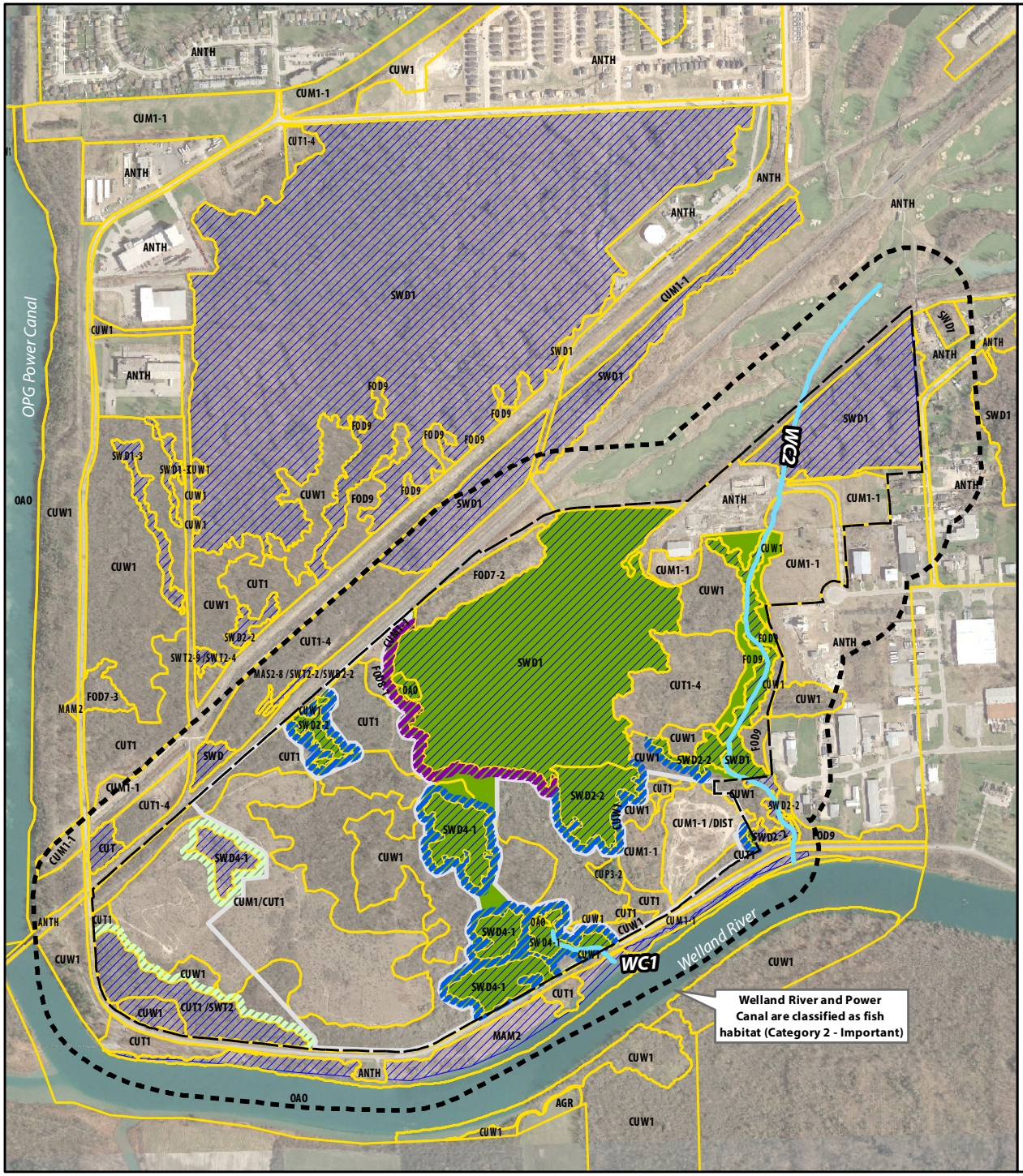
Path: S:\9024 - SAV 7602 Riverfront Community\gis\mxd\2019 12 04 EIS report figures\Figure 9 Natural Heritage Feature Summary.mxd REVISED: December 4, 2019



Study Area
Riverfront Residential
Adjacent Lands (120 m from Riverfront Residential)
Ecological Land Classification (updated area within/ adjacent to Riverfront Residential, Savanta 2018)
Provincially Significant Wetland (MNRF)
Fish Habitat (Category 2 - Important)
Riverfront Residential Natural Heritage System
15 m Buffer
20 m Buffer
Other Lands Owned by Applicant - Outside OPA 128
15 m Buffer

Vegetation Community (ELC Code)

AGR, Agricultural
ANTH, Anthropogenic
CUM1-1, Dry - Moist Old Field Meadow
CUM1/CUT1, Mineral Cultural Thicket
CUP3-2, White Pine Coniferous Plantation
CUT, Cultural Thicket
CUT1, Mineral Cultural Thicket
CUT1-4, Gray Dogwood Deciduous Cultural Thicket
CUW1, Mineral Cultural Woodland
FOD7-2, Fresh – Moist Green Ash Lowland Deciduous Forest
FOD7-3, Fresh – Moist Willow Lowland Deciduous Forest
FOD8-1, Fresh – Moist Poplar Deciduous Forest
FOD9, Fresh – Moist Oak – Maple – Hickory Deciduous Forest
MAM2, Mineral Meadow Marsh
MAS2-8, Rice Cut-grass Mineral Shallow Marsh
OAO, Open Aquatic
SWD, Mineral Deciduous Swamp
SWD1, Oak Mineral Deciduous Swamp
SWD1-3, Pin Oak Mineral Deciduous Swamp
SWD2-2, Green Ash Mineral Deciduous Swamp
SWD4-1, Willow Mineral Deciduous Swamp
SWT2, Mineral Thicket Swamp
SWT2-2, Willow Mineral Deciduous Thicket Swamp
SWT2-4, Buttonbush Mineral Deciduous Thicket Swamp
SWT2-9, Grey Dogwood Mineral Deciduous Thicket Swamp

Riverfront Residential Block Plan Environmental Impact Statement

Figure 10a
Natural Heritage System and Buffers

0 100 Meters

N

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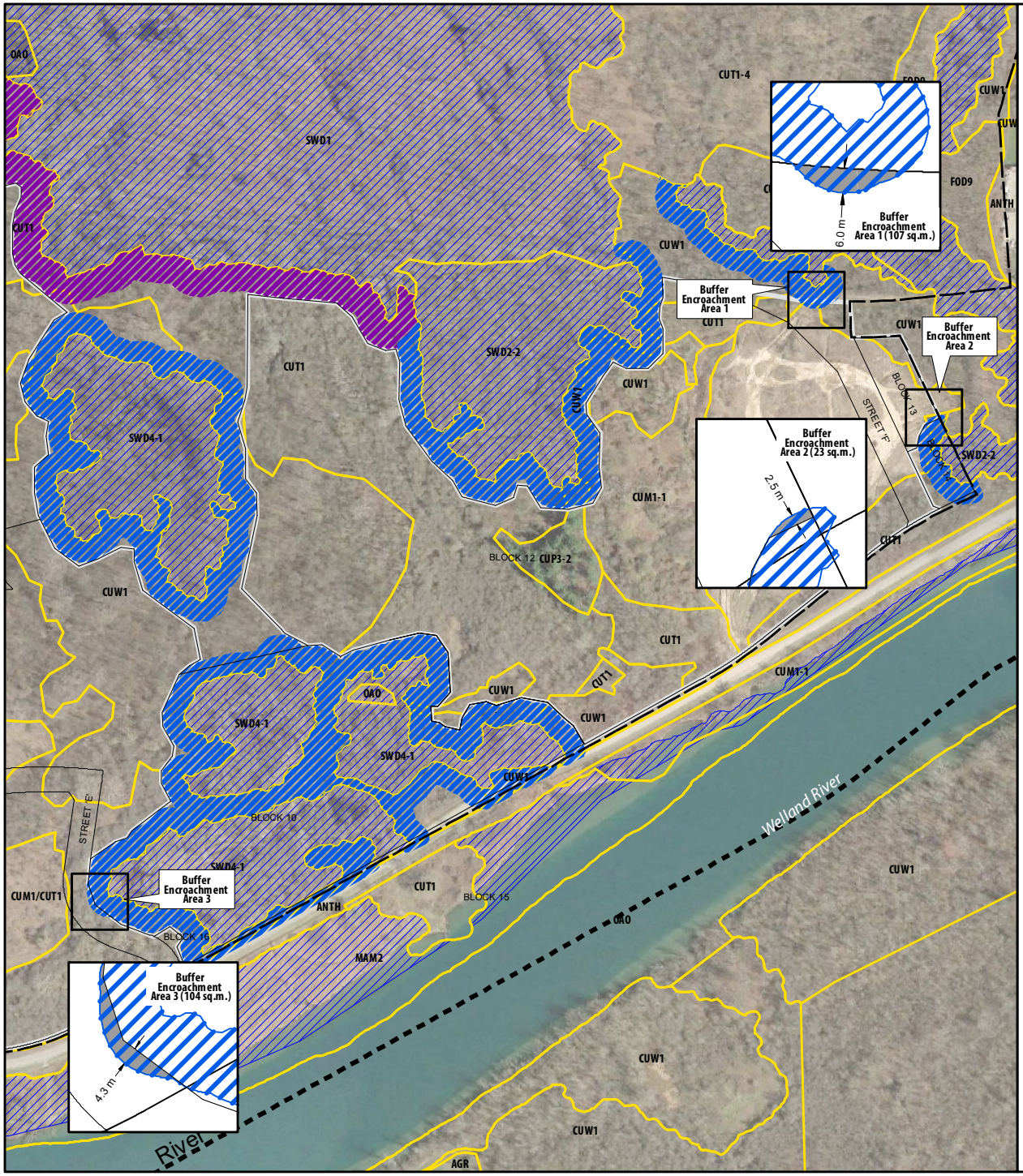
Path: S:\9024 - SAV 7602 Riverfront Community\gis\mxd\2019 12 04 EIS report figures\Figure 10a Natural Heritage System and Buffers.mxd REVISED: December 12, 2019



Study Area

Riverfront Residential

Adjacent Lands (120 m from Riverfront Residential)

Ecological Land Classification (updated area within/ adjacent to Riverfront Residential, Savanta 2018)

Provincially Significant Wetland (MNRF)

15 m Buffer

20 m Buffer

Vegetation Community (ELC Code)

AGR, Agricultural
ANTH, Anthropogenic
CUM1-1, Dry - Moist Old Field Meadow
CUM1/CUT1, Mineral Cultural Thicket
CUP3-2, White Pine Coniferous Plantation
CUT, Cultural Thicket
CUT1, Mineral Cultural Thicket
CUT1-4, Gray Dogwood Deciduous Cultural Thicket
CUW1, Mineral Cultural Woodland
FOD7-2, Fresh – Moist Green Ash Lowland Deciduous Forest
FOD7-3, Fresh – Moist Willow Lowland Deciduous Forest
FOD8-1, Fresh – Moist Poplar Deciduous Forest
FOD9, Fresh – Moist Oak – Maple – Hickory Deciduous Forest
MAM2, Mineral Meadow Marsh
MAS2-8, Rice Cut-grass Mineral Shallow Marsh
OAO, Open Aquatic
SWD, Mineral Deciduous Swamp
SWD1, Oak Mineral Deciduous Swamp
SWD1-3, Pin Oak Mineral Deciduous Swamp
SWD2-2, Green Ash Mineral Deciduous Swamp
SWD4-1, Willow Mineral Deciduous Swamp
SWT2, Mineral Thicket Swamp
SWT2-2, Willow Mineral Deciduous Thicket Swamp
SWT2-4, Buttonbush Mineral Deciduous Thicket Swamp
SWT2-9, Grey Dogwood Mineral Deciduous Thicket Swamp

Riverfront Residential Block Plan Environmental Impact Statement

Figure 10b
Proposed Buffer Encroachments

0 100 Meters

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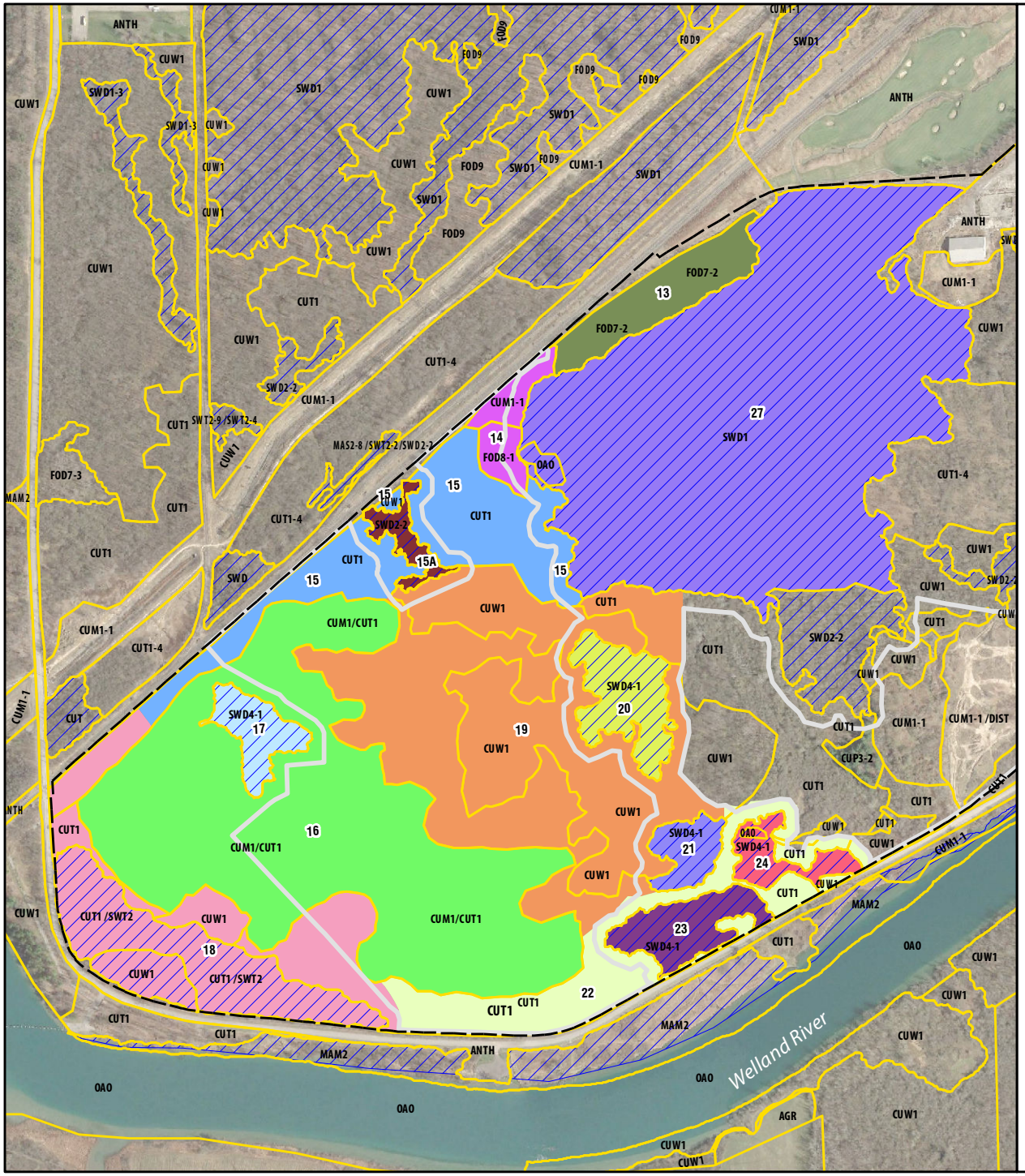
Path: S:\9024 - SAV 7602 Riverfront Community\gis\mxd\2019 12 04 EIS report figures\Figure 10b Proposed Buffer Encroachments.mxd REVISED: December 12, 2019



Study Area

Riverfront Residential

Ecological Land Classification (updated area within/ adjacent to Riverfront Residential, Savanta 2018)

Provincially Significant Wetland (MNRF)

19 ELC Polygon # (Dougan & Associates 2016 EIS)

The coloured polygons refer to the ELC unit numbers utilized in the 2016 EIS (Dougan & Associates). The individual colours do not represent interpretation, the colours serve to clearly depict where the Dougan & Associates ELC units occur. These polygon unit numbers are referenced in Tables 8 and 9 (Appendix B).

Vegetation Community (ELC Code)

AGR, Agricultural
ANTH, Anthropogenic
CUM1-1, Dry - Moist Old Field Meadow
CUM1/CUT1, Mineral Cultural Thicket
CUP3-2, White Pine Coniferous Plantation
CUT, Cultural Thicket
CUT1, Mineral Cultural Thicket
CUT1-4, Gray Dogwood Deciduous Cultural Thicket
CUW1, Mineral Cultural Woodland
FOD7-2, Fresh – Moist Green Ash Lowland Deciduous Forest
FOD7-3, Fresh – Moist Willow Lowland Deciduous Forest
FOD8-1, Fresh – Moist Poplar Deciduous Forest
FOD9, Fresh – Moist Oak – Maple – Hickory Deciduous Forest
MAM2, Mineral Meadow Marsh
MAS2-8, Rice Cut-grass Mineral Shallow Marsh
OAO, Open Aquatic
SWD, Mineral Deciduous Swamp
SWD1, Oak Mineral Deciduous Swamp
SWD1-3, Pin Oak Mineral Deciduous Swamp
SWD2-2, Green Ash Mineral Deciduous Swamp
SWD4-1, Willow Mineral Deciduous Swamp
SWT2, Mineral Thicket Swamp
SWT2-2, Willow Mineral Deciduous Thicket Swamp
SWT2-4, Buttonbush Mineral Deciduous Thicket Swamp
SWT2-9, Grey Dogwood Mineral Deciduous Thicket Swamp

Riverfront Residential Block Plan Environmental Impact Statement

Figure 12
West Development Area Flora/Fauna Sensitivity Analysis ELC Polygons

0 100 Meters

N

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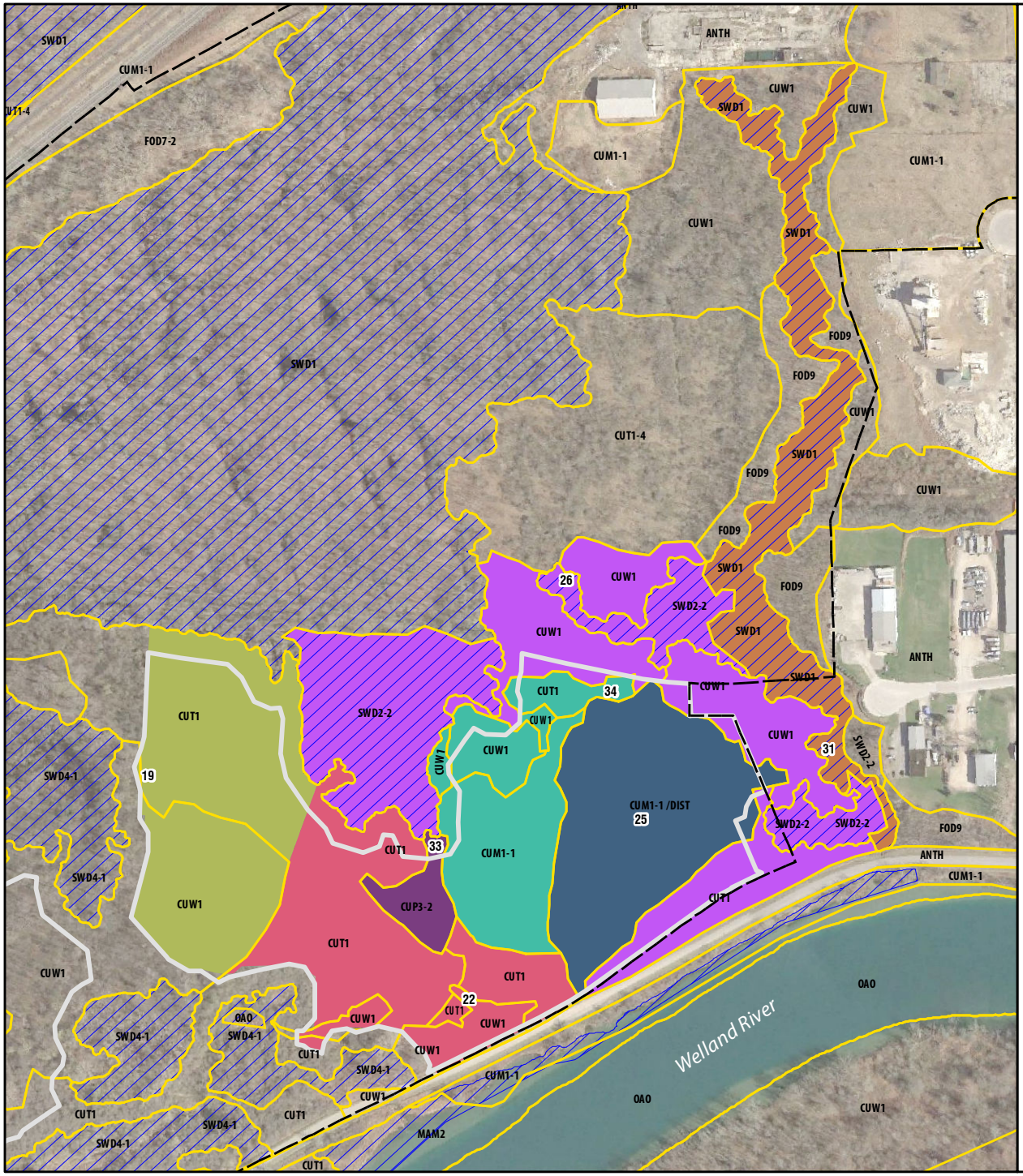
Path: S:\9024 - SAV 7602 Riverfront Community\gis\mxd\2019 07 24 EIS report figures\Figure 12 West Development Area Flora Fauna Sensitivity Analysis ELC Polygons.mxd REVISED: July 26, 2019



Study Area

Riverfront Residential

Ecological Land Classification (updated area within/ adjacent to Riverfront Residential, Savanta 2018)

Provincially Significant Wetland (MNRF)

26 ELC Polygon # (Dougan & Associates 2016 EIS)

The coloured polygons refer to the ELC unit numbers utilized in the 2016 EIS (Dougan & Associates). The individual colours do not represent interpretation, the colours serve to clearly depict where the Dougan & Associates ELC units occur. These polygon unit numbers are referenced in Tables 8 and 9 (Appendix B).

Vegetation Community (ELC Code)

AGR, Agricultural
ANTH, Anthropogenic
CUM1-1, Dry - Moist Old Field Meadow
CUM1/CUT1, Mineral Cultural Thicket
CUP3-2, White Pine Coniferous Plantation
CUT, Cultural Thicket
CUT1, Mineral Cultural Thicket
CUT1-4, Gray Dogwood Deciduous Cultural Thicket
CUW1, Mineral Cultural Woodland
FOD7-2, Fresh – Moist Green Ash Lowland Deciduous Forest
FOD7-3, Fresh – Moist Willow Lowland Deciduous Forest
FOD8-1, Fresh – Moist Poplar Deciduous Forest
FOD9, Fresh – Moist Oak – Maple – Hickory Deciduous Forest
MAM2, Mineral Meadow Marsh
MAS2-8, Rice Cut-grass Mineral Shallow Marsh
OAO, Open Aquatic
SWD, Mineral Deciduous Swamp
SWD1, Oak Mineral Deciduous Swamp
SWD1-3, Pin Oak Mineral Deciduous Swamp
SWD2-2, Green Ash Mineral Deciduous Swamp
SWD4-1, Willow Mineral Deciduous Swamp
SWT2, Mineral Thicket Swamp
SWT2-2, Willow Mineral Deciduous Thicket Swamp
SWT2-4, Buttonbush Mineral Deciduous Thicket Swamp
SWT2-9, Grey Dogwood Mineral Deciduous Thicket Swamp

Riverfront Residential Block Plan Environmental Impact Statement

Figure 13
East Development Area Flora/Fauna Sensitivity Analysis ELC Polygons

0 100 Meters

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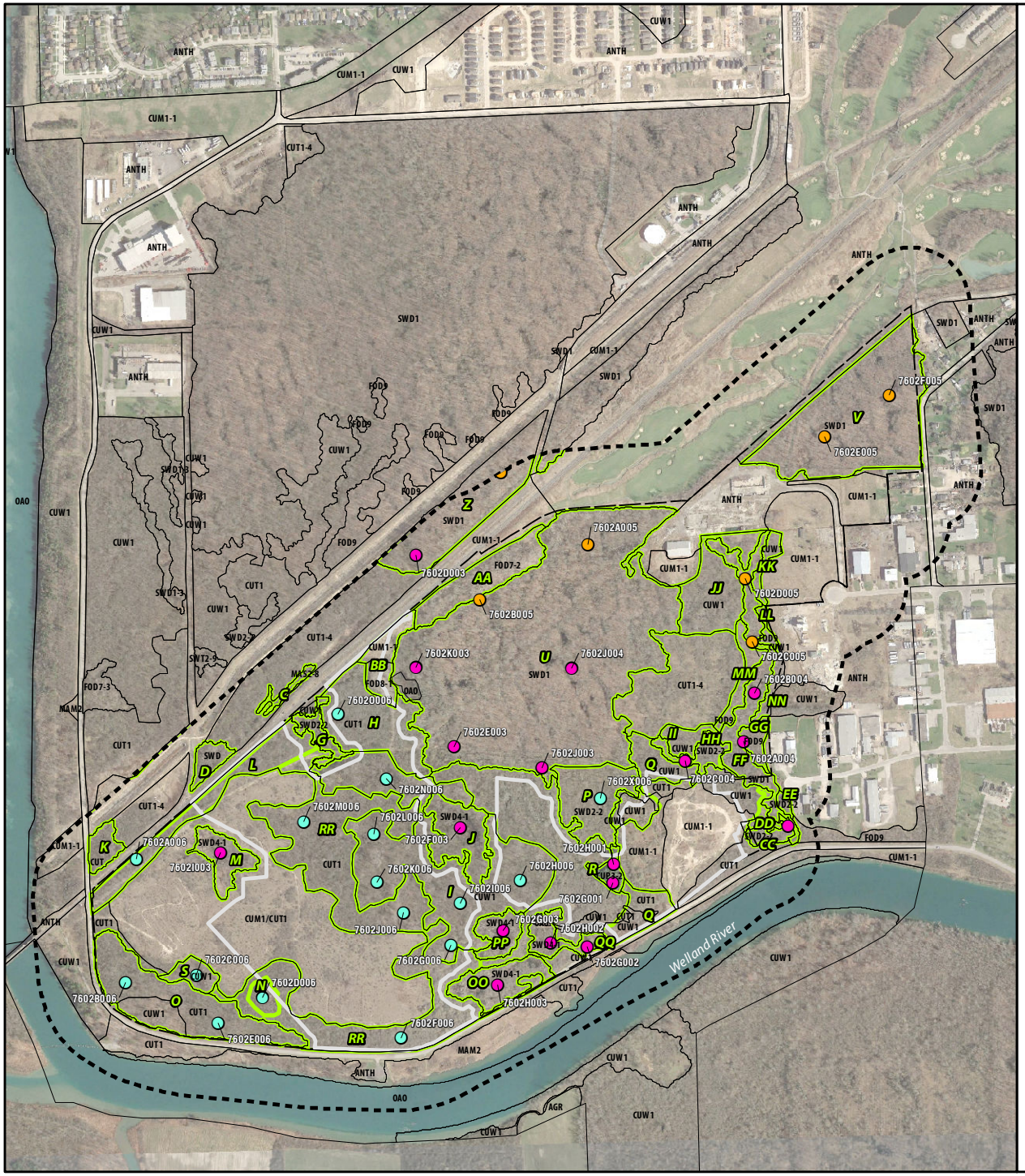
Path: S:\9024 - SAV 7602 Riverfront Community\gis\mxd\2019 07 24 EIS report figures\Figure 13 East Development Area Flora Fauna Sensitivity Analysis ELC Polygons.mxd REVISED: July 26, 2019



Study Area
Riverfront Residential
Ecological Land Classification
Bat Habitat Assessment Polygon
Primary Passive Acoustic Monitoring Station
Secondary Passive Acoustic Monitoring Station
Tertiary Passive Acoustic Monitoring Station

Note: Polygons with a letter label assigned that have no acoustic monitoring station illustrated (i) did not contain snag trees, (ii) are located outside of the OPA approved development areas, or (iii) are considered in relation to a nearby monitoring station.

Vegetation Communities (ELC)

AGR, Agricultural
ANTH, Anthropogenic
CUM1-1, Dry - Moist Old Field Meadow
CUP3-2, White Pine Coniferous Plantation
CUT, Cultural Thicket
CUT1, Mineral Cultural Thicket
CUT1-4, Gray Dogwood Deciduous Cultural Thicket
CUW1, Mineral Cultural Woodland
FOD7-2, Fresh – Moist Green Ash Lowland Deciduous Forest
FOD7-3, Fresh – Moist Willow Lowland Deciduous Forest
FOD8-1, Fresh – Moist Poplar Deciduous Forest
FOD9, Fresh – Moist Oak – Maple – Hickory Deciduous Forest
MAM2, Mineral Meadow Marsh
MAS2-8, Rice Cut-grass Mineral Shallow Marsh
OAO, Open Aquatic
SWD, Willow Mineral Deciduous Swamp
SWD1, Oak Mineral Deciduous Swamp
SWD1-3, Pin Oak Mineral Deciduous Swamp
SWD2-2, Green Ash Mineral Deciduous Swamp
SWD4-1, Willow Mineral Deciduous Swamp
SWT2, Mineral Thicket Swamp
SWT2-2, Willow Mineral Decidious Thicket Swamp
SWT2-4, Buttonbush Mineral Deciduous Thicket Swamp
SWT2-9, Grey Dogwood Mineral Deciduous Thicket Swamp

Riverfront Residential Block Plan Environmental Impact Statement

Figure 14
Bat Habitat Assessment and Acoustic Monitoring Stations

0 200 M

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Path: S:\9024 - SAV 7602 Riverfront Community\gis\mxd\2019 07 24 EIS report figures\Figure 14 BatHabAss_AcouMonStns.mxd REVISED: July 26, 2019

Study Area
Riverfront Residential
Provincially Significant Wetland (MNRF)
Fish Habitat (Category 2 - Important)
Fish Habitat (Category 3 - Marginal)
Drainage Feature DF-1 (approximate Location)
Potential Buried Pipe Location

Riverfront Residential Block Plan Environmental Impact Statement

Figure 15
Surface Water Features and Fish Habitat

0 100 Meters

N

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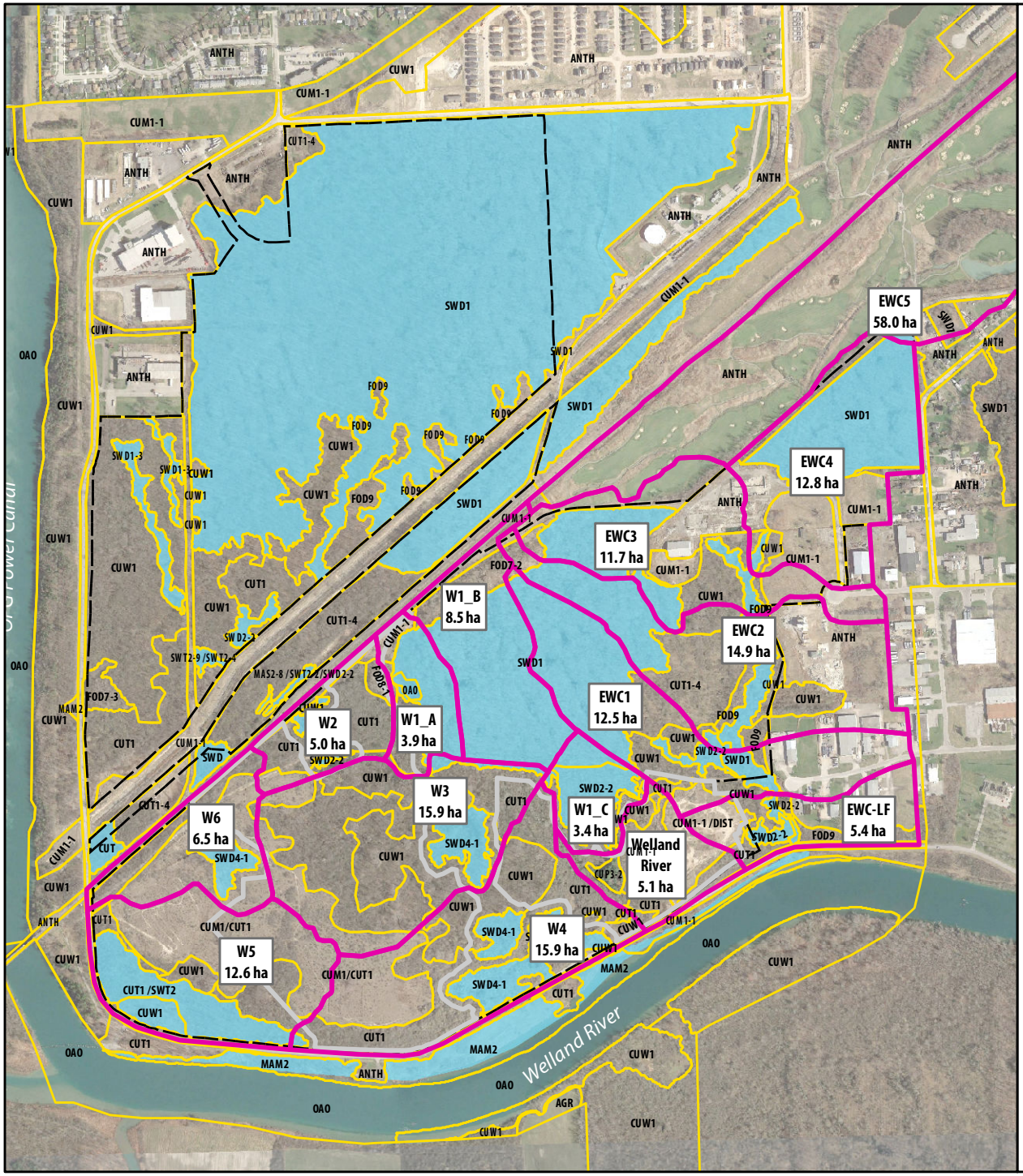
Path: S:\9024 - SAV 7602 Riverfront Community\gis\mxd\2019 07 24 EIS report figures\Figure 15 Surface Water Features and Fish Habitat.mxd REVISED: August 16, 2019



Study Area

Riverfront Residential

Ecological Land Classification (updated area within/ adjacent to OPA Development Area, Savanta 2018)

Provincially Significant Wetland (MNRF)

Drainage Catchment Boundary

Vegetation Community (ELC Code)

AGR, Agricultural
ANTH, Anthropogenic
CUM1-1, Dry - Moist Old Field Meadow
CUM1/CUT1, Mineral Cultural Thicket
CUP3-2, White Pine Coniferous Plantation
CUT, Cultural Thicket
CUT1, Mineral Cultural Thicket
CUT1-4, Gray Dogwood Deciduous Cultural Thicket
CUW1, Mineral Cultural Woodland
FOD7-2, Fresh – Moist Green Ash Lowland Deciduous Forest
FOD7-3, Fresh – Moist Willow Lowland Deciduous Forest
FOD8-1, Fresh – Moist Poplar Deciduous Forest
FOD9, Fresh – Moist Oak – Maple – Hickory Deciduous Forest
MAM2, Mineral Meadow Marsh
MAS2-8, Rice Cut-grass Mineral Shallow Marsh
OAO, Open Aquatic
SWD, Mineral Deciduous Swamp
SWD1, Oak Mineral Deciduous Swamp
SWD1-3, Pin Oak Mineral Deciduous Swamp
SWD2-2, Green Ash Mineral Deciduous Swamp
SWD4-1, Willow Mineral Deciduous Swamp
SWT2, Mineral Thicket Swamp
SWT2-2, Willow Mineral Deciduous Thicket Swamp
SWT2-4, Buttonbush Mineral Deciduous Thicket Swamp
SWT2-9, Grey Dogwood Mineral Deciduous Thicket Swamp

Riverfront Residential Block Plan Environmental Impact Statement

Figure 16
Pre-Development Wetland Subcatchment Map

0 100 Meters

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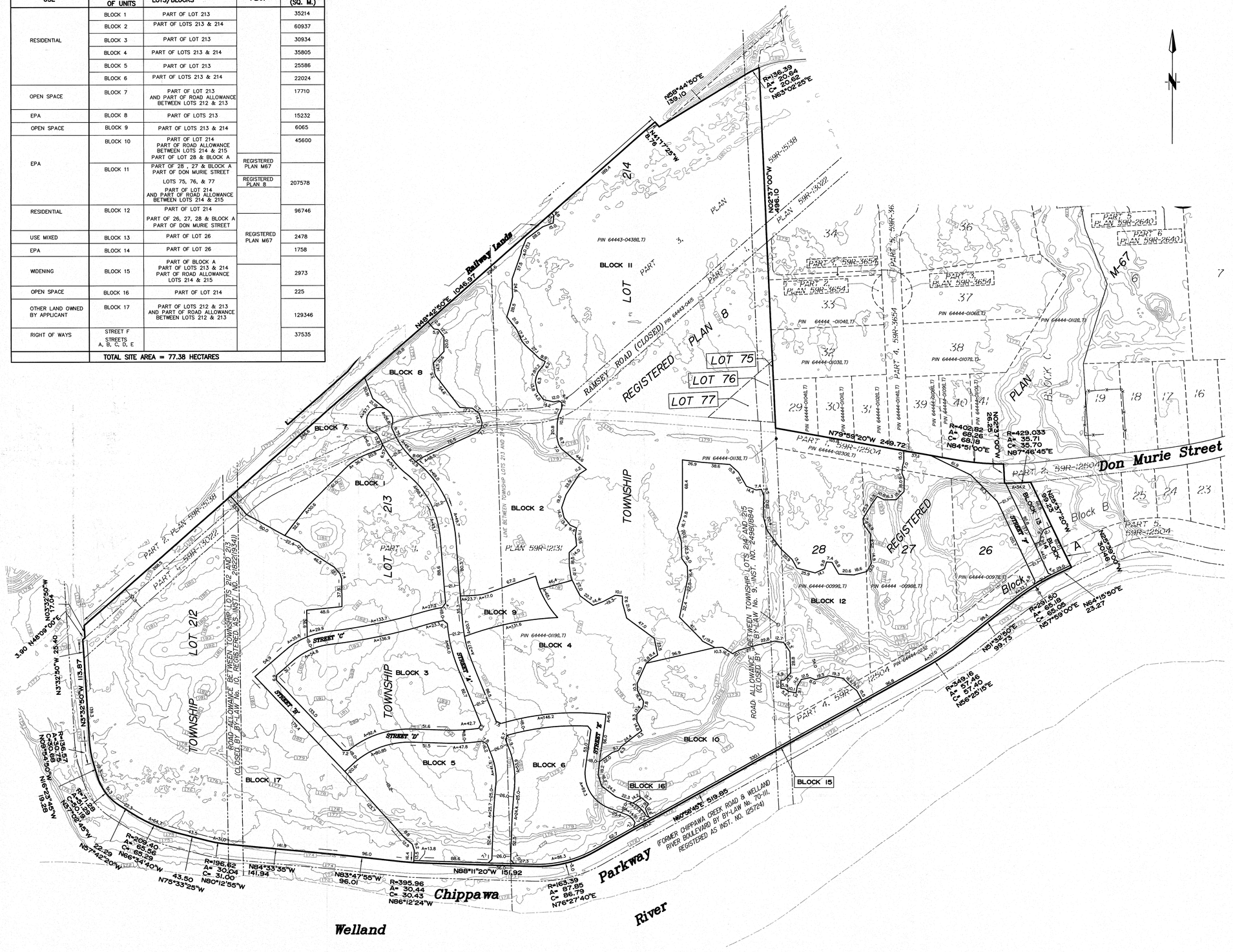
Path: S:\9024 - SAV 7602 Riverfront Community\gis\mxd\2019 07 24 EIS report figures\Figure 16 Pre-Development Wetland Subcatchment Map.mxd REVISED: July 26, 2019

Appendix B – Revised Draft Plan



LAND USE SCHEDULE

USE	No. OF UNITS	LOTS/BLOCKS	PLAN	AREA (SQ. M.)
RESIDENTIAL	BLOCK 1	PART OF LOT 213		35214
	BLOCK 2	PART OF LOTS 213 & 214		60937
	BLOCK 3	PART OF LOT 213		30934
	BLOCK 4	PART OF LOTS 213 & 214		35805
	BLOCK 5	PART OF LOT 213		25586
	BLOCK 6	PART OF LOTS 213 & 214		22024
OPEN SPACE	BLOCK 7	PART OF LOT 213 AND PART OF ROAD ALLOWANCE BETWEEN LOTS 212 & 213		17710
EPA	BLOCK 8	PART OF LOTS 213		15232
OPEN SPACE	BLOCK 9	PART OF LOTS 213 & 214		6065
EPA	BLOCK 10	PART OF LOT 214 PART OF ROAD ALLOWANCE BETWEEN LOTS 214 & 215 PART OF LOT 28 & BLOCK A	REGISTERED PLAN M67	45600
	BLOCK 11	PART OF 28 , 27 & BLOCK A PART OF DON MURIE STREET LOTS 75, 76, & 77 PART OF LOT 214 AND PART OF ROAD ALLOWANCE BETWEEN LOTS 214 & 215	 REGISTERED PLAN 8	207578
RESIDENTIAL	BLOCK 12	PART OF LOT 214 PART OF 26, 27, 28 & BLOCK A PART OF DON MURIE STREET	REGISTERED PLAN M67	96746
USE MIXED	BLOCK 13	PART OF LOT 26		2478
EPA	BLOCK 14	PART OF LOT 26		1758
WIDENING	BLOCK 15	PART OF BLOCK A PART OF LOTS 213 & 214 PART OF ROAD ALLOWANCE LOTS 214 & 215		2973
OPEN SPACE	BLOCK 16	PART OF LOT 214		225
OTHER LAND OWNED BY APPLICANT	BLOCK 17	PART OF LOTS 212 & 213 AND PART OF ROAD ALLOWANCE BETWEEN LOTS 212 & 213		129346
RIGHT OF WAYS	STREET F STREETS A, B, C, D, E			37535
	TOTAL SITE AREA = 77.38 HECTARES			

SITE KEY PLAN

NOT TO SCALE

DRAFT PLAN OF SUBDIVISION OF :

LOTS 76 & 77 AND PART OF LOT 75
REGISTERED PLAN 8

LOTS 26, 27, 28 & BLOCK E(0.3 RESERVE)

AND PART OF
BLOCK A

AND PART OF
DON MURIE STREET (CLOSED)
REGISTERED PLAN M67

AND PART OF
TOWNSHIP LOTS 212, 213, 214 & 215

AND PART OF
ORIGINAL ROAD ALLOWANCE BETWEEN LOTS 212 AND 213 (CLOSED)

AND PART OF
ORIGINAL ROAD ALLOWANCE BETWEEN LOTS 214 AND 215 (CLOSED)

GEOGRAPHIC TOWNSHIP OF STAMFORD
IN THE
CITY OF NIAGARA FALLS
REGIONAL MUNICIPALITY OF NIAGARA

SCALE 1 : 2500 METRES
0 50 100 150

METRIC NOTE

DISTANCES AND ELEVATIONS SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

SCHEDULE RE:
SECTION 51(17) OF THE PLANNING ACT

A. SHOWN
B. SHOWN
C. SHOWN
D. RESIDENTIAL DEVELOPMENT
E. SHOWN
F. SHOWN
G. SHOWN WOODED AREAS
H. MUNICIPAL WATER
I. MIXED
J. SHOWN
K. ALL SERVICES TO BE AVAILABLE
L. SHOWN

OWNER'S CERTIFICATE

IN ACCORDANCE WITH THE SUBDIVISION ACT AND THE PLANNING ACT I HEREBY AUTHORIZE ASHENHURST NOUWENS & ASSOCIATES INC. TO PREPARE AND SUBMIT THIS PLAN OF SUBDIVISION FOR APPROVAL.

OWNER: GR (CAN) INVESTMENT CO. LTD.

August 14, 2019
DATE

I HAVE AUTHORITY TO BIND THE CORPORATION

SURVEYOR'S CERTIFICATE

I CERTIFY THAT THE BOUNDARIES OF THE LANDS TO BE SUBDIVIDED , AS SHOWN ON THIS PLAN AND THEIR RELATIONSHIP TO ADJACENT LANDS , ARE ACCURATELY SHOWN.

AUGUST. 14, 2019
DATE

HARRY KALANTZAKOS
ONTARIO LAND SURVEYOR

REVISIONS

JULY 30, 2019	REVISED AS PER CLIENT
JULY 12, 2019	REVISED AS PER CLIENT
DECEMBER 18, 2018	ISSUED FOR REVIEW

ASHENHURST NOUWENS & ASSOCIATES INC.
PROFESSIONAL ENGINEERS & ONTARIO LAND SURVEYORS
225 KING WILLIAM STREET, SUITE 204, HAMILTON, ONTARIO L8R IBI
TELEPHONE: (905) 529-6316
(905) 529-4314
FAX: (905) 529-6651
ANA SINCE 1956
e-mail: anl@AshenhurstNouwens.ca

DRAWN BY	CALC'D BY	CHK'D BY	FILE No.
W.S.	H.K.	H.K.	18143 DRAFT PLAN R1

Appendix C – Tables

Table 1. Ecological Field Studies (2015 - 2019)

FIELD DATE	NATURE OF INVESTIGATION	SURVEYOR
2015		
April 1, 7, 8, 9, 10, 12, 13, 16, 17, 19, 20	Salamander Movement Surveys	D. White K. Beauchamp (Dougan and Associates) Helen Hemansen (OMNRF)
April 19	Nocturnal Amphibian Surveys	D. White (Dougan and Associates)
May 6, 8, 15	Spring Ecological Land Classification Surveys Spring Plant Inventory	D. White Z. Harris K. Beauchamp (Dougan and Associates)
May 28, 29 June 4, 5	Breeding Bird Surveys	K. Konze (Dougan and Associates)
May 28 June 24	Nocturnal Amphibian Surveys	Z. Harris K. Beauchamp (Dougan and Associates)
June 3	Summer Ecological Land Classification Surveys Summer Plant Inventory	S. Hill Z. Harris (Dougan and Associates)
August 17, 26, 27, 28 September 1	Summer Ecological Land Classification Surveys Wetland Delineation Summer Plant Inventory	D. White Z. Harris K. Beauchamp S. Hill (Dougan and Associates)
September 2	Wetland Verification	D. White Z. Harris S. Hill

FIELD DATE	NATURE OF INVESTIGATION	SURVEYOR
		(Dougan and Associates) GR (CAN) Investments Co. Ltd representatives Anne Yagi (MNRF) Lee-Ann Hamilton (NPCA)
September 28 October 5	Fall Ecological Land Classification Surveys Fall Plant Inventory	D. White Z. Harris (Dougan and Associates)
November 11	Cavity Tree and Mast Tree Surveys	D. White Z. Harris (Dougan and Associates)
2017		
February 24, 28	Salamander Movement Surveys	E. Lee L. Williamson O. Park J. Leslie
March 1	Vernal Pool Habitat Assessment	E. Lee L. Williamson
March 30	Winter Raptor Surveys	P. Burke
April 18	Woodland Raptor / Stick Nest Surveys	P. Burke
April 28 May 10, 15, 19, 23	Wildlife Road Crossing Surveys Reptile Emergence Surveys	R. Lee K. Beauchamp (Dougan and Associates)
June 13, 15	Turtle Nesting Surveys Turtle Basking Surveys	R. Lee C. Myrdal (Dougan and Associates) K. Beauchamp (Dougan and Associates)
June 19	Acadian Flycatcher Breeding Bird Surveys	P. Burke
August 4, 11	Vernal Pool Habitat Assessments	L. Williamson

FIELD DATE	NATURE OF INVESTIGATION	SURVEYOR
		M. Green O. Park C. Zoladeski
September 2 October 2, 5	Fall Reptile Surveys	L. Williamson M. Green
September 6	Detailed Wetland Surveys	C. Zoladeski K. Hunt
September 17	Detailed Wetland Natural Cover Survey	T. Hilditch
October 2, 5, 10	Turtle Basking Surveys	L. Williamson M. Green
October 10	Wildlife Road Crossing Surveys	L. Williamson M. Green
November 7, 8, 9	Bat Habitat Assessment Surveys	L. Williamson J. Leslie
2018		
January 8, 11, 12, 15, 16 February 5	Bat Habitat Assessment Surveys	L. Williamson M. Green O. Park
May 31 June 5, 12, 19 July 9	Bat Acoustic Monitor Deployment (May 31) and Monitor Rotation Dates	L. Williamson M. Green R. Rossi R. Lee
June 8, 14	Woodlot Canopy Cover / Stem Density Surveys Ecological Land Classification Update Surveys	J. Leslie A. Smith
July 20	Bat Acoustic Monitor Retrieval	L. Williamson M. Green R. Rossi A. Smith
July 3	Wetland Feature Surveys	C. Zoladeski
July 12	Staff Gauge Installation	R. Lee R. Rossi

FIELD DATE	NATURE OF INVESTIGATION	SURVEYOR
		A. Smith
July 18	Soil Core Sampling	O. Park R. Rossi A. Smith
August 2	Woodlot Canopy Cover / Stem Density Surveys Ecological Land Classification Update Surveys Installation and Monitoring of Staff Gauges Bat Acoustic Monitor Installation in Tertiary Study Area	J. Leslie
August 3	Wetland and Restoration Area Surveys	C. Zoladeski
August 9	Staff Gauge Installation Soil Core Sampling	L. Williamson M. Green
August 10	Soil Core Sampling	L. Williamson M. Green
August 16	Bat Acoustic Monitor Retrieval from Tertiary Study Area	L. Williamson M. Green
August 27	Staff Gauge Monitoring Turtle hatchling survey and turtle nesting suitability observations (City lands south of Chippawa Parkway)	L. Williamson M. Green
September 7	Staff Gauge Monitoring Milkweed Abundance Survey	L. Williamson P. Burke
September 14	Milkweed Abundance Survey Turtle hatchling survey and turtle nesting suitability observations (City lands south of Chippawa Parkway) Wildlife road crossing survey	L. Williamson
September 17	Rare Plant Survey (Honey-locust and Great Plains Ladies'-tresses)	C. Zoladeski
September 21	Rare Plant Survey (Great Plains Ladies'-tresses)	O. Park
September 21	Staff Gauge Monitoring Milkweed Abundance Survey	L. Williamson

FIELD DATE	NATURE OF INVESTIGATION	SURVEYOR
October 11	Staff Gauge Monitoring	L. Williamson
October 25	Staff Gauge Monitoring	L. Williamson
November 9	Staff Gauge Monitoring	L. Williamson
November 22	Staff Gauge Monitoring	L. Williamson
2019		
April 18	Amphibian Call Survey (Round 1) and Egg Mass Survey	L. Williamson M. Green
May 27	Amphibian Call Survey (Round 2)	L. Williamson M. Green
June 19	Amphibian Call Survey (Round 3)	L. Williamson M. Green

						Dougan and Associates	Savanta	
COMMON NAME	**LATIN NAME**	**Provincial Status (S RANK)**	**Global Status (G RANK)**	**COSSARO (MNRF)**	**COSEWIC STATUS**	**2015**	**2017**	**2018**
Common Elderberry	*Sambucus canadensis*	S5	G5			x		
Black Elderberry	*Sambucus nigra*	SNA	G5T5			x		
Maple-Leaved Viburnum	*Viburnum acerifolium*	S5	G5			x		
Nannyberry	*Viburnum lentago*	S5	G5			x		x
Cranberry Viburnum	*Viburnum opulus ssp. opulus*	SNA	G5					x
Highbush Cranberry	*Viburnum opulus ssp. trilobum*	S5	G5T5			x		
Downy Arrowwood	*Viburnum rafinesquianum*	S5	G5					x
Smooth Arrowwood	*Viburnum recognitum*	S4	G5			x		
Creeping Saltbush	*Atriplex prostrata*	SNA	G5			x		
Staghorn Sumac	*Rhus typhina*	S5	G5			x		
Eastern Poison Ivy	*Toxicodendron radicans var. radicans*	S5	GNR			x		x
Western Poison Ivy	*Toxicodendron radicans var. rydbergii*	S5	G5					x
Spotted Water-Hemlock	*Cicuta maculata var. maculata*	S5	G5T5			x		
Wild Carrot	*Daucus carota*	SNA	GNR			x		x
Common Water-Parsnip	*Sium suave*	S5	G5			x		
Spreading Dogbane	*Apocynum androsaemifolium*	S5	G5T?			x		x
Hemp Dogbane	*Apocynum cannabinum*	S5	G5			x		
Swamp Milkweed	*Asclepias incarnata ssp. incarnata*	S5	G5T5			x		
Common Milkweed	*Asclepias syriaca*	S5	G5			x		
Butterfly Milkweed	*Asclepias tuberosa var. interior*	S4	G5				x	
Lesser Periwinkle	*Vinca minor*	SNA	GNR			x		
Mountain Holly	*Ilex mucronata*	S5	G5			x		x
Common Winterberry	*Ilex verticillata*	S5	G5			x		
Common Yarrow	*Achillea millefolium*	SNA	G5			x		
Great Ragweed	*Ambrosia trifida*	S5	G5			x		
Howell's Pussytoes	*Antennaria howellii*	S5	G5					x
Canada Pussytoes	*Antennaria howellii ssp. canadensis*	S4S5	G5T5			x		
Burdock species	*Arctium sp.*					x		
Wormwood species	*Artemisia sp.*					x		
Aster species	*Aster sp.*					x		
Nodding Beggarticks	*Bidens cernua*	S5	G5			x		
Purple-Stemmed Beggarticks	*Bidens connata*	S4?	G5			x		
Devil's Beggarticks	*Bidens frondosa*	S5	G5			x		
Three-Parted Beggarticks	*Bidens tripartita*	S5	G5			x		
Nodding Thistle	*Carduus nutans*	SNA	GNR			x		
Brown Knapweed	*Centaurea jacea*	SNA	GNR					x
Black Knapweed	*Centaurea nigra*	SNA	GNR			x		
Wild Chicory	*Cichorium intybus*	SNA	GNR			x		
Bull Thistle	*Cirsium vulgare*	SNA	G5			x		
Flat-Top White Aster	*Doellingeria umbellata var. umbellata*	S5	G5T5			x		
Annual Fleabane	*Erigeron annuus*	S5	G5			x		
Philadelphia Fleabane	*Erigeron philadelphicus var. philadelphicus*	S5	G5			x		
Common Boneset	*Eupatorium perfoliatum*	S5	G5			x		
White Wood Aster	*Eurybia divaricata*	S2S3	G5	THR	THR	x		
Large-Leaved Aster	*Eurybia macrophylla*	S5	G5			x		

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Schreber's Aster	*Eurybia schreberi*	S2	G4			x		x
Grass-Leaved Goldenrod	*Euthamia graminifolia*	S5	G5			x		x
Spotted Joe Pye Weed	*Eutrochium maculatum var. maculatum*	S5	G5T5			x		x
Hawkweed species	*Hieracium sp.*					x		
Common Nipplewort	*Lapsana communis*	SNA	GNR			x		x
Oxeye Daisy	*Leucanthemum vulgare*	SNA	GNR			x		
Dense Blazing-Star	*Liatris spicata var. spicata*	S2	G5	THR	THR		x	
Rattlesnakeroot species	*Nabalus sp.*					x		
Meadow Hawkweed	*Pilosella caespitosa*	SNA	GNR			x		
Black-Eyed Susan	*Rudbeckia hirta var. pulcherrima*	S5	G5			x		
Tall Goldenrod	*Solidago altissima var. altissima*	S5	GNR			x		x
Canada Goldenrod (var. canadensis)	*Solidago canadensis var. canadensis*	S5	G5T5			x		
Zigzag Goldenrod	*Solidago flexicaulis*	S5	G5			x		
Early Goldenrod	*Solidago juncea*	S5	G5			x		x
Grey-Stemmed Goldenrod (var. nemoralis)	*Solidago nemoralis var. nemoralis*	S5	G5T?			x		
Round-Leaved Goldenrod	*Solidago patula*	S4	G5			x		
Rough-Stemmed Goldenrod (ssp. rugosa)	*Solidago rugosa ssp. rugosa*	S5	G5T5			x		x
White Heath Aster	*Symphyotrichum ericoides var. ericoides*	S5	G5T5			x		
Smooth Aster	*Symphyotrichum laeve var. laeve*	S5	G5T5			x		
Panicled Aster (ssp. lanceolatum)	*Symphyotrichum lanceolatum ssp. lanceolatum*	S5	G5T5			x		
Calico Aster	*Symphyotrichum lateriflorum var. lateriflorum*	S5	G5T5			x		x
New England Aster	*Symphyotrichum novae-angliae*	S5	G5			x		x
Old Field Aster	*Symphyotrichum pilosum var. pilosum*	S5	G5T5			x		
Arrow-Leaved Aster	*Symphyotrichum urophyllum*	S4	G4G5			x		
Common Dandelion	*Taraxacum officinale*	SNA	G5			x		
Coltsfoot	*Tussilago farfara*	SNA	GNR			x		
Spotted Jewelweed	*Impatiens capensis*	S5	G5			x		
Japanese Barberry	*Berberis thunbergii*	SNA	GNR			x		
May-Apple	*Podophyllum peltatum*	S5	G5			x		
Blue-Beech	*Carpinus caroliniana ssp. virginiana*	S5	G5T			x		
Eastern Hop-Hornbeam	*Ostrya virginiana*	S5	G5			x		
Virginia Waterleaf	*Hydrophyllum virginianum var. virginianum*	S5	G5			x		
Forget-Me-Not species	*Myosotis sp.*					x		
Garlic Mustard	*Alliaria petiolata*	SNA	G5			x		
Black Mustard	*Brassica nigra*	SNA	GNR			x		
Cut-Leaved Toothwort	*Cardamine concatenata*	S5	G5			x		
Limestone Bittercress	*Cardamine douglassii*	S4	G5			x		
Pennsylvania Bittercress	*Cardamine pensylvanica*	S5	G5			x		
Common Hackberry	*Celtis occidentalis*	S4	G5			x		
Tartarian Honeysuckle	*Lonicera tatarica*	SNA	GNR			x		
Western Snowberry	*Symphoricarpos occidentalis*	SNA	G5			x		
Common Mouse-Ear Chickweed	*Cerastium fontanum ssp. vulgare*	SNA	GNR			x		
Hedge False Bindweed	*Calystegia sepium*					x		
Field Bindweed	*Convolvulus arvensis*	SNA	GNR			x		
Pale Dogwood	*Cornus obliqua*	S5	G5T?			x		

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Grey Dogwood	*Cornus racemosa*	S5	G5?			x		x
Red-Osier Dogwood	*Cornus sericea*	S5	G5			x		
Russian Olive	*Elaeagnus angustifolia*	SNA	GNR			x		
Highbush Blueberry	*Vaccinium corymbosum*	S4	G5			x		
Honey Locust	*Gleditsia triacanthos*	S2?	G5			x		x
Kentucky Coffee-Tree	*Gymnocladus dioicus*	S2	G5	THR	THR	x		
Black Medick	*Medicago lupulina*	SNA	GNR			x		
White Sweet-Clover	*Melilotus albus*	SNA	GNR			x		x
Yellow Sweet-Clover	*Melilotus officinalis*	SNA	GNR			x		x
Purple Crown-Vetch	*Securigera varia*	SNA	GNR			x		
Clover species	*Trifolium sp.*					x		
Red Clover	*Trifolium pratense*	SNA	GNR			x		
White Clover	*Trifolium repens*	SNA	GNR			x		
Vetch species	*Vicia sp.*					x		
Tufted Vetch	*Vicia cracca*	SNA	GNR			x		
American Beech	*Fagus grandifolia*	S4	G5			x		
White Oak	*Quercus alba*	S5	G5			x		x
Swamp White Oak	*Quercus bicolor*	S4	G5			x		x
Northern Pin Oak	*Quercus ellipsoidalis*	S3	G5			x		
Burr Oak	*Quercus macrocarpa*	S5	G5			x		
Pin Oak	*Quercus palustris*	S4	G5			x		x
Northern Red Oak	*Quercus rubra*	S5	G5			x		x
Spotted Geranium	*Geranium maculatum*	S5	G5			x		
Wild Black Currant	*Ribes americanum*	S5	G5			x		x
Eastern Prickly Gooseberry	*Ribes cynosbati*	S5	G5			x		
Skunk Currant	*Ribes glandulosum*	S5	G5			x		
Swamp Gooseberry	*Ribes hirtellum*	S5	G5			x		
Bristly Black Currant	*Ribes lacustre*	S5	G5			x		
European Red Currant	*Ribes rubrum*	SNA	G4G5					x
Swamp Red Currant	*Ribes triste*	S5	G5			x		
American Witch-Hazel	*Hamamelis virginiana*	S4S5	G5			x		
Common St. John's-Wort	*Hypericum perforatum ssp. perforatum*	SNA	GNR			x		x
Spotted St. John's-Wort	*Hypericum punctatum*	S5	G5			x		
Hickory species	*Carya sp.*					x		
Bitternut Hickory	*Carya cordiformis*	S5	G5			x		
Shagbark Hickory	*Carya ovata var. ovata*	S5	G5			x		x
Black Walnut	*Juglans nigra*	S4?	G5			x		
Downy Wood Mint	*Blephilia ciliata*	S1	G5			x		
Common Dead-Nettle	*Lamium amplexicaule*	SNA	GNR			x		
American Water-Horehound	*Lycopus americanus*	S5	G5			x		x
Northern Water-Horehound	*Lycopus uniflorus*	S5	G5			x		x
Field Mint	*Mentha arvensis*					x		
Common Self-Heal	*Prunella vulgaris ssp. vulgaris*	SNA	G5T?			x		x
Mad-Dog Skullcap	*Scutellaria lateriflora*	S5	G5			x		
Northern Spicebush	*Lindera benzoin*	S4	G5			x		

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Purple Loosestrife	*Lythrum salicaria*	SNA	G5			x		x
Basswood	*Tilia americana*	S5	G5			x		
Carolina Spring Beauty	*Claytonia caroliniana*	S5	G5			x		
Eastern Spring Beauty	*Claytonia virginica*	S5	G5			x		
Osage-Orange	*Maclura pomifera*	SNA	G5			x		
White Ash	*Fraxinus americana*	S4	G5			x		
Red Ash	*Fraxinus pennsylvanica*	S4	G5			x		x
European Privet	*Ligustrum vulgare*	SNA	GNR			x		x
Canada Enchanter's Nightshade	*Circaea canadensis ssp. canadensis*	S5	G5T5			x		
Willowherb species	*Epilobium sp.*					x		
Northern Willowherb	*Epilobium ciliatum ssp. ciliatum*	S5	G5T?			x		
Small-Flowered Willowherb	*Epilobium parviflorum*	SNA	GNR					x
Evening Primrose species	*Oenothera sp.*					x		
Beechdrops	*Epifagus virginiana*	S5	G5			x		
Wood-Sorrel species	*Oxalis sp.*					x		
Common Wood-Sorrel	*Oxalis montana*	S5	G5			x		
Greater Celandine	*Chelidonium majus*	SNA	GNR			x		
Bloodroot	*Sanguinaria canadensis*	S5	G5			x		
Ditch-Stonecrop	*Penthorum sedoides*	S5	G5			x		
White Turtlehead	*Chelone glabra*	S5	G5			x		
Butter-And-Eggs	*Linaria vulgaris*	SNA	GNR			x		
Foxglove Beardtongue	*Penstemon digitalis*	SNA	G5			x		x
Hairy Beardtongue	*Penstemon hirsutus*	S4	G4			x		
Large-Bracted Plantain	*Plantago aristata*	SNA	G5			x		
English Plantain	*Plantago lanceolata*	SNA	G5			x		
Common Plantain	*Plantago major*	SNA	G5			x		
Common Speedwell	*Veronica officinalis*	SNA	G5			x		
Marshpepper Smartweed	*Persicaria hydropiper*	SNA	GNR			x		
Arrow-Leaved Smartweed	*Persicaria sagittata*	S4S5	G5			x		
Virginia Smartweed	*Persicaria virginiana*	S4	G5			x		x
Knotweed species	*Polygonum sp.*					x		
Leathery Knotweed	*Polygonum achoreum*	S5	G5			x		
Prostrate Knotweed	*Polygonum aviculare ssp. aviculare*	SNA	GNRTNR			x		
Curled Dock	*Rumex crispus*	SNA	GNR					x
Creeping Yellow Loosestrife	*Lysimachia nummularia*	SNA	GNR			x		
Yellow Marsh Marigold	*Caltha palustris*	S5	G5			x		
Kidney-Leaved Buttercup	*Ranunculus abortivus*	S5	G5			x		
Common Buttercup	*Ranunculus acris*	SNA	G5			x		
Bristly Buttercup	*Ranunculus hispidus var. hispidus*	S3	G5T5			x		
Early Meadow-Rue	*Thalictrum dioicum*	S5	G5			x		
Glossy Buckthorn	*Frangula alnus*	SNA	GNR			x		
Alder-Leaved Buckthorn	*Rhamnus alnifolia*	S5	G5			x		x
European Buckthorn	*Rhamnus cathartica*	SNA	GNR			x		x
Hooked Agrimony	*Agrimonia gryposepala*	S5	G5			x		x
Downy Serviceberry	*Amelanchier arborea*	S5	G5			x		

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Black Chokeberry	*Aronia melanocarpa*	S5	G5			x		x
Hawthorn species	*Crataegus sp.*					x		
Grand Hawthorn	*Crataegus grandis*					x		
English Hawthorn	*Crataegus monogyna var. monogyna*	SNA	G5			x		
Dotted Hawthorn	*Crataegus punctata*	S5	G5			x		
Fleshy Hawthorn	*Crataegus succulenta*	S5	G4G5			x		
Wild Strawberry	*Fragaria virginiana*	S5	G5			x		x
Avens species	*Geum sp.*					x		
White Avens	*Geum canadense*	S5	G5					x
Barren Strawberry	*Geum fragarioides*	S5	G5			x		
Rough Avens	*Geum laciniatum*	S4	G5			x		
Apple species	*Malus sp.*					x		
Sweet Crabapple	*Malus coronaria*	S4	G5			x		
Common Apple	*Malus pumila*	SNA	G5			x		
Cinquefoil species	*Potentilla sp.*					x		
Sulphur Cinquefoil	*Potentilla recta*	SNA	GNR			x		
Old Field Cinquefoil	*Potentilla simplex*	S5	G5			x		
American Plum	*Prunus americana*	S4	G5			x		
Sweet Cherry	*Prunus avium*	SNA	GNR			x		
Pin Cherry	*Prunus pensylvanica*	S5	G5			x		
Black Cherry	*Prunus serotina var. serotina*	S5	G5			x		
Chokecherry	*Prunus virginiana var. virginiana*	S5	G5T?			x		
Rose species	*Rosa sp.*					x		
Multiflora Rose	*Rosa multiflora*	SNA	GNR			x		x
Swamp Rose	*Rosa palustris*	S5	G5			x		
Briar Rose	*Rosa rubiginosa var. rubiginosa*	SNA				x		
Alleghany Blackberry	*Rubus allegheniensis*	S5	G5			x		
Bristly Dewberry	*Rubus hispidus*	S4	G5			x		
European Red Raspberry	*Rubus idaeus ssp. idaeus*	SNA	G5T5			x		
North American Red Raspberry	*Rubus idaeus ssp. strigosus*	S5	G5T5			x		
Black Raspberry	*Rubus occidentalis*	S5	G5			x		
Dewberry	*Rubus pubescens*	S5	G5			x		
White Meadowsweet	*Spiraea alba var. alba*	S5	G5			x		
Common Buttonbush	*Cephalanthus occidentalis*	S5	G5			x		
Bedstraw species	*Galium sp.*					x		
Blunt-Leaved Bedstraw	*Galium obtusum*	S4S5	G5			x		x
Common Marsh Bedstraw	*Galium palustre*	S5	G5			x		
Eastern Cottonwood	*Populus deltoides ssp. deltoides*	S5	G5T5			x		x
Trembling Aspen	*Populus tremuloides*	S5	G5			x		x
Willow species	*Salix sp.*					x		
White Willow	*Salix alba*	SNA	G5			x		
Peach-Leaved Willow	*Salix amygdaloides*	S5	G5			x		x
Bebb's Willow	*Salix bebbiana*	S5	G5			x		x
Pussy Willow	*Salix discolor*	S5	G5			x		
Cottony Willow	*Salix eriocephala*	S5	G5			x		

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Sandbar Willow	*Salix interior*	S5	GNR			x		
Black Willow	*Salix nigra*	S4	G5			x		
Hybrid Crack Willow	*Salix x fragilis*	HYB	GNA			x		x
Manitoba Maple	*Acer negundo*	S5	G5			x		
Red Maple	*Acer rubrum*	S5	G5			x		x
Silver Maple	*Acer saccharinum*	S5	G5			x		x
Sugar Maple	*Acer saccharum*	S5	G5			x		
Freeman's Maple	*Acer x freemanii*	HYB	GNA			x		
Bittersweet Nightshade	*Solanum dulcamara*	SNA	GNR			x		
White Elm	*Ulmus americana*	S5	G5			x		x
Slippery Elm	*Ulmus rubra*	S5	G5			x		
Small-Spike False Nettle	*Boehmeria cylindrica*	S5	G5			x		x
Canada Wood Nettle	*Laportea canadensis*	S5	G5			x		
Dwarf Clearweed	*Pilea pumila*	S5	G5			x		
European Stinging Nettle	*Urtica dioica ssp. dioica*	SNA	G5T5?			x		
Blue Vervain	*Verbena hastata*	S5	G5			x		
White Vervain	*Verbena urticifolia*	S5	G5			x		
Violet species	*Viola sp.*					x		
Le Conte's Violet	*Viola affinis*	S4?	G5			x		x
Marsh Blue Violet	*Viola cucullata*	S5	G4G5			x		
Palmate-Leaved Violet	*Viola palmata*	S2	G5			x		
Woolly Blue Violet	*Viola sororia*	S5	G5			x		
Thicket Creeper	*Parthenocissus vitacea*	S5	G5			x		x
Riverbank Grape	*Vitis riparia*	S5	G5			x		x
Eastern Red Cedar	*Juniperus virginiana var. virginiana*	S5	G5T			x		
Scots Pine	*Pinus sylvestris*	SNA	GNR			x		
Southern Water-Plantain	*Alisma subcordatum*	S4?	G5			x		
Northern Water-Plantain	*Alisma triviale*	S5	G5			x		
Nodding Onion	*Allium cernuum*	S2	G5			x		
Wild Leek	*Allium tricoccum var. tricoccum*	S4	G5			x		
Common Daffodil	*Narcissus pseudonarcissus*	SNA	GNR			x		
Jack-In-The-Pulpit	*Arisaema triphyllum ssp. triphyllum*	S5	G5			x		
Duckweed species	*Lemna sp.*					x		
Garden Asparagus	*Asparagus officinalis*	SNA	G5?			x		x
European Lily-Of-The-Valley	*Convallaria majalis var. majalis*	SNA	G5			x		
Wild Lily-Of-The-Valley (ssp. canadense)	*Maianthemum canadense ssp. canadense*	S5	G5T5			x		
Large False Solomon's Seal	*Maianthemum racemosum*	S5	G5T			x		
Star-Flowered False Solomon's Seal	*Maianthemum stellatum*	S5	G5			x		
Eastern Rose Twisted-Stalk	*Streptopus lanceolatus var. lanceolatus*	S5?	G5T5			x		
Large-Flowered Bellwort	*Uvularia grandiflora*	S5	G5			x		
Northern Clustered Sedge	*Carex arcta*	S4S5	G5			x		
Bebb's Sedge	*Carex bebbii*	S5	G5			x		
Woodland Sedge	*Carex blanda*	S5	G5			x		
Hoary Sedge	*Carex canescens ssp. canescens*	S5	G5T5			x		
Bearded Sedge	*Carex comosa*	S5	G5			x		

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Fringed Sedge	*Carex crinita var. crinita*	S5	G5			x		x
Crested Sedge	*Carex cristatella*	S5	G5					x
Star Sedge	*Carex echinata ssp. echinata*	S5	G5			x		
Yellow Sedge	*Carex flava*	S5	G5			x		x
Garber's Sedge	*Carex garberi*	S4	G5			x		x
Graceful Sedge	*Carex gracillima*	S5	G5			x		x
Gray's Sedge	*Carex grayi*	S4	G4			x		x
Porcupine Sedge	*Carex hystericina*	S5	G5			x		
Bladder Sedge	*Carex intumescens*	S5	G5			x		
Lake Sedge	*Carex lacustris*	S5	G5			x		
Finely-Nerved Sedge	*Carex leptonervia*	S5	G5			x		x
Hop Sedge	*Carex lupulina*	S5	G5			x		
Pale Sedge	*Carex pallescens*	S4	G5			x		x
Woolly Sedge	*Carex pellita*	S5	G5			x		
Drooping Sedge	*Carex prasina*	S4	G4			x		x
Necklace Sedge	*Carex projecta*	S5	G5			x		x
Cyperus-Like Sedge	*Carex pseudocyperus*	S5	G5			x		
Eastern Star Sedge	*Carex radiata*	S5	G5			x		
Retrorse Sedge	*Carex retrorsa*	S5	G5			x		
Rosy Sedge	*Carex rosea*	S5	G5			x		
Awl-Fruited Sedge	*Carex stipata var. stipata*	S5	G5			x		x
Tussock Sedge	*Carex stricta*	S5	G5			x		
Tender Sedge	*Carex tenera*	S5	G5			x		
Blunt Broom Sedge	*Carex tribuloides var. tribuloides*	S4	G5			x		x
Tuckerman's Sedge	*Carex tuckermanii*	S5	G4			x		
Fox Sedge	*Carex vulpinoidea*	S5	G5			x		x
Red-Stemmed Spikerush	*Eleocharis erythropoda*	S5	G5			x		
Blunt Spikerush	*Eleocharis obtusa*	S5	G5			x		
Ovate Spikerush	*Eleocharis ovata*	S4S5	G5			x		
Common Spikerush	*Eleocharis palustris*	S5	G5?			x		x
Soft-Stemmed Bulrush	*Schoenoplectus tabernaemontani*	S5	G5			x		
Bulrush species	*Scirpus sp.*					x		
Dark-Green Bulrush	*Scirpus atrovirens*	S5	G5?			x		x
Red-Tinged Bulrush	*Scirpus microcarpus*	S5	G5			x		
Hanging Bulrush	*Scirpus pendulus*	S5	G5			x		
Harlequin Blue Flag	*Iris versicolor*	S5	G5			x		
Strict Blue-Eyed Grass (var. montanum)	*Sisyrinchium montanum var. montanum*	S5	G5T4T5			x		
Rush species	*Juncus sp.*					x		
Dudley's Rush	*Juncus dudleyi*	S5	G5			x		x
Soft Rush	*Juncus effusus*	S5	G5			x		
Path Rush	*Juncus tenuis*	S5	G5			x		
Torrey's Rush	*Juncus torreyi*	S5	G5					x
Yellow Trout Lily	*Erythronium americanum ssp. americanum*	S5	G5T5			x		
White Trillium	*Trillium grandiflorum*	S5	G5			x		
Shining Ladies'-Tresses	*Spiranthes lucida*	S4	G5				x	

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COMMON NAME	**LATIN NAME**	**Provincial Status (S RANK)**	**Global Status (G RANK)**	**COSSARO (MNRF)**	**COSEWIC STATUS**	**2015**	**2017**	**2018**
Great Plains Ladies'-Tresses	*Spiranthes magnicamporum*	S3?	G4					x
Redtop	*Agrostis gigantea*	SNA	G4G5			x		x
Creeping Bentgrass	*Agrostis stolonifera*	SNA	G5			x		
Stout Woodreed	*Cinna arundinacea*	S4	G5					x
Drooping Woodreed	*Cinna latifolia*	S5	G5			x		x
Orchard Grass	*Dactylis glomerata*	SNA	GNR			x		
Canada Wildrye	*Elymus canadensis var. canadensis*	S4S5	G5TNR			x		
Bottlebrush Grass	*Elymus hystrix*	S5	G5			x		
Virginia Wildrye	*Elymus virginicus var. virginicus*	S5	G5T5			x		
Eastern Mannagrass	*Glyceria septentrionalis var. septentrionalis*	S4	G5			x		x
Fowl Mannagrass	*Glyceria striata*	S5	G5			x		x
Rice Cutgrass	*Leersia oryzoides*	S5	G5			x		
White Cutgrass	*Leersia virginica*	S4	G5			x		
Meadow Fescue	*Lolium pratense*	SNA	G5			x		
Reed Canary Grass	*Phalaris arundinacea var. arundinacea*	S5	GNR			x		
American Reed	*Phragmites australis ssp. americanus*	S4?	G5T4			x		
European Reed	*Phragmites australis ssp. australis*	SNA	G5T5			x		
Canada Bluegrass	*Poa compressa*	SNA	GNR			x		x
Eurasian Woodland Bluegrass	*Poa nemoralis*	SNA	G5			x		
Kentucky Bluegrass (ssp. pratensis)	*Poa pratensis ssp. pratensis*	SNA	G5T5			x		
Yellow Indiangrass	*Sorghastrum nutans*	S4	G5					x
Slender Wedgegrass	*Sphenopholis intermedia*	S4S5	G5			x		
Pondweed species	*Potamogeton sp.*					x		
Narrow-Leaved Cattail	*Typha angustifolia*	SNA	G5			x		
Broad-Leaved Cattail	*Typha latifolia*	S5	G5			x		
Orange Daylily	*Hemerocallis fulva*	SNA	GNR			x		
Northeastern Lady Fern	*Athyrium filix-femina var. angustum*	S5	G5T5			x		
Wood Fern species	*Dryopteris sp.*					x		
Spinulose Wood Fern	*Dryopteris carthusiana*	S5	G5			x		
Field Horsetail	*Equisetum arvense*	S5	G5			x		x
Sensitive Fern	*Onoclea sensibilis*	S5	G5			x		x
Royal Fern	*Osmunda regalis var. spectabilis*	S5	G5T			x		
Cinnamon Fern	*Osmundastrum cinnamomeum*	S5	G5			x		
Eastern Marsh Fern	*Thelypteris palustris var. pubescens*	S5	G5T?			x		

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COMMON NAME	**SCIENTIFIC NAME**	**Provincial Status (S RANK)**	**Global Status (G RANK)**	**COSSARO (MNRF)**	**COSEWIC (Federal)**	**2015**	**2017**	**2018**	**2019**
ODONATA									
Swamp Darner	*Epiaeschna heros*	S2S3	G5				x		
BUTTERFLIES									
Monarch	*Danaus plexippus*	S4B, S2N	G4	SC	END			x	
AMPHIBIANS									
Blue-spotted Salamander	*Ambystoma laterale*	S4	G5			x	x		
American Toad	*Anaxyrus americanus*	S5	G5			x	x		x
Gray Treefrog	*Hyla versicolor*	S5	G5			x	x		x
Western Chorus Frog (Carolinian populat	*Pseudacris triseriata*	S4	G5	NAR	NAR	x	x		x
Spring Peeper	*Pseudacris crucifer*	S5	G5			x			
American Bullfrog	*Lithobates catesbeiana*	S4	G5				x		
Northern Green Frog	*Lithobates clamitans*	S5	G5				x	x	x
Wood Frog	*Lithobates sylvatica*	S5	G5			x			x
Northern Leopard Frog	*Lithobates pipiens*	S5	G5		NAR	x		x	x
REPTILES									
Snapping Turtle	*Chelydra serpentina*	S3	G5	SC	SC		x		
Midland Painted Turtle	*Chrysemys picta marginata*	S5	G5T5				x		
Eastern Gartersnake	*Thamnophis sirtalis*	S5	G5				x	x	
Northern Red-Bellied Snake	*Storeria occipitomaculata*	S5	G5				x		
Dekay's Brownsnake	*Storeria dekayi*	S5	G5		NAR		x	x	
Eastern Milksnake	*Lampropeltis triangulum*	S4	G5	NAR	SC		x		
BIRDS									
Wood Duck	*Aix sponsa*	S5	G5			x			
Mallard	*Anas platyrhynchos*	S5	G5			x			
Wild Turkey	*Meleagris gallopavo*	S5	G5			x			
Rock Pigeon	*Columba livia*	SNA	G5			x			
Mourning Dove	*Zenaida macroura*	S5	G5			x			
Chimney Swift	*Chaetura pelagica*	S4B, S4N	G5	THR	THR	x			
Killdeer	*Charadrius vociferus*	S5B, S5N	G5			x			
American Woodcock	*Scolopax minor*	S4B	G5				x		
Spotted Sandpiper	*Actitus macularius*	S5	G5			x			
Common Tern	*Sterna hirundo*	S4B	G5			x			
Double-crested Cormorant	*Phalacrocorax auritus*	S5B	G5			x			
Great Blue Heron	*Ardea herodias*	S4	G5			x			
Great Egret	*Ardea alba*	S2B	G5			x			
Black-crowned Night-Heron	*Nycticorax nycticorax*	S3B,S3N	G5			x			

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COMMON NAME	**SCIENTIFIC NAME**	**Provincial Status (S RANK)**	**Global Status (G RANK)**	**COSSARO (MNRF)**	**COSEWIC (Federal)**	**2015**	**2017**	**2018**	**2019**
Sharp-shinned Hawk	*Accipiter striatus*	S5	G5			x	x		
Great Horned Owl	*Bubo virginianus*	S4	G5			x			
Red-bellied Woodpecker	*Melanerpes carolinus*	S4	G5			x			
Downy Woodpecker	*Picoides pubescens*	S5	G5			x			
Hairy Woodpecker	*Picoides villosus*	S5	G5			x			
Northern Flicker	*Colaptes auratus*	S4B	G5			x			
Eastern Wood-Pewee	*Contopus virens*	S4B	G5	SC	SC	x			
Acadian Flycatcher	*Empidonax virescens*	S2S3B	G5	END	END	x			
Willow Flycatcher	*Empidonax traillii*	S5B	G5			x			
Eastern Phoebe	*Sayornis phoebe*	S5B	G5			x			
Great Crested Flycatcher	*Myiarchus crinitus*	S4B	G5			x			
Yellow-throated Vireo	*Vireo flavifrons*	S4B	G5			x	x		
Warbling Vireo	*Vireo gilvus*	S5B	G5			x			
Red-eyed Vireo	*Vireo olivaceus*	S5B	G5			x			
Blue Jay	*Cyanocitta cristata*	S5	G5			x			
American Crow	*Corvus brachyrhynchos*	S5B	G5			x			
Purple Martin	*Progne subis*	S4B	G5			x			
Tree Swallow	*Tachycineta bicolor*	S4B	G5			x			
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	S4B	G5			x			
Barn Swallow	*Hirundo rustica*	S4B	G5	THR	THR	x			
Black-capped Chickadee	*Poecile atricapillus*	S5	G5			x			
Tufted Titmouse	*Baeolophus bicolor*	S4	G5			x	x		
White-breasted Nuthatch	*Sitta carolinensis*	S5	G5			x	x		
House Wren	*Troglodytes aedon*	S5B	G5			x			
Wood Thrush	*Hylocichla mustelina*	S4B	G4	SC	THR	x			
American Robin	*Turdus migratorius*	S5B	G5			x			
Gray Catbird	*Dumetella carolinensis*	S4B	G5			x			
Brown Thrasher	*Toxostoma rufum*	S4B	G5			x			
European Starling	*Sturnus vulgaris*	SNA	G5			x			
Cedar Waxwing	*Bombycilla cedrorum*	S5B	G5			x			
House Sparrow	*Passer domesticus*	SNA	G5			x			
American Goldfinch	*Spinus tristis*	S5B	G5			x		x	
Blue-winged Warbler	*Vermivora cyanoptera*	S4B	G5			x			
Common Yellowthroat	*Geothlypis trichas*	S5B	G5			x			
Yellow Warbler	*Setophaga petechia*	S5B	G5			x			
Blackpoll Warbler	*Setophaga striata*	S4B	G5			x			
Wilson's Warbler	*Cardellina pusilla*	S4B	G5			x			
Eastern Towhee	*Pipilo erythrophthalmus*	S4B	G5			x			
Chipping Sparrow	*Spizella passerina*	S5B	G5			x			
Field Sparrow	*Spizella pusilla*	S4B	G5			x			
Savannah Sparrow	*Passerculus sandwichensis*	S4B	G5			x			

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Song Sparrow	*Melospiza melodia*	S5B	G5			x			
Swamp Sparrow	*Melospiza georgiana*	S5B	G5			x			
Scarlet Tanager	*Piranga olivacea*	S4B	G5			x			
Northern Cardinal	*Cardinalis cardinalis*	S5	G5			x			
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	S4B	G5			x			
Indigo Bunting	*Passerina cyanea*	S4B	G5			x			
Red-winged Blackbird	*Agelaius phoeniceus*	S4	G5			x			
Rusty Blackbird	*Euphagus carolinus*	S4B	G5	NAR	SC		x		
Common Grackle	*Quiscalus quiscula*	S5B	G5			x			
Brown-headed Cowbird	*Molothrus ater*	S4B	G5			x			
Orchard Oriole	*Icterus spurius*	S4B	G5			x			
Baltimore Oriole	*Icterus galbula*	S4B	G5			x			
MAMMALS									
Eastern Small-footed Myotis	*Myotis leibii*	S2S3	G4	END				x	
Little Brown Myotis	*Myotis lucifugus*	S4	G3	END	END			x	
Northern Myotis	*Myotis septentrionalis*	S3	G1G2	END	END			x	
Silver-haired Bat	*Lasionycteris noctivagans*	S4	G3G4					x	
Eastern Red Bat	*Lasiurus borealis*	S4	G3G4					x	
Big Brown Bat	*Eptesicus fuscus*	S4	G5					x	
Hoary Bat	*Lasiurus cinereus*	S4	G3G4					x	
Coyote	*Canis latrans*	S5	G5				x		
White-tailed Deer	*odocoileus virginianus*	S5	G5					x	
FISH									
Golden Shiner	*Notemigonus crysoleucas*	S5	G5			x			
Emerald Shiner	*Notropis atherinoides*	S5	G5			x			
Bluntnose Minnow	*Pimephales notatus*	S5	G5	NAR	NAR	x			
White Sucker	*Catostomus commersonii*	S5	G5			x			
Central Mudminnow	*Umbra limi*	S5	G5			x			
Brown Bullhead	*Ameiurus nebulosus*	S5	G5			x			
Brook Stickleback	*Culaea inconstans*	S5	G5			x			
Largemouth Bass	*Micropterus salmoides*	S5	G5			x			
Yellow Perch	*Perca flavescens*	S5	G5			x			
Explanation of Status and Acronymns									
COSSARO: Committee on the Status of Species at Risk in Ontario									
COSEWIC: Committee on the Status of Endangered Wildlife in Canada									
S1: Critically Imperiled—Critically imperiled in the province (often 5 or fewer occurrences)									

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COMMON NAME	**SCIENTIFIC NAME**	**Provincial Status (S RANK)**	**Global Status (G RANK)**	**COSSARO (MNRF)**	**COSEWIC (Federal)**	**2015**	**2017**	**2018**	**2019**
S2: Imperiled—Imperiled in the province, very few populations (often 20 or fewer),									
S3: Vulnerable—Vulnerable in the province, relatively few populations (often 80 or fewer)									
S4: Apparently Secure—Uncommon but not rare									
S5: Secure—Common, widespread, and abundant in the province									
SX: Presumed extirpated									
SH: Possibly Extirpated (Historical)									
SNR: Unranked									
SU: Unrankable—Currently unrankable due to lack of information									
SNA: Not applicable—A conservation status rank is not applicable because the species is not a suitable target for conservation activities.									
S#S#: Range Rank—A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species									
S#B- Breeding status rank									
S#N- Non Breeding status rank									
?: Indicates uncertainty in the assigned rank									
G1: Extremely rare globally; usually fewer than 5 occurrences in the overall range									
G1G2: Extremely rare to very rare globally									
G2: Very rare globally; usually between 5-10 occurrences in the overall range									
G2G3: Very rare to uncommon globally									
G3: Rare to uncommon globally; usually between 20-100 occurrences									
G3G4: Rare to common globally									
G4: Common globally; usually more than 100 occurrences in the overall range									
G4G5: Common to very common globally									
G5: Very common globally; demonstrably secure									
GU: Status uncertain, often because of low search effort or cryptic nature of the species; more data needed.									
T: Denotes that the rank applies to a subspecies or variety									
Q: Denotes that the taxonomic status of the species, subspecies, or variety is questionable.									
END: Endangered									
THR: Threatened									
SC: Special Concern									
NAR: Not At Risk									
IND: Indeterminant, insufficient information to assign status									
DD: Data Deficient									
6: Rare in Site Region 6									
7: Rare in Site Region 7									
Area: Minimum patch size for area-sensitive species (ha)									
H- highly significant in Hamilton Region (i.e. rare)									
m- moderately significant in Hamilton Region (i.e. uncommon)									
L1- extremely rare locally (Toronto Region)									
L2- very rare locally (Toronto Region)									
L3- rare to uncommon locally (Toronto Region)									
HR- rare in Halton Region, highly significant									
HU- uncommon in Halton Region, moderately significant									

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COMMON NAME	**SCIENTIFIC NAME**	**Provincial Status (S RANK)**	**Global Status (G RANK)**	**COSSARO (MNRF)**	**COSEWIC (Federal)**	**2015**	**2017**	**2018**	**2019**
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Significant Wildlife Habitat (SWH) Indicator Species									
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Ministry of Natural Resources and Forestry (MNRF). 2015. Significant wildlife habitat criteria schedules for ecoregion 7E. Available at: https://dr6j45jk9xcmk.cloudfront.net/documents/4776/schedule-7e-jan-2015-access-vers-final-s.pdf.									
Natural Heritage Information Center (NHIC). 2016. Onatrio Species List: All Species.									

Table 2. Woodland Significance Criteria (MNR 2010) Pre and Post-Development Comparison

Criteria Comments	Standards	Existing Conditions on Subject Lands	Proposed Conditions
1. Woodland Size Criteria			
• Size refers to the areal (spatial) extent of the woodland (irrespective of ownership). • Woodland areas are considered to be generally continuous even if intersected by narrow gaps 20 m or less in width between crown edges. • Size value is related to the scarcity of woodland in the landscape derived on a municipal basis with consideration of differences in woodland coverage among physical sub-units (e.g., watersheds, biophysical regions). • Size criteria should also account for differences in landscape-level physiography (e.g., moraines, clay plains) and community vegetation types.	Where woodlands cover: • is less than about 5% of the land cover, woodlands 2 ha in size or larger should be considered significant • is about 5–15% of the land cover, woodlands 4 ha in size or larger should be considered significant • is about 15–30% of the land cover, woodlands 20 ha in size or larger should be considered significant • is about 30–60% of the land cover, woodlands 50 ha in size or larger should be considered significant • occupies more than about 60% of the land, a minimum size is not suggested, and other factors should be considered Note: The size threshold should be reduced in the absence of information for the other three criteria.	Woodland cover in the City of Niagara Falls is 25% (NPCA 2010). The overall area of contiguous woodland on the Subject Lands is 47.80 ha, including woodland areas with PSWs that have been included as Significant Woodlands (per Regional OP Criteria), but would otherwise not meet criteria. There are 1.68 ha of wooded area (per ELC woodland definitions) that would not meet criteria to be considered as part of the contiguous woodland. The main 47.80 ha woodland meets the significance criteria with respect to size. The smaller non-contiguous woodland patches do not meet the size criteria.	Removal of 6.86 ha of the woodland is proposed. Woodland restoration will result in the long-term creation of approximately 3.27 ha of woodland (in areas that are not currently woodland communities, including the former Block 25 Utility/Corridor area that has now been incorporated into the Block 18 Environmental Protection Area), resulting in an overall long-term Significant Woodland area of 44.21 ha, based on existing woodland boundaries. This represents a decrease of 3.59 ha (7.5%), based on current woodland communities. The residual woodland will continue to meet size criteria for significance. LID measures are proposed for installation in some buffer areas to assist in maintaining water balance and water quality in adjacent wetlands. While invasive species removal will occur in these areas, the footprint of the LID measure will not be restored to a woodland community over the long-term. Although the location, extend and form of LIDs will be confirmed during the detailed design process, Wood has estimated that LIDs will not

Criteria Comments	Standards	Existing Conditions on Subject Lands	Proposed Conditions
	As a consideration in addressing the potential loss of biodiversity, the largest woodland in the planning area (or sub-unit) should be identified as significant.		occupy more than 2% of the overall area of the buffer. Once LIDs are finalized, the Conceptual Ecological Restoration Plan will be reviewed to confirm if additional woodland restoration areas are required to address any changes in overall area of woodland restoration being proposed. In the near-term (2-4 years) it is predicted that the cultural woodlands proposed for removal on the Subject Lands will, in absence of management activities, cease to be woodlands due to Emerald Ash Borer infestation and invasive species (e.g., Common Buckthorn). Proposed woodland restoration activities within existing cultural woodland areas will result in habitat restoration (principally invasive species removal and woodland density plantings) over an area of 3.08 ha. This restoration will assist in maintaining the long-term ecological function of these woodland areas, including buffering of adjacent PSWs from invasive species (e.g., buckthorn).

Criteria Comments	Standards	Existing Conditions on Subject Lands	Proposed Conditions
2. Ecological Functions Criteria			
a. Woodland interior			
• Interior habitat more than 100 m from the edge (as measured from the limits of a continuous woodland as defined above) is important for some species. • For purposes of this criterion, a maintained public road would create an edge even if the opening was not wider than 20 m and did not create a separate woodland.	Woodlands should be considered significant if they have: • any interior habitat where woodlands cover less than about 15% of the land cover • 2 ha or more of interior habitat where woodlands cover about 15–30% of the land cover • 8 ha or more of interior habitat where woodlands cover about 30–60% of the land cover • 20 ha or more of interior habitat where woodlands cover more than about 60% of the land cover	The woodlands on the Subject Lands contain 6.07 ha of interior habitat (measured 100 m from the edge) and 0.096 ha of deep interior forest (measured 200 m from the edge). Based on this, the woodland meets the significance criteria associated with interior habitat (2 ha or more when forest cover is between 15-30%).	Following woodland removal and creation of new woodland habitat in areas not currently woodland, over the long-term, the amount of 100-m interior habitat will be 7.03 ha, an 0.96-ha gain over existing conditions. This will result in a long-term net gain in woodland function for species that prefer interior forest habitat. This increase in 100-m interior habitat is not anticipated to be affected by the installation of LID measures sporadically throughout the buffer areas. The LID measures, where installed, will small (e.g., 9 m by 7 m per the conceptual example shown in **Appendix F**) and not anticipated to impact what constitutes interior habitat. Over the long-term, factoring in proposed woodland removal and creation, the 200-m interior forest will increase to 0.215 ha, an increase of 0.119 ha, resulting in a net gain in woodland function for species that prefer deep interior habitat. Similarly, LID measures are not anticipated to impact the 200-m interior forest calculations.

Criteria Comments	Standards	Existing Conditions on Subject Lands	Proposed Conditions
b. Proximity to other woodlands or other habitats			
• Woodlands that overlap, abut or are close to other significant natural heritage features or areas could be considered more valuable or significant than those that are not. • Patches close to each other are of greater mutual benefit and value to wildlife.	Woodlands should be considered significant if: • a portion of the woodland is located within a specified distance (e.g., 30 m) of a significant natural feature or fish habitat likely receiving ecological benefit from the woodland and the entire woodland meets the minimum area threshold (e.g., 0.5–20 ha, depending on circumstance)	The overall contiguous woodland on the Subject Lands a number of different Provincially Significant Wetland units, which likely receive ecological benefit from the adjacent woodland. A portion of the overall contiguous woodland on the Subject Lands contains fish habitat (Type 2 – Important) associated with Watercourse 1 and Watercourse 2. Fish habitat likely receives ecological benefit from the woodland. A portion of the woodland contains a Significant Valleyland associated with Watercourse 2. The Significant Valleyland likely receives ecological benefit from the woodland. Several types of Significant Wildlife Habitat are present within the woodland. Significant Wildlife Habitat likely receives ecological benefit from the woodland. The entire woodland (47.8 ha) meets the size threshold for this criterion to apply. Based on this, the woodland would meet significance criteria associated with proximity to other habitats.	The residual woodland on the Subject Lands will continue to contain all existing PSW units. Proposed buffers (ranging from 15-20 m in width, depending on sensitivity) will be provided around all PSW units. Some woodland outside of defined buffers (but within 30 m of PSW units) will be removed. However, buffering and other ecological functions provided by the removed woodland areas are anticipated to be maintained within the identified buffers (many of which are subject to proposed woodland restoration and creation) to maintain the function provided by adjacent woodland areas. Removal of woodlands, when coupled with mitigation measures (e.g., buffers, water balance mitigation) will ensure that impacts on wetlands will not occur as a result of woodland removal. No significant woodland removal is proposed within 30 m of fish habitat in Watercourse 1 or 2. Therefore, residual woodland will continue to provide supporting functions for fish habitat within and adjacent to the woodlands.

Criteria Comments	Standards	Existing Conditions on Subject Lands	Proposed Conditions
			Only a very small portion of woodland removal is proposed within 30 m of the Significant Valleyland associated with Watercourse 2. This removal is not anticipated to have any negative impact on the Significant Valleyland. No Significant Wildlife Habitat is located within any of the woodland areas proposed for removal. Woodland removal will occur within 30 m of some Significant Wildlife Habitat, typically associated with residual woodlands and wetlands. No impacts on Significant Wildlife Habitat are anticipated due to removal of some woodland within 30 m. Buffers will be maintained and mitigation will be implemented as necessary to ensure no negative impact on Significant Wildlife Habitat. Habitat for Great Plains Ladies-Tresses (SWH) is also located within 30 m of the woodlands proposed for removal, although this species, which persists in meadow/thicket environments is not dependant on adjacent woodlands to provide supporting ecological functions. Overall, the residual woodland on the property will continue to provide ecological benefits to other significant natural features.

Criteria Comments	Standards	Existing Conditions on Subject Lands	Proposed Conditions
c. Linkages			
• Linkages are important connections providing for movement between habitats. • Woodlands that are located between other significant features or areas can be considered to perform an important linkage function as "stepping stones" for movement between habitats.	Woodlands should be considered significant if they: • are located within a defined natural heritage system or provide a connecting link between two other significant features, each of which is within a specified distance (e.g., 120 m) and meets minimum area thresholds (e.g., 1–20 ha, depending on circumstance)	Portions of the woodland provide linkage function from the Welland River to the larger portions of the woodland at the north end of the Subject Lands. This was determined to be an Amphibian Movement Corridor (SWH).	Removal of some woodland from the overall contiguous woodland unit is not anticipated to have a negative impact on the linkage function of the residual woodland. The residual woodland will continue to provide a contiguous linkage from the Welland River to the woodlands and wetlands at the northern end of the Subject Lands. The linkage is anticipated to be enhanced by woodland restoration measures along its length, which will ultimately restore gaps in woodland coverage (e.g., gaps <20 m proposed to be restored to woodlands). Meadow restoration will also enhance the linkage function outside of existing and proposed wooded areas.
d. Water protection			
• Source water protection is important. • Natural hydrological processes should be maintained.	Woodlands should be considered significant if they: • are located within a sensitive or threatened watershed or a specified distance (e.g., 50 m or top of valley bank if greater) of a sensitive groundwater discharge, sensitive recharge, sensitive headwater area, watercourse or fish habitat and meet minimum area thresholds	Portions of the woodland are located within 50 m of watercourses that provide fish habitat (Type 2 – Important), including Watercourses 1 and 2. Woodlands provide supporting riparian functions to these watercourses. Woodland meets significance criteria with respect to watercourse protection.	Only one small portion of the Significant Woodland proposed for removal is located within 50 m of the top of bank of the Watercourse 2 valleylands. A vegetated buffer between the top of bank and adjacent development will be maintained and no negative impacts on fish habitat within Watercourse 2 are anticipated as a result of woodland removal within 50 m.

Criteria Comments	Standards	Existing Conditions on Subject Lands	Proposed Conditions
	(e.g., 0.5–10 ha, depending on circumstance)		No Significant Woodland removal is proposed within 50 m of fish habitat within Watercourse 1. The residual woodland on the Subject Lands will continue to provide water protection functions to Watercourses 1 and 2.
e. Woodland diversity			
• Certain woodland species have had major reductions in representation on the landscape and may need special consideration. • More native diversity is more valuable than less diversity.	Woodlands should be considered significant if they have: • a naturally occurring composition of native forest species that have declined significantly south and east of the Canadian Shield and meet minimum area thresholds (e.g., 1–20 ha, depending on circumstance) • a high native diversity through a combination of composition and terrain (e.g., a woodland extending from hilltop to valley bottom or to opposite slopes) and meet minimum area thresholds (e.g., 2–20 ha, depending on circumstance)	The woodlands on the Subject Lands contain the Niagara Falls Slough Forest Wetland Complex which contains a variety of wetland habitat types and high native species diversity and is an overall excellent representation of Carolinian slough forest. The woodland would meet the criteria for significance. Woodlands proposed for removal are generally cultural in nature and are in severe/advancing decline due to the loss of the tree canopy to Emerald Ash Borer and invasion of the understory by exotic Common Buckthorn Shrub.	The high diversity slough forests will be protected with no removal proposed. Buffers and other mitigation measures (e.g., water balance maintenance and strategic siting of trails outside of sensitive areas) will be implemented to prevent negative impacts on these highly diverse areas. Woodland creation and restoration along the edges of the slough forest wetland (i.e., within buffer areas) will assist in mitigating the effects of adjacent development and result long-term enhancements to woodland form and function. Removal of the 6.86 ha of primarily cultural woodland in severe state of decline is not anticipated to have any negative impact on overall diversity of the residual woodland.

Criteria Comments	Standards	Existing Conditions on Subject Lands	Proposed Conditions
3. Uncommon Characteristics Criteria			
• Woodlands that are uncommon in terms of species composition, cover type, age or structure should be protected. • Older woodlands (i.e., woodlands greater than 100 years old) are particularly valuable for several reasons, including their contributions to genetic, species and ecosystem diversity.	Woodlands should be considered significant if they have: • a unique species composition or the site is represented by less than 5% overall in woodland area and meets minimum area thresholds (e.g., 0.5 ha, depending on circumstance) • a vegetation community with a provincial ranking of S1, S2 or S3 (as ranked by the NHIC and meet minimum area thresholds (e.g., 0.5 ha, depending on circumstance) • habitat (e.g., with 10 individual stems or 100 m^2 of leaf coverage) of a rare, uncommon or restricted woodland plant species and meet minimum area thresholds (e.g., 0.5 ha, depending on circumstance): o vascular plant species for which the NHIC's Southern Ontario Coefficient of Conservatism is 8, 9 or 10 o tree species of restricted distribution such as sassafras or rock elm	The woodland on the Subject Lands contains several rare species including Schreber's Aster (S2 - Imperiled) and Honey-locust (S2S3 – Imperiled to Vulnerable). The woodland also contains portions of old growth forest within the main Oak Mineral Deciduous Swamp unit.	Rare species and community types will be protected within the woodland with mitigation implemented as necessary to maintain important species and habitats (e.g., water balance mitigation measures). The portions of woodland proposed for removal do not contain any uncommon characteristics. Therefore, the residual woodland will continue to meet the criteria for significance associated with uncommon characteristics.

Criteria Comments	Standards	Existing Conditions on Subject Lands	Proposed Conditions
	○ species existing in only a limited number of sites within the planning area • characteristics of older woodlands or woodlands with larger tree size structure in native species and meet minimum area thresholds (e.g., 1–10 ha, depending on circumstance): ○ older woodlands could be defined as having 10 or more trees/ha greater than 100 years old ○ larger tree size structure could be defined as 10 or more trees/ha at least 50 cm in diameter, or a basal area of 8 or more m^2/ha in trees that are at least 40 cm in diameter		
4. Economic and Social Functional Values Criteria			
• Woodlands that have high economic or social values through particular site characteristics or deliberate management should be protected.	Woodlands should be considered significant if they have: • high productivity in terms of economically valuable products together with continuous native natural attributes and meet minimum area thresholds (e.g., 2–10 ha, depending on circumstance)	The woodland is not known to be provide high productivity associated with economically valuable products. The woodland may provide special services such as air quality improvement and other natural services. As private property, the woodland does not provide recreational services at the present time.	The residual woodland will continue to provide important ecosystem services (e.g., air quality improvement, water quality maintenance) and social values, potentially including enhanced recreational and education values, due to trail construction and the proposed wetland discovery centre.

Criteria Comments	Standards	Existing Conditions on Subject Lands	Proposed Conditions
	• a high value in special services, such as air-quality improvement or recreation at a sustainable level that is compatible with long-term retention and meet minimum area thresholds (e.g., 0.2–10 ha, depending on circumstance) • important identified appreciation, education, cultural or historical value and meet minimum area thresholds (e.g., 0.2–10 ha, depending on circumstance)	The slough forest may provide important social value and educational opportunities. The portions of woodland proposed for removal do not provide any important social values based on community type.	Removal of portions of the woodland is not anticipated to have any negative impacts on the ecosystem or social services or value of the residual woodland on the Subject Lands.

Table 3. Amphibian Call Count and Egg Mass Survey Results

STATION NUMBER	SURVEY TYPE	SURVEY ROUND	SPECIES CODE												WATER
			NOAM	AMTO	FOTO	GRTR	SPPE	CHFR	WOFR	NLFR	PIFR	GRFR	BULL	MIFR	Present (Y/N)
SWD VP2	EMS	1	X												Y
	AMC	1		1(1)				2(17)							Y
		2		1(1)		1(4)									Y
		3	X												Y

LEGEND:

SPECIES CODE	COMMON NAME	SCIENTIFIC NAME
NOAM	No Amphibians	No amphibians despite survey effort
AMTO	American Toad	*Anaxyrus americanus*
FOTO	Fowler's Toad	*Anaxyrus fowleri*
GRTR	Gray Treefrog	*Hyla versicolor*
CHFR	Western Chorus Frog	*Pseudacris triseriata*
WOFR	Wood Frog	*Lithobates sylvaticus*
NLRF	Northern Leopard Frog	*Lithobates pipiens*
PIFR	Pickerel Frog	*Lithobates palustris*
GRFR	Green Frog	*Lithobates clamitans*
BULL	American Bullfrog	*Lithobates catesbeianus*
MIFR	Mink Frog	*Lithobates septentrionalis*
SPPE	Spring Peeper	*Pseudacris crucifer*

CALL CODES	
X	No amphibians heard
1	Calls can be counted without error
2	Calls overlap but can be reliably estimated
3	Calls overlap too much to estimate number

SURVEY TYPES	
AMC	Amphibian Call Survey
EMS	Egg Mass Survey

Note: For each species, the first number in the AMC results is the call code and the second number, which is in brackets, is the number of individuals of that species heard calling.

Table 4. Bat Acoustic Monitoring Dates

MONITORING STATION	DATE INSTALLED	DATE REMOVED
7602G001	31-May-2018	05-June-2018
7602H001	31-May-2018	05-June-2018
7602G002	05-June-2018	12-June-2018
7602H002	05-June-2018	12-June-2018
7602D003	12-June-2018	19-June-2018
7602F003	12-June-2018	19-June-2018
7602G003	12-June-2018	15-June-2018
7602H003	12-June-2018	19-June-2018
7602I003	12-June-2018	19-June-2018
7602J003	12-June-2018	19-June-2018
7602K003	12-June-2018	19-June-2018
7602A004	19-June-2018	22-June-2018
7602B004	19-June-2018	22-June-2018
7602C004	19-June-2018	22-June-2018
7602A005	09-July-2018	20-July-2018
7602B005	09-July-2018	20-July-2018
7602C005	09-July-2018	20-July-2018
7602D005	09-July-2018	20-July-2018
7602E003	09-July-2018	20-July-2018
7602E005	09-July-2018	20-July-2018
7602F005	09-July-2018	20-July-2018
7602J004	09-July-2018	20-July-2018
7602A006	02-Aug-2018	16-Aug-2018
7602B006	02-Aug-2018	16-Aug-2018
7602C006	02-Aug-2018	16-Aug-2018
7602D006	02-Aug-2018	16-Aug-2018
7602E006	02-Aug-2018	16-Aug-2018
7602F006	02-Aug-2018	16-Aug-2018
7602G006	02-Aug-2018	16-Aug-2018
7602H006	02-Aug-2018	15-Aug-2018
7602I006	02-Aug-2018	16-Aug-2018
7602J006	02-Aug-2018	16-Aug-2018
7602K006	02-Aug-2018	16-Aug-2018
7602L006	02-Aug-2018	16-Aug-2018
7602M006	02-Aug-2018	16-Aug-2018

MONITORING STATION	DATE INSTALLED	DATE REMOVED
7602N006	02-Aug-2018	16-Aug-2018
7602O006	02-Aug-2018	16-Aug-2018
7602X006	02-Aug-2018	16-Aug-2018

Table 5. Weather Conditions during Bat Acoustic Monitoring Studies

DATE	WEATHER CONDITIONS[1]		
	AVERAGE TEMPERATURE (°C)	AVERAGE WIND SPEED (km/h)	PRECIPITATION (mm)
31-May-18	24.3	29.3	Trace
01-Jun-18	22.8	11.2	0
02-Jun-18	17.8	16.3	0
03-Jun-18	18.0	10.5	0
04-Jun-18	17.5	26.4	1.2
05-Jun-18	14.8	19.5	0
06-Jun-18	12.8	10.4	0
07-Jun-18	14.5	17.1	0
08-Jun-18	18.0	10.1	0
09-Jun-18	17.5	6.9	0
10-Jun-18	20.5	20.7	0
11-Jun-18	18.0	19.5	0
12-Jun-18	20.3	10.2	0
13-Jun-18	18.8	24.3	2
14-Jun-18	20.3	20.1	0
15-Jun-18	16.0	9.2	0
16-Jun-18	20.3	11.5	0

DATE	WEATHER CONDITIONS[1]		
	AVERAGE TEMPERATURE (°C)	AVERAGE WIND SPEED (km/h)	PRECIPITATION (mm)
17-Jun-18	21.0	14.7	0
18-Jun-18	23.5	21.1	14
19-Jun-18	23.0	14.3	0
20-Jun-18	18.0	6.9	0
21-Jun-18	19.5	20.4	0
22-Jun-18	18.0	13.7	3
09-Jul-18	21.8	20.9	0
10-Jul-18	23.8	14.3	0
11-Jul-18	21.3	8.5	0
12-Jul-18	25.3	9.2	0
13-Jul-18	27.5	15.3	0
14-Jul-18	24.0	10.3	3
15-Jul-18	25.0	9.3	0
16-Jul-18	25.0	14.3	9.6
17-Jul-18	25.0	18.7	0
18-Jul-18	20.3	11.3	0
19-Jul-18	23.0	10.8	0
20-Jul-18	27.0	20.9	0

DATE	WEATHER CONDITIONS[1]		
	AVERAGE TEMPERATURE (°C)	AVERAGE WIND SPEED (km/h)	PRECIPITATION (mm)
02-Aug-18	23.5	15.9	0.4
03-Aug-18	23.3	8.7	0
04-Aug-18	23.8	13.5	0
05-Aug-18	24.0	17.8	0
06-Aug-18	25.5	17.1	15
07-Aug-18	24.5	8.3	Trace
08-Aug-18	23.0	13.6	36
09-Aug-18	22.0	18.0	0
10-Aug-18	23.0	16.5	0
11-Aug-18	20.5	9.4	0
12-Aug-18	21.3	10.0	0
13-Aug-18	21.0	8.1	0
14-Aug-18	23.5	13.5	0
15-Aug-18	23.0	16.1	0
16-Aug-18	25.0	14.9	4.8

Notes

[1] Weather data sourced from Government of Canada (2019a; 2019b; 2019c; 2019d, 2019e)

Polygon	SM3 Monitoring Station	ELC Community	Low Frequency Calls					High Frequency Calls								Total
			Hoary Bat	Big Brown Bat	Silver-haired Bat	Unidentified Calls	Total Low Frequency Calls	Eastern Red Bat	Eastern Small-footed Myotis	Northern Myotis	Little Brown Myotis	Tri-colored Bat	Unidentified Calls with Myotis characteristics	Unidentified Calls without Myotis characteristics	Total High Frequency Calls	
H	7602O006	CUT1	92	102	58	145	397	13	0	0	0	0	0	15	28	425
Subtotal			92	102	58	145	397	13	0	0	0	0	0	15	28	425
I	7602I006	CUW1	35	69	34	199	337	29	0	0	0	0	2	143	174	511
I	7602G006	CUW1	7	1	15	16	39	2	0	0	0	0	0	0	2	41
I	7602K006	CUW1	7	1	9	38	55	0	0	0	0	0	0	0	0	55
I	7602L006	CUW1	81	153	58	320	612	16	0	0	0	0	0	14	30	642
I	7602N006	CUW1	48	87	21	123	279	7	0	0	0	0	0	8	15	294
I	7602H006	CUW1	38	42	52	266	398	0	0	0	0	0	0	3	3	401
Subtotal			216	353	189	962	1720	54	0	0	0	0	2	168	224	1944
J	7602F003	SWD4-1	25	8	28	402	463	0	0	0	0	0	0	1	1	464
Subtotal			25	8	28	402	463	0	0	0	0	0	0	1	1	464
L	7602A006	CUT1	32	112	67	82	293	2	0	0	0	0	0	0	2	295
Subtotal			32	112	67	82	293	2	0	0	0	0	0	0	2	295
M	7602I003	SWD4-1	14	21	2	73	110	0	0	0	0	0	0	0	0	110
Subtotal			14	21	2	73	110	0	0	0	0	0	0	0	0	110
N	7602D006	CUW1	0	0	0	4	4	0	0	0	0	0	0	0	0	4
Subtotal			0	0	0	4	4	0	0	0	0	0	0	0	0	4
O	7602B006	SWD2-2	0	0	0	1	1	0	0	0	0	0	0	0	0	1
O	7602E006	SWD2-2	31	22	21	50	124	2	0	0	0	0	2	5	9	133
Subtotal			31	22	21	51	125	2	0	0	0	0	2	5	9	134
P	7602X006	SWD2-2	49	144	52	131	376	6	1	0	0	0	0	2	9	385
Subtotal			49	144	52	131	376	6	1	0	0	0	0	2	9	385
R	7602G001	CUP3-2	12	23	0	80	115	0	0	0	0	0	0	0	0	115
R	7602H001	CUP3-2	18	14	10	38	80	0	0	0	0	0	0	1	1	81
Subtotal			30	37	10	118	195	0	0	0	0	0	0	1	1	196
S	7602C006	CUW1	32	14	54	563	663	0	0	0	0	0	0	0	0	663
Subtotal			32	14	54	563	663	0	0	0	0	0	0	0	0	663
U	7602J003	SWD1	9	8	8	172	197	0	0	0	0	0	0	1	1	198
U	7602A005	SWD1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U	7602B005	SWD1	450	246	40	237	973	0	0	0	0	0	0	13	13	986
U	7602E003	SWD1	2	19	0	3	24	0	0	1	0	0	0	0	1	25
U	7602J004	SWD1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U	7602K003	SWD1	71	263	211	801	1346	0	0	0	0	0	0	8	8	1354
Subtotal			532	536	259	1213	2540	0	0	1	0	0	0	22	23	2563
V	7602E005	SWD1	4	166	2	18	190	0	0	12	0	0	15	9	36	226
V	7602F005	SWD1	16	2053	86	100	2255	0	0	5	0	0	14	7	26	2281
Subtotal			20	2219	88	118	2445	0	0	17	0	0	29	16	62	2507
Z	7602D003	SWD1	11	0	6	481	498	0	0	0	0	0	0	2	2	500
Z	7602J005	SWD1	42	58	12	351	463	0	0	0	0	0	1	0	1	464
Z	7602K005	SWD1	31	13	14	117	175	0	0	1	0	0	0	0	1	176
Z	7602L005	SWD1	18	2	2	64	86	0	0	0	0	0	0	0	0	86
Subtotal			102	73	34	1013	1222	0	0	1	0	0	1	2	4	1226
FF	7602D005	SWD1	62	7	36	113	218	0	0	0	0	0	0	1	1	219
FF	7602C005	SWD1	51	30	3	18	102	0	0	0	0	0	0	3	3	105
FF	7602B004	SWD1	10	10	10	93	123	0	0	0	0	0	0	2	2	125
Subtotal			123	47	49	224	443	0	0	0	0	0	0	6	6	449
GG	7602A004	FOD9	24	13	15	291	343	0	0	0	0	0	0	2	2	345
Subtotal			24	13	15	291	343	0	0	0	0	0	0	2	2	345
HH	7602C004	SWD2-2	11	14	18	75	118	0	0	0	0	0	0	0	0	118
Subtotal			11	14	18	75	118	0	0	0	0	0	0	0	0	118
OO	7602H003	SWD4-1	28	23	8	388	447	0	0	0	0	0	0	1	1	448

Polygon	SM3 Monitoring Station	ELC Community	Low Frequency Calls					High Frequency Calls								Total
			Hoary Bat	Big Brown Bat	Silver-haired Bat	Unidentified Calls	Total Low Frequency Calls	Eastern Red Bat	Eastern Small-footed Myotis	Northern Myotis	Little Brown Myotis	Tri-colored Bat	Unidentified Calls with Myotis characteristics	Unidentified Calls without Myotis characteristics	Total High Frequency Calls	
Subtotal			28	23	8	388	447	0	0	0	0	0	0	1	1	448
PP	7602G003	SWD4-1	0	0	0	30	30	0	0	0	0	0	0	1	1	31
Subtotal			0	0	0	30	30	0	0	0	0	0	0	1	1	31
QQ	7602G002	SWD4-1	2	2	0	149	153	0	0	0	0	0	0	3	3	156
QQ	7602H002	SWD4-1	27	37	12	47	123	0	0	0	0	0	0	4	4	127
Subtotal			29	39	12	196	276	0	0	0	0	0	0	7	7	283
RR	7602F006	CUT1	112	188	105	348	753	10	0	0	0	0	0	11	21	774
RR	7602J006	CUT1	15	29	12	73	129	5	0	0	0	0	0	17	22	151
RR	7602M006	CUT1	36	172	35	53	296	6	0	0	0	0	0	2	8	304
Subtotal			163	389	152	474	1178	21	0	0	0	0	0	30	51	1229
TOTAL			1553	4166	1116	6553	13388	98	1	19	0	0	34	279	431	13819

Table 8A: West Development Area Sensitive Flora Species / Rare Vegetation Community Analysis

ELC POLYGON (FIGURE 12, APPENDIX A)	SCIENTIFIC NAME	COMMON NAME	CO-EFFICIENT OF CONSERVATISM (CC)	S-RANK (NHIC 2016)	G-RANK (NHIC 2016)	LOCALLY RARE (OLDHAM 2010)	IMPACT OF THE WEST DEVELOPMENT AREA	PROPOSED MITIGATION MEASURES
ELC Polygon 13 (FOD7-2)	*Quercus palustris*	Pin Oak	9	S4	G5		• This vegetation community is located on 'other lands owned by the applicant' situated east of the proposed open space park along the railway. The FOD7-2 is part of a significant woodland and contains significant wildlife habitat for woodland birds. The Riverfront Residential Area does not directly front this vegetation community.	• The Riverfront Residential Area does not directly front this vegetation community – the adjacent residential lot line (in Block 2) should be set back 10 m from the western edge of the FOD7-2 to avoid potential impacts to this woodland.
ELC Polygon 14 (FOD8-1 + CUM1)	*Carex leptonervia*	Finely-nerved Sedge	5	S5	G5	X	• Part of this vegetation is proposed for removal; the portion that overlaps with proposed wetland buffers will be maintained.	• Since Finely-nerved Sedge is considered common and secure in Ontario (S5) and has a generally broad habitat fidelity (i.e., CC 5), passive mitigation is proposed, where seed collection should occur if/where mature specimens are observed during flora salvage ahead of site clearing. Seed collection can be conducted in early summer for this species. Seeds should be dispersed in local deciduous or mixed forest habitat. This species is capable of adapting to disturbed conditions (Reznicek et al. 2011).
	Eleocharis palustris	Creeping Spike-rush	6	S5	G5?	X		• Prior to construction, a survey will be completed to determine the precise location of this species within the FOD8-1 forest unit. Any individuals that may be impacted by development will be transplanted to suitable locations in the NHS.
ELC Polygon 15 (SWD2-2)	*Quercus bicolor*	Swamp White Oak	8	S4	G5		• This PSW unit is retained. With a canopy dominated by Green Ash in a state of dieback, this community will be subject to structural change over time; this could result in a natural decline of plant species with high sensitivity to disturbance (i.e., those with a high co-efficient of conservatism value). This is a relatively small and narrow wetland and a 10 m buffer should adequately protect the transitioning species composition and ecological function. No locally or provincially rare plants were observed in this wetland.	• Recommended buffer width of 10 m, although 15 m buffer is being provided to address NPCA requirements. Buffer planting approach proposed in the Restoration Plan (**Appendix E**) was designed to provide appropriate edge protection and to aid in natural succession over time as this community transitions due to the dieback of the existing, mature Green Ash canopy.
ELC Polygon 16 (CUM1 / CUT1)	*Sorghastrum nutans*	Yellow Indian-grass	8	S4	G5	X	• This early successional vegetation community is proposed for removal.	• Yellow Indian-grass is considered apparently secure in Ontario (S4) and has moderate habitat fidelity/tolerance to disturbance (i.e., CC 8). This species should be included in the seed mix (from nursery stock and/or from seed collect on-site) applied to native open meadow habitat restoration areas east and southwest of the west development area (i.e., native meadow restoration 1 areas as outlined in the Conceptual Ecological Restoration Plan - **Appendix E**).

Table 8A: West Development Area Sensitive Flora Species / Rare Vegetation Community Analysis

ELC POLYGON (FIGURE 12, APPENDIX A)	SCIENTIFIC NAME	COMMON NAME	CO-EFFICIENT OF CONSERVATISM (CC)	S-RANK (NHIC 2016)	G-RANK (NHIC 2016)	LOCALLY RARE (OLDHAM 2010)	IMPACT OF THE WEST DEVELOPMENT AREA	PROPOSED MITIGATION MEASURES
	Sprianthes magnicamporum	Great Plains Ladies'-tresses	8	S3?	G4	X		• Great Plains Ladies'-tresses is provincially rare (S3?) and has moderate habitat fidelity / tolerance to disturbance (i.e. CC 8). Sod mat transfers are proposed to relocate specimens from this population to several targeted transplant locations within the NHS (as detailed in **Appendix E**). As detailed in **Appendix E**, locations were selected based on the presence of suitable early successional habitat, similar soils (LIO mapping) to the source population, and the ability to selectively remove Common Buckthorn in these areas and, as a result, limit soil disturbance and broad herbicide application.
	Antennaria howelii	Howell's Pussytoes	2	S5	G5	X		• Since Howell's Pussytoes is considered common and secure in Ontario (S5) and has a generally broad habitat fidelity (i.e., CC 2), passive mitigation is proposed, where seed collection should occur if/where mature specimens are observed during flora salvage ahead of site clearing. Seed collection can be conducted in mid-summer for this species. Seeds should be dispersed in local upland meadows or sparsely treed areas (i.e., native meadow restoration areas).
	Carex flava	Yellow Sedge	5	S5	G5	X		• Since Yellow Sedge is considered common and secure in Ontario (S5) and has a generally broad habitat fidelity (i.e., CC 5), passive mitigation is proposed, where seed collection should occur if/where mature specimens are observed during flora salvage ahead of site clearing. Seed collection can be conducted in mid to late summer for this species. Seeds should be dispersed in local meadow marsh or open swamp habitat.
ELC Polygon 17 (SWD4-1)	*Carex flava*	Yellow Sedge	5	S5	G5	X	• This PSW unit is located outside of OPA 128 on other lands owned by the applicant. The plant species noted here will be retained within the PSW.	• This PSW unit is located outside of OPA 128 on other lands owned by the applicant. The PSW fronts the proposed development and a 15 m buffer width is recommended. Four locally rare plants are present in this wetland, as well as one species with a co-efficient of conservatism value of 10 (i.e., CC10 - the highest value, assigned to species with strict habitat fidelity and high sensitivity to disturbance). The latter species' abundance was rare in this wetland (2016 EIS). This buffer width also recognizes that the canopy has a high proportion of White Willow (*Salix alba*), which is an exotic species, intermixed with various other native canopy species.
	Carex garberi	Elk Sedge	10	S4	G5	X		
	Carex leptonervia	Finely-nerved Sedge	5	S5	G5	X		
	Quercus palustris	Pin Oak	9	S4	G5			
	Rhamnus alnifolia	Alder-leaved Buckthorn	7	S5	G5	X		
ELC Polygon 18 (CUT1/SWT2 and	*Carex prasina*	Drooping Sedge	10	S4	G4	X	• The PSW unit that is located within this Polygon is located outside of OPA 128 on other lands owned by the	• This PSW unit is located outside of OPA 128 on other lands owned by the applicant. The PSW fronts the

Table 8A: West Development Area Sensitive Flora Species / Rare Vegetation Community Analysis

ELC POLYGON (FIGURE 12, APPENDIX A)	SCIENTIFIC NAME	COMMON NAME	CO-EFFICIENT OF CONSERVATISM (CC)	S-RANK (NHIC 2016)	G-RANK (NHIC 2016)	LOCALLY RARE (OLDHAM 2010)	IMPACT OF THE WEST DEVELOPMENT AREA	PROPOSED MITIGATION MEASURES
CUW1)	*Cinna latifolia*	Drooping Woodreed	7	S5	G5	X	applicant. This PSW is in a state of transition due to the dieback of mature Ash trees within the tree canopy layer. Species with a high CC value (i.e., Drooping Sedge) may naturally decline due to changing habitat conditions.	proposed development and a 15 m buffer width is recommended. Four locally rare plants are present in this wetland, as well as one species with a co-efficient of conservatism value of 10 (i.e., CC10 - the highest value, assigned to species with strict habitat fidelity and high sensitivity to disturbance). The species with a CC value of 10 (Drooping Sedge) prefers rich deciduous woodlands where it grows in wet depressions. The latter species' abundance was rare in this wetland (2016 EIS). Due to the significant dieback of Ash trees in this community, species having a high CC value may naturally decline due to changing habitat conditions. A 15 m buffer should adequately protect the transitioning species composition and ecological functions.
	Quercus bicolor	Swamp White Oak	8	S4	G5			
	Quercus palustris	Pin Oak	9	S4	G5			
	Rhamnus alnifolia	Alder-leaved Buckthorn	7	S5	G5	X		
	Viola affinis	Le Conte's Violet	6	S4?	G5	X		
ELC Polygon 19 (CUT1 and CUW1)	*Prunus americana*	American Plum	6	S4	G5	X	• A portion of this mixed, cultural vegetation community is proposed for removal.	• Mitigation should consist of planting local nursery stock in nearby suitable habitat. This species prefers open meadows or upland thickets.
	Quercus palustris	Pin Oak	9	S4	G5			• Through completion of a Tree Saving Plan, survey the removal area and locate any mid-age to mature trees having potential to be incorporated into the site plan. • Since this species is not rare in Ontario and common in Niagara Region, proposed mitigation is focused on healthy specimens that are established in the local landscape. Although this species is characteristic of poor to moderately drained soil, it can also tolerate upland habitat and, relative to other trees species, is considered to have moderate to good tolerance of disturbance (Matheny and Clark 1998).
	Carex leptonervia	Finely-nerved Sedge	5	S5	G5	X		• Finely-nerved Sedge is considered common and secure in Ontario (S5) and has generally broad habitat fidelity (i.e. CC 5). Seed collection should occur if/where mature specimens are observed during flora salvage ahead of site clearing. Seed collection can be conducted in early summer for this species. Seeds should be dispersed in local deciduous or mixed forest habitat. This species is capable of adapting to disturbed conditions (Reznicek et al. 2011); mitigation is not proposed for specimens occurring in retained areas close to construction.
ELC Polygon 20 (SWD4-1)	*Quercus palustris*	Pin Oak	9	S4	G5		• This PSW unit is retained. The plant species noted here will be retained.	• Recommended buffer of 15 m. One locally rare plant species (Alder-leaved Buckthorn) and one plant species with a high CC value of 9 (Pin Oak) are present. Changes to hydrology are the primary risk to these species. This community also contains a relatively large area of shallow water; none of the rare plant species
	Rhamnus alnifolia	Alder-leaved Buckthorn	7	S5	G5	X		

Table 8A: West Development Area Sensitive Flora Species / Rare Vegetation Community Analysis

ELC POLYGON (FIGURE 12, APPENDIX A)	SCIENTIFIC NAME	COMMON NAME	CO-EFFICIENT OF CONSERVATISM (CC)	S-RANK (NHIC 2016)	G-RANK (NHIC 2016)	LOCALLY RARE (OLDHAM 2010)	IMPACT OF THE WEST DEVELOPMENT AREA	PROPOSED MITIGATION MEASURES
								that were observed are dependent on prolonged water saturation, although it does increase the interspersion value of the wetland, which is known to increase diveristy of flora and fauna. With suitable maintenance of the existing hydrological regime, a 15 m buffer is expected to adequately protect the species composition and ecological function.
ELC Polygon 21 (SWD4-1)	*Quercus palustris*	Pin Oak	9	S4	G5		• This PSW unit that is retained. The plant species noted here will be retained.	• Recommended buffer width of 10 m although 15 m buffer is being provided to address NPCA requirements. No locally rare plant species were observed. One plant species was observed with a high CC value (Pin Oak), which is generally tolerant of human influence. Much of this wetland has frequent admixtures of upland plant species, suggesting drier conditions for much of the year. A 15 m buffer is expected to adequately protect the species composition and ecological functions.
ELC Polygon 22 (CUT1)	*Cinna latifolia*	Drooping Woodreed	7	S5	G5	X	• This early successional vegetation community is proposed for partial removal.	• Mitigation should consist of targeted seed salvage of specimens observed within or in close proximity to the development footprint. This should occur in late summer when seeds are fully developed, with seed dispersal occurring in swamp habitat (coniferous, mixed, or thickets) in areas with minimal human disturbance and high diversity of native species.
ELC Polygon 23 (SWD4-1)	*Quercus palustris*	Pin Oak	9	S4	G5		• This PSW is retained. The plant species noted here will be retained.	• Recommended buffer width of 10 m, although 15 m buffer is being provided to address NPCA requirements. No locally rare plant species were observed; one plant species with a high CC value was observed (Pin Oak), which is generally tolerant of human influence. Much of this wetland has frequent admixtures of upland plant species, suggesting drier conditions for much of the year. A 15 m buffer is expected to adequately protect the species composition and ecological function.
ELC Polygon 24 (SWD4-1)	*Quercus palustris*	Pin Oak	9	S4	G5		• This PSW unit is retained. The plant species noted here will be retained.	• Recommended buffer width of 10m, although 15 m buffer is being provided to address NPCA requirements. No locally rare plant species were observed; one plant species with a high CC value was observed (Pin Oak), which is generally tolerant of human influence. Much of this wetland has frequent admixtures of upland plant species, suggesting drier conditions for much of the year. A 15 m buffer is expected to adequately protect the species composition and ecological function.
ELC Polygon 27 (SWD1)	*Aronia melanocarpa*	Black Chokeberry	7	S5	G5	X	• This PSW unit is retained. The plant species noted here will be retained along with the rare vegetation	• Recommended buffer width of 20 m. This wetland has the highest diversity of plant species with a CC value of

Table 8A: West Development Area Sensitive Flora Species / Rare Vegetation Community Analysis

ELC POLYGON (FIGURE 12, APPENDIX A)	SCIENTIFIC NAME	COMMON NAME	CO-EFFICIENT OF CONSERVATISM (CC)	S-RANK (NHIC 2016)	G-RANK (NHIC 2016)	LOCALLY RARE (OLDHAM 2010)	IMPACT OF THE WEST DEVELOPMENT AREA	PROPOSED MITIGATION MEASURES
	Carex grayi	Gray's Sedge	8	S4	G4	X	community (Buttonbush Mineral Thicket Swamp SWT2-4) and older growth forest stands. The provincially rare Buttonbush Mineral Thicket Swamp occurs as inclusions, in low troughs, within this swamp away from the feature's edge. The older growth forest stands are situated in the interior of this swamp. The rare plant and vegetation communities within this PSW will be protected by the assigned buffer, associated planting, appropriate maintenance of the existing water balance regime (to be demonstrated through the stormwater management plan), and trail siting.	8 or higher (i.e., species having a higher degree of habitat fidelity and sensitivity to disturbance), and the highest abundance of locally rare plants. Since this is a relatively large wetland, a larger proportion of the interior will remain protected from disturbance through a wider buffer. Existing clay soil on the Subject Lands reduces permeability and increases surface water runoff; the 20 m buffer will assist in maintaining hydrological input and reduce impacts caused by overland runoff, along with LIDs and BMPs. This will aid in maintaining existing water quality within the wetland core and the species that have come to depend on this.
	Carex pallescens	Pale Sedge	5	S4	S5	X		
	Carex projecta	Necklace Sedge	5	S5	G5	X		
	Cinna latifolia	Drooping Woodreed	7	S5	G5	X		
	Eurybia schreberi	Schreber's Aster	8	S2	G4	X		
	Galium obtusum	Blunt-leaved Bedstraw	6	S4S5	G5	X		
	Glyceria septentrionalis var. septentrionalis	Eastern Mannagrass	8	S4	G5			
	Ilex mucronata	Mountain Holly	8	S5	G5	X		
	Quercus bicolor	Swamp White Oak	8	S4	G5			
	Quercus palustris	Pin Oak	9	S4	G5			
	NA	Older Growth Forest Stands	-	-	-	-		
	NA	Buttonbush Mineral Thicket Swamp (SWT2-4)	-	S3	G4	-		

Notes:

1. Dense Blazing Star (*Liatris spicata var. spicata*) is present on adjacent lands. Species at Risk habitat polygons are not provided in the EIS since this is sensitive data that is provided only to the MECP. SAR are addressed with MECP through the IGF process.
2. Species latin names highlighted in light blue are new species detected by Savanta during 2018 botanical surveys that are new additions to the original Dougan and Associates plant list (EIS, 2016)
3. S-rank and G-rank for the rare vegetation community (Buttonbush Mineral Thicket Swamp SWT2-4) are as per the NHIC 2013 database status table
4. Oldham, M.J. 2010. Checklist of the Vascular Plants of Niagara Regional Municipality. Ontario Natural Heritage Information Centre, Ministry of Natural resources. Peterborough, Ontario for Niagara Peninsula Conservation Authority, Welland, Ontario.
5. Reznicek, E. G. Voss, & B. S. Walters. February 2011. Michigan Flora Online. University of Michigan. Web. September 11, 2018. https://michiganflora.net/species.aspx?id=996

Table 8B: West Development Area - Sensitive Fauna Species/Wildlife Habitat Analysis

WILDLIFE HABITAT TYPE	SPECIES RECORDED	ELC POLYGON (FIGURE 12, APPENDIX A)	IMPACT OF THE WEST DEVELOPMENT AREA	PROPOSED MITIGATION MEASURES
Woodland Fauna				
Woodland Area-Sensitive Bird SWH	• Yellow-throated Vireo • Tufted Titmouse	13, 27	• These ELC polygons include the occurrences of regionally rare birds within the Subject Lands (Black and Roy 2010): Tufted Titmouse and Yellow-throated Vireo. ELC polygon 27 (SWD1) will be retained within the NHS; the FOD7-2 (Polygon 13) is part of other lands owned by the applicant, but it will be retained in the NHS. • Buffer plantings and woodland restoration efforts proposed in the Conceptual Restoration Plan (**Appendix E**), over time, will improve woodland patch size which will benefit all of the listed species.	• Appropriate buffer width (20m) and associated planting will be applied to protect ELC polygon 27 (SWD1) which fronts development of the Subject Land; ELC polygon 13 (FOD7-2) is part of other lands owned by the applicant – the residential lot line on the Subject Lands adjacent to this feature will be set back at least 10m from the western edge of the FOD7-2. • Management of the invasive shrub, Common Buckthorn, will also help to improve quality of restored forest areas. The proposed Wetland Discovery Centre (**Appendix E**) will also aide in educating residents and visitors about the rare species and habitat types present within the Subject Lands and suggest citizen actions to help preserve local biodiversity.
Deer Wintering SWH	• White-tailed Deer	13, 27		
Bat Maternity Colony SWH	• Hoary Bat • Silver-haired Bat • Big Brown Bat	27		
Rare Species SWH (Woodland Species)	• Eastern Wood-Pewee • Wood Thrush	13, 27		
Woodland Breeding Amphibian SWH	• Wood Frog • Gray Treefrog • Spring Peeper • Western Chorus Frog • Blue-spotted Salamander	13, 21, 23, 24, 27	• All of the woodland amphibian species recorded on the Subject Lands are considered regionally widespread except for Blue-spotted Salamander which is regionally rare (NPCA 2010). • All of the ELC polygons within the NHS on the Subject Lands that contain this SWH type will be retained. Buffer plantings and woodland restoration efforts proposed in the Conceptual Ecological Restoration Plan (**Appendix D**), over time, will improve woodland patch size which will benefit all of the listed species (i.e., provision of non-breeding habitat types and improved amphibian movement corridor functions). • Development of the Subject Lands will result in an increased local road network and traffic which may result in increased amphibian road mortality.	• Appropriate buffer width and associated planting will be applied to protect the features where this SWH type was identified. Buffer widths between 10-20 m, depending on feature are considered sufficiently protective. However, to address NPCA requirements, a minimum buffer width of 15 m is provided where 10 m was originally proposed. • Buffer width varies from 15 m (applied to ELC polygons 21, 23 and 24) to 20 m (applied to the ELC polygon 27); ELC polygon 13 (FOD7-2) is part of other lands owned by the applicant – the residential designation on the Subject Lands adjacent to this feature will be set back at least 10m from the western edge of the FOD7-2. • Management of the invasive shrub, Common Buckthorn, will also help to improve quality of restored forest areas. • The proposed Wetland Discovery Centre (**Appendix E**) will also aid in educating residents and visitors about the rare species and habitat types present within the Subject Lands and suggest citizen actions to help preserve local biodiversity. • The life processes of woodland breeding amphibians are met within the large woodland/wetland complexes that will be preserved on-site. • The provision of wildlife ecopassages beneath Chippawa Parkway would improve connectivity between the Subject Lands and City lands/wetlands associated with the Welland River south of the roadway. • These ecopassages would need to be identified through the Chippawa Parkway EA process. Wildlife fencing (i.e., Animex fencing), extending 30 m to 100 m from the NHS/roadway interface, will be required to direct amphibians, reptiles and small to medium sized mammals on the Subject Lands towards the ecopassages.

Table 8B: West Development Area - Sensitive Fauna Species/Wildlife Habitat Analysis

Wetland Fauna				
Wetland Breeding Amphibian SWH	• Gray Treefrog • American Toad • Northern Leopard Frog • Bullfrog • Blue-spotted Salamander	24 (OAO inclusion) 27 (OAO inclusion)	• All of the wetland amphibian and reptile species recorded on the Subject Lands are considered regionally widespread except for Blue-spotted Salamander (regionally rare) and Snapping Turtle (local-Species at Risk, Special Concern) (NPCA 2010). • All of these ELC polygons will be retained. Buffer plantings and woodland restoration efforts proposed in the Conceptual Ecological Restoration Plan (**Appendix E**), over time, will create an improved movement corridor for individuals moving between different habitat types to support their life processes. • Development of the Subject Lands will result in an increased local road network and traffic that may result in increased amphibian and reptile road-mortality. • Turtle nesting habitat is highly limited on the Subject Lands due to historical disturbance and compaction of soils. • Turtles may be crossing Chippawa Parkway in order to access potential nestin areas on City property south of the road; which increases the risk of road mortality. • Road mortality is a threat to turtle population levels in southern Ontario.	• Appropriate buffer width and associated planting will be applied to protect the features that contain the ponds where these SWH types were identified (20 m buffer applied to ELC polygon 27; 15m buffer applied to ELC polygon 24). • Trail siting guidance for a trail through the movement corridor (between Blocks 4 and 12) is provided in section 4.1 to minimize impacts of trails on sensitive flora and fauna within the NHS. • Management of the invasive shrub, Common Buckthorn, will also help to improve quality of restored forest areas. • The proposed Wetland Discovery Centre (**Appendix E**) will also aid in educating residents and visitors about the rare species and habitat types present within the Subject Lands and suggest citizen actions to help preserve local biodiversity. • Since turtle nesting habitat is highly limited on the Subject Lands, the creation of two artificial turtle nesting beaches is recommended within the NHS area between these two ponds. • Suitable pond habitat for open wetland (non-woodland) amphibians and turtles is limited on the Subject Lands. • The creation of two turtle/amphibian ponds is proposed within the NHS within restored open meadow habitat. • The EA for the proposed widening of Chippawa Parkway should consider the provision of wildlife ecopassages beneath the roadway. The latter would provide a connection between habitats north and south of Chippawa Parkway, including potential turtle nesting habitat on City lands south of this road. • Wildlife fencing is recommended extending from the NHS / roadway interface to direct wildlife towards any installed ecopassages. • Target wildlife species for the eco-passage should include reptiles, amphibians, and small to medium sized mammals.
Turtle Overwintering SWH	• Midland Painted Turtle • Snapping Turtle	24 (OAO inclusion) 27 (OAO inclusion)		
Rare Species SWH (Wetland Species)	• Snapping Turtle	24 (OAO inclusion) 27 (OAO inclusion)		

Table 8B: West Development Area - Sensitive Fauna Species/Wildlife Habitat Analysis

Aquatic Fauna				
Type 2 Important Fish Habitat in Watercourse 1	• Emerald Shiner	24 (Watercourse 1 located within SWD4-1)	• No direct impacts on fish habitat in Watercourse 1 are anticipated to occur as a result of development and site alteration on adjacent lands (only a SWM pond is proposed for construction adjacent to the feature) • Indirect effects during construction could include erosion and sedimentation within the watercourse (with associated effects on fish and fish habitat) and accidental spills (with potential effects on fish, depending on the material, magnitude and location of the spill). • Indirect post-construction effects could include changes in hydrology and associated effects on fish habitat and alterations in water quality due to runoff from adjacent lands. • Site restoration work (including invasive species management) will occur within the buffer and could result in indirect effects on fish habitat.	• Fish habitat will be protected from adjacent development and site alteration by a minimum 15 m buffer from the wetland unit that contains the watercourse. In several locations, the watercourse runs in close proximity to the wetland boundary and therefore the minimum buffer width is 15 m. In most locations, the watercourse is located within the interior of the wetland unit and the buffer (including riparian wetland) from the watercourse channel will be greater than 15 m. Restoration works within the buffer will enhance buffer function and associated fish habitat protection. • Erosion and sedimentation control measures will be implemented during construction to minimize the potential for transfer of eroded sediments from the construction area to the watercourse. Monitoring will be completed during construction to confirm that mitigation is installed and functioning as designed. • Spill prevention and response measures will be implemented throughout construction to minimize the potential for accidental spills and to mitigate potential effects of any spills that do occur. • The proposed minimum buffer adjacent to the watercourse will assist in mitigating potential effects due to erosion and sedimentation and accidental spills on the Subject Lands by providing additional buffering capacity to minimize the potential for these materials to reach the watercourse. • Stormwater management mitigation on the Subject Lands will collect runoff from impervious surfaces (e.g., roads and driveways) and direct it to the stormwater management pond, which will provide Normal level of quality control and will discharge to the Welland River. Therefore, no direct discharge from SWM ponds to Watercourse 1 will occur, with no associated potential for effects on water quality and habitat (e.g., due to erosion). • Low Impact Development measures and other stormwater mitigation (e.g., Low Impact Development) will be implemented as necessary to maintain or improve hydrology within Watercourse 1. This will require confirmation through feature-based water balance, to be completed a later date. • Best management practices (e.g., erosion and sedimentation controls, timing windows, adherence to manufacturer's instructions associated with use of herbicide adjacent to watercourses) will be implemented during invasive species management activities.
Significant Valleyland & Type 2 Important Fish Habitat associated with the Welland River	• 30 species of fish have been recorded in the Lower Welland River (Chippawa Channel). Details are provided in NPCA (2011)	n/a – Feature is located off the Subject Lands	• No direct impacts on fish habitat in the Welland River are anticipated to occur as a result of development and site alteration on the Subject Lands • A SWM Pond on the Subject Lands will discharge directly to the Welland River and it is anticipated that some discharge infrastructure (e.g., outlet headwall and conveyance channel) will be required within the Welland River riparian area and potentially on the banks • Indirect effects during construction could include erosion and sedimentation within the watercourse (with associated effects on fish and fish habitat) and accidental spills (with potential effects on fish, depending on the material, magnitude and location of the spill). • Indirect post-construction effects could include changes in hydrology and	• The SWM Pond discharge infrastructure should be designed to minimize negative effects on riparian and fish habitat in the Welland River. Mitigation will likely be required to minimize potential negative effects during installation of the infrastructure (e.g., timing windows, work-site isolation, erosion and sediment controls). • Erosion and sedimentation control measures will be implemented during construction to minimize the potential for transfer of eroded sediments from the construction area to the Welland River. Monitoring will be completed during construction to confirm that mitigation is installed and functioning as designed. • Spill prevention and response measures will be implemented throughout construction to minimize the potential for accidental spills and to mitigate potential effects of any spills that do occur. • Stormwater management mitigation on the Subject Lands will collect runoff from

Table 8B: West Development Area - Sensitive Fauna Species/Wildlife Habitat Analysis

			associated effects on fish habitat and alterations in water quality due to runoff from adjacent lands.	impervious surfaces (e.g., roads and driveways) and direct it to the stormwater management pond, which will provide Normal level of quality control and will discharge to the Welland River.
Type 3 Marginal Fish Habitat in the Conrail Drain (adjacent lands)	• Brook Stickleback	n/a – Feature is located off the Subject Lands	• No direct impacts on fish habitat in the Conrail Drain are anticipated to occur as a result of development and site alteration on the Subject Lands since the drain is located a minimum of approximately 100 m from the Subject Lands and at most points is >120 m away. • Indirect impacts on fish habitat in the Conrail Drain are not anticipated since the distance of the feature from the Subject Lands and that a railway line separates the Subject Lands from the feature, preventing direct drainage from the Subject Lands from reaching the Conrail Drain	• Erosion and sedimentation control measures will be implemented during construction to minimize the potential for transfer of eroded sediments from the construction area to the Conrail Drain. Monitoring will be completed during construction to confirm that mitigation is installed and functioning as designed. • Spill prevention and response measures will be implemented throughout construction to minimize the potential for accidental spills and to mitigate potential effects of any spills that do occur. • Stormwater management mitigation on the Subject Lands will collect runoff from impervious surfaces (e.g., roads and driveways) and direct it to the stormwater management pond which will discharge to the Welland River. No stormwater from the Subject Lands will be directed to the Conrail Drain.

Notes:

- Species at Risk habitat polygons are not provided in the EIS since this is sensitive data that is provided only to the MNRF. There are no significant Species at Risk fauna habitat polygons within the west development area. The Species at Risk fauna habitat polygons for bats and Acadian Flycatcher are all situated in retained habitat that will have appropriate buffer width, associated buffer planting, and trail siting applied to protect the habitat of these species. Species at Risk are addressed with MNRF through the Information Gathering Form process.
- This table addresses only SWH polygons that fall within or adjacent to the west development area; the applicable ELC polygons are shown on **Figure 12** (**Appendix A**)
- Regarding woodland breeding amphibian SWH, the Riverfront Community EIS Addendum (Savanta, March 2018) SWH mapping included ELC polygon 15, which is a Green Ash Mineral Deciduous Swamp and also a PSW unit. As confirmed through site visits to this feature in summer 2018, this feature does not contain suitable breeding amphibian habitat (lack of suitable depressional areas). As such, this feature (ELC polygon 15) would not meet the MNRF SWH criteria for woodland amphibian SWH. ELC polygon 15 is however retained since it is a PSW unit.

- Black, J.E. and K.J. Roy 2010. Niagara Birds.
- Niagara Peninsula Conservation Authority (NPCA) 2010. Niagara Natural Areas Inventory.

Table 9A: East Development Area - Sensitive Flora Species / Rare Vegetation Community Analysis

ELC POLYGON (FIGURE 13, APPENDIX A)	SCIENTIFIC NAME	COMMON NAME	CO-EFFICIENT OF CONSERVATISM (CC)	S-RANK (NHIC 2016)	G-RANK (NHIC 2016)	LOCALLY RARE (OLDHAM 2010)	IMPACT OF THE EAST DEVELOPMENT AREA	PROPOSED MITIGATION MEASURES
ELC Polygon 19 (CUT1 and CUW1)	*Prunus americana*	American Plum	6	S4	G5	X	• Species-specific mitigation measures are proposed for the portion of this vegetation community planned for removal	• Mitigation should consist of planting local nursery stock in nearby suitable habitat within the NHS as per the Conceptual Ecological Restoration Plan in **Appendix E**. This species prefers open meadows or upland thickets.
	Quercus palustris	Pin Oak	9	S4	G5			• Through completion of a Tree Saving Plan, survey the removal area and locate any mid-age to mature trees having potential to be incorporated into the site plan. Since this species is not rare in Ontario and common in Niagara Region, proposed mitigation is focused on healthy specimens that are established in the local landscape and not identified as a potential hazard tree by a qualified arborist. • Although this species is characteristic of poor to moderately drained soil, it can also tolerate upland habitat and, relative to other trees species, is considered to have moderate to good tolerance of disturbance (Matheny and Clark 1998).
	Carex leptonervia	Finely-nerved Sedge	5	S5	G5	X		• Finely-nerved Sedge is considered common and secure in Ontario (S5) and has generally broad habitat fidelity (i.e. CC 5). Seed collection should occur if/where mature specimens are observed during flora salvage ahead of site clearing. Seed collection can be conducted in early summer for this species. Seeds should be dispersed in local deciduous or mixed forest habitat. This species is capable of adapting to disturbed conditions (Reznicek et al. 2011).
ELC Polygon 22 (CUT1 and CUW1)	*Cinna latifolia*	Drooping Woodreed	7	S5	G5	X	• This early successional vegetation community is proposed for removal outside of areas that overlap with PSW buffers.	• Mitigation should consist of targeted seed salvage of specimens observed within or in close proximity to the development footprint. This should occur in late summer when seeds are fully developed, with seed dispersal occurring in swamp habitat (coniferous, mixed, or thickets) in areas with minimal human disturbance and high diversity of native species.
ELC Polygon 25 (CUM1-1 / DIST)	*Carex pellita*	Woolly Sedge	4	S5	G5	X	• This disturbed cultural meadow is proposed for removal. Species-specific mitigation measures are provided.	• Wooly Sedge is considered common and secure in Ontario (S5) and has generally broad habitat fidelity (i.e. CC 4). Seed collection should occur if/where mature specimens are observed during flora salvage ahead of site clearing. Seed collection can be conducted in mid to late summer for this species. Seeds should be dispersed in local meadow or shallow marsh habitat where surface water pooling is known to occur for at least part of the season.
	Quercus palustris	Pin Oak	9	S4	G5			• Through completion of a Tree Saving Plan, survey the removal area and locate any mid-age to mature trees with potential to be incorporated into the site plan. Since this species is not rare in Ontario and is common in Niagara Region, proposed mitigation is focused on healthy specimens that are established in the local landscape. Although this species is characteristic of poor to moderately drained soil, it can also tolerate upland habitat and, relative to other trees species, is considered to have moderate to good tolerance of disturbance (Matheny and Clark 1998).

Table 9A: East Development Area - Sensitive Flora Species / Rare Vegetation Community Analysis

ELC POLYGON (FIGURE 13, APPENDIX A)	SCIENTIFIC NAME	COMMON NAME	CO-EFFICIENT OF CONSERVATISM (CC)	S-RANK (NHIC 2016)	G-RANK (NHIC 2016)	LOCALLY RARE (OLDHAM 2010)	IMPACT OF THE EAST DEVELOPMENT AREA	PROPOSED MITIGATION MEASURES
ELC Polygon 26 (SWD2-2, CUW1, CUT1)	*Cinna latifolia*	Drooping Woodreed	7	S5	G5	X	• This vegetation community is a PSW unit that is retained. The plant species noted here will be retained.	• Recommended buffer width of 10 m, although a 15 m buffer from the PSW limit has been provided to address NPCA requirements. One locally rare plant species was observed (Drooping Woodreed), which has a CC value of 7 (i.e., not known to be highly sensitive to disturbance). Much of this wetland has frequent admixtures of upland plant species, suggesting drier conditions for much of the year. A 15 m buffer is expected to adequately protect the species composition and ecological functions.
	NA	Older Growth Forest Stands	-	-	-	-		
ELC Polygon 31 (SWD1)	*Gleditsia triacanthos*	Honey-locust	3	S2?	G5	X	• This vegetation community is a PSW unit that is retained and also contains a candidate significant valleyland associated with watercourse 2. The plant species noted here will be retained.	• The closest point of this vegetation community (PSW) is set back approximately 40m from the east development area. One provincially rare and locally rare plant (Honey-locust) is present within this swamp. Honey-locust has a CC values of 3 and is not known to be highly sensitive to disturbance. Matheny and Clark (1998) also note that Honey- locust has a relatively good tolerance of disturbance. Two additional species present (Pin Oak and Swamp White Oak) have CC values of 9 and 8, respectively. These trees are considered to have moderate to good tolerance of disturbance (Matheny and Clark 1998). Much of this wetland has frequent admixtures of upland plant species, suggesting drier conditions for much of the year. This wetland is set back from development (approximately 40 m at its closest point to east development area) and will be naturally buffered by existing, intervening vegetation. A 10m buffer is recommended, and a minimum 15 m buffer (based on NPCA requirements) is applied to the Green Ash Mineral Deciduous Swamp (SWD2-2) located between this feature and the east development area. The setback from development, adjacent retained vegetation and associated buffer width are expected to protect the species composition and ecological functions of this wetland (SWD1).
	Quercus palustris	Pin Oak	9	S4	G5			
	Quercus bicolor	Swamp White Oak	8	S4	G5			
ELC Polygon 33 (CUP3-2)	*Quercus bicolor*	Swamp White Oak	8	S4	G5		• This disturbed cultural plantation is proposed for removal. Species-specific mitigation measures are provided.	• Through completion of a Tree Saving Plan, survey the removal area and locate mid-age to mature trees with potential to be incorporated into the site plan. Since this species is not rare in Ontario and common in Niagara Region, proposed mitigation is focused on healthy specimens that are established in the local landscape. Consideration will also be given to local hydrology, as this species does prefer moist soil. Relative to other trees species, Swamp White Oak is considered to have a good tolerance of disturbance (Matheny and Clark 1998).
	Quercus palustris	Pin Oak	9	S4	G5			• Through completion of a Tree Saving Plan, survey removals area and locate any mid-age to mature trees with potential to be incorporated into the site plan. Since this species is not rare in Ontario and common in Niagara Region, proposed mitigation is focused on healthy specimens that are established in the local landscape. Although this species is characteristic of poor to moderately drained soil, it can also tolerate upland habitat and, relative to other trees species, is considered to have moderate to good tolerance of disturbance (Matheny and Clark 1998).

Table 9A: East Development Area - Sensitive Flora Species / Rare Vegetation Community Analysis

ELC POLYGON (FIGURE 13, APPENDIX A)	SCIENTIFIC NAME	COMMON NAME	CO-EFFICIENT OF CONSERVATISM (CC)	S-RANK (NHIC 2016)	G-RANK (NHIC 2016)	LOCALLY RARE (OLDHAM 2010)	IMPACT OF THE EAST DEVELOPMENT AREA	PROPOSED MITIGATION MEASURES
ELC Polygon 34 (CUW1, CUT1, CUM1)	*Quercus palustris*	Pin Oak	9	S4	G5		• This disturbed cultural woodland is proposed for removal. Species-specific mitigation measures are provided.	• Through completion of a Tree Saving Plan, survey removals area and locate any mid-age to mature trees having potential to be incorporated into the site plan. • Since this species is not rare in Ontario and common in Niagara Region, proposed mitigation is focused on healthy specimens that are established in the local landscape. Although this species is characteristic of poor to moderately drained soil, it can also tolerate upland habitat and, relative to other trees species, is considered to have moderate to good tolerance of disturbance (Matheny and Clark 1998).

Notes

1. Species latin names highlighted in light blue are new species detected by Savanta during 2018 botanical surveys that are new additions to the original Dougan and Associates plant list (EIS, 2016).
2. Oldham, M.J. 2010. Checklist of the Vascular Plants of Niagara Regional Municipality. Ontario Natural Heritage Information Centre, Ministry of Natural resources. Peterborough, Ontario for Niagara Peninsula Conservation Authority, Welland, Ontario.
3. Matheny, N. and J.R. Clark. 1998. Trees and Development: A Technical Guide to Preservation of Trees During Land Development. International Society of Arboriculture: Illinois.
4. The 2016 EIS (Dougan and Associates) had noted the presence of Ribes glandulosum in the east development area, the latter was confirmed to be a data entry error and was meant to be Ribes americanum which is a common species.

Table 9B: East Development Area - Sensitive Fauna Species / Wildlife Habitat Analysis

WILDLIFE HABITAT TYPE	SPECIES RECORDED	ELC POLYGON (FIGURE 13, APPENDIX A)	IMPACT OF EAST DEVELOPMENT AREA	PROPOSED MITIGATION MEASURES
Woodland Fauna				
Deer Wintering SWH	• White-tailed Deer	26 (SWD2-2 portions only) 31	• These vegetation communities are PSWs that will be retained. • Buffer plantings and woodland restoration efforts proposed in the Conceptual Ecological Restoration Plan (**Appendix E**), over time, will improve woodland patch size which will benefit this SWH type	• Appropriate buffer width and associated planting will be applied to protect this woodland/wetland feature edge. Minimum buffer width of 10 m was recommended, but a 15 m buffer is being provided to address NPCA requirements. No trails are proposed in this area. • Management of the invasive shrub, Common Buckthorn, will also help to improve quality of restored habitat along the ravine at the east end of the Subject Lands (within the NHS). The proposed Wetland Discovery Centre (**Appendix E**) will aid in educating residents and visitors about the rare species and habitat types present within the Subject Lands and suggest citizen actions to help preserve local biodiversity
Rare Species SWH	• Wood Thrush	26 (Wooded eastern portion along ravine only)	• Wood Thrush utilizes habitat within PSWs and cultural woodland at the east end of the Subject Lands. • The habitat polygon continues further	• Appropriate buffer width and associated planting will be applied to protect this woodland/wetland feature edge. Minimum buffer width

Table 9B: East Development Area - Sensitive Fauna Species / Wildlife Habitat Analysis

WILDLIFE HABITAT TYPE	SPECIES RECORDED	ELC POLYGON (FIGURE 13, APPENDIX A)	IMPACT OF EAST DEVELOPMENT AREA	PROPOSED MITIGATION MEASURES
		31	north of the proposed residential area along a retained ravine. • Adjacent to the east development area, the PSWs will be retained and only a fringe of cultural woodland is proposed for removal that extends into the proposed development area. • PSW buffer plantings and woodland restoration efforts outlined in the Conceptual Restoration Plan (**Appendix E**), over time, will improve woodland patch quality in this area which is of benefit to this species.	of 10 m was recommended, but a 15 m buffer is being provided to address NPCA requirements. No trails are proposed in this area. • Management of the invasive shrub, Common Buckthorn, within this Wood Thrush SWH polygon will help improve habitat quality. The proposed Wetland Discovery Centre (**Appendix E**) will aid in educating residents and visitors about the rare species and habitat types present within the Subject Lands and suggest citizen actions to help preserve local biodiversity.
Woodland Breeding Amphibian SWH	• Gray Treefrog • Western Chorus Frog • Spring Peeper	26 (SWD2-2 portions only) 31	• Based on targeted amphibian call count surveys conducted by Dougan and Associates (EIS 2016) in wetlands west of the east development area, it is probable that a similar suite of amphibian species is present north and east of the east development area (i.e., SWD2-2 portions of ELC polygon 26 and SWD1 within ELC polygon 31). • Since the wetlands in ELC polygons 26 and 31 are retained within the NHS, candidate significant wildlife	• Appropriate buffer width and associated planting will be applied to protect the features where this SWH type was identified. • Minimum buffer width of 10 m was recommended, but a 15 m buffer is being provided to address NPCA requirements. • No trails are proposed in this area. • The proposed Wetland Discovery Centre (**Appendix E**) will aid in educating residents and visitors

Table 9B: East Development Area - Sensitive Fauna Species / Wildlife Habitat Analysis

WILDLIFE HABITAT TYPE	SPECIES RECORDED	ELC POLYGON (FIGURE 13, APPENDIX A)	IMPACT OF EAST DEVELOPMENT AREA	PROPOSED MITIGATION MEASURES
			habitat presence for woodland amphibians was assumed to be present. • The calling amphibian species are all considered regionally wide-spread. Blue-spotted Salamander was not recorded in the east development area during surveys by Savanta. • Buffer plantings and restoration efforts proposed in the Conceptual Restoration Plan (**Appendix E**), over time, will improve woodland patch size which will benefit all of the listed species (i.e. provision of non-breeding habitat types and improved amphibian movement corridor functions). • Development of proposed residential areas will result in an increased local road network and traffic which could result in increased amphibian mortality.	about the rare species and habitat types present within the Subject Lands and suggest citizen actions to help preserve local biodiversity. • Management of the invasive shrub Common Buckthorn will help improve habitat quality within the ravine at the east end of the Subject Lands (within the NHS). • This ravine may assist with north-south movement of amphibians and other fauna within the Subject Lands. • The life processes of woodland breeding amphibians are met within the large woodland/wetland complexes that will be preserved on-site. • The provision of a wildlife eco-passage beneath Chippawa Parkway would improve connectivity between the Subject Lands and City lands/wetlands associated with the Welland River south of the roadway. • This eco-passage would need to be identified through the Chippawa Parkway EA process. • If an eco-passage is installed then

Table 9B: East Development Area - Sensitive Fauna Species / Wildlife Habitat Analysis

WILDLIFE HABITAT TYPE	SPECIES RECORDED	ELC POLYGON (FIGURE 13, APPENDIX A)	IMPACT OF EAST DEVELOPMENT AREA	PROPOSED MITIGATION MEASURES
				wildlife fencing (i.e., Animex fencing) should be considered extending 30 m to 100m from the NHS/roadway interface to direct amphibians, reptiles and small to medium sized mammals on the Subject Lands towards the eco-passage.
Aquatic Fauna				
Fish Habitat	• Emerald Shiner	24 (Watercourse 1 located within SWD4-1)	• No direct impacts on fish habitat in Watercourse 1 are anticipated to occur as a result of development and site alteration on adjacent lands • Indirect effects during construction could include erosion and sedimentation within the watercourse (with associated effects on fish and fish habitat) and accidental spills (with potential effects on fish, depending on the material, magnitude and location of the spill). • Indirect post-construction effects could include changes in hydrology and associated effects on fish habitat and alterations in water quality due to runoff from adjacent lands. • Site restoration work (including invasive species management) will occur within	• Fish habitat will be protected from adjacent development and site alteration by a minimum 15 m buffer (as required by the NPCA) from the wetland unit that contains the watercourse. In several locations, the watercourse runs in close proximity to the wetland boundary and therefore the minimum buffer width is 15 m. In most locations, the watercourse is located within the interior of the wetland unit and the buffer (including riparian wetland) from the watercourse channel will be greater than 15 m. Restoration works within the buffer will enhance buffer function and associated fish habitat protection. • Erosion and sedimentation control measures will be implemented during construction to minimize the potential for transfer of eroded sediments from the

Table 9B: East Development Area - Sensitive Fauna Species / Wildlife Habitat Analysis

WILDLIFE HABITAT TYPE	SPECIES RECORDED	ELC POLYGON (FIGURE 13, APPENDIX A)	IMPACT OF EAST DEVELOPMENT AREA	PROPOSED MITIGATION MEASURES
			the buffer and could result in indirect effects on fish habitat.	construction area to the watercourse. Monitoring will be completed during construction to confirm that mitigation is installed and functioning as designed. • Spill prevention and response measures will be implemented throughout construction to minimize the potential for accidental spills and to mitigate potential effects of any spills that do occur. • The proposed minimum buffer adjacent to the watercourse will assist in mitigating potential effects due to erosion and sedimentation and accidental spills on the Subject Lands by providing additional buffering capacity to minimize the potential for these materials to reach the watercourse. • Stormwater management mitigation on the Subject Lands will collect runoff from impervious surfaces (e.g., roads and driveways) and direct it to the stormwater management pond, which will provide Normal level of quality control and will discharge to the Welland River. Therefore, no direct discharge from SWM ponds to Watercourse 1 will occur, with no associated potential for effects on water quality and habitat (e.g., due to

Table 9B: East Development Area - Sensitive Fauna Species / Wildlife Habitat Analysis

WILDLIFE HABITAT TYPE	SPECIES RECORDED	ELC POLYGON (FIGURE 13, APPENDIX A)	IMPACT OF EAST DEVELOPMENT AREA	PROPOSED MITIGATION MEASURES
				erosion). • Low Impact Development measures and other stormwater mitigation (e.g., roof drain collector systems) will be implemented as necessary to maintain or improve hydrology within Watercourse 1. This will require confirmation through feature-based water balance, to be completed at a later date. • Best management practices (e.g., erosion and sedimentation controls, timing windows, adherence to manufacturer's instructions associated with use of herbicide adjacent to watercourses) will be implemented during invasive species management activities.
Significant Valleyland & Type 2 Important Fish Habitat in Watercourse 2	• White Sucker • Largemouth Bass • Central Mudminnow • Brown Bullhead	31 (Watercourse 2 located within SWD1)	• No direct impacts on fish habitat in Watercourse 2 are anticipated to occur as a result of development and site alteration on adjacent lands • Installation of a watermain crossing of Watercourse 2 (via directional drilling) is not anticipated to impact fish habitat provided appropriate mitigation is	• Fish habitat will be protected from adjacent development and site alteration by a minimum 15 m buffer from the wetland unit (as required by NPCA) that contains the watercourse. Given that the watercourse is located well inside the wetland, the buffer (including the riparian wetland) will be greater than 15 m from the watercourse channel in all locations where it runs adjacent to the proposed

Table 9B: East Development Area - Sensitive Fauna Species / Wildlife Habitat Analysis

WILDLIFE HABITAT TYPE	SPECIES RECORDED	ELC POLYGON (FIGURE 13, APPENDIX A)	IMPACT OF EAST DEVELOPMENT AREA	PROPOSED MITIGATION MEASURES
	• Golden Shiner • Bluntnose Minnow		implemented during construction. • Indirect effects during construction could include erosion and sedimentation within the watercourse (with associated effects on fish and fish habitat) and accidental spills (with potential effects on fish, depending on the material, magnitude and location of the spill). • Indirect post-construction effects could include changes in hydrology and associated effects on fish habitat and alterations in water quality due to runoff from adjacent lands.	development area. Restoration works within the wetland buffer will enhance buffer function and associated fish habitat protection. • Standard directional drilling mitigation will be required to minimize the potential for temporary impacts and prevent long-term negative impacts on fish. Mitigation is anticipated to include erosion and sedimentation controls, spill prevention and response measures, appropriate design mitigation (e.g., depth beneath watercourse) and restoration of disturbed riparian areas. • Erosion and sedimentation control measures will be implemented during construction to minimize the potential for transfer of eroded sediments from the construction area to the watercourse. Monitoring will be completed during construction to confirm that mitigation is installed and functioning as designed. • Spill prevention and response measures will be implemented throughout construction to minimize the potential for accidental spills and to mitigate potential effects of any spills that do occur.

Table 9B: East Development Area - Sensitive Fauna Species / Wildlife Habitat Analysis

WILDLIFE HABITAT TYPE	SPECIES RECORDED	ELC POLYGON (FIGURE 13, APPENDIX A)	IMPACT OF EAST DEVELOPMENT AREA	PROPOSED MITIGATION MEASURES
				• The buffer from the adjacent wetland will assist in mitigating potential effects due to erosion and sedimentation and accidental spills on the Subject Lands by providing additional buffering capacity to minimize the potential for these materials to reach the watercourse. • Stormwater management mitigation on the Subject Lands will collect runoff from impervious surfaces (e.g., roads and driveways) and direct it to the stormwater management pond, which will provide Normal level of quality control and will discharge to the Welland River. Therefore, no direct discharge from SWM ponds to Watercourse 2 will occur, with no associated potential for effects on water quality and habitat (e.g., due to erosion). • Low Impact Development measures and other stormwater mitigation (e.g., roof drain collector systems) will be implemented as necessary to maintain or improve hydrology within Watercourse 2. This will require confirmation through feature-based water balance, to be completed a later date.

Table 9B: East Development Area - Sensitive Fauna Species / Wildlife Habitat Analysis

WILDLIFE HABITAT TYPE	SPECIES RECORDED	ELC POLYGON (FIGURE 13, APPENDIX A)	IMPACT OF EAST DEVELOPMENT AREA	PROPOSED MITIGATION MEASURES
Significant Valleyland and Type 2 Important Fish Habitat in the Welland River	• 30 species of fish have been recorded in the Lower Welland River (Chippawa Channel). Details are provided in NPCA (2011)	n/a – Feature is located off the Subject Lands	• No direct impacts on fish habitat in Welland are anticipated to occur as a result of development and site alteration on the Subject Lands • A SWM Pond on the Subject Lands will discharge directly to the Welland River and it is anticipated that some discharge infrastructure (e.g., outlet headwall and conveyance channel) will be required within the Welland River riparian area and potentially on the banks • Indirect effects during construction could include erosion and sedimentation within the watercourse (with associated effects on fish and fish habitat) and accidental spills (with potential effects on fish, depending on the material, magnitude and location of the spill). • Indirect post-construction effects could include changes in hydrology and associated effects on fish habitat and alterations in water quality due to runoff from adjacent lands.	• The SWM Pond discharge infrastructure should be designed to minimize negative effects on riparian and fish habitat in the Welland River. Mitigation will likely be required to minimize potential negative effects during installation of the infrastructure (e.g., timing windows, work-site isolation, erosion and sediment controls). • Erosion and sedimentation control measures will be implemented during construction to minimize the potential for transfer of eroded sediments from the construction area to the Welland River. Monitoring will be completed during construction to confirm that mitigation is installed and functioning as designed. • Spill prevention and response measures will be implemented throughout construction to minimize the potential for accidental spills and to mitigate potential effects of any spills that do occur. • Stormwater management mitigation on the Subject Lands will collect runoff from impervious surfaces (e.g., roads and driveways) and direct it to the stormwater management pond, which

Table 9B: East Development Area - Sensitive Fauna Species / Wildlife Habitat Analysis

WILDLIFE HABITAT TYPE	SPECIES RECORDED	ELC POLYGON (FIGURE 13, APPENDIX A)	IMPACT OF EAST DEVELOPMENT AREA	PROPOSED MITIGATION MEASURES
				will provide Normal level of quality control and will discharge to the Welland River.

Notes:

- Species at Risk habitat polygons are not provided in the EIS since this is sensitive data that is provided only to the MNRF. There are no significant Species at Risk fauna habitat polygons within the east development area. 'The significant Species at Risk fauna habitat polygons for bats and Acadian Flycatcher are all situated within the NHS and will have appropriate buffer width, associated buffer planting, and trail siting applied to protect the habitat of these species. Species at Risk are addressed with MECP through the Information Gathering Form process.

- This table addresses only SWH polygons that fall within or adjacent to east development area; the applicable ELC polygons are shown on **Figure 13** (**Appendix A**).

Table 11: Water Budget Recommendations By Wetland Vegetation Community

ELC code	Significant wildlife habitat identified for breeding amphibians?	Dominant canopy layer vegetation species	Water inundation requirements for dominant vegetation species	Post-development (no mitigation) inundation conditions	Water Budget Assessment Recommendations (Wood 2019)
OAO Open Aquatic	W1A & W4 – Confirmed SWH for amphibian breeding habitat (woodland) See **Figure 4a** (**Appendix A**) W1A & W4 - Wetland Amphibian Breeding SWH and Turtle Overwintering SWH See **Figure 4e** (**Appendix A**)	NA (primarily open water)	Permanent standing water	W1A – 0% increase in annual runoff volumes W4 – 0% increase in annual runoff volumes	At detailed design identify opportunities, through LIDs, for providing additional surface water inputs to support turtle overwintering. In 2017 and 2018 it was observed that OAO's in both W1A and W4 catchment went dry.
SWD1 Oak Mineral Deciduous Swamp	W1A, W1B, W3, EWC1, EWC2, EWC3, EWC4, EWC5, EWCLF – Confirmed SWH for amphibian breeding habitat (woodland) See Figure 4a	Bur Oak, Pin Oak	Bur Oak are relatively intolerant of flooding >2 weeks long during the growing season; Pin Oak requires intermittent flooding during the dormant season but is relatively intolerant of flooding during the growing season similar to Bur Oak	W1A - 0% increase in annual runoff volumes, water inundation requirements for dominant Oak species likely maintained W1B- 0% increase in annual runoff volumes, water inundation requirements for dominant Oak species likely maintained W3 – 1% increase in annual runoff volumes, water inundation requirements for dominant Oak species likely maintained EWC1 – 1% decrease in annual runoff volumes, water inundation requirements for dominant Oak species likely maintained EWC-LF – 2% decrease in annual runoff volumes, water inundation requirements for dominant Oak species likely maintained	Recommend infiltration LIDs to reduce post-development surface runoff volumes during summer period

ELC code	Significant wildlife habitat identified for breeding amphibians?	Dominant canopy layer vegetation species	Water inundation requirements for dominant vegetation species	Post-development (no mitigation) inundation conditions	Water Budget Assessment Recommendations (Wood 2019)
SWD2-2 Green Ash Mineral Deciduous Swamp	W1C, W2, EWC1, EWC2 and EWCLF - Confirmed SWH for amphibian breeding habitat (woodland) See Figure 4a	Green Ash	Green Ash is common on land subject to flooding and can remain healthy when flooded for as much as 40% of the growing season	W1A contributes surface water flows to W2. W1A - 0% increase in annual runoff volumes W1C – 2% increase in annual surface runoff volumes, water inundation requirements for dominant Ash species likely maintained W2 – 4% increase in annual surface runoff volumes, water inundation requirements for dominant Ash species likely maintained EWC1 – 1% decrease in annual surface runoff volumes; water inundation requirements for dominant Ash species likely maintained EWC-LF – 2% decrease in annual surface runoff volumes; water inundation requirements for dominant Ash species likely maintained	Recommend infiltration LIDs to reduce post-development surface runoff volumes during summer period Further assessment at detailed design is needed to determine if the Green Ash swamp within EWC-LF catchment is a tableland wetland (surface water fed) or a riparian wetland.

Table 11: Water Budget Recommendations By Wetland Vegetation Community

ELC code	Significant wildlife habitat identified for breeding amphibians?	Dominant canopy layer vegetation species	Water inundation requirements for dominant vegetation species	Post-development (with mitigation) inundation conditions	Water Budget Assessment Recommendations (Wood 2018)
SWD4-1 Willow Mineral Deciduous Swamp	W4 - Confirmed SWH for amphibian breeding habitat (woodland) See **Figure 4a** W3 & W6 – Candidate SWH for amphibian breeding habitat (woodland) See **Figure 4a**	Hybrid Crack Willow	This hybrid species is common on land subject to flooding (i.e. riversides, stream banks, pond sides); tolerant to inundation and requires a relatively short dry season (~ 2 months)	W1B contributes surface water flow to W3. W1B- 0% increase in annual runoff volumes post-development with mitigation. W3 – 1% increase in annual surface runoff volumes,water inundation requirements for dominant Willow species likely maintained W4 – 0% increase in annual surface runoff volumes,water inundation requirements for dominant Willow species likely maintained W6 - 1% increase in annual surface runoff volumes,water inundation requirements for dominant Willow species likely maintained	Recommend a combination of conveyance and infiltration LIDs to support frequent flooding, and a short dry season
SWT2 Mineral Thicket Swamp	No (**Figure 4a**, **Appendix A**)	Common Buckthorn, Grey Dogwood, Nannyberry	Shallow inundation up to 5cm or water at surface level early April - late May, drawdown in summer, and moist (no inundation) September-November	W4 - 0% increase in annual surface runoff volumes, water inundation requirements for dominant species likely maintained W5 – 0% increase in annual surface runoff volumes, water inundation requirements for dominant species likely maintained	Recommend infiltration LIDs to reduce post-development surface runoff volumes during summer period

Table 12. Summary of EIS Commitments & Recommendations

ID Label	TOPIC	EIS RECOMMENDATION[1]
i) Endangered and Threatened Species		
SAR-1	**Acadian Flycatcher**	Potentially suitable habitat for Acadian Flycatcher was identified within a retained significant wetland/woodland of the NHS on the Subject Lands and several areas outside the Subject Lands. A 20 m setback will be applied to the suitable habitat polygon in the NHS adjacent to the Riverfront Residential Area.
SAR-2	**Bat species (Eastern Small-foot Myotis, Northern Myotis, Little Brown Myotis)**	Several endangered bat species (Eastern Small-footed Myotis, Northern Myotis, Little Brown Myotis) were recorded on the Subject Lands through the completion of MNRF survey protocol in 2018. SAR bat habitat maternity roost habitat is present within forests and swamps generally outside of the area proposed for development. One small area of foraging habitat will be removed for the proposed development, although this area represents a negligible component of the overall maternity roost habitat in the area. Cultural thicket and meadow communities within 40 m of the forests and swamps are considered to represent foraging habitat for these species. Some foraging habitat will be removed, although this area represents a negligible component of the overall foraging habitat in the area. Dialogue is underway with MECP to ensure all requirements under the *Endangered Species Act, 2007* are met. Tree and woody vegetation removals outside the NHS should be completed outside the bat roosting season (Mar 30 to Oct 1) to avoid impacts to SAR bats. This approach avoids contravention of ESA (2007) Section 9 for the four 'at risk' bat species and an overall benefit permit is not required for the removal of trees outside of the NHS. If vegetation clearing must occur between March 30 and Oct 1, due diligence screening will be conducted through the completion of nighttime bat presence / absence surveys. Woodland restoration proposed in buffer areas is anticipated to help improve the quality of SAR bat habitat. Species with shaggy bark that provide bat roosting opportunities (i.e., oak, maple, hickory species) are proposed for planting within woodland/wetland buffers and additional restoration areas and over time, these tree plantings will mature and provide buffering functions to the large, mature, retained woodlands, and eventually, these tree plantings may provide direct habitat for bat species. The proposed wetland discovery centre will also aid in educating residents and visitors about the rare species and habitat types present within the Subject Lands and suggest citizen actions to help preserve local biodiversity.
SAR-3	**Dense Blazing Star**	Clusters of a Threatened plant species (Dense Blazing Star) were recorded on the Subject Lands outside of the proposed Riverfront Residential development area. The proposed setbacks from the observed individuals are anticipated to prevent adverse effects on the species. Dialogue is underway with MECP to ensure that all requirements under the *Endangered Species Act, 2007* are met.
ii) Flora / fauna / soils rescue and salvage		
RESC-1	**Bats and Migratory Birds**	If tree/woody vegetation outside the NHS is proposed for removal during the bat roosting season / bird nesting season (i.e., between March 30 and October 1), then due diligence screening must be conducted. This would entail evening bat acoustic surveys and daytime avian nest surveys.
RESC-2	**Transplant / Salvage Opportunities**	A provincially rare population of Great Plains Ladies'-tresses was identified within the proposed west development area. A transplantation program is proposed into native meadow restoration areas to sustain this species in appropriate habitat of the retained NHS. Sod mat / plug transplantation is recommended (**Appendix E**). Where feasible, pilot transplants should occur and be demonstrated to result in replanting success, prior to full relocation of these species from the Riverfront Residential area. As detailed in **Tables 8a and 9a (Appendix B)**, a variety of locally rare plant species occur within the PSWs, with some species occurring both within PSW units and within proposed development areas. Five locally rare (Oldham 2010) plant species, listed below, occur on the Subject Lands only within ELC polygons that are proposed for partial or complete removal. Mitigation measures are provided in **Tables 8a and 9a (Appendix B)** and further detail is provided in section 5 of the Conceptual Ecological Restoration Plan (**Appendix E**). • Creeping Spike-rush (*Eleocharis palustris)* • American Plum (Prunus americana) • Woolly Sedge (*Carex pellita*) • Yellow Indian-grass (*Sorghastrum nutans*)

Table 12. Summary of EIS Commitments & Recommendations

ID Label	TOPIC	EIS RECOMMENDATION[1]
		For vegetation salvage, specific measures are required at sites where invasive species are present (i.e., harvesting plugs). Flora / soil salvage should not be conducted if a salvage site contains highly invasive species (Category 1; Urban Forest Associates 2002). Specific transplant opportunities are identified in the Conceptual Ecological Restoration Plan (**Appendix E**).
iii) Invasive Plant Management		
INV-3	**Invasive Plant Species**	The Conceptual Ecological Restoration Plan in **Appendix E** provides details regarding the proposed management of the highly invasive shrub Common Buckthorn and subsequent in-plantings with native stock. Edge management will be conducted (i.e., herbicide treatment) following best management practices within specified areas of woodland/wetland buffers before planting with native, restoration stock occurs (as per **Appendix E**). This will facilitate establishment of planted, native vegetation by reducing competition from non-native and invasive species.
iv) Natural Heritage Feature Buffers		
NHFB-1	**Provincially Significant Wetlands**	Variable width buffers will be applied to the PSWs that front the development based on their sensitivity to adjacent development as detailed in **Tables 8a-8b** and **9a-9b** (**Appendix B**). Proposed buffer widths vary from 10 m to 20 m and actual buffers vary from 15 m to 20 m to address NPCA requirements, as illustrated on **Figure 10** (**Appendix A**). **Appendix E:** The Conceptual Ecological Restoration Plan outlines invasive species management and edge management recommendations within wetland buffers and provides tailored native planting prescriptions. Some Low Impact Development measures are proposed for installation in wetland buffers to assist in maintaining water quality and water balance in adjacent PSWs. Design and construction mitigation is proposed to minimize the impact of these measures on buffer function.
NHFB-2	**Retained Woodlands**	Variable width buffers will be applied to retained woodlands based on their sensitivity to adjacent development as detailed in **Tables 8a-8b** and **9a-9b** (**Appendix B**). Proposed buffer widths vary from 10 m to 20 m and actual buffers vary from 15 m to 20 m to address NPCA requirements, as illustrated on **Figure 10** (**Appendix A**). **Appendix E:** The Conceptual Ecological Restoration Plan outlines invasive species management and edge management recommendations within woodland buffers and provides tailored native planting prescriptions. Pre-stressing west-oriented woodland edges (i.e., exposed to predominant westerly winds) is recommended adjacent to the east development area to reduce potential for tree windthrow. Some Low Impact Development measures are proposed for installation in wetland buffers to assist in maintaining water quality and water balance in adjacent PSWs. Design and construction mitigation is proposed to minimize the impact of these measures on buffer function.
NHFB-3	**Fish Habitat**	A SWM Pond is proposed in proximity to fish habitat associated with watercourse 1 (WC1). Construction of the proposed SWM Pond should occur outside of the 15m buffer applied to WC1 and the 15m buffer applied to the PSWs also located in the vicinity of the proposed SWM Pond location.
v) Conceptual Trail Plan		
TRAI-1	**Trail System**	A conceptual trail network is provided by Wavefront Planning & Design (2019) and includes one trail within the NHS (to provide pedestrian access between Blocks 4 and 12). The preliminary location of the NHS trail was selected to avoid impacts to SWH and Species at Risk habitat. This NHS trail width will be minimized and mature tree removal will be avoided to the extent possible. The trail will be surfaced with mulch or other soft material and will be situated at grade to permit wildlife to cross the trail and prevent impacts on surface water drainage. At detailed design, the exact location of the NHS trail should be staked with a qualified biologist in the field to avoid mature trees, cavity trees, and other sensitive features/elements, such as natural surface water drainage inlets into woodland/wetland areas. Any lighting associated with the trail should be downward-facing to minimize light pollution within retained natural areas.
vi) Wetland Water Balance		
WWBA-1	**Retained Wetlands Preliminary Water Balance**	A preliminary water balance and conceptual grading plan was prepared for the wetland catchments on the Subject Lands. **Table 11** (**Appendix B**) of this current EIS Addendum provides commitments in terms of the specific hydroperiod and seasonal water inundation needs of wetlands on the Subject Lands. Wetland catchments with a predicted >10% change in drainage area or average annual surface water volume were assessed to determine whether mitigation is required.

Table 12. Summary of EIS Commitments & Recommendations

ID Label	TOPIC	EIS RECOMMENDATION[1]
		Specific wetland units were identified that will require mitigation solutions be determined at the detailed stormwater management plan stage. It must be demonstrated through the stormwater management plan that the specific hydroperiod/seasonal water balance requirements can be met in the post-development condition (i.e., through implementation of LIDs and BMPs). Wetland discharges related to Drainage Feature 1 will be maintained as necessary to ensure water balance in the wetland is suitably maintained. A detailed design will be prepared during the detailed engineering stage, but conceptually, maintenance of wetland discharge could be maintained by piping or realignment of Drainage Feature 1 within the buffer of adjacent features.
WWBA-2	**Retained Open Aquatic Features – Augmenting Hydroperiod**	Two retained open aquatic features within the NHS would benefit from receiving additional water input compared to existing conditions in order to better support functional and productive habitat for open wetland amphibians and turtle species. The opportunity to direct additional surface water to these two existing open aquatic ponds should be explored at the stormwater management plan stage. If pursued, a permit through NPCA would be required to purposefully augment water levels within certain wetlands/pools.
vii) Other Natural Heritage Restoration Components		
NHR-1	**Specialized Wildlife Habitat Features**	The creation of several specialized wildlife habitat features is proposed within the restoration plan, including: pollinator habitat, turtle nesting beaches, and two open water wetlands. Specific details are provided in **Appendix E.** Regarding the two created wetlands (which target creation of turtle and open wetland amphibian habitat), the final dimensions of these wetlands will be determined at the detailed stormwater management plan stage based on water availability to sustain each wetland. Associated grading will be required to provide sufficient surface water drainage to these features. This will necessitate the use of ESC measures, including appropriate timing of wetland construction (i.e., outside typical summer storm event periods). Target wetland hydroperiod, planting prescriptions and implementation details are provided in the **Appendix E**.
NHR-2	**Riverfront Wetland Discovery Centre and Native Plant Nursery**	The Conceptual Ecological Restoration Plan (**Appendix E**) proposes the creation of a native plant nursery and a Riverfront Wetland Discovery Centre (latter to serve as a public environmental education facility) on the GR(Can) Land Holdings. The nursery would serve to responsibly collect and store seed from mature specimens and propagate target tree, shrub and herbaceous species for use within restoration areas both on-site and, potentially, at future off-site restoration projects.
NHR-3	**Resource Management Plan Agreement Requirements**	Per OPA 128 section 2.5.11 (City 2018), relocation works for Great Plains Ladies'-tresses (rare species SWH) will require a Work Permit issued by the NPCA and in accordance with the conditions of a Resource Management Agreement entered into by the proponent and the City as a condition of draft plan approval, site plan approval or zoning by-law amendment. Per OPA 128 section 2.5.12 (City 2018), ecological restoration areas identified in the Conceptual Ecological Restoration Plan (**Appendix E**), which align with restoration areas shown on OPA Map 4 of Schedule A-6(a), shall be rehabilitated in accordance with the conditions of a Resource Management Agreement entered into by the proponent and the City as a condition of draft plan approval, site plan approval or zoning by-law amendment.
NHR-4	**Linkages**	A continuous north-south linkage corridor is provided to facilitate wildlife movements through the core natural heritage features between the east and west development areas, as well as to those features north of the railway and the Welland River south of the Subject Lands. To facilitate this linkage, mitigation, in the form of ecopassages and wildlife directional fencing is recommended at locations along Chippawa Parkway and Dorchester Road. Multiple ecopassages should be considered at the terminus of the linkage on Chippawa Parkway, this spacing at approximately 100 m intervals. Ecopassages should be designed to provide passage for amphibians and reptiles. Exclusionary fencing should be provided as well. One additional passage is recommended at Dorchester Road. While the ultimate design and implementation of movement corridors on Chippawa Parkway and Dorchester Road should be completed by the City of Niagara Falls as part of the Class Environmental Assessment process for road upgrades, it may be necessary to implement temporary wildlife passage measures associated with minor road upgrades (e.g., new intersections leading into the community) being completed by GR (CAN), depending on the timing of the City-led road improvements. This should be considered at the detailed design stage for road improvements being completed by GR (CAN). Road elevation increases may be necessary to install wildlife eco-passages, so if the upgrades being contemplated by GR (CAN) present an opportunity or requirement to increase road grade in certain locations where road mortality risk is highest,

Table 12. Summary of EIS Commitments & Recommendations

ID Label	TOPIC	EIS RECOMMENDATION[1]
		installation of eco-passages (even if of a more temporary nature) should be considered to mitigate road mortality until such time as the full road upgrades are completed by the City.
viii) Best Management Practices		
BMP-1	**Construction Requirements**	Construction practice requirements will include erosion and sediment control, a spill prevention and response plan, etc. ESC measures will be designed during the detailed design stage and an ESC control plan will be prepared for agency review and approval. The plan will identify the proposed erosion and sedimentation control measures, phasing of construction, and monitoring requirements.
BMP-2	**Tree Saving Plan**	A Tree Saving Plan should be completed by a qualified arborist, at the site plan stage. The Tree Saving Plan will serve to identify suitable trees for retention within the development area. Trees selected for retention should be species that are relatively, tolerant of disturbance and that will not pose higher risk to human life or property.
BMP-3	**Rear Yard Fencing**	It is recommended that rear yards backing onto ecological buffers be fenced to deter landowner encroachment into the NHS (e.g., mowing, dumping of refuse).
BMP-4	**Pre-stressing West-facing Woodland Edges**	Proposed development will create new west-facing woodland edges that will be more susceptible to windthrow. Pre-stressing these edges is recommended to build the tolerance of the intended, new woodland edge to wind stress. In year 1, 20% of the trees within the removal area and within the margins of the future edge should be cut (including any trees deemed to be hazard trees). Cut trees should be felled and left within the feature to decay naturally. The next year, full vegetation removal can be completed (in the proposed removal area) to establish the new woodland edge.
BMP-5	**Directional Drilling Beneath Watercourse 2**	The proposed watermain crossing of WC2 will be installed by directional drilling and no open-cut construction methodologies will be employed. Standard design and construction mitigation for directionally drilled watermain installations beneath watercourses will be employed to prevent short-term impacts during construction and long-term impacts due to presence of the structure.
ix) Ecological Monitoring		
MON-1	**NHS Monitoring**	Monitoring is proposed to address planted, transplanted and retained vegetation communities, flora and fauna. A detailed monitoring plan, incorporating baseline monitoring, compliance monitoring during construction, post-construction effectiveness monitoring and post-construction performance monitoring will be prepared as a condition of Draft Plan Approval, in consultation with the City, Region and NPCA.

Notes

[1] This table summarizes all recommendations that remain relevant from the September 2017 EIS and associated March 2018, January 2019 and this current December 2019 EIS Addendums.

Appendix D – Ecological Data

ELC COMMUNITY DESCRIPTION & CLASSIFICATION

SITE: Riverside		POLYGON: 3 (CUW1)	
SURVEYOR(S): Zola Jesle	DATE: 12 April 2019	UTME:	
START:	END	UTMZ:	UTMN:

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☒ TERRESTRIAL	☐ ORGANIC	☐ LACUSTRINE	☐ NATURAL	☐ PLANKTON	☐ LAKE
☐ WETLAND	☒ MINERAL SOIL	☐ RIVERINE	☑ CULTURAL	☐ SUBMERGED	☐ POND
☐ AQUATIC	☐ PARENT MIN.	☒ BOTTOMLAND		☐ FLOATING-LVD.	☐ RIVER
	☐ ACIDIC BEDRK.	☐ TERRACE		☐ GRAMINOID	☐ STREAM
	☐ BASIC BEDRK.	☐ VALLEY SLOPE		☐ FORB	☐ MARSH
	☐ CARB. BEDRK.	☐ TABLELAND		☐ LICHEN	☐ SWAMP
		☐ ROLL. UPLAND		☐ BRYOPHYTE	☐ FEN
		☐ CLIFF		☒ DECIDUOUS	☐ BOG
		☐ TALUS		☐ CONIFEROUS	☐ BARREN
		☐ CREVICE / CAVE		☐ MIXED	☐ MEADOW
		☐ ALVAR			☐ PRAIRIE
		☐ ROCKLAND			☐ THICKET
		☐ BEACH / BAR			☐ SAVANNAH
		☐ SAND DUNE			☑ WOODLAND
		☐ BLUFF			☐ FOREST
					☐ PLANTATION

SITE	COVER
☐ OPEN WATER	☐ OPEN
☐ SHALLOW WATER	☐ SHRUB
☒ SURFICIAL DEP.	☑ TREED
☐ BEDROCK	

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY	1-2	3	see table at right
2	SUB-CANOPY	2	2	
3	UNDERSTOREY	3	4	
4	GRD. LAYER	6-7	1	

HT CODES: 1 = >25 m 2 = 10<HT≤25 m 3 = 2<HT≤10 m 4 = 1<HT≤2 m 5 = 0.5<HT≤1 m 6 = 0.2<HT≤0.5 m 7 = HT<0.2 m

CVR CODES 0= NONE 1= 0% < CVR ≤ 10% 2= 10 < CVR ≤ 25% 3= 25 < CVR ≤ 60% 4= CVR > 60%

STAND COMPOSITION:		BA:

SIZE CLASS ANALYSIS:		< 10	O	10 - 24	O	25 - 50	R	> 50
STANDING SNAGS:		< 10	O	10 - 24	O	25 - 50		> 50
DEADFALL / LOGS:	O	< 10	O	10 - 24		25 - 50		> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE :		PIONEER		YOUNG	√	MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE: Clay-Loam	DEPTH TO MOTTLES / GLEY	g = 40cm	G=
MOISTURE:	DEPTH OF ORGANICS:	/	(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:	/	(cm)

COMMUNITYCLASSIFICATION:

COMMUNITY CLASS:	CODE:
COMMUNITY SERIES:	CODE:
ECOSITE:	CODE:
VEGETATION TYPE: Poplar Cultural Woodland	CODE: CUW1
INCLUSION	CODE:
COMPLEX	CODE:

Notes:
Dense, tall (3-5 m) shrub layer.
Largest trees are cottonwood.

ELC PLANT SPECIES LIST

SITE:	
POLYGON:	
DATE:	
SURVEYOR(S):	

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL.
Populus deltoides	O	O	O		
Frax. pennsyl.		O	O		
Ulmus americ.		R			
Fagus grandif.		R			
Betulus grandid.	R		R		
Celtis occid.			R		
Rhamn. cath.			D		
Cornus foemina			O		
Rosa multif.			R		
Vitis riparia			O		

SPECIES CODE	LAYER 1	2	3	4	COLL.
Aster lateriff.					
Frag. virgin.					
Carex sp.					
Gramineae					

ELC COMMUNITY DESCRIPTION & CLASSIFICATION

SITE: Riverside		POLYGON: 4 (CUT1)	
SURVEYOR(S): Zoladeski	DATE: 12 April 2019	UTME:	
START:	END	UTMZ:	UTMN:

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☒ TERRESTRIAL	☐ ORGANIC	☐ LACUSTRINE	☐ NATURAL	☐ PLANKTON	☐ LAKE
☐ WETLAND	☒ MINERAL SOIL	☐ RIVERINE	☒ CULTURAL	☐ SUBMERGED	☐ POND
☐ AQUATIC	☐ PARENT MIN.	☒ BOTTOMLAND		☐ FLOATING-LVD.	☐ RIVER
	☐ ACIDIC BEDRK.	☐ TERRACE		☐ GRAMINOID	☐ STREAM
	☐ BASIC BEDRK.	☐ VALLEY SLOPE		☐ FORB	☐ MARSH
	☐ CARB. BEDRK.	☐ TABLELAND		☐ LICHEN	☐ SWAMP
		☐ ROLL. UPLAND		☐ BRYOPHYTE	☐ FEN
		☐ CLIFF		☒ DECIDUOUS	☐ BOG
		☐ TALUS		☐ CONIFEROUS	☐ BARREN
		☐ CREVICE / CAVE		☐ MIXED	☐ MEADOW
		☐ ALVAR			☐ PRAIRIE
		☐ ROCKLAND			☒ THICKET
		☐ BEACH / BAR			☐ SAVANNAH
		☐ SAND DUNE			☐ WOODLAND
		☐ BLUFF			☐ FOREST
					☐ PLANTATION

SITE	COVER
☐ OPEN WATER	☐ OPEN
☐ SHALLOW WATER	☒ SHRUB
☒ SURFICIAL DEP.	☐ TREED
☐ BEDROCK	

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY	2	1	see table at right
2	SUB-CANOPY	3	1	
3	UNDERSTOREY	3-4	4	
4	GRD. LAYER	6-7	1	

HT CODES: 1 = >25 m 2 = 10<HT≤25 m 3 = 2<HT≤10 m 4 = 1<HT≤2 m 5 = 0.5<HT≤1 m 6 = 0.2<HT≤0.5 m 7 = HT<0.2 m

CVR CODES 0= NONE 1= 0% < CVR ≤ 10% 2= 10 < CVR ≤ 25% 3= 25 < CVR ≤ 60% 4= CVR > 60%

STAND COMPOSITION:			BA:

SIZE CLASS ANALYSIS:	O	< 10	R	10 - 24		25 - 50		> 50
STANDING SNAGS:		< 10	R	10 - 24	R	25 - 50		> 50
DEADFALL / LOGS:	O	< 10		10 - 24		25 - 50		> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE :		PIONEER		YOUNG	✓	MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE: Clay	DEPTH TO MOTTLES / GLEY	g = 35cm	G=
MOISTURE:	DEPTH OF ORGANICS:		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:		(cm)

COMMUNITYCLASSIFICATION:

COMMUNITY CLASS:	CODE:
COMMUNITY SERIES:	CODE:
ECOSITE:	CODE:
VEGETATION TYPE: Buckthorn-Hawthorn Cultural Thicket	CODE: CUT1
INCLUSION	CODE:
COMPLEX	CODE:

Notes:
Tall thicket of densely growing Buckthorn and Hawthorn (4-6m). Sparse tree cover of mostly dead standing ash.

ELC PLANT SPECIES LIST

SITE:	
POLYGON:	
DATE:	
SURVEYOR(S):	

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL.
Ilex verti. (most dead)	R	O	O		
Ulmus amer.		R			
Rhamn. cath.			A		
Crataegus sp.			A		
Cornus foemina			O		
Cornus stolon.			R		

SPECIES CODE	LAYER 1	2	3	4	COLL.
Carex sp.				R	
Graminae				O	
Prunella vulg.				O	
Frag. virginiana				O	
Aster of lateriflo.				D	
Geum canad.				R	

ELC COMMUNITY DESCRIPTION & CLASSIFICATION

SITE: Riverside		POLYGON: 1 (SWT2)	
SURVEYOR(S): C. Zoladeski	DATE: 12 April 2019	UTME:	
START:	END	UTMZ:	UTMN:

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☐ TERRESTRIAL	☐ ORGANIC	☐ LACUSTRINE	☒ NATURAL	☐ PLANKTON	☐ LAKE
☒ WETLAND	☒ MINERAL SOIL	☐ RIVERINE	☐ CULTURAL	☐ SUBMERGED	☐ POND
☐ AQUATIC	☐ PARENT MIN.	☒ BOTTOMLAND		☐ FLOATING-LVD.	☐ RIVER
	☐ ACIDIC BEDRK.	☐ TERRACE		☐ GRAMINOID	☐ STREAM
	☐ BASIC BEDRK.	☐ VALLEY SLOPE		☐ FORB	☐ MARSH
	☐ CARB. BEDRK.	☐ TABLELAND		☐ LICHEN	☒ SWAMP
		☐ ROLL. UPLAND		☐ BRYOPHYTE	☐ FEN
		☐ CLIFF		☒ DECIDUOUS	☐ BOG
		☐ TALUS		☐ CONIFEROUS	☐ BARREN
		☐ CREVICE / CAVE		☐ MIXED	☐ MEADOW
		☐ ALVAR			☐ PRAIRIE
		☐ ROCKLAND			☐ THICKET
		☐ BEACH / BAR			☐ SAVANNAH
		☐ SAND DUNE			☐ WOODLAND
		☐ BLUFF			☐ FOREST
					☐ PLANTATION

SITE	COVER
☐ OPEN WATER	☐ OPEN
☐ SHALLOW WATER	☒ SHRUB
☐ SURFICIAL DEP.	☐ TREED
☐ BEDROCK	

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY	2	1	see table at right
2	SUB-CANOPY	3	2	
3	UNDERSTOREY	3-4	4	
4	GRD. LAYER	6-7	1	

HT CODES: 1 = >25 m 2 = 10<HT≤25 m 3 = 2<HT≤10 m 4 = 1<HT≤2 m 5 = 0.5<HT≤1 m 6 = 0.2<HT≤0.5 m 7 = HT<0.2 m

CVR CODES 0= NONE 1= 0% < CVR ≤ 10% 2= 10 < CVR ≤ 25% 3= 25 < CVR ≤ 60% 4= CVR > 60%

STAND COMPOSITION:							BA:
SIZE CLASS ANALYSIS:	A	< 10	O	10 - 24	R	25 - 50	> 50
STANDING SNAGS:	O	< 10	O	10 - 24	O	25 - 50	> 50
DEADFALL / LOGS:	O	< 10	O	10 - 24		25 - 50	> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE :		PIONEER		YOUNG	✓	MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE: Clay	DEPTH TO MOTTLES / GLEY	g = 25cm	G=
MOISTURE:	DEPTH OF ORGANICS:		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:		(cm)

COMMUNITYCLASSIFICATION:

COMMUNITY CLASS:	CODE:
COMMUNITY SERIES:	CODE:
ECOSITE:	CODE:
VEGETATION TYPE: Buckthorn-Ash Mineral Thicket Swamp	CODE: SWT2
INCLUSION	CODE:
COMPLEX	CODE:

Notes:
Tall thicket of buckthorn and G. Ash saplings. Scattered tree presence of ash trees, but mostly dead. Extensive carpet of moss.

ELC PLANT SPECIES LIST

SITE:	
POLYGON:	
DATE:	
SURVEYOR(S):	

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL.
Frax. pennsyl. (mostly dead)	R	O	A		
Rhamn. cathar.			D		
Vitis riparia			O		
Cornus foemina			O		
Cornus stolon.			O		
Toxicod. radicans			O		

SPECIES CODE	LAYER 1	2	3	4	COLL.
Taraxac. offic.				O	
Fraq. virgin.				O	
Graminae				O	
Aster lanceol.				O	
Solidago sp.				O	
Carex sp.				R	
Moss (extensive)				D	

Waterpooling in tiny depressions amongst moss carpet

ELC COMMUNITY DESCRIPTION & CLASSIFICATION

SITE: Riverside		POLYGON: 2 (SWT2)	
SURVEYOR(S): E. Zoladeski	DATE: 12 April 2019		UTME:
START:	END	UTMZ:	UTMN:

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☐ TERRESTRIAL	☐ ORGANIC	☐ LACUSTRINE	☐ NATURAL	☐ PLANKTON	☐ LAKE
☐ WETLAND	☐ MINERAL SOIL	☐ RIVERINE	☐ CULTURAL	☐ SUBMERGED	☐ POND
☐ AQUATIC	☐ PARENT MIN.	☐ BOTTOMLAND		☐ FLOATING-LVD.	☐ RIVER
	☐ ACIDIC BEDRK.	☐ TERRACE		☐ GRAMINOID	☐ STREAM
	☐ BASIC BEDRK.	☐ VALLEY SLOPE		☐ FORB	☐ MARSH
	☐ CARB. BEDRK.	☐ TABLELAND		☐ LICHEN	☐ SWAMP
		☐ ROLL. UPLAND		☐ BRYOPHYTE	☐ FEN
		☐ CLIFF		☐ DECIDUOUS	☐ BOG
		☐ TALUS		☐ CONIFEROUS	☐ BARREN
		☐ CREVICE / CAVE		☐ MIXED	☐ MEADOW
		☐ ALVAR			☐ PRAIRIE
		☐ ROCKLAND			☐ THICKET
		☐ BEACH / BAR			☐ SAVANNAH
		☐ SAND DUNE			☐ WOODLAND
		☐ BLUFF			☐ FOREST
					☐ PLANTATION

SITE	COVER
☐ OPEN WATER	☐ OPEN
☐ SHALLOW WATER	☐ SHRUB
☐ SURFICIAL DEP.	☐ TREED
☐ BEDROCK	

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY	2	1	see table at right
2	SUB-CANOPY	3	1	
3	UNDERSTOREY	3-4	4	
4	GRD. LAYER	6	1	

HT CODES: 1 = >25 m 2 = 10<HT≤25 m 3 = 2<HT≤10 m 4 = 1<HT≤2 m 5 = 0.5<HT≤1 m 6 = 0.2<HT≤0.5 m 7 = HT<0.2 m

CVR CODES 0= NONE 1= 0% < CVR ≤ 10% 2= 10 < CVR ≤ 25% 3= 25 < CVR ≤ 60% 4= CVR > 60%

STAND COMPOSITION:	BA:

SIZE CLASS ANALYSIS:		< 10		10 - 24		25 - 50		> 50
	A		R		R			
STANDING SNAGS:		< 10	R	10 - 24		25 - 50		> 50
DEADFALL / LOGS:	O	< 10	O	10 - 24	R	25 - 50		> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE :		PIONEER		YOUNG	✓	MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE: Clay	DEPTH TO MOTTLES / GLEY	g = 10cm	G=
MOISTURE:	DEPTH OF ORGANICS: /		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK: /		(cm)

COMMUNITYCLASSIFICATION:

COMMUNITY CLASS:		CODE:
COMMUNITY SERIES:		CODE:
ECOSITE:		CODE:
VEGETATION TYPE: Buckthorn - Ash Mineral Thicket Swamp		CODE: SWT2
INCLUSION		CODE:
COMPLEX		CODE:

Notes: Most, if not all, ash layer + med. size trees Dead. This has effectively turned this community into a tall (4-6m) thicket.

ELC PLANT SPECIES LIST

SITE:	
POLYGON:	
DATE:	
SURVEYOR(S):	

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL.
Frax. pennsyl. (dead)	O	O	A		
Quercus bicolor		R	R		
Quercus palustris		R			
Ulmus americ.			R		
Rhamn. cath.			D		
Cornus stolonif.			O		
Rhus typhina			A		
→ Viburnum edule			R		
Toxicod. radicans			O		

SPECIES CODE	LAYER 1	2	3	4	COLL.
Onoclea sensit.				OA	
Gramineae				O	
Fraq. virgin.				O	
Solidago sp.				O	
Prunella vulg.				O	
Aster cf laterif.				O	
Carex sp.				O	
Aster lenceol.				O	

Shallow water pools in network of channels.

High moss cover.

In addition to naturally fallen trees, signs of past logging - rotting stumps.

Administrative Information

PROJECT NAME	DATE	ROUND	START TIME	END TIME	OBSERVER(S)
Riverfront	Apr 18, 2019	1	05:22 pm	05:32 pm	LW MG

Weather Conditions

CLOUD COVER (%)	TEMPERATURE (°C)	WIND	PRECIPITATION	HUMIDITY (%)
84%	22	1 Light Air (1-5 km…	None	53%

Station Information

STATION ID	STATION DIRECTION	UTM	WATER PRESENCE	WATER DEPTH
SWDVP2	East	653967.6 E 4768373.0 N	Yes	Type water depth

Call Count

	In		Out	
SPECIES	CC	QTY	CC	QTY
CHFR	2: Calls overlap each other, b…	17		0
AMTO	1: Males can be counted indi…	1		0
		0		0

Add Row

Species Alerts/Incidentals

Add incidental

Edit

COMMON OR LATIN NAME	QTY
	0

Add Row

Other Comments

Type comments for future reference

Administrative Information

PROJECT NAME	DATE	ROUND	START TIME	END TIME	OBSERVER(S)
Riverfront	May 27, 2…	2	09:52 pm	09:55 pm	LW MG

Weather Conditions

CLOUD COVER (%)	TEMPERATURE (°C)	WIND	PRECIPITATION	HUMIDITY (%)
100%	18	1 Light Air (1-5 km…	None	61%

Station Information

STATION ID	STATION DIRECTION	UTM	WATER PRESENCE	WATER DEPTH
SWDVP2	South East	653967.6 E 4768373.0 N	Yes	10-15

Call Count

	In		Out	
SPECIES	CC	QTY	CC	QTY
GRTR	1: Males can be counted indi…	4		
AMTO	1: Males can be counted indi…	1		
GRFR	(X)		1: Males can be counted indi…	2

Add Row

Species Alerts/Incidentals

Add incidental

Edit

COMMON OR LATIN NAME	QTY

Add Row

Other Comments

GRFR heard to the NE

Administrative Information

PROJECT NAME	DATE	ROUND	START TIME	END TIME	OBSERVER(S)
Riverfront	Jun 19, 2019	3	11:41 pm	11:44 pm	LW MG

Weather Conditions

CLOUD COVER (%)	TEMPERATURE (°C)	WIND	PRECIPITATION	HUMIDITY (%)
72%	20	1 Light Air (1-5 km…	None	76%

Station Information

STATION ID	STATION DIRECTION	UTM	WATER PRESENCE	WATER DEPTH
SWDVP2	South East	653967.6 E 4768373.0 N	Yes	Type water depth

Call Count

	In		Out	
SPECIES	CC	QTY	CC	QTY
GRTR	(X)		2: Calls overlap each other, b…	7
GRFR	(X)		1: Males can be counted indi…	4

Add Row

Species Alerts/Incidentals

Add incidental

Edit

COMMON OR LATIN NAME	QTY

Add Row

Other Comments

Out calls: from wetland to the NW.

Appendix E - Conceptual Ecological Restoration Plan

SAVANTA

Riverfront Residential Natural Heritage System

Conceptual Ecological Restoration Plan

DECEMBER 2019

SAVANTA
A GEI Company

Riverfront Residential Natural Heritage System

Conceptual Ecologial Restoration Plan

REPORT PREPARED FOR
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Table of Contents

1.0 INTRODUCTION

This Conceptual Ecological Restoration Plan (CERP) provides details regarding the impact mitigation, restoration and enhancement program associated with the proposed Riverfront Residential development. This Plan has been prepared as input to the successful establishment of a viable Settlement Area NHS. The limits of the GR (CAN) Riverfront Residential lands are depicted on **Figure 1** (**Appendix A**).

The establishment of an NHS in a Settlement Area requires an understanding of a number of important objectives, including the need for:

- Long Term Core Natural Area Protection;
- Appropriate Linkages and Connections;
- Viability and Sustainability of Natural Features and Functions; and
- Compatibility and Integration with Healthy, Livable and Safe Communities.

This CERP provides more detail regarding how these NHS and ecological objectives will be achieved. These measures have considered the need to create refugia for species and habitats that may be affected by aspects of climate change (e.g., those that are less tolerant to extended periods of drought). Specific consideration was also given to the importance of better understanding, integrating and managing relationships and interactions amongst community residents, visitors and the NHS. Rather than an NHS serving simply as a repository for nature conservation, fenced off and managed with limited human access, it is important to consider an NHS in terms of a resource that interacts with and contributes to healthy communities.

The proposed Riverfront NHS includes a variety of natural heritage feature types, including: provincially significant wetland, significant wildlife habitat, significant woodlands, and habitat of threatened and endangered species. As explained in the Riverfront Residential Block Plan EIS (cover document to this Appendix), the limits of the development footprint avoid and minimize impacts to significant natural features and associated functions and concentrate proposed development in areas of greater disturbance, where vegetation communities and fauna assemblages are generally reflective of highly altered soil/topographic conditions. Ecological enhancement and restoration opportunities have been developed with an understanding of the current and historic ecological features and functions within the Subject Lands.

This CERP addresses the retention, restoration and enhancement of biodiversity, and the promotion of a viable and sustainable NHS. This will be achieved through the: creation of a variety of habitats (general and specialized); establishment of protective and restored buffers; propagation and increase in populations of species at risk; and the development and integration of a Wetland Discovery Centre. That Centre will in part manage access to the NHS, while at the same time educating community residents and visitors of the important benefits we derive from natural areas (i.e., ecosystem goods and services).

The objectives of this Conceptual Ecological Restoration Plan are defined in detail in **Table 1** (**Appendix B**) and are summarized in the following list:

- Create a viable, connected NHS with appropriate core natural areas, linked together in a manner to support internal and external ecological connections;

- Ensure the NHS is adapted to Settlement Area conditions and that it possesses a level of resilience in the face of climate change;
- Enhance retained woodlands and wetlands through invasive species management and native plantings;
- Protect and enhance Species at Risk habitat and significant wildlife habitat;
- Create habitat to serve the life processes of turtles, open-wetland amphibian species and odonates; and
- Implement measures to manage post-development human use and associated potential impacts.

Details regarding the project background/history, existing ecological conditions, impact assessment and associated mitigation are provided in the Riverfront Residential EIS Addendum (cover document to this Appendix). Section 2 of this CERP summarizes existing conditions on the Subject Lands, both within the proposed development areas and within the retained NHS where restoration activities are proposed to occur. Restoration areas are illustrated on **Figure 2** (**Appendix A**) and are described in sections 3 to 5. The proposed Riverfront Wetland Discovery Centre and a Native Plant Nursery are discussed in sections 6 and 7, respectively.

2.0 EXISTING ECOLOGICAL CONDITIONS

2.1 Background

The following studies were referenced in the preparation of this CERP:

- Preliminary Natural Heritage Characterization (Draft), Thundering Waters Secondary Plan, Dougan & Associate November 2015;
- Characterization and Environmental Impact Study, Thundering Waters Secondary Plan, Dougan & Associates June 2016;
- Response to Peer Review Comments, Dougan & Associates July 27, 2016;
- Environmental Impact Study, Savanta Inc. September 2017;
- Environmental Impact Study Addendum, Riverfront Community OPA, Savanta Inc. March 2018; and
- Riverfront Residential Environmental Impact Study, Addendum to March 2018 EIS, Savanta Inc. January 2019.

2.2 Physical Setting

The Subject Lands are situated in the Haldimand Clay physiographic region (Chapman and Putnam 1984). The Lower Welland River and South Niagara Falls watersheds generally possess low groundwater vulnerability due to the thick deposits of the Haldimand Clay Plain (NPCA 2012), resulting in poorly drained lands. The surface horizons range from 15 cm to 20 cm deep and have a clay loam to clay texture while subsoils are heavy clay.

2.3 Biological Setting

The Subject Lands occur within the Carolinian or Deciduous Forest Zone, at the northern geographic limit of many warmer climate vegetation species. Dominant upland vegetation communities found within this zone include maple-beech-elm- basswood and butternut-chestnut-white ash-black cherry. The lowland vegetation communities in the Carolinian or Deciduous Forest Zone are dominated by single species such as white cedar, willow, tamarack, alder, red or silver maple or black ash (Rowe 1972). There are also a variety of locally rare species known in the vicinity of the Subject Lands, including Black Gum (*Nyssa sylvatica*) and Pignut Hickory (*Carya glabra*).

2.3.1 Ecological Land Classification and Botanical Inventory

2.3.1.1 Existing Vegetation Communities

The Subject Lands contain a mix of natural and disturbed features, the former being associated with older woodlands which exhibit the typical slough ridge topography associated with the Haldimand Clay Plain. Within the Subject Lands, the more intact forest cover is concentrated in the oak mineral deciduous swamps (SWD1) located within the NHS (based upon historical aerial photograph review). These more intact forested areas exhibit relatively fewer signs of disturbance aside from some trails, debris disposal and some evidence of hunting.

The proposed development area exhibits a relatively higher degree of disturbance, with evidence of

substantial grading and filling associated with the historic alteration of the original Welland River alignment, fill deposition from the creation of the Chippawa Power Canal and the Conrail Drain, the rail line installation and operation, and associated deforestation. Broad areas of disturbed lands include an early successional matrix of cultural woodland (in-decline due to Emerald Ash Borer), cultural thicket, and old-field meadows. The cultural woodland and cultural thicket areas contain abundant Common Buckthorn, which is a highly invasive shrub species.

There is one provincially rare vegetation community within the Oak Mineral Deciduous Swamp (SWD1) within the NHS. Buttonbush Mineral Deciduous Thicket Swamp (SWT2-4) occurs as small inclusions within some sections of slough inside the SWD1, specifically occupying some sections of slough within the swamp. SWT2-4 is provincially rare (S3) and apparently secure at the global level (G4; NHIC 2018). This rare vegetation community will be retained and can serve as a potential location for the sustainable harvest of propagules (e.g., seeds, cuttings).

2.3.1.2 Plant Species and Habitats

One Species at Risk plant was found on the Subject Lands, outside the development area: Dense Blazing Star (*Liatris spicata var. spicata*), which is Threatened in Ontario and Canada. This species does not occur naturally in Niagara and populations in this area are considered introduced (Oldham 2010). This species is being addressed with the Ministry of Environment, Conservation and Parks (MECP) to ensure all requirements under the *Endangered Species Act, 2007* are satisfied.

Two provincially rare plants occur in the retained NHS:

- Schreber's Aster (*Eurybia schreberi)* - S2, G4 (NHIC 2018), located in the large oak mineral deciduous swamp (SWD1) in the centre of the Subject Lands; and
- Honey-locust (*Gleditsia triacanthos*) – S2?, G5 (NHIC 2018), located in the oak mineral deciduous swamp (SWD1) within a ravine at the east end of the Subject Lands.

One provincially rare plant occurs in the proposed west development area: Great Plains Ladies'-tresses (*Spiranthes magnicamporum*) (S3? G4; NHIC 2018). This species was found in open, early-successional vegetation communities on disturbed soils.

Various significant wildlife habitat types specific to provincially rare plants and rare vegetation communities/older growth forest, are present within the retained NHS. The only SWH type present within the proposed residential area is the rare species SWH type, based on the presence of Great Plains Ladies'-tresses.

Three other species with a high coefficient of conservatism (values of 9 or 10) were recorded within the Subject Lands: Pin Oak (*Quercus palustris)*, Elk Sedge (*Carex garberi*), and Drooping Sedge (*Carex prasina*). The latter two species occur only within significant wetland units that will be retained. Pin Oak occurs within a variety of the retained vegetation types and some Pin Oak stems occur within the proposed development areas. A Tree Saving Plan, completed by a qualified arborist, will identify Pin Oak stems suitable for retention within the Riverfront Residential area.

As detailed in the EIS, a variety of locally rare plant species occur within the retained significant wetlands, with some species occurring both within PSW units and within proposed development areas. Five locally rare (Oldham 2010) plant species, listed below, occur on the Subject Lands only within ELC polygons that are proposed for partial or complete removal. Mitigation measures are

provided in the EIS and summarized below. Further detail is provided in section 5 regarding flora salvage.

- Great Plains Ladies'-tresses – transplant to secure, permanent native meadow;
- Creeping Spike-rush (*Eleocharis palustris)* – transplant individuals in the native FOD8-1 community and collect and distribute seed in appropriate habitat from other communities*;*
- American Plum (*Prunus americana*) – plant nursery stock;
- Woolly Sedge (*Carex pellita*) – collect and distribute seed in appropriate habitat;
- Finely-nerved Sedge (*Carex loptonervia*) – collect and distribute see in appropriate habitat; and
- Yellow Indian-grass (*Sorghastrum nutans*) – include this species in groundcover terraseed mix to be applied in native meadow restoration areas.

2.3.2 Wildlife Species and Habitats

The EIS provides a detailed account of Species at Risk (SAR) and species of conservation concern. In summary, nine Species at Risk (SAR) fauna were recorded within the Subject Lands:

- Little Brown Myotis *(Myotis lucifugus)* – Endangered in Ontario and Canada;
- Northern Myotis (*Myotis septentrionalis*) – Endangered in Ontario and Canada;
- Small-footed Myotis (*Myotis leibii)* – Endangered in Ontario and Canada;
- Acadian Flycatcher (*Empidonax virescens*) – Endangered in Ontario and Canada;
- Barn Swallow (*Hirundo rustica*) – Threatened in Ontario and Canada;
- Monarch (*Danaus plexippus*) – Special Concern in Ontario and Endangered in Canada;
- Wood Thrush (*Hylocichla mustelina*) – Special Concern in Ontario and Threatened in Canada; and
- Eastern Wood-Pewee (*Contopus virens*) – Special Concern in Ontario and Canada; and
- Snapping Turtle (*Chelydra serpentina*) – Special Concern in Ontario and Canada.

Special Concern species are addressed as part of significant wildlife habitat analysis, which is summarized briefly below. Threatened and Endangered species are being addressed with the MECP to ensure that all requirements under the *Endangered Species Act, 2007* are satisfied.

A variety of significant wildlife habitat types specific to fauna are present within the retained NHS. As discussed in the EIS, no SWH types for fauna are present within the proposed development areas.

Four fauna species recorded on the Subject Lands are considered locally rare (NPCA 2010):

- Tufted Titmouse *(Baeolophus bicolor);*
- Yellow-throated Vireo *(Vireo flavifrons);*
- Acadian Flycatcher *(Empidonax virescens);* and
- Blue-spotted Salamander (*Ambystoma laterale*).

These four, wildlife species were recorded within retained wetlands/woodlands. Low numbers of Blue-

spotted Salamander were also recorded within portions of the proposed west development during early spring movement between overwintering habitat and breeding areas (no suitable breeding habitat is present within the proposed development areas).

2.3.3 Vegetation/Habitat Proposed for Removal

Development of the Subject Lands has been planned in a manner that avoids removal of significant wetlands and minimizes the removal of significant woodland and significant wildlife habitat.

Removal of rare species SWH for the provincially rare plant Great Plains Ladies'-tresses is proposed – this species' occurrence overlaps with portions of the west development area and it will not be sustained as thicket and woodland cover succeeds over the disturbed meadow. A transplantation and propagation program is proposed to relocate and expand this plant population into a permanently secure, native meadow restoration area inside the NHS. This meadow will be managed to prevent/halt successional advancement, allowing the species to persist over the long term.

A portion of significant woodland (6.86 ha) is proposed for removal. This area is primarily comprised of cultural woodland in severe/advancing decline due to loss of the tree canopy layer to Emerald Ash Borer, and the invasion of the understory by the exotic shrub Common Buckthorn. These cultural woodland patches will not meet significant woodland criteria in the near-term (two to five years) due to the loss of tree density in these ash-dominated areas. Woodland restoration is proposed to demonstrate no negative impact.

Below, a summary is provided of the area of vegetation types proposed for removal to implement this development:

- Cultural woodland in declining health that will not meet significance criteria in the near-term: 6.60 ha;
- Poplar Deciduous Forest (FOD8-1): 0.26 ha;
- Treed patches that do not meet significant woodland criteria under existing conditions (certain cultural woodland and cultural plantation patches): 0.70 ha; and
- Early successional vegetation (cultural thicket, cultural meadow, disturbed cultural meadow): 29.58 ha.

The restoration areas within the NHS target the replacement of low-quality Common Buckthorn/Hawthorn shrub thickets – situated adjacent to retained natural features - with the establishment of the vegetation community types listed below. These restoration trajectories are intended to establish over the next five to 30 years. The restoration treatment types are described in detail in section 3 and **Appendix B** and include woodland restoration treatments (types WR1 to WR5), native meadow restoration treatments (types NM1 to NM3), and the creation of two open wetlands. In addition, buffer planting treatments (types BP1 and BP2) are proposed for two PSWs located outside of OPA 128 on other lands owned by the applicant that front the proposed development. Those restoration treatments include:

- Woodland restoration areas (WR1 to WR5): 8.06 ha;
- Permanent native meadow restoration areas (NM1 to NM3): 2.79 ha;
- Created open wetlands: 0.16 ha (final size to be determined through refinement at the stormwater management plan stage based on water availability to sustain each wetland); and

- Buffer plantings on other lands owned by the applicant (BP1 and BP2): 1.75 ha.

Woodland restoration areas may be subject to refinement following completion of detailed design of Low Impact Development (LID) measures that are proposed for installation in some woodland/wetland buffer areas to assist in maintaining water quality and quantity within wetlands. Woodland restoration will not be possible where LID measures are installed, although it is anticipated that LID measures will occupy <2% of the overall buffer area. Subject to the magnitude of LID measure requirements, woodland restoration areas may need to be added.

3.0 ECOLOGICAL RESTORATION AREAS & TREATMENT TYPES

Restoration areas have been identified where the tree canopy layer has died back, is in a stage of severe/advancing decline due to Emerald Ash Borer (EAB), and/or Common Buckthorn warrants management. The decline and/or absence of the forest canopy layer has facilitated the establishment and spread of shrub thicket in the understory that contains a high density of Common Buckthorn (*Rhamnus cathartica*) and, to a lesser extent, Glossy Buckthorn (*Rhamnus frangula*). Both of these shrub species are highly invasive (Category 1 invasive; Urban Forest Associates 2002). Without intervention, the rapid decline of the Ash canopy layer on the Subject Lands and the abundance of Common Buckthorn will continue to hamper the establishment of healthy, native forest cover in these areas.

The restoration measures outlined in this plan are designed to help establish an ecological trajectory that favours the recovery of native woodland and meadow communities. Woodland and native meadow restoration areas are illustrated on **Figure 3** (**Appendix A**). Restoration within these areas will occur in two phases. Multi-year Common Buckthorn management will be conducted first to remove/control this highly invasive shrub and then native plantings will be installed. The following sections outline the approaches proposed for Common Buckthorn management and for native plant re-establishment. Additional measures are then discussed regarding to limit disturbance within the restoration areas and adjacent, retained woodlands/wetlands.

3.1 Common Buckthorn Management

The following characteristics of Common Buckthorn were considered when selecting suitable treatment options to manage this invasive species within the restoration areas:

- The high invasive success of Common Buckthorn is largely attributed to its high metabolic rate and litter production facilitating the relatively rapid transformation of its growing environment. Common Buckthorn uses allelopathic properties to alter soil nitrogen concentrations (CVC 2016). This is accomplished through the development of leaves with high nitrogen content that allow Common Buckthorn to accelerate rates of photosynthesis and growth. Common Buckthorn further extends its growing season through the use of an early leaf flush and late leaf drop (University of Minnesota 2016). The nitrogen-rich leaf litter often decomposes and can destroy fungi, beneficial to other plant species, causing a shift in ecosystem processes (MDNR 2012; Knight et al. 2007).

- Juglone, an allelopathic chemical used by members of the *Juglandaceae* family (species include Black Walnut and Butternut trees), has toxic properties that affect adjacent vegetation. One symptom of exposure to Juglone in susceptible plants is respiratory inhibition leading to decreased metabolic activity. Depending on the sensitivity of the plant species, respiratory inhibition can result in stunted growth, wilting or death (Pascoe 2002). Common Buckthorn is not tolerant of Juglone, therefore, the application of Juglone-containing mulch to removal sites may further discourage the recolonization of Common Buckthorn if used in conjunction with Juglone-tolerant, native shrub underplantings.

- Well-established Common Buckthorn stands will contain a prolific seed bank; native underplantings will provide competition with this seed bank and, with time, create shading that can further reduce the colonization of Common Buckthorn (UTRCA 2016). In large treatment areas where a strategic approach may be required, fruit-bearing (female)

Common Buckthorn shrubs should be the highest priority for removal in order to combat further establishment of the seed bank. The female trees are best identified in late autumn when the fruits are readily visible. This step is then followed by the removal of male plants and re-treating any regrowth.

- The removal of Common Buckthorn in large, open environments is a multi-year process that can require several different removal techniques. Identifying the degree of treatment is guided by the Ontario Invasive Plant Council Best Management Practices for this species (Anderson 2012).

Management areas that will target Common Buckthorn are illustrated on **Figure 4** (**Appendix A**). Two treatment types have been selected, both of which follow "The Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) Publication 75, Guide to Weed Control 2012-2013" (Anderson 2012). For both treatment types:

- All Common Buckthorn material is to be removed from the Subject Lands and landfilled;
- Ideally, Common Buckthorn treatment should occur in the spring (before native plant leaf out) or fall, however, treatment timing may be adjusted since MNRF requires that herbicide application in/near wetlands occur when no standing water is present;
- Following the first treatment, monitoring and repeated cutting/herbicide application will occur twice annually (if needed) for two to four years; and
- Native plants will be installed at the end of this period – detailed native planting prescriptions are provided for woodland restoration in **Table 2**, native meadow restoration in **Table 3**, and cover crops in **Table 5** (**Appendix B**).

Type 1 Common Buckthorn Treatment

Targeted areas for his treatment are illustrated by green-shaded areas on **Figure 4** (**Appendix A**): This approach is suited to areas with low to moderate Common Buckthorn density and/or in areas that are more ecologically sensitive. Type 1 treatment areas are located within: retained upland woodland patches; buffer lands within 7.5 m of a significant wetland boundary; and the entire 20 m buffer applied to the large Oak Mineral Deciduous Swamp (SWD1), in the centre of the Subject Lands.

The Type 1 approach retains existing, native vegetation to the extent feasible. Common Buckthorn stems are to be cut with chainsaws and then the cut stems are to be immediately treated with herbicide (glyphosate). For Common Buckthorn seedlings, a targeted foliar spray can be used (i.e., wicking method).

Select areas within the Type 1 treatment area will have Juglone-containing mulch or leaf litter applied within Common Buckthorn treatment sites to a depth of 25 cm to 30 cm.

Type 2 Common Buckthorn Treatment

Targeted areas for his treatment are illustrated by orange-shaded areas on **Figure 4** (**Appendix A**): The Type 2 treatment approach is well-suited to areas where the tree canopy layer is in severe/advancing decline (due to EAB) and where Common Buckthorn abundance is high. This approach relies upon heavy machinery. Type 2 treatment areas are located within: the outer half of significant wetland buffers (with the exception of the large SWD1 in the centre of the Subject Lands where only type 1 treatment is

applied); and all other restoration areas that do not meet the location criteria for the Type 1 treatment.

The majority of existing vegetation will be cleared, for the Type 2 approach, in order to provide effective Common Buckthorn control. Several protective measures are proposed as a result:

- A Tree Saving Plan will be completed by a qualified arborist within the Type 2 treatment areas to identify eligible native trees that are feasible to retain;
- Approved erosion and sediment control (ESC) fencing should be installed at the edge of the adjacent Type 1 treatment area (where existing, native vegetation is to be retained) prior to initiation of the Type 2 treatment; and
- The integrity of the ESC measures must be regularly monitored, particularly following storm events.

During the first year of treatment, stems are to be cut with heavy machinery and then herbicide (glyphosate) applied immediately to the cut stems. In open areas, mowing can be done if Common Buckthorn plants are less than two years of age. The treatment area will then be roto-tilled to partially bury the nitrogen-rich soil created by Common Buckthorn. Nitrogen-rich soil can encourage re-establishment of this and other invasive/exotic species. Ideally, deep-tilling would occur however the highly disturbed, clay soils would inhibit the effectiveness of this action.

Following the first year of treatment, mowing (followed by immediate application of herbicide to the cut stems) or foliar spray are two suitable options to address regrowth. A cover crop will be applied following each treatment to assist with Common Buckthorn seed bank competition. Cover crops are addressed in further detail in section 3.5.

3.2 Woodland Restoration

Cross-section examples of the proposing woodland restoration planting prescriptions are provided on **Figures 5a** to **5e** (**Appendix A**). Detailed native species planting lists and implementation notes are provided in **Table 2** (**Appendix B**) for each of the five woodland restoration treatment types. The proposed native plant assemblages have been tailored to suit adjacent, retained features along with available light, soil and growing conditions. Since the tree canopy and herbaceous layers will remain largely intact in the Common Buckthorn Type 1 treatment areas, in-planting of native trees and/or shrubs will occur where openings are created, and groundcover seed mix/cover crop will not be applied since the herbaceous layer will be largely retained. The Common Buckthorn Type 2 treatment areas will be planted with trees/shrubs, native groundcover and cover crop.

Juglone-containing mulch or standard mulch will be applied to a depth of 25 cm to 30 cm: (1) around tree/shrub in-plantings; and (2) within Common Buckthorn treatment Type 1 areas where larger openings are created due to the removal of larger nodes of this invasive shrub. Mulch serves to reduce vegetation competition while native plantings establish.

Tree seed collection/planting is also proposed for oak species (Red Oak, Pin Oak, Swamp White Oak) in targeted locations within certain woodland restoration areas (i.e., WR2 and WR3; **Table 2**, **Appendix B**). The success of oak seed planting would be improved by collecting acorns from mature specimens on-site since they are adapted to local growing conditions. The potential creation of a native plant nursery within the Riverfront Land Holdings (section 7) would serve to responsibly collect and store seed from mature specimens and propagate target tree, shrub and herbaceous species for use within restoration areas both on-site and, potentially, at future off-site restoration projects.

Woodland restoration will benefit a variety of significant wildlife habitat types, generalist and specialist species that utilize the Subject Lands, including woodland birds, calling amphibians and salamanders that rely on woodland breeding pools, bats, and overwintering deer. The protection of retained woodland/swamp features and improvements to woodland patch quality, size and shape are expected to benefit several Species at Risk, including Endangered bat species, Acadian Flycatcher, Wood Thrush and Eastern Wood-Pewee. Schreber's Aster, which is a provincially rare plant, is a woodland species that may also benefit over time as woodland area expands within the NHS.

3.3 Native Meadow Restoration

Permanent meadow restoration is proposed within areas that will be subject to the Common Buckthorn Type 2 treatment, which will clear existing vegetation. The purpose of native meadow restoration is to establish a restoration trajectory that favours the development of a diverse, resilient and self-supporting open vegetation community, that provides habitat for a variety of provincially and locally rare species, such as: Great Plains Ladies'-tresses, Dense Blazing Star, Yellow Indian-grass, Monarch, bees, other pollinators and fauna that utilize early successional areas. This community will be managed in favour of open native meadow over the long term to ensure species and communities dependent upon open native meadows are sustained in this post-development landscape.

The proposed native plant assemblages have been tailored to suit adjacent, retained features along with available light, soil and growing conditions. The groundcover seed mix used in the native meadow restoration area includes pollinator foraging/host plants, prairie associate species, and will be applied with a cover crop within the native meadow restoration areas. Flora salvage/transplant will also occur in targeted locations for Dense Blazing Star and Great Plains Ladies'-tresses, as explained in section 5.2. These transplanted species will be the subject of specialized propagation work (at the on-site native plant nursery), to continually increase the population size and extent of distribution.

Detailed native species planting lists and implementation notes are provided in **Table 3** (**Appendix B**) for the three types of meadow restoration treatments. A brief summary of each is offered below.

Native meadow treatment Type 1 (NM1) is the largest open habitat restoration area and will contain one created open wetland (discussed in section 3.4) and pockets of hummocky topography. These specialized features will hold water for variable lengths of time and over time, are expected to provide a diversity of microhabitats that will benefit an array of flora and fauna, including Great Plains Ladies'-tresses (NM1 is the primary, recommended transplant location proposed for this rare plant), Dense Blazing Star and prairie associate plants, pollinators, amphibians, turtles, butterflies and odonates. Native meadow treatment Type 2 (NM2) focuses on two wetland buffers that border the east development area. A different groundcover seed mix is prescribed in NM2 (compared to NM1) to reflect different soil conditions. A created wetland (section 3.4) is also proposed within NM2.

Native meadow treatment Type 3 (NM3) is situated within the open space/parkland of the proposed west development area. NM3 will also serve as a recommended transplant location for Great Plains Ladies'-tresses as it shares similar soils to the existing location. The groundcover seed mix applied to this area will include prairie associate grasses/flowering plants, such as Big Bluestem, so that the NM3 restoration areas can serve as public education examples of pollinator/prairie gardens. Interpretive signage is recommended to explain the value and unique character of these restoration areas. The edge of the NM3 treatment areas must be clearly defined so that grass mowing within the park does not infringe into the restoration areas. Since NM3 is proposed adjacent to the railway, dialogue with the rail operator is required to ensure plantings are compatible with their requirements.

3.4 Open Wetland Creation

Two created wetlands are proposed in order to augment limited open wetland breeding, foraging and overwintering habitat types for turtles and open-wetland amphibians. The created wetlands are proposed in the vicinity of two existing open aquatic ponds within the retained NHS that, based on baseline inventories, support SWH for open-wetland calling amphibians, overwintering turtles and Snapping Turtle (Special Concern in Ontario and Canada). This allows the created wetlands to also serve as refugia or stepping-stone habitats to facilitate movement of reptiles and amphibians across the local landscape within this north-south movement corridor of the NHS.

One created wetland is proposed within each of native meadow restoration treatment Types NM1 and NM2. The intent is for each wetland to support suitable overwintering habitat (i.e., ice-free conditions at the bottom of the pond during the winter) for turtles and open-wetland amphibians that hibernate aquatically (i.e., Bullfrog, Green Frog, Northern Leopard Frog).

Both created wetlands will be graded to contain a littoral zone, which will support meadow marsh vegetation that transitions to shallow aquatic marsh, and an open water zone. Planting details for the created wetlands are provided in **Table 4** (**Appendix B**). The selected herbaceous and shrub species will provide shelter, egg attachment sites, leaf litter, attract insects, and help regulate the temperature of the wetland. Installation of coarse woody debris (i.e., logs and large branches) will provide additional egg attachment sites and refugia.

The base of the created wetlands should be constructed of native clay soil with a 300 mm deep layer of hydric soil to support growth of moist-wet vegetation communities. Hydric soil exhibits the following characteristics:

- Thoroughly blended and friable, consisting of 45% sand, 35% silt and 20% clay;
- pH of 6.5 to 7.5;
- Bulk density of 951 kg/m^3 to 1069 kg/m^3;
- Minimum 12% organic matter and 3% organic carbon; and
- Free from subsoil, roots, vegetation, debris, toxic materials and stones over 50 mm in diameter.

The open water zone of each created wetland will contain one to two plunge pools that reach at least 1 m depth to provide suitable overwintering conditions, including during drier years. The open water areas should contain water through most or all of the year. Meadow marsh requires ephemeral flooding that lasts less than two weeks. Meadow marshes can dry to ground-level for much of the year, with saturated/moist soils within the rooting zone, outside of flooded events. The water inundation requirements of shallow aquatic marsh include:

- Maximum water depth - 60 cm;
- Average depth - 30 cm to 45 cm;
- Minimum depth - saturated soils (followed by flooded conditions);
- Inundation duration - return to average depth within about 40 days of flooding; and
- Duration of flooding - tolerant of frequent inundation (maximum water depth to saturated soil conditions), if left inundated greater than 2 years the vegetation community will change (i.e., to hybrid cattail or other species), a late summer drawdown period is recommended to encourage seed germination and avoid establishment of hybrid/glaucous cattail.

Ensuring that appropriate hydroperiod will be sustained in the created wetlands will be demonstrated at the stormwater management plan stage pre-development. The detail available at the stormwater management plan stage will also allow for the exact size of each created wetland and target vegetation community to be determined based on water availability.

3.5 Cover Crop Selection

The purpose of the cover crop is to: (1) provide prompt competition with non-native species during the Common Buckthorn removal period for the Type 2 treatment areas (**Figure 2**, **Appendix A**); and, (2) enable the native groundcover seed mix to establish over two to three years with reduced competition from non-native species.

At the end of the Common Buckthorn removal period, a cover crop will be included in the native groundcover seed mix. To improve success of the cover crop, seed planting windows must be adhered to and weekly watering should occur during peak summer periods. The recommended cover crop species are intolerant of drought conditions.

Recommended cover crop options are provided in **Table 5** (**Appendix B)**. Cover crop species choice depends on timing of planting. Each cover crop species has specific germination and growth requirements (i.e., growing degree days, temperature).

3.6 Buffer Plantings on Other Lands Owned by the Applicant (outside OPA 128)

Two PSW units and their associated 15 m buffer are located on other lands owned by the applicant east of Dorchester Road (outside of OPA 128) that will front the proposed development. A cross-section example of the proposing buffer planting prescriptions (BP1 and BP2) for these wetlands is provided on **Figure 5f** (**Appendix A**). Detailed native species planting lists and implementation notes are provided in **Table 6** (**Appendix B**). The proposed native plant assemblages have been tailored to suit adjacent, retained features along with available light, soil and growing conditions. Both of these 15 m wetland buffers will be subject to Common Buckthorn Type 1 treatment. Since the tree canopy and herbaceous layers will remain largely intact, in-planting of native trees and/or shrubs will occur where openings are created. Groundcover seed mix/cover crop will not be applied since the herbaceous layer will be largely retained.

3.7 Informal Site Access Control

The Subject Lands are presently subject to considerable recreational use by off-road vehicles. These activities risk introducing invasive seeds into restoration areas. The off-road vehicles may drive through restoration areas and disturb or destroy planted native stock. The use of fencing or armour stone/boulders at common informal access sites is recommended to limit access to the site by motorized vehicles.

The presence of deer overwintering habitat in the central portion of the Subject Lands (within retained woodland/swamp) may pose a challenge to the establishment of native vegetation with the restoration areas. Winter herbivory is more likely to result in the loss of planted woody stock. The use of wildlife exclusionary fencing may be warranted if monitoring identifies areas where considerable planted stock has been lost to herbivory. Monitoring is described in the EIS.

4.0 SPECIALIZED WILDLIFE HABITAT RESTORATION

4.1 Turtle and Amphibian Habitat Enhancement

In addition to the creation of two open wetlands (section 3.4) that target the habitat preferences of Midland Painted Turtle, Snapping Turtle and open-wetland calling amphibians, several other ecological enhancement measures are proposed to benefit amphibians and turtles within the NHS. The opportunity to direct additional surface water to the two existing, retained open aquatic ponds (that support turtle and amphibian SWH) should be explored further at the detailed stormwater management plan stage. Both ponds were observed to dry down in 2017 and 2018 to levels that would make the provision of suitable overwintering habitat challenging. Augmenting the hydroperiod of these ponds, (i.e., through the use of LID and BMP techniques), could improve the overwintering habitat quality for turtles and open-wetland amphibians. Similarly, additional surface water could be directed to select woodland amphibian breeding pools within the retained oak swamp (SWD1) in the centre of the NHS. All pools/sloughs within approximately 100 m of the western edge of the SWD1 were observed to be dry by early summer 2018. Directing additional water to select woodland pools must be carefully managed to ensure a late summer or fall dry-down period occurs during most years. This ensures that predatory fish do not establish within the pools that would decrease habitat viability for sensitive woodland amphibians such as salamanders, Wood Frog, Spring Peeper and Western Chorus Frog.

Two artificial turtle nesting beaches are proposed in proximity to the two created wetlands and the two existing, retained open aquatic pond features that provide turtle and amphibian SWH. Conceptual design details for the turtle nesting beaches are provided on **Figure 5g** (**Appendix A**).

Management of the invasive shrub Common Buckthorn and subsequent restoration of native early-successional and woodland communities will help improve habitat quality within movement corridors. The provision of native early-successional communities (i.e., native meadow) will also augment overwintering habitat for amphibian species that hibernate terrestrially, such as Gray Treefrog, American Toad and Spring Peeper.

The provision of one or more wildlife ecopassages beneath Chippawa Parkway would improve connectivity between the Subject Lands and City lands/wetlands associated with the Welland River south of the roadway. Ecopassage location(s) would need to be identified prior to any major road improvements (e.g., resulting from the Chippawa Parkway EA process). If an ecopassage is installed then wildlife fencing (i.e., *Animex* fencing) should be considered extending 30 m to 100 m from the NHS/roadway interface to direct amphibians, reptiles and small to medium sized mammals on the Subject Lands towards the ecopassage(s).

4.2 Pollinator Habitat

The insect species observed on the Subject Lands are typical of disturbed areas and will benefit from the establishment of more diverse, native open meadow and early successional vegetation types. The groundcover seed mixes that will be applied in the outer band of woodland restoration areas and throughout native meadow restoration areas (NM1 and NM2; **Table 3**, **Appendix B**) were designed to provide a diversity of foraging plants and host plants for pollinator species. All of the groundcover seed mixes include Milkweed species, which is the host plant of Monarch (Special Concern in Ontario and Endangered in Canada).

Planting Shagbark Hickory and Oak species (Red Oak, Pin Oak and Swamp White), both in the form of

seed and nursery sapling stock, in woodland restoration areas is expected to benefit a variety of moth species, as Oak and Hickory trees establish across a broader area of the NHS. Moths are an important pollinator group that rely on these tree species for part of their lifecycle. Select portions of woodland restoration areas WR2 and WR3 (**Table 2**, **Appendix B**) have been selected for direct tree seeding of the Oak species mentioned above. Shagbark Hickory seed is expected to be naturally introduced to restoration areas as this species is present in a variety of retained woodlands/wetlands and hickory nuts are effectively distributed by squirrels.

5.0 SPECIALIZED PLANT SALVAGE/PROPAGATION

The EIS commits to several flora salvage/transplant opportunities, which are summarized below:

- Great Plains Ladies'-tresses: This species occurs within the proposed west development area on disturbed soils. It is proposed for transplant into permanent native meadow restoration areas; i.e., restoration treatment types NM1 and NM3 (**Table 3**, **Appendix B**). The transplant recipient sites have been selected to enable the long-term maintenance of native meadow, preventing the advance of succession. Specific measures will be required to establish soils and microhabitats in those areas to optimize successful outcomes. The sod mat or plug transplant techniques are proposed since this orchid species relies on underlying fungi/soil microbes. Technical methods regarding the transplant approach are discussed in the January 2019 EIS section 7.4.1.

- Drooping Woodreed (*Cinna latifolia*): This species is present in several retained wetlands on the Subject Lands and also within the proposed west and east development areas. Seed collection, nursery production and or seed dispersal is proposed in the retained, central oak swamp (SWD1) on the Subject Lands. Seed should be collected from mature specimens in late summer and grown in nursery conditions for out-planting and/or distributed into shaded areas of the SWD1.

- Finely-nerved Sedge (*Carex leptonervia*): This species is present in several retained wetlands on the Subject Lands and also within the proposed west and east development areas. Seed dispersal is proposed in retained upland forest within the central portion of the NHS (FOD7-2). Seed should be collected from mature specimens in early summer and grown in nursery conditions for out- planting and/or distributed into the FOD7-2.

- Creeping Spike-rush and Woolly Sedge: These two species are present in small, moist depressions or tire ruts within disturbed cultural meadows on-site that are proposed for development. Seed should be collected from mature specimens in late summer and grown in nursery conditions for out-planting and/or dispersed in the outer fringe area of existing open aquatic ponds (i.e., ELC OAO inclusion within the central SWD1 and within a SWD4-1 that borders Chippawa Parkway) or adjacent to the proposed turtle/amphibian ponds in the central portion of the NHS (section 4.1). Seeds and/or out-plantings should be distributed in shallow marsh or meadow marsh habitat where surface water pooling is known to occur for at least part of the season. Any individual Creeping Spike-rush present in the FOD8-1 community proposed for removal will be transplanted to suitable habitat in the NHS.

6.0 RIVERFRONT WETLAND DISCOVERYCENTRE

6.1 Introduction

Understanding the benefits of interactions between community residents and nature, GR(CAN) Investment Co. Ltd. envisions the creation of a Wetland Discovery Centre, imagined to be a unique community destination containing environmental education opportunities with depictions of social and cultural inclusivity.

The conceptual site location and design concepts for the Centre are intended to encourage the exploration of sustainable site designs using low impact development and LEED principles. Ecological restoration efforts around the Wetland Discovery Centre will including plantings of native trees and shrubs and small demonstration areas, including a created wetland, pollinator plant gardens, and First Nations medicinal/food plant gardens. Low impact development technologies to be considered include green roofs, rain gardens and porous pavements for self- contained storm water management.

Accessibility to this destination will use active transportation and transit methods sharing roadway systems with emphasis on cycle paths and walking trails/sidewalks.

Key facility design and site context considerations are provided in the following section.

6.2 Wetland Discovery Centre Design Elements

The Wetland Discovery Centre, as conceptualized, would occupy about 8,000 square feet (750 m^2). Conceptual design elements within the facility, for consideration, include:

- Arrival hall and orientation space;
- Interpretive/education theatre space that can be partitioned for smaller functions;
- Large outdoor gathering space (deck/outdoor teaching area) with a raised deck overlooking an existing, large treed swamp;
- Library/digital resource space with interactive computer monitors for displays and education;
- Washrooms: M/F, accessible gender-neutral stalls, accommodate motorized wheelchairs;
- Gift shop/passive canteen area;
- Wayfinding program that would be visual and tactile; and
- Interpretive display opportunities for First Nations and Riverfront Community natural heritage system information.

The design principles/objectives listed below are offered for the exterior of the Wetland Discovery Centre and connections to the centre. The proposed exterior design of the Wetland Discovery Centre site is depicted conceptually on **Figure 6** (**Appendix A**).

- Roadway access – limit to 2 residential lanes with turn-around that would accommodate transit drop-off and loading zones, larger temporary parking could be available off-site;
- Sidewalk connections – 1.2 m wide sidewalks would connect to the Riverfront

neighbourhood and regional trail networks;

- Multi-modal (non-motorized) cycling and walking trails – 3 m wide trails with three difficulty levels: (1) porous pavement short loop (AODA compliant), (2) raised boardwalk with railings medium distance loop, and (3) un-paved longer distance loop with barriers to contain users;
- Infinity trail loop – figure 8 shaped loop around therapeutic gardens including raised planting beds that will be accessible to wheelchairs, the gardens will include pollinator plants and a native plant propagation demonstration area;
- Active transportation program – bike share program with bike racks;
- Seating/rest areas with sun shelters – drinking fountains with water bottle fillers at building;
- Site Lighting – LED lights at transitional areas, trailheads and around the facility; and
- First Nations interpretive arrival courtyard – "Meeting Place" feature with a garden featuring indigenous medicinal plants and food plants.

The slough ridge wetland communities on the Niagara (Haldimand Clay Plain) are significant features and are less well-understood than many wetlands elsewhere in Ontario. The Wetland Discovery Centre and the Native Plant nursery together provide an important opportunity for wetland research. The slough features are widespread in Niagara and they are generally dominated by seasonal woodland pools and minor grade differences between the tops of ridges and the bottom of swales.

Those characteristics make them relatively more susceptible to changes under drought conditions. Long term and frequent droughts could have significant effects on the persistence and viability of regional and local flora and fauna that are dependent upon traditional hydroperiods (e.g., amphibians). The Wetland Discovery Centre offers an opportunity to host and lead research into various aspects of slough ridge wetland ecology, including areas of resiliency and adaptation.

7.0 NATIVE PLANT NURSERY

The creation of a native plant nursery within the Subject Lands will support the sustainable harvest of seed and other propagules, storage, experimental propagation technique advancement and the generation of native, locally adapted seed/stock for use within restoration areas both within and outside of the Subject Lands. This initiative could be well-suited to collaboration amongst various stakeholders including academic institutions (e.g., Niagara College School of Environment and Horticulture), NPCA, MNRF/MECP and Niagara Parks School of Horticulture).

The success of native woody stock (trees/shrubs) and seed mixes proposed for use in restoration areas will be enhanced by the use of the on-site native plant nursery. Certain trees (i.e., Oak species) can be challenging to grow from standard nursery stock in disturbed and heavy clay soils, such as those found on the Subject Lands. Collecting acorns from mature Oak specimens on-site would facilitate the success of restoration plantings as these seeds are already better adapted to local growing conditions.

8.0 MONITORING

Ecological monitoring requirements are outlined in the Riverfront Residential EIS (January 2019) and EIS Addendum (December 2019).

9.0 CONCLUSION

The proposed restoration efforts on the Subject Lands have been designed to benefit Species at Risk, significant wildlife habitat, and retained significant woodlands and wetlands on the Subject Lands. The efforts outlined herein contribute to the establishment of a viable Riverfront Residential NHS, through the:

- Long term protection of significant, intact natural features;
- Conservation and enhancement of the important local connections from the Welland River, through the extensive natural and restored areas;
- Improved viability and sustainability of retained natural features and functions (e.g., through permanent native meadow creation/maintenance and potential enhanced pond hydrology); and
- The appropriately managed integration of human uses these important natural areas.

Proposed investments in the Wetland Discovery Centre and native plant nursery will contribute significantly, not only to ecological enhancement, but also to the education and inspiration of citizens interested in the conservation and promotion of biodiversity and healthier environmental systems. Long term research into the management and adaptation of the slough ridge wetland systems in Niagara will contribute to ongoing conservation and management knowledge in response to climate change.

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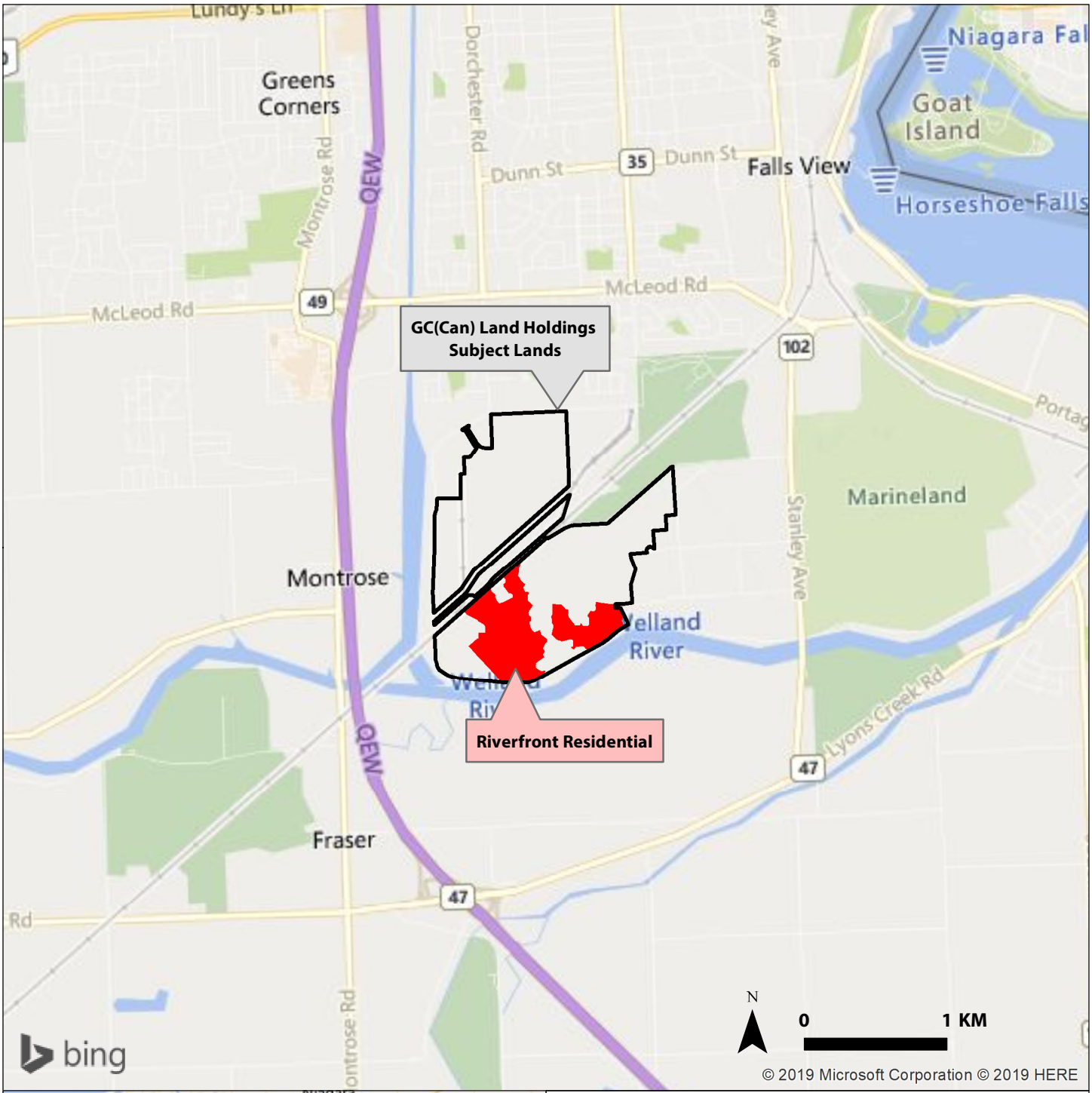
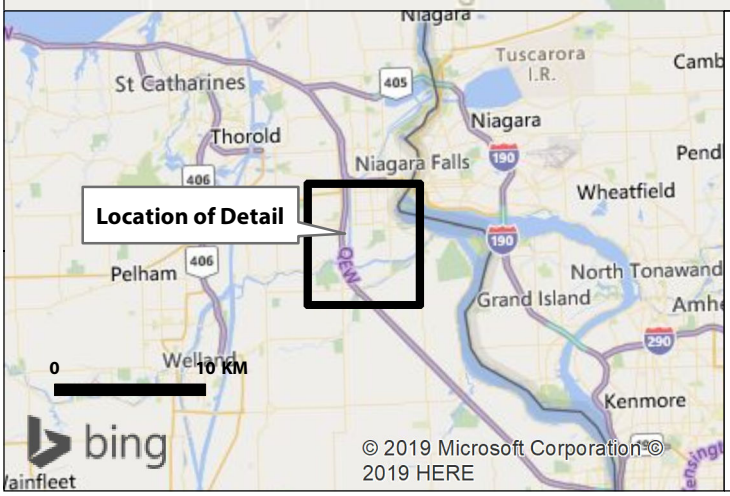
APPENDICES

Appendix A – Figures

Appendix B – Tables

Appendix A – Figures





Riverfront Residential - Conceptual Restoration Plan

Figure 1
Location of Subject Lands

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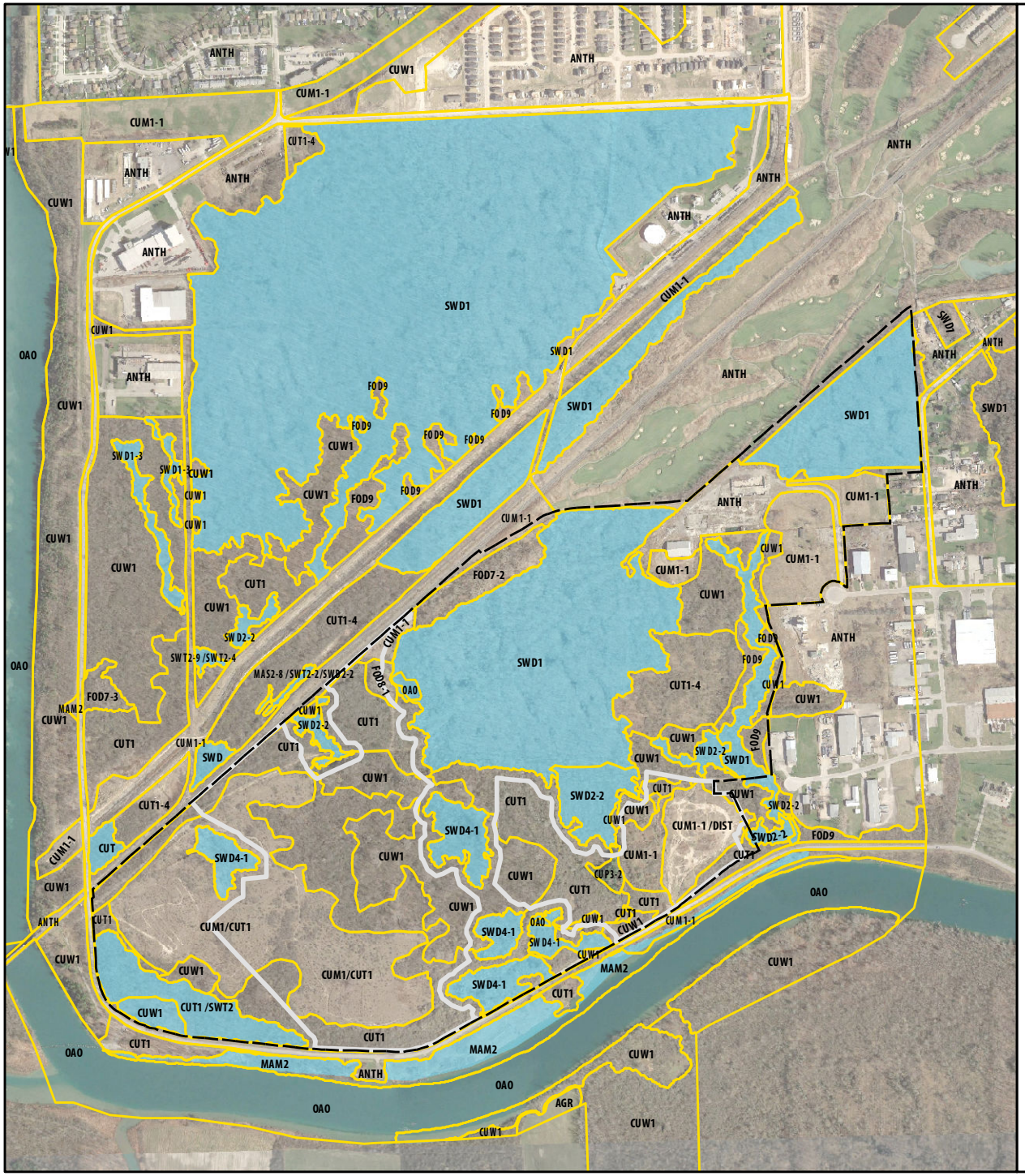

Study Area

Riverfront Residential

Ecological Land Classification (updated area within/ adjacent to Riverfront Residential, Savanta 2018)

Provincially Significant Wetland (MNRF)

Vegetation Community (ELC Code)

AGR, Agricultural
ANTH, Anthropogenic
CUM1-1, Dry - Moist Old Field Meadow
CUM1/CUT1, Mineral Cultural Thicket
CUP3-2, White Pine Coniferous Plantation
CUT, Cultural Thicket
CUT1, Mineral Cultural Thicket
CUT1-4, Gray Dogwood Deciduous Cultural Thicket
CUW1, Mineral Cultural Woodland
FOD7-2, Fresh – Moist Green Ash Lowland Deciduous Forest
FOD7-3, Fresh – Moist Willow Lowland Deciduous Forest
FOD8-1, Fresh – Moist Poplar Deciduous Forest
FOD9, Fresh – Moist Oak – Maple – Hickory Deciduous Forest
MAM2, Mineral Meadow Marsh
MAS2-8, Rice Cut-grass Mineral Shallow Marsh
OAO, Open Aquatic
SWD, Mineral Deciduous Swamp
SWD1, Oak Mineral Deciduous Swamp
SWD1-3, Pin Oak Mineral Deciduous Swamp
SWD2-2, Green Ash Mineral Deciduous Swamp
SWD4-1, Willow Mineral Deciduous Swamp
SWT2, Mineral Thicket Swamp
SWT2-2, Willow Mineral Deciduous Thicket Swamp
SWT2-4, Buttonbush Mineral Deciduous Thicket Swamp
SWT2-9, Grey Dogwood Mineral Deciduous Thicket Swamp

Riverfront Residential Block Plan Environmental Impact Statement

Figure 2
Vegetation Commmunities and Provincially Significant Wetlands

0 100 Meters

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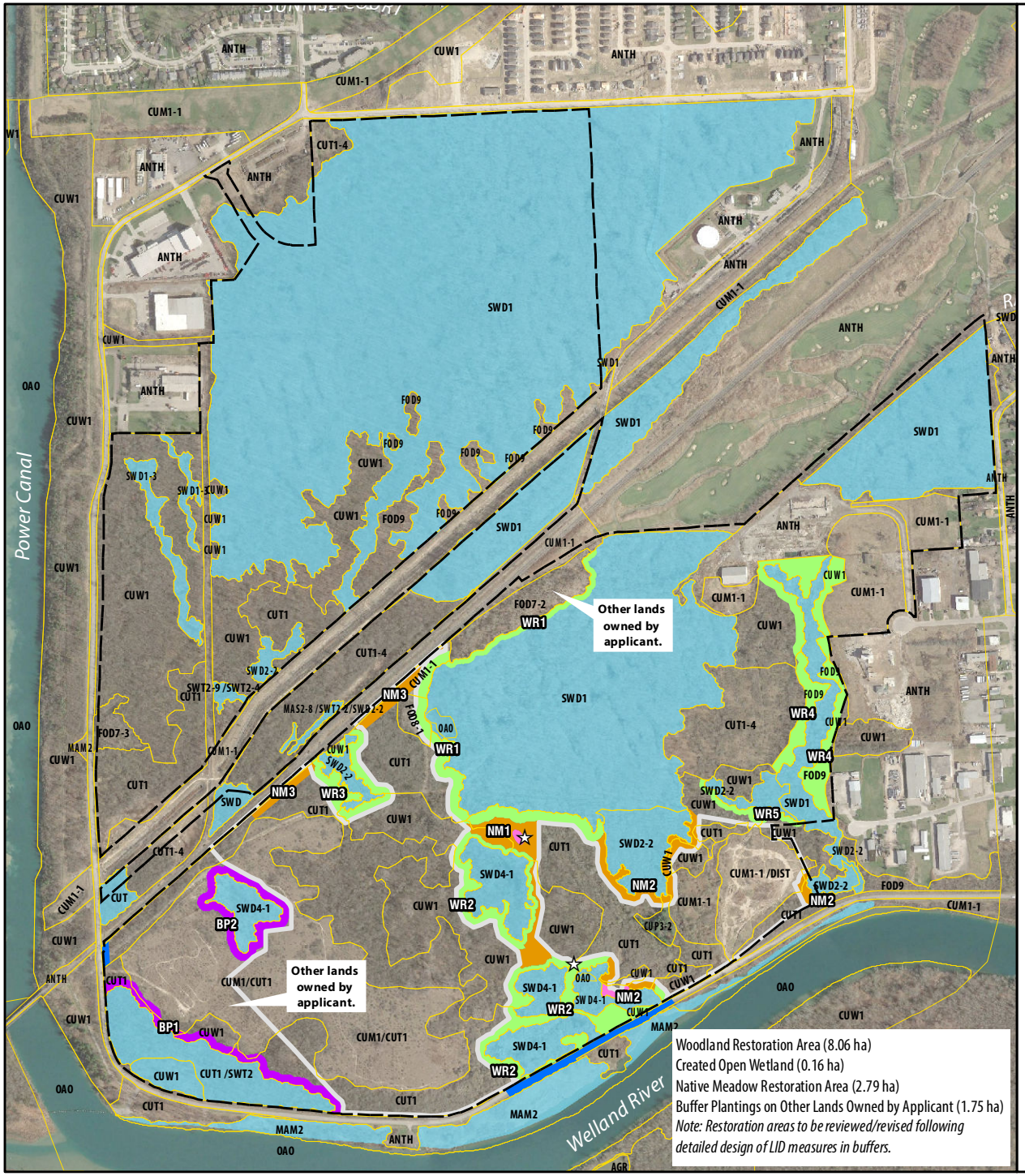

GR(Can) Land Holdings Study Area

Riverfront Residential

Ecological Land Classification (updated area within/adjacent to Riverfront Residential by Savanta 2018)

Provincially Significant Wetland (MNRF)

Restoration Treatment Type

Created Open Wetland

Native Meadow Restoration Area

Candidate Area for Potential Wildlife Ecopassage (to be determined through Chippawa Parkway EA)

Woodland Restoration Area

15 m Buffer Planting (Other lands owned by applicant)

☆ Turtle Nesting Beach

NM1 Restoration Treatment Type - refer to planting prescriptions in Tables D1-3 (Appendix D2)

Vegetation Communities (ELC)

AGR, Agricultural
ANTH, Anthropogenic
CUM1-1, Dry - Moist Old Field Meadow
CUM1/CUT1, Mineral Cultural Thicket
CUP3-2, White Pine Coniferous Plantation
CUT, Cultural Thicket
CUT1, Mineral Cultural Thicket
CUT1-4, Gray Dogwood Deciduous Cultural Thicket
CUW1, Mineral Cultural Woodland
FOD7-2, Fresh – Moist Green Ash Lowland Deciduous Forest
FOD7-3, Fresh – Moist Willow Lowland Deciduous Forest
FOD8-1, Fresh – Moist Poplar Deciduous Forest
FOD9, Fresh – Moist Oak – Maple – Hickory Deciduous Forest
MAM2, Mineral Meadow Marsh
MAS2-8, Rice Cut-grass Mineral Shallow Marsh
OAO, Open Aquatic
SWD, Mineral Deciduous Swamp
SWD1, Oak Mineral Deciduous Swamp
SWD1-3, Pin Oak Mineral Deciduous Swamp
SWD2-2, Green Ash Mineral Deciduous Swamp
SWD4-1, Willow Mineral Deciduous Swamp
SWT2, Mineral Thicket Swamp
SWT2-2, Willow Mineral Deciduous Thicket Swamp
SWT2-4, Buttonbush Mineral Deciduous Thicket Swamp
SWT2-9, Grey Dogwood Mineral Deciduous Thicket Swamp

Riverfront Residential - Conceptual Restoration Plan

Figure 3 Ecological Restoration Treatment Types

0 100 Meters

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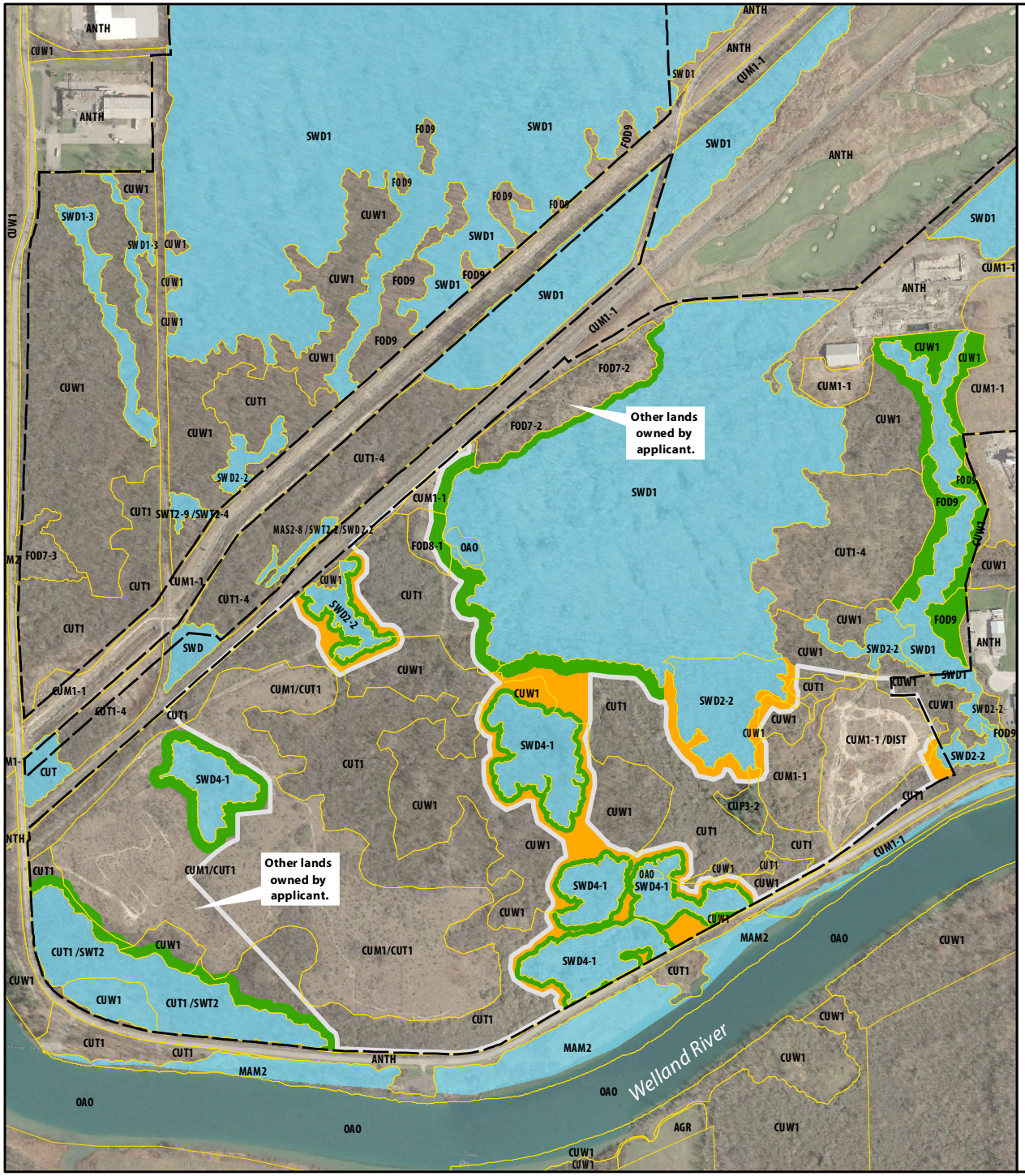

GR(Can) Land Holdings Study Area

Riverfront Residential

Ecological Land Classification (updated area within/adjacent to Riverfront Residential Savanta 2018)

Provincially Significant Wetland (MNRF)

Buckthorn Treatment Type 1

Buckthorn Treatment Type 2

Vegetation Community (ELC Code)

AGR, Agricultural
ANTH, Anthropogenic
CUM1-1, Dry - Moist Old Field Meadow
CUM1/CUT1, Mineral Cultural Thicket
CUP3-2, White Pine Coniferous Plantation
CUT, Cultural Thicket
CUT1, Mineral Cultural Thicket
CUT1-4, Gray Dogwood Deciduous Cultural Thicket
CUW1, Mineral Cultural Woodland
FOD7-2, Fresh – Moist Green Ash Lowland Deciduous Forest
FOD7-3, Fresh – Moist Willow Lowland Deciduous Forest
FOD8-1, Fresh – Moist Poplar Deciduous Forest
FOD9, Fresh – Moist Oak – Maple – Hickory Deciduous Forest
MAM2, Mineral Meadow Marsh
MAS2-8, Rice Cut-grass Mineral Shallow Marsh
OAO, Open Aquatic
SWD, Mineral Deciduous Swamp
SWD1, Oak Mineral Deciduous Swamp
SWD1-3, Pin Oak Mineral Deciduous Swamp
SWD2-2, Green Ash Mineral Deciduous Swamp
SWD4-1, Willow Mineral Deciduous Swamp
SWT2, Mineral Thicket Swamp
SWT2-2, Willow Mineral Deciduous Thicket Swamp
SWT2-4, Buttonbush Mineral Deciduous Thicket Swamp
SWT2-9, Grey Dogwood Mineral Deciduous Thicket Swamp

Riverfront Residential - Conceptual Restoration Plan

Figure 4 Common Buckthorn Removal Areas & Treatments

0 100 Meters

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Path: S:\9024 - SAV 7602 Riverfront Community\gis\mxd\2019 12 03 Conceptual Restoration\Figure 4 Common Buckthorn Removal Areas and Treatments.mxd REVISED: December 4, 2019

PLANTING DENSITY

WOODLAND RESTORATION TREATMENT WR1 (20M BUFFER)

- 5 Trees / 100m^2
- 6 Shrubs / 100m^2

*Refer to Table D1 (Appendix D2) for full planting lists and implementation details

*The 20m buffer width applies only where the SWD1 PSW unit fronts the proposed development

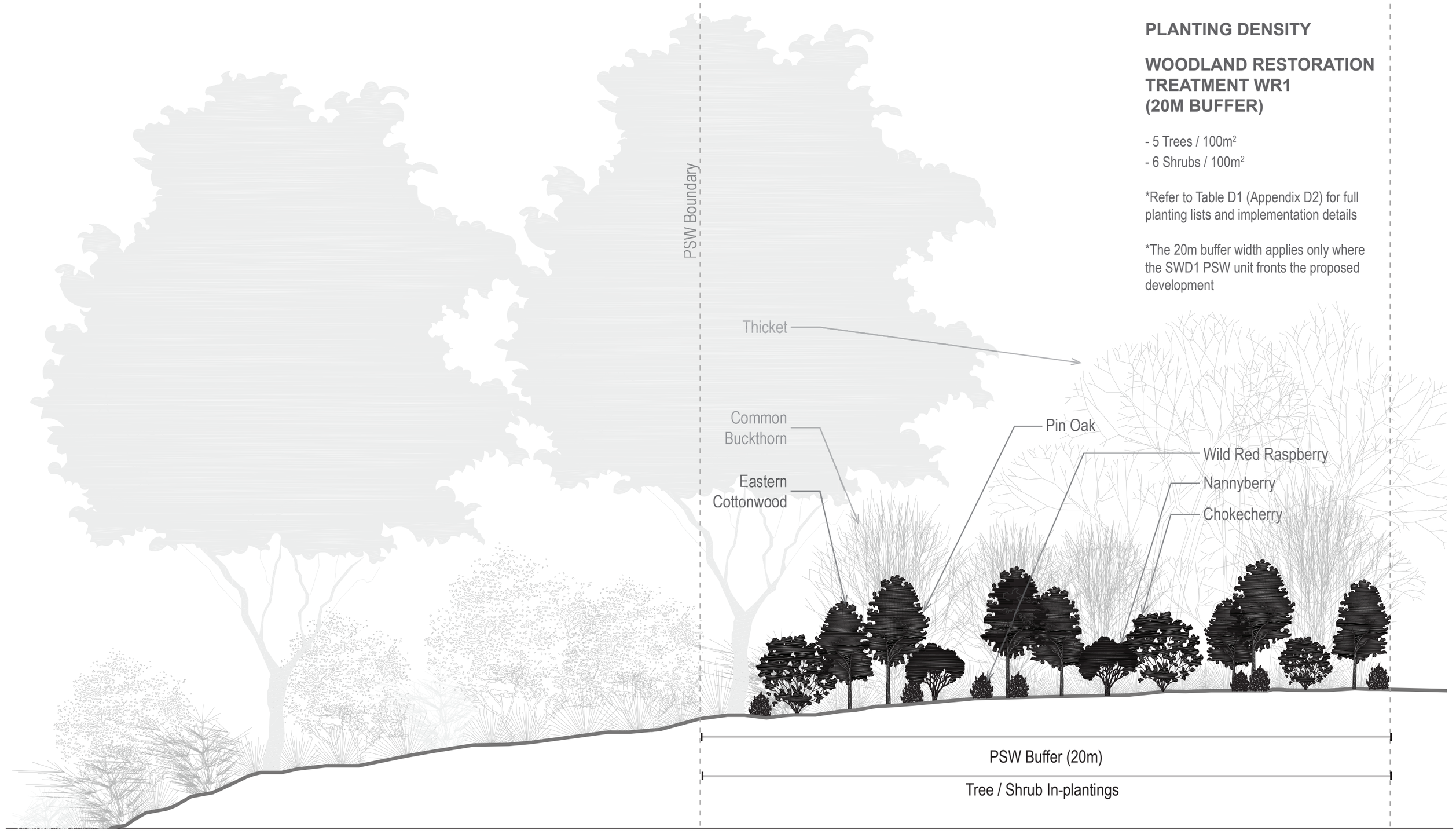

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FIGURE 5a
PROPOSED WOODLAND RESTORATION PLANTINGS

TREATMENT WR1

PROPOSED NEW VEGETATION

EXISTING VEGETATION

PLANTING DENSITY

WOODLAND RESTORATION TREATMENT WR2 (15m BUFFER)

- 3 Trees / 100m^2
- 8 Shrubs / 100m^2

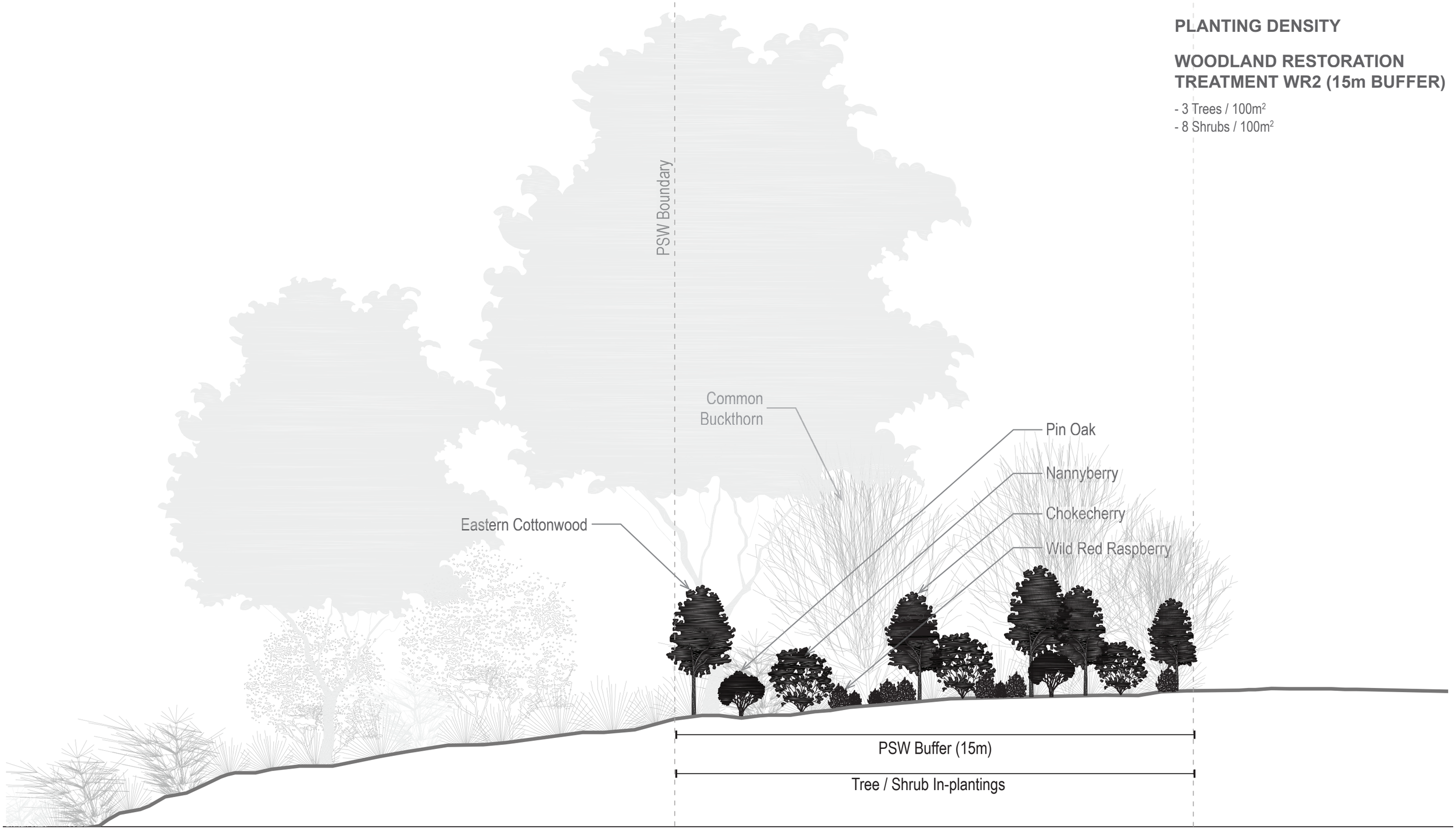

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FIGURE 5b
PROPOSED WOODLAND RESTORATION PLANTINGS

TREATMENT WR2

PROPOSED NEW VEGETATION

EXISTING VEGETATION

PLANTING DENSITY

WOODLAND RESTORATION TREATMENT WR2 (15m BUFFER)

- 3 Trees / 100m^2
- 8 Shrubs / 100m^2
- Tree Seed Planting

WOODLAND RESTORATION TREATMENT WR3 (15m BUFFER)

- 3 Trees / 100m^2
- 8 Shrubs / 100m^2
- Tree Seed Planting

*Refer to Table D1 (Appendix D2) for full planting lists and implementation details

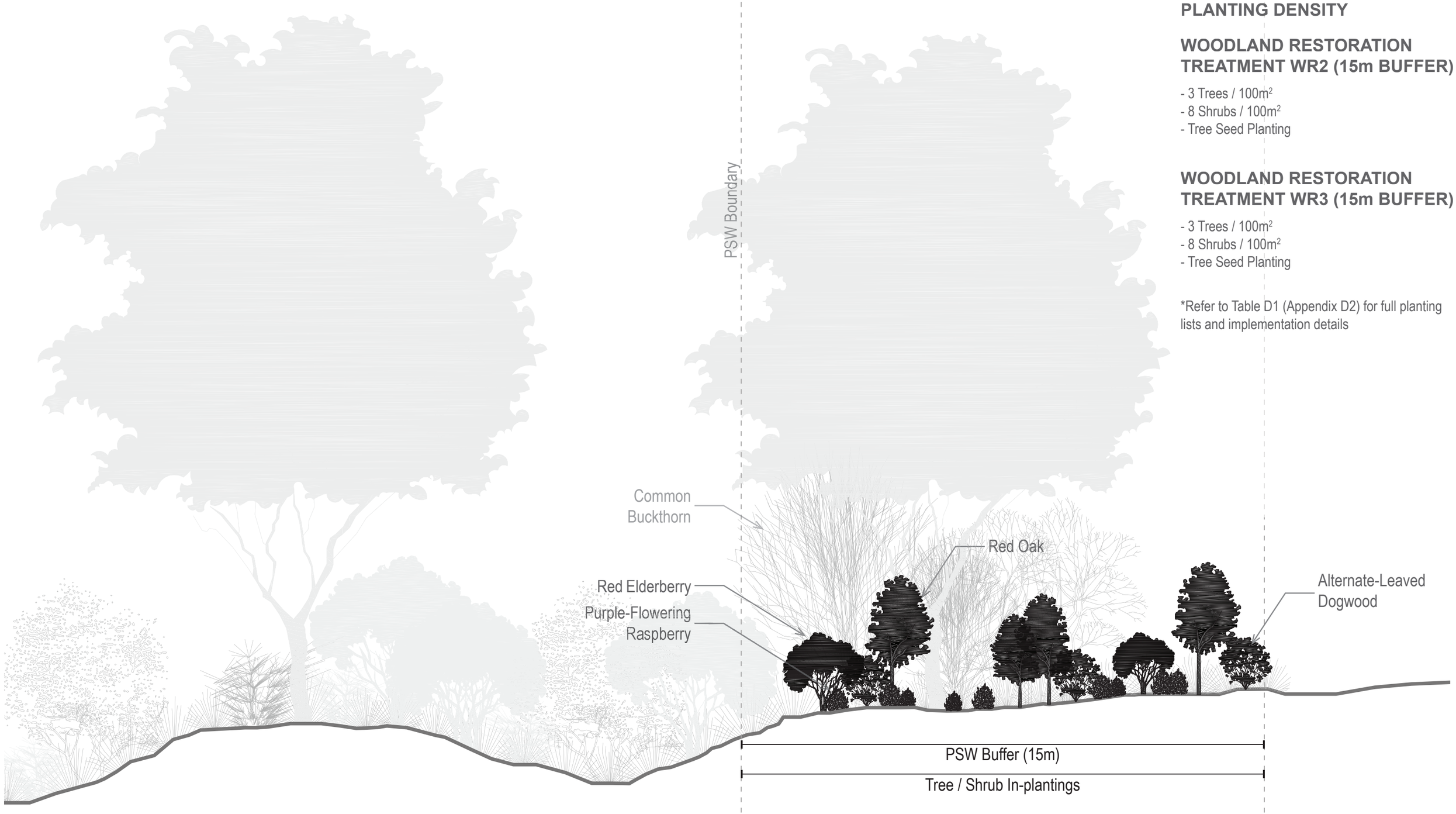

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FIGURE 5c
PROPOSED WOODLAND RESTORATION PLANTINGS

TREATMENT WR2 and WR3

PROPOSED NEW VEGETATION

EXISTING VEGETATION

PLANTING DENSITY

This restoration area (WR4) is within a retained woodland, shrub in-planting density will be determined at detailed design depending on current status of the sub-canopy and shrub layers after Common Buckthorn removal

Only shrub in-plantings proposed where Common Buckthorn removal occurs within WR5. The existing tree canopy, sub-canopy and herbaceous layers will remain largely in-tact. No buffer applied as this restoration area is well north of the proposed development

*Refer to Appendix D2 for full planting lists and implementation details

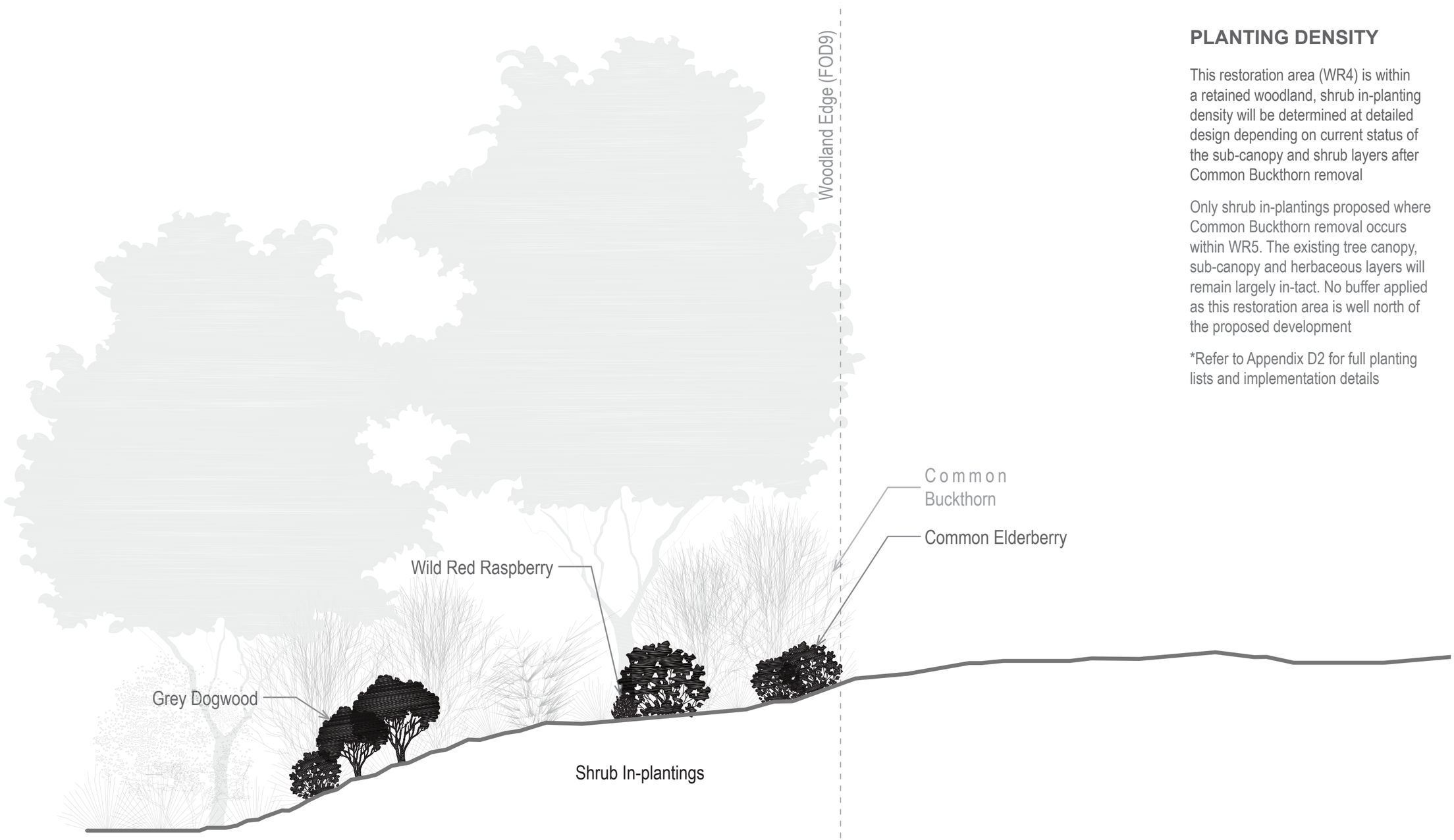

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FIGURE 5d
PROPOSED WOODLAND RESTORATION PLANTINGS

TREATMENT WR4

PROPOSED NEW VEGETATION

EXISTING VEGETATION

PLANTING DENSITY

This restoration area (WR5) is within a retained vegetation community, shrub in-planting density will be determined at detailed design depending on current status of the sub-canopy and shrub layers after Common Buckthorn removal

Only shrub in-plantings proposed where Common Buckthorn removal occurs within the WR6 wetland buffer. The existing tree canopy, sub-canopy and herbaceous layers will remain largely in-tact

*Refer to Appendix D2 for full planting lists and implementation details

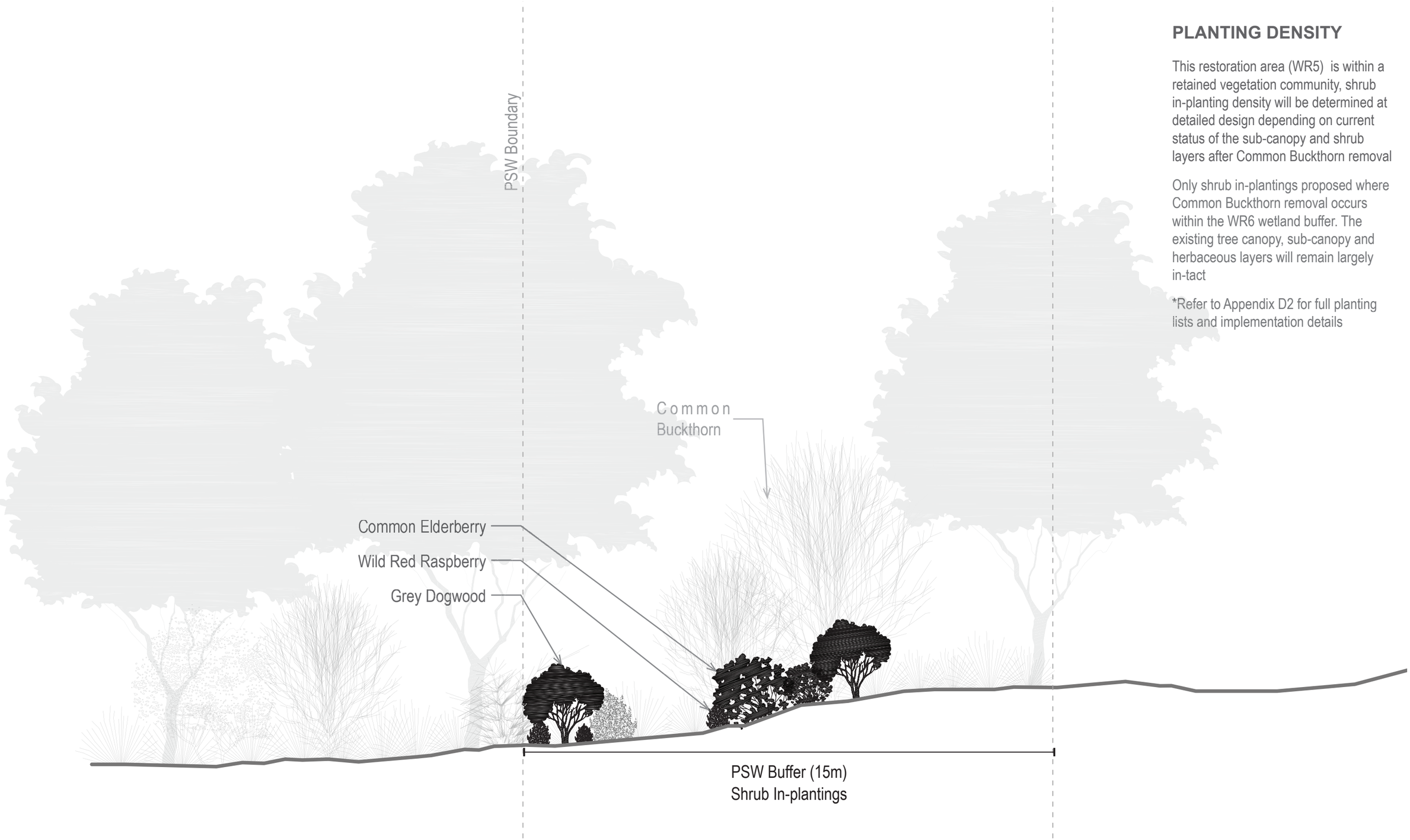

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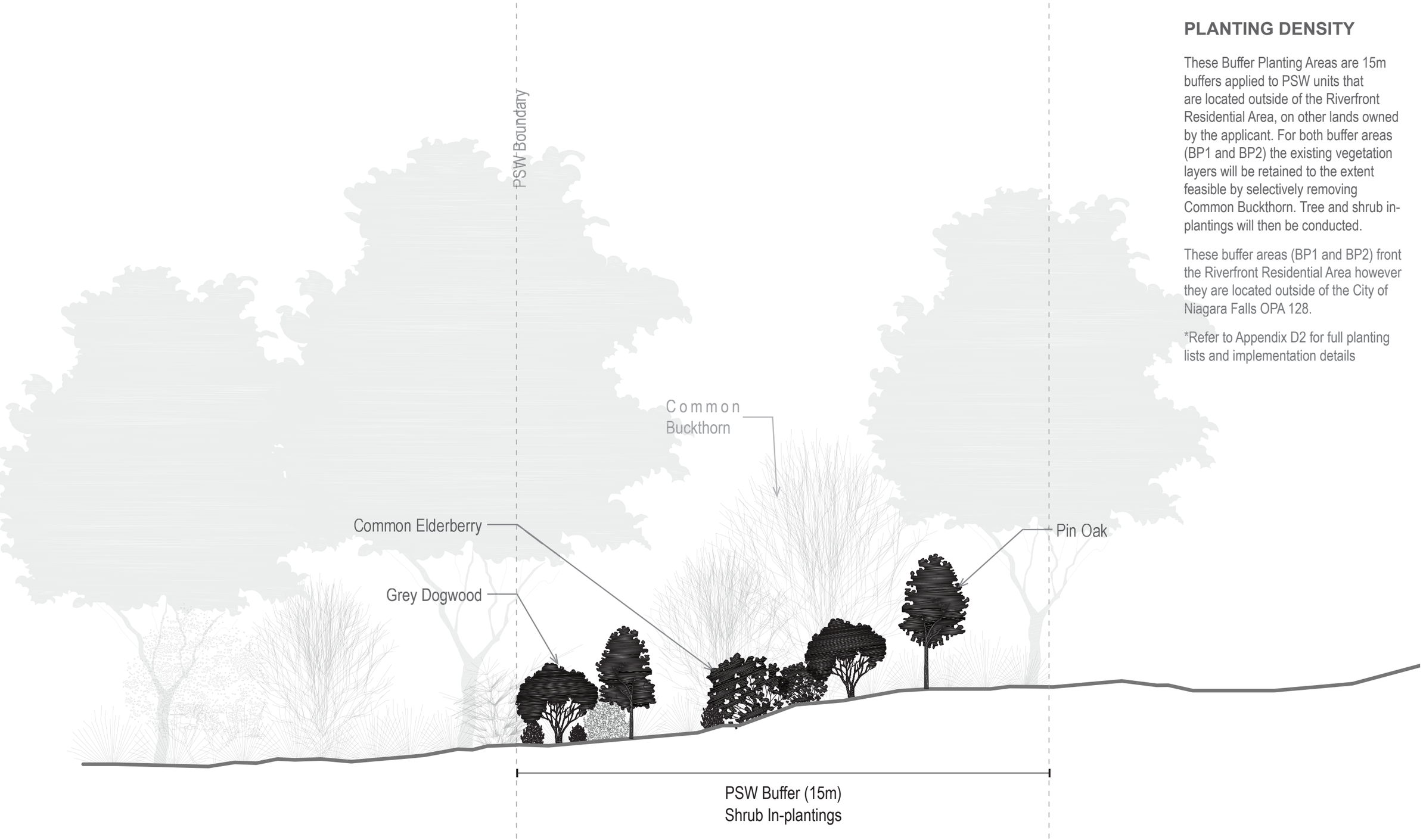
FIGURE 5e
PROPOSED WOODLAND RESTORATION PLANTINGS

TREATMENT WR5

PROPOSED NEW VEGETATION

EXISTING VEGETATION



PLANTING DENSITY

These Buffer Planting Areas are 15m buffers applied to PSW units that are located outside of the Riverfront Residential Area, on other lands owned by the applicant. For both buffer areas (BP1 and BP2) the existing vegetation layers will be retained to the extent feasible by selectively removing Common Buckthorn. Tree and shrub in-plantings will then be conducted.

These buffer areas (BP1 and BP2) front the Riverfront Residential Area however they are located outside of the City of Niagara Falls OPA 128.

*Refer to Appendix D2 for full planting lists and implementation details

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FIGURE 5f
PROPOSED PSW BUFFER PLANTING AREAS
(OTHER LANDS OWNED BY APPLICANT)

TREATMENTS BP1 & BP2

PROPOSED NEW VEGETATION

EXISTING VEGETATION

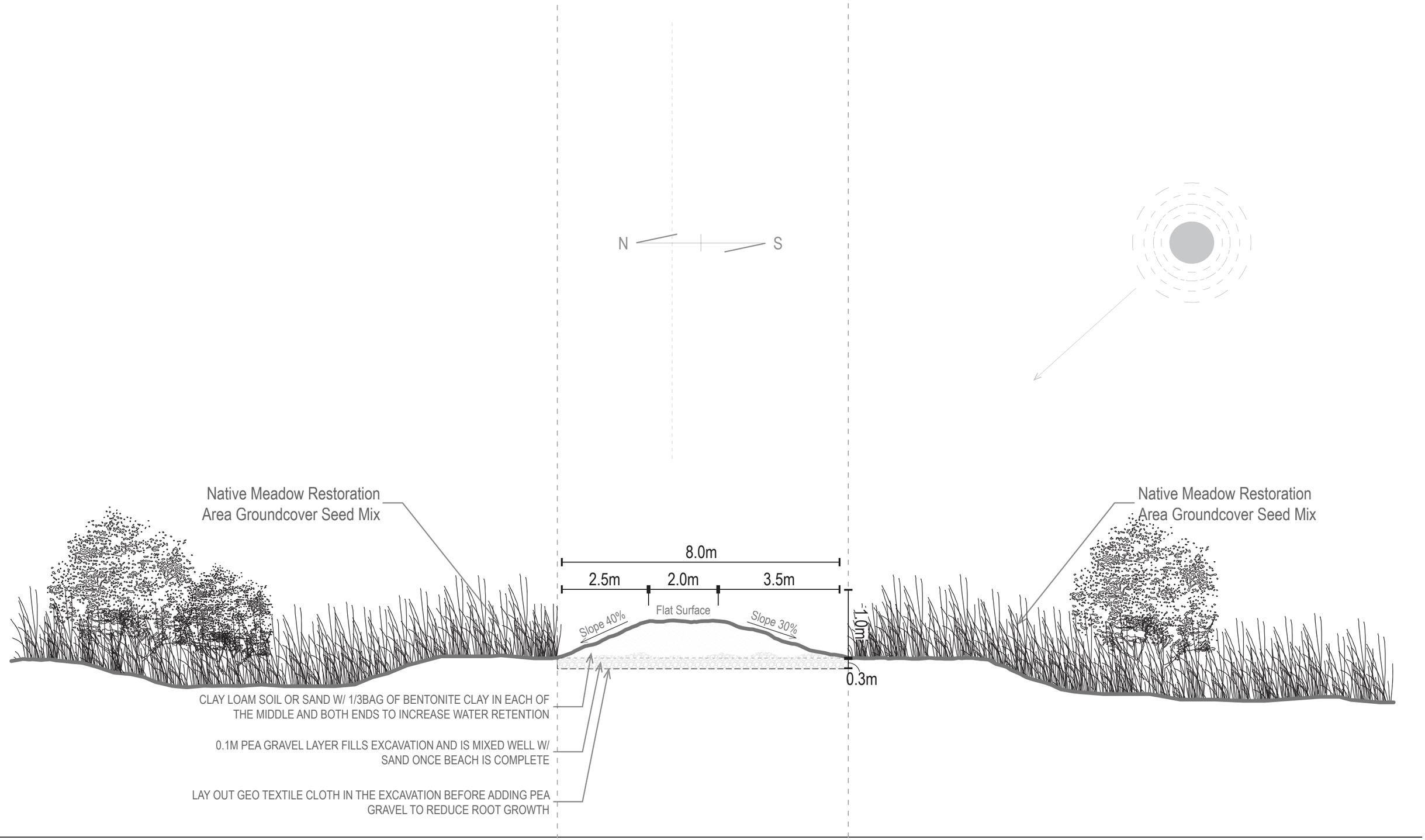

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FIGURE 5g
CONCEPTUAL TURTLE NESTING BEACH DESIGN

PROPOSED NEW VEGETATION

Riverfront Residential - Conceptual Restoration Plan

Figure 6 Wetland Discovery Centre Concept Sketch

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Appendix B – Tables

Table 1: Restoration Goals and Objectives, Proposed Riverfront Residential Community

GOAL	OBJECTIVES	TARGETS
Establish an NHS that will be viable and sustainable within the proposed Riverfront Community	• Consider and plan for the degree of human use associated with the future community • Ensure internal and external connections are maintained/established to promote ongoing movement of plants, wildlife and genetic material and to sustain life cycle function-depended areas • Improve the resilience of specialized habitats that may be more vulnerable to climate change	• The conceptual plan for a Wetland Discovery Centre will encourage interest in the natural environment generally and specifically related to examples such as: - sustainable site design using low impact development and LEED principles - Stewardship of ecological resources - Importance of native plants as an integral component of community landscaping; and - Indigenous values and traditional understanding • Identify potentially suitable locations for trails, interpretive signage and/or viewing platforms that will reduce potential impacts on natural features and provide important opportunities for individual and community interactions with nature • Establish one or more wildlife ecopassages (and associated directional fencing) beneath Chippawa Parkway to improve connectivity between the Subject Lands and City lands/wetlands associated with the Welland River • Create and enhance habitat to serve the life processes of turtles, open-wetland amphibian species and odonates, including pond habitat that suits their habitat preferences, turtle nesting beaches, turtle overwintering habitat and movement corridors • Include deeper pools as refugia for drought periods • Increase the diversity and health of native vegetation communities. Increase cover of open meadow and early successional vegetation types (i.e., host plants for pollinator species; range of moisture classes and microclimates to increase insect diversity)

Table 1: Restoration Goals and Objectives, Proposed Riverfront Residential Community

GOAL	OBJECTIVES	TARGETS
Conserve and Enhance Retained Provincially Significant Wetlands	• Conserve and increase native biodiversity through invasive species management and control and through the propagation of local native species	• Implement an extensive multi-year program to remove problematic invasive plant species including Common Buckthorn and Reed Grass • Plan and implement diverse native meadow communities inclusive of open wetland and pockets of hummocky topography • Ensure specialized features will hold water for variable lengths of time. This will better support a diversity of microhabitats and flora and fauna • Two created wetlands are proposed in order to augment limited open wetland breeding, foraging and overwintering habitat types for turtles and open-wetland amphibians (i.e., reduction of a limiting factor to diversity) • The creation of a native plant nursery within the Subject Lands (likely in proximity to the Wetland Discovery Center to promote education and research) will encourage the sustainable harvest of seed and other propagules, storage, experimental propagation technique advancement and the generation of native, locally adapted seed/stock for use within restoration areas both within and outside of the Subject Lands
	• Ensure the urbanization of the Riverfront Lands recognizes and respects the current hydrology of wetland units • Complete Feature-based Water Balance exercises to match pre and post development conditions	• Establish protective buffers suited to the sensitivities of each wetland • Control and eliminate invasive species within significant wetlands • Monitor the features over time to identify potential enhancement treatments where acceptable to regulatory authorities (e.g., hydrologic enhancements to mitigate against drought)
Protect and enhance Retained Significant Woodlands	• Improve the management and health of woodlands within the NHS to promote diversity and resilience to insects and	• Implement direct afforestation and invasive species management within and/or along the edge of retained woodlands

Table 1: Restoration Goals and Objectives, Proposed Riverfront Residential Community

GOAL	OBJECTIVES	TARGETS
	disease	• Enhance retained woodlands through Common Buckthorn invasive species control and native plantings
Protect and enhance Significant Wildlife Habitat (SWH)	• Ensure SWH continues to be present and function in a sustainable manner • Increase the population size of rare species wherever practical	• Plant visual barrier vegetation (such as bramble and thorny species) to deter off-trail access into retained features • Reduce the potential for wildlife road mortality • Improve the accessibility of various habitats suiting the life processes of target wildlife within the NHS. • Create artificial turtle nesting beaches and open wetlands - both of which are limited habitat types on the Subject Lands • These specialized features will provide a diversity of microhabitats that will benefit an array of flora and fauna, including Great Plains Ladies'-tresses. NM1 is the primary, recommended transplant location proposed for this rare plant and grassland associate plants, pollinators, amphibians, turtles, butterflies and odonates
Habitat of Endangered and Threatened Species	• Ensure Habitat of Endangered and Threatened Species is conserved and enhanced where feasible • Updated submission of the MECP Information Gathering Form (IGF) to address potential impacts to Species at Risk	• Prevent impacts on Dense Blazing Star and Acadian Flycatcher • Minimize potential alterations in habitat for endangered bat species
Rare Species	• Maintain and enhance rare species habitat and increase population size where feasible	• Identify Pin Oak stems suitable for retention within the Riverfront Residential area. • Establish native meadow (subject to the Common Buckthorn Type 2 treatment), that favours the development of a diverse, resilient and self-supporting open vegetation community. It will provide habitat for a variety of provincially and locally rare species, such as: Great Plains Ladies'-tresses, Dense

Table 1: Restoration Goals and Objectives, Proposed Riverfront Residential Community

GOAL	OBJECTIVES	TARGETS
		Blazing Star, Yellow Indian-grass, Monarch, bees, other pollinators and fauna that utilize early successional areas • Implement Great Plains Ladies'-tresses transplant and propagation program • Collect and distribute Creeping Spike-rush (*Eleocharis palustris*) seed in appropriate habitat • Plant American Plum (*Prunus americana*) nursery stock • Collect and distribute Woolly Sedge (*Carex pellita*) seed in appropriate habitat • Include Yellow Indian-grass (*Sorghastrum nutans*) in the groundcover terraseed mix to be applied in native meadow restoration areas
Fish Habitat	• Ensure fish habitat is conserved and improved through construction and post construction activities	• Proposed buffers from WC1 and WC2 will result in long-term protection for the features • Following implementation of mitigation, no net effects on fish habitat are anticipated due to potential indirect effects during construction (e.g., erosion and sedimentation) • No net effects on fish habitat due to stormwater management within the Riverfront Residential lands are anticipated provided the SWM plan is effective in maintaining or enhancing existing watercourse hydrology • Long-term enhancements to fish habitat may result from proposed invasive species management and associated restoration in the vicinity of the watercourses, including within buffer areas

Table 2: Woodland Restoration Area Planting Details

WR1: SWD1 and FOD7-2

Implementation Notes:

- Common Buckthorn removal type 1
- Apply Woodland Restoration Treatment 1 throughout the WR1 identified area on **Figure 3** (**Appendix A**)
- Tree/shrub plantings throughout the buffer where canopy has been opened up due to buckthorn removal
- Woody stock planting density: 5 trees/100 m^2, 6 shrubs/100 m^2
- Portions of WR1 that are presently cultural thicket (CUT1) are expected to have more abundant Common Buckthorn, the removal of which will create larger openings. In these larger open areas, apply groundcover seed mix and cover crop. Exact areas where seed mix should be applied will be determined at detailed design.
- Apply native groundcover seed mix at terraseed rate: 10 kg/ha to 15 kg/ha
- Cover crop applied with the groundcover seed mix (application rate kg/ha depends on cover crop species choice, refer to **Table 5, Appendix B**)
- Two herbaceous species are identified for seed collection and dispersal into mature portions of the SWD1/FOD7-2: (1) distribute seed collected from on-site Drooping Woodreed (*Cinna latifolia*) in late summer into shaded areas of the SWD1; and (2) distribute seed collected from on-site Finely-nerved Sedge (*Carex leptonervia*) in early summer into the FOD7-2.

TREES	SHRUBS	GROUNDCOVER SEED MIX
Swamp White Oak (*Quercus bicolor*) Pin Oak (*Quercus palustris*) Northern Red Oak (*Quercus rubra*) Shagbark Hickory (*Carya ovata*) Red Maple (*Acer rubrum*) Sugar Maple (*Acer saccharum*) Basswood (*Tilia americana*) Eastern Cottonwood (*Populus deltoides spp. deltoides*) Paper Birch (*Betula papyrifera*)	Choke Cherry (*Prunus virginiana*) Red-osier Dogwood (*Cornus stolonifera*) Alternate-leaved Dogwood (*Cornus alternifolia*) Wild Red Raspberry (*Rubusidaeus ssp. strigosus*) Nannyberry (*Viburnum lentago*) Red Elderberry (*Sambucus racemosa ssp. pubens*)	Virginia Rye (*Elymus virginicus*) Slender Wheat Grass (*Elymus trachycaulis*) Butterfly Milkweed (*Asclepias tuberosa*) Sand Dropseed (*Sporobolus cryptandrus*) Wild Columbine (*Aquilegia canadensis*) Dwarf Blazing Star (*Liatris cylindracea*) Rough Dropseed (*Sporobolus aspera*) Virginia Mountain Mint (*Pycnanthemum virginianum*) White Vervain (*Verbena urtriculata*) Gold Fruited Sedge (*Carex aurea*) Soft Agrimony (*Agrimona pubescens*) Poverty Oatgrass (*Danthonia spicate*) Early Goldenrod (*Solidago juncea*) Slender Mountain Mint (*Pycnanthemum tenuifolia*)

WR2: SWD4-1 Units

Implementation Notes:

- Common Buckthorn removal type 1 within 7.5 m adjacent to the wetland boundary and removal type 2 within the outer 7.5 m of the wetland buffer
- Apply Woodland Restoration Planting Treatment 2 (WR2) within the SWD4-1 wetland buffer areas shown on **Figure 3** (**Appendix A**)
- Tree/shrub plantings throughout the 15 m of the buffer
- Woody stock planting density: 3 trees/100 m^2, 8 shrubs/100 m^2

Table 2: Woodland Restoration Area Planting Details

Apply tree seed in 6 to 12 pods (locations to be identified at detailed design) within the retained vegetation zone adjacent to the wetland edge. Three Oak species are targeted within the pods: Red Oak, Swamp White Oak and Pin Oak. The tree seed pods should be situated beneath existing canopy cover ('shelter wood') to provide semi-shade conditions. For Red Oak, three acorns should be placed together in each planting hole to yield (approximately) one seedling. For Pin Oak and Swamp White Oak, five acorns should be placed together in each planting hole to yield (approximately) one seedling. Apply standard mulch to 25 cm to 30 cm depth after seed planting is complete to retain moisture and to reduce competition from other plants

- Apply groundcover seed mix and cover crop within the type 2 treatment area; no groundcover seed mix or cover crop application in the type 1 treatment area (majority of existing herbaceous layer will be retained in the latter)
- Apply native groundcover seed mix at terraseed rate: 10 kg/ha to 15 kg/ha
- Cover crop applied with the groundcover seed mix (application rate kg/ha depends on cover crop species choice refer to **Table 5**, **Appendix B**)

TREES	SHRUBS	GROUNDCOVER SEED MIX
Pin Oak (*Quercus palustris*) Northern Red Oak (*Quercus rubra*) Shagbark Hickory (*Carya ovata*) Eastern Cottonwood (*Populus deltoides spp deltoides*) Refer to Implementation Note regarding Oak seed planting	Cottony Willow (*Salix eriocephala*) Nannyberry (*Viburnum lentago*) Wild Red Raspberry (*Rubus idaeus ssp. strigosus*) Purple-flowering Raspberry (*Rubus odoratus*) Alleghany Blackberry (*Rubus allegheniensis*) Dotted Hawthorn (*Crataegus punctata*)	Virginia Rye (*Elymus virginicus*) Slender Wheat Grass (*Elymus trachycaulis*) Butterfly Milkweed (*Asclepias tuberosa*) Sand Dropseed (*Sporobolus cryptandrus*) Wild Columbine (*Aquilegia canadensis*) Dwarf Blazing Star (*Liatris cylindracea*) Rough Dropseed (*Sporobolus aspera*) Virginia Mountain Mint (*Pycnanthemum virginianum*) White Vervain (*Verbena urtriculata*) Gold Fruited Sedge (*Carex aurea*) Soft Agrimony (*Agrimona pubescens*) Poverty Oatgrass (*Danthonia spicate*) Early Goldenrod (*Solidago juncea*) Slender Mountain Mint (*Pycnanthemum tenuifolia*)

WR3: SWD2-2 (west development area)

Implementation Notes:

- Common Buckthorn removal type 1 within 7.5 m adjacent to wetland boundary and removal type 2 within the outer 7.5 m of the wetland buffer
- Apply Woodland Restoration Planting Treatment 3 (WR3) throughout the 15 m buffer applied to this SWD2-2 wetland
- Tree/shrub plantings throughout the buffer
- Woody stock planting density: 3 trees/100 m^2, 8 shrubs/100 m^2
- Apply tree seed in 6 pods to 12 pods (locations to be identified at detailed design) within the retained vegetation zone adjacent to the wetland edge. Three Oak species are targeted within the pods: Red Oak, Swamp White Oak and Pin Oak. The tree seed pods should be situated beneath existing canopy cover ('shelter wood') to provide semi-shade conditions. For Red Oak, three acorns should be placed together in each planting hole to yield (approximately) one seedling. For Pin Oak and Swamp White Oak, five acorns should be placed together in each planting hole to yield (approximately) one seedling. Apply standard mulch to 25 cm to 30 cm depth after seed planting is complete to retain moisture and to reduce competition from other plants.
- Apply groundcover seed mix and cover crop only within the type 2 treatment area; no groundcover seed mix or cover crop application in the type 1 treatment area (majority of existing herbaceous layer will be retained in the latter)
- Apply native groundcover seed mix at terraseed rate: 10 kg/ha to 15 kg/ha

Cover crop applied with the groundcover seed mix (application rate kg/ha depends on cover crop species choice refer to **Table 5**, **Appendix B**)

Table 2: Woodland Restoration Area Planting Details

TREES	SHRUBS	GROUNDCOVER SEED MIX
Swamp White Oak (*Quercus bicolor*) Northern Red Oak (*Quercus rubra*) Shagbark Hickory (*Carya ovata*) Sugar Maple (*Acer saccharum*) Red Maple (*Acer rubrum*) White Elm (*Ulmus americana*) Refer to Implementation Note regarding Oak seed planting	Nannyberry (*Viburnum lentago*) Alternate-leaved Dogwood (*Cornus alternifolia*) Downy Arrowwood (*Viburnum rafinesquianum*) Purple-Flowering Raspberry (*Rubus odoratus*) Wild Red Raspberry (*Rubus idaeus ssp. strigosus*) Eastern Prickly Gooseberry (*Ribes cynosbati*)	Virginia Rye (*Elymus virginicus*) Slender Wheat Grass (*Elymus trachycaulis*) Butterfly Milkweed (*Asclepias tuberosa*) Sand Dropseed (*Sporobolus cryptandrus*) Wild Columbine (*Aquilegia canadensis*) Dwarf Blazing Star (*Liatris cylindracea*) Rough Dropseed (*Sporobolus aspera*) Virginia Mountain Mint (*Pycnanthemum virginianum*) White Vervain (*Verbena urtriculata*) Gold Fruited Sedge (*Carex aurea*) Soft Agrimony (*Agrimona pubescens*) Poverty Oatgrass (*Danthonia spicate*) Early Goldenrod (*Solidago juncea*) Slender Mountain Mint (*Pycnanthemum tenuifolia*)
WR4: CUW and FOD9 Units (eastern ravine)		
Implementation Notes: • Common Buckthorn removal type 1 • Apply Woodland Restoration Planting Treatment 4 (WR4) throughout the Common Buckthorn removal areas in the CUW and FOD9 units within the ravine northeast of the Riverfront Residential Area • Where nodes of Common Buckthorn are removed and create openings, apply shrub plantings along with Juglone-containing mulch or standard mulch to a depth of 25 cm to 30 cm • Woody stock planting density will be determined at detailed design based on the current abundance of Common Buckthorn and predicted amount of sub-canopy openings that will be created due to management of this invasive shrub No groundcover treatment or cover crop (in-planting of shrubs only)		
TREES	**SHRUBS**	**GROUNDCOVER SEED MIX**
No tree planting proposed since WR5 is within a retained woodland patch	Northern Spicebush (*Lindera benzoin*) Smooth Rose (*Rosa blanda*) Purple-Flowering Raspberry (*Rubus odoratus*) Eastern Prickly Gooseberry (*Ribes cynosbati*) Canada Fly Honeysuckle (*Lonicera canadensis*) Red Elderberry (*Sambucus racemosa ssp. pubens*) Nannyberry (*Viburnum lentago*) Choke Cherry (*Prunus virginiana*)	No groundcover treatment as existing herbaceous layer will be retained (in-planting of shrubs only)
WR5: SWD2-2 Unit (east development area)		
Implementation Notes: • No Common Buckthorn removal within this treatment area as it is a wetland buffer that is set back from development with existing woodland between the buffer and the development area • Apply Woodland Restoration Treatment 5 (WR5) within the SWD2-2 wetland buffer • This restoration area is within a retained vegetation community, shrub in-planting density will be determined at detailed design depending on current status of the sub-canopy and shrub layers		

Table 2: Woodland Restoration Area Planting Details

No groundcover treatment or cover crop (in-planting of shrubs only)		
TREES	**SHRUBS**	**GROUNDCOVER SEED MIX**
No tree planting proposed since WR6 is within a retained woodland patch	Northern Spicebush (*Lindera benzoin*) Smooth Rose (*Rosa blanda*) Purple-Flowering Raspberry (*Rubus odoratus*) Eastern Prickly Gooseberry (*Ribes cynosbati*) Canada Fly Honeysuckle (*Lonicera canadensis*) Red Elderberry (*Sambucus racemosa ssp. pubens*) Nannyberry (*Viburnum lentago*) Choke Cherry (*Prunus virginiana*)	No groundcover treatment as existing herbaceous layer will be retained (in-planting of shrubs only)

Table 3: Native Meadow Restoration Area Planting Details

NM1: Native meadow restoration in south-central portion of NHS	
Implementation Notes: • Common Buckthorn removal type 2 • Apply Native Meadow Restoration Treatment 1 throughout the NM1 identified area on **Figure 3** (**Appendix A**) • A diverse, native meadow is the target for this restoration area, which is intended to provide habitat for a variety of provincially or locally rare species, including: Great Plains Ladies'-tresses, Yellow Indian-grass, Monarch, bees, and other pollinators. After multi-year Common Buckthorn treatment is complete, soil testing and site-preparation are required before planting occurs in NM1: (1) collect soil sample and submit to an accredited soil laboratory for testing, (2) in autumn apply amendments as per soil testing results and terraseed with the native seed mix and cover crop. Soil amendments could include alterations to soil chemistry, texture, or addition of mycorrhizal inoculants. • Conduct transplants into NM1: (1) accurately demarcate existing specimens of Great Plains Ladies'-tresses (within the SWH polygons) in the field in late September and perform plug/sod mat transplants once the plant is dormant in late October. • Apply groundcover seed mix (outside of sod mat transplant areas) at terraseed application rate of 15 kg/ha to 20 kg/ha (use a low-height groundcover seed mix to reduce shading of Great Plains Ladies'-tresses) • Some of the species in the groundcover seed mix require more moist soil conditions, planting of these species should target areas adjacent to the proposed amphibian / turtle ponds within NM1 • Apply cover crop with the groundcover seed mix (application rate kg/ha depends on cover crop species choice, refer to **Table 5**, **Appendix B**) • No tree / shrub planting proposed	
GROUNDCOVER SEED MIX	
Virginia Rye (*Elymus virginicus*) Indian Grass (*Sorghastrum nutans*) Slender Wheat Grass (*Elymus trachycaulis*) Canada Rye (*Elymus canadensis*) Sand Dropseed (*Sporobous cryptandrus*) Giant Yellow Hyssop (*Agastache nepetoides*) Swamp Milkweed (*Asclepias incarnata*) Common Milkweed (*Asclepias syriaca*) Butterfly Milkweed (*Asclepias tuberosa*) Spiked Blazing Star (*Liatris spicata*) Ironweed (*Vernonia missurica*)	Virginia Mountain Mint (*Pycnanthemum virginianum*) Green Headed Coneflower (*Rudbekia laciniata*) Early Goldenrod (*Soldiago juncea*) Grey Goldenrod (*Solidago nemoralis*) Heath Aster (*Symphyotrichum ericoides*) Bergamot (*Monarda fistulosa*) Blue Vervain (*Verbena hastata*) White Vervain (*Verbena urticifolia*) Hoary Vervain (*Verbena stricta*)
NM2: Native meadow restoration in eastern portion of the NHS	
Implementation Notes: • Common Buckthorn removal type 2 • Apply Native Meadow Restoration Treatment 2 within the wetland buffers identified as NM2 on **Figure 3** (**Appendix A**) • Apply woody stock within interior 5 m of the wetland buffer (against the wetland boundary) • Woody stock planting density: 2 trees/100 m^2, 8 shrubs/100 m^2 • Concentrate tree/shrub plantings in the first 5 m of the buffer (against the retained feature edge) • Apply groundcover seed mix at terraseed application rate of 7 kg/ha to 10 kg/ha • Apply cover crop with the groundcover seed mix (application rate kg/ha depends on cover crop species choice refer to **Table 5**, **Appendix B**)	

Table 3: Native Meadow Restoration Area Planting Details

TREES	SHRUBS	GROUNDCOVER SEED MIX
Northern Red Oak (*Quercus rubra*) Red Maple (*Acer rubrum*) Shagbark Hickory (*Carya ovata*)	American Plum (*Prunus americana*) Grey Dogwood (*Cornus foemina*) Staghorn Sumac (*Rhus typhina*) Dotted Hawthorn (*Crataegus punctata*)	Virginia Rye (*Elymus virginicus*) Riverbank Rye (*Elymus riparius*) Canada Rye (*Elymus canadensis*) Indian Grass (*Sorghastrum nutans*) Slender Wheat Grass (*Elymus trachycaulis*) Common Milkweed (*Asclepias syriaca*) Sweet Ox-eye (*Heliopsis helianthoides*) Giant Yellow Hyssop (*Agastache nepetoides*) Indian Hemp (*Apocynum cannabinum*) Blue Vervain (*Verbena hastata*) Sand Dropseed (*Sporobolus cryptandrus*) Poverty Oatgrass (*Danthonia spicate*) Brown-Eyed Susan (*Rudbeckia hirta*) Early Goldenrod (Solidago juncea) Path Rush (*Juncus tenuis*) Bergamot (*Monardafistulosa*) Grey Goldenrod (*Solidago nemoralis*) New England Aster (*Symphyotrichum novae-angliae*)

NM3: Pollinator plant restoration areas within Open Space / Parkland

Implementation Notes:

- Apply Native Meadow Restoration Treatment 3 throughout the NM3 identified areas on **Figure 3** (**Appendix A**)
- NM3 will be a recipient location for sod mat transplants of Great Plains Ladies'-tresses; areas between sod mat transplants will be terraseeded with a low-height groundcover seed mix to reduce shading of this plant.
- The location of the NM3 polygons should be clearly demarcated in the field ahead of site clearing for development. Existing vegetation will be cleared within the open space / parkland designated area however disturbance to existing soils should be minimized to the extent feasible within the NM3 polygons. Apply the measures outlined in the NM1 implementation notes to demarcate and transplant the Great Plains Ladies'- tresses.
- Apply groundcover seed mix (outside of sod mat transplant areas) at terraseed application rate of 15 kg/ha to 20 kg/ha
- Apply cover crop with the groundcover seed mix (application rate kg/ha depends on cover crop species choice, refer to **Table 5**, **Appendix B**)
- No tree/shrub planting proposed

GROUNDCOVER SEED MIX	
Key species to include: Indian Grass (*Sorghastrum nutans*) Big Bluestem (*Andropogon gerardii)* Common Milkweed (*Asclepias syriaca*) Butterfly Milkweed (*Asclepias tuberosa*)	Early Goldenrod (Soldiago juncea) Grey Goldenrod (Solidago nemoralis) Bergamot (Monarda fistulosa) Spiked Blazing Star (Liatris spicata) Ironweed (Veronia missurica)

Table 4: Created Open Wetland Planting Details

Created open wetlands within native meadow restoration areas NM1 and NM2		
Implementation Notes: • Shrub planting density: 4 shrubs/100m^2 within the littoral zone • Apply cover crop with the groundcover seed mix (application rate kg/ha depends on cover crop species choice, refer to **Table 5**, **Appendix B**) • Collect and distribute native floating aquatic vegetation samples from the existing open aquatic ponds that are retained within the NHS		
TREES	**SHRUBS**	**GROUNDCOVER SEED MIX**
No tree planting proposed	Pale Dogwood (*Cornus obliqua*) Buttonbush (*Cephalanthus occidentalis)* Willow shrub species *(Salix spp.*)	Spotted Jewelweed (*Impatiens capensis)* Broad-fruited Burreed (*Sparaganium eurycarpum)* Creeping Spike-rush (*Eleocharis palustris)* Soft-stemmed Bulrush (*Schoenoplectus tabernaemontani*) Variegated Pond-lily (*Nuphar variegata*) Broad-leaved Arrowhead (*Sagittaria latifolia*) Water-plantain (*Alisma plantago-aquatica*)

Table 5: Recommended Cover Crop Options

Common Name	Scientific Name	Planting Window	Seed Rate when applied with native seed mix	Seed rate when applied without native seed mix*	Comments
Canada Wild Rye	*Elymus canadensis*	September 15 to October 20	15 kg/ha	67-224 kg/ha	
Oats	*Avena sativa*	Late April to mid-May and August to September	20 kg/ha	90-157 kg/ha	Leave standing dead in winter
Buckwheat	*Fagopyrun escelentum*	June and July	20 kg/ha	56-78 kg/ha	If applying later in timing window, apply with Oats to provide fall and winter cover (standing dead)
Winter Wheat	*Triticum aestivum*	Mid to late September	20 kg/ha	78-224 kg/ha	

Notes:

*Pure cover crop (with no additional native seed mix) will be applied to the Common Buckthorn type 2 removal areas following each herbicide treatment to provide cover and competition with the Common Buckthorn seed bank.

Cover crop species selection, application seed rate and timing windows based on professional experience and Bjorkman, T. no date. New York Cover Crop Decision Support Tool. Cornell University, Horticulture Section.

Table 6: 15 m Buffer Planting Areas (Other Lands Owned by Applicant)

BP1: SWD4-1

Implementation Notes:

- Common Buckthorn removal type 1
- Apply BP1 treatment throughout the 15 m buffer assigned to this wetland (which is located on other lands owned by the applicant)
- Tree/shrub plantings throughout the buffer where canopy opened up by buckthorn removal
- Woody stock planting density: 3 trees/100 m^2, 8 shrubs/100 m^2
- Apply tree seed in 6 pods to 12 pods (locations to be identified at detailed design) within the retained vegetation zone adjacent to the wetland edge. Three Oak species are targeted within the pods: Red Oak, Swamp White Oak and Pin Oak. The tree seed pods should be situated beneath existing canopy cover ('shelter wood') to provide semi-shade conditions. For Red Oak, three acorns should be placed together in each planting hole to yield (approximately) one seedling. For Pin Oak and Swamp White Oak, five acorns should be placed together in each planting hole to yield (approximately) one seedling. Apply standard mulch to 25 cm to 30cm depth after seed planting is complete to retain moisture and to reduce competition from other plants.
- No groundcover treatment or cover crop (existing vegetation is present throughout most of this buffer area)

TREES	SHRUBS	GROUNDCOVER SEED MIX
Pin Oak (*Quercuspalustris*) Northern Red Oak (*Quercus rubra*) Shagbark Hickory (*Carya ovata*) Eastern Cottonwood (*Populus deltoides spp deltoides*) Refer to Implementation Note regarding Oak seed planting	Cottony Willow (*Salix eriocephala*) Nannyberry (*Viburnum lentago*) Wild Red Raspberry (*Rubus idaeus ssp.strigosus*) Purple-flowering Raspberry (*Rubus odoratus*) Alleghany Blackberry (*Rubus allegheniensis*) Dotted Hawthorn (*Crataegus punctata*)	No groundcover treatment as existing herbaceous layer will be retained (in-planting of trees and shrubs only)

BP2: SWT2/CUT1

- Common Buckthorn removal type 1
- Apply BP2 treatment throughout the 15m buffer assigned to this wetland (which is located on other lands owned by the applicant)
- Tree/shrub plantings throughout the buffer where canopy opened up by buckthorn removal
- Woody stock planting density: 2 trees/100 m^2, 10 shrubs/100 m^2
- No groundcover treatment or cover crop (existing vegetation is present throughout most of this buffer area)

TREES	SHRUBS	GROUNDCOVER SEED MIX
Eastern Cottonwood (*Populus deltoides spp. deltoides*) Northern Red Oak (*Quercus rubra*) Black Cherry (*Prunus serotina*)	Grey Dogwood (*Cornus foemina*) Choke Cherry (*Prunus virginiana*) Nannyberry (*Viburnum lentago*) Red Elderberry (*Sambucus racemosa ssp. pubens*) Wild Red Raspberry (*Rubus idaeus ssp.strigosus*) Purple-Flowering Raspberry (*Rubus odoratus*) Eastern Prickly Gooseberry (*Ribes cynosbati*)	No groundcover treatment as existing herbaceous layer will be retained (in-planting of trees and shrubs only)

Appendix F - Conceptual LID Information (Wood)

Memo

To:	John Henricks, NPG; Noel Boucher, Savanta
From:	Ron Scheckenberger / Aaron Farrell
Date:	December 5, 2019
File:	TPB184078
c.c.	Feng Shi, GR (CAN)
Re:	**Response to Selected Preliminary Environmental Planning Comments, Riverfront Development, City of Niagara Falls**

Further to the meeting of November 20, 2019 with Region of Niagara, NPCA, City of Niagara Falls and Riverfront representatives, Wood has prepared the following responses to selected preliminary environmental planning comments provided by the Region and Conservation Authority accordingly.

Comment 15b/17a/22 – Establishing a conceptual design of SWM treatment (LID BMPs) at the interface with the various wetlands is difficult to address at this stage without more specifics related to storm sewer depths, local catchments and coverage, and individual lot grading. For the most part though the drainage areas will be small (as detailed in the ESR and updated FSS specific to wetland water balances), and to replicate current conditions, it is proposed to have multiple influent points. As such the proposed buffer is expected to easily accommodate any secondary treatment approach particularly since the length will not be limiting – only the width. It is anticipated that OGSs will be located in the road ROW upstream of the influent points to the wetlands and the balance of the "treatment" required in the buffers will largely offer polishing and energy dissipation functions. It should also be noted that based on recent dialogue with City staff, Niagara Falls will not be pursuing LID BMPs within the balance of the development area and rather is preferring the use of end-of-pipe facilities (as presented in the most recent FSS).

Based on the foregoing, and at the request of GR (CAN), Wood has prepared a typical plan of a local catchment drainage system which depicts (ref. attached):

- Catchment
- Storm sewers
- Oil and grit separators (OGS)
- Energy dissipation and polishing treatment system in buffer

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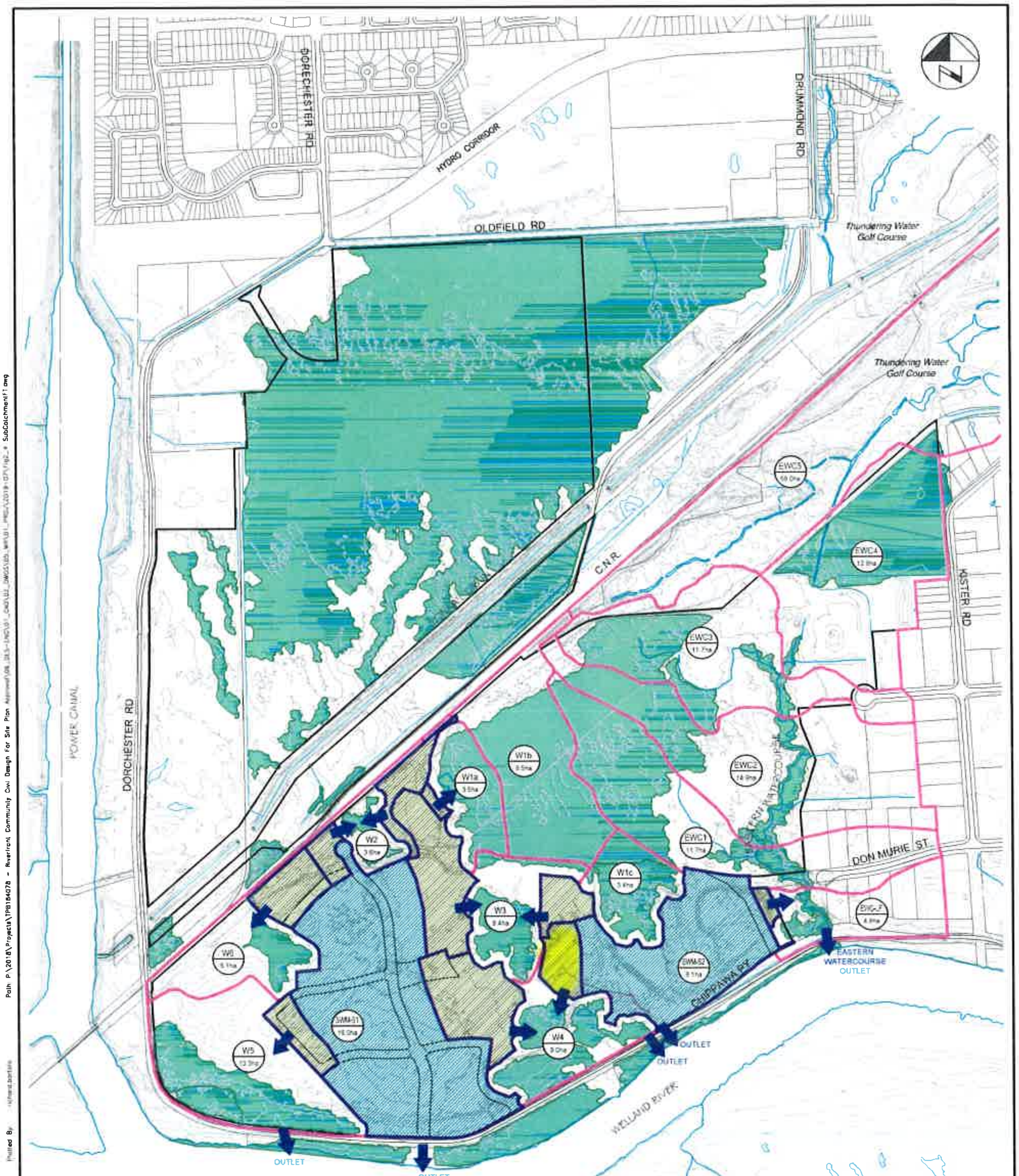
The primary treatment of stormwater runoff is proposed through the OGS in the local road ROW. The secondary treatment (polishing) and energy dissipation is proposed via the proposed feature in the buffer to the wetland. This small depression with a filter media would be mildly graded to capture concentrated treated discharge from the storm sewer. Low flows would infiltrate while larger flows would be filtered and dissipate energy prior to discharge to the wetland via a level spreader. As noted during the November 20, 2019 meeting, O&M for the OGS would be per the manufacturer's specification (typical inspection and cleanout once a year) and for the feature in the buffer, this could likely also be inspected annually, with minor trash cleanout; no major maintenance (sediment cleanout) would be expected for 20+ years. It should also be noted, per the attached plan, that a short armourstone retaining wall will likely be required proximate to the storm outfall to facilitate lot grading accordingly.

We trust the foregoing and the attached adequately addresses the concerns raised by the Region and NPCA.

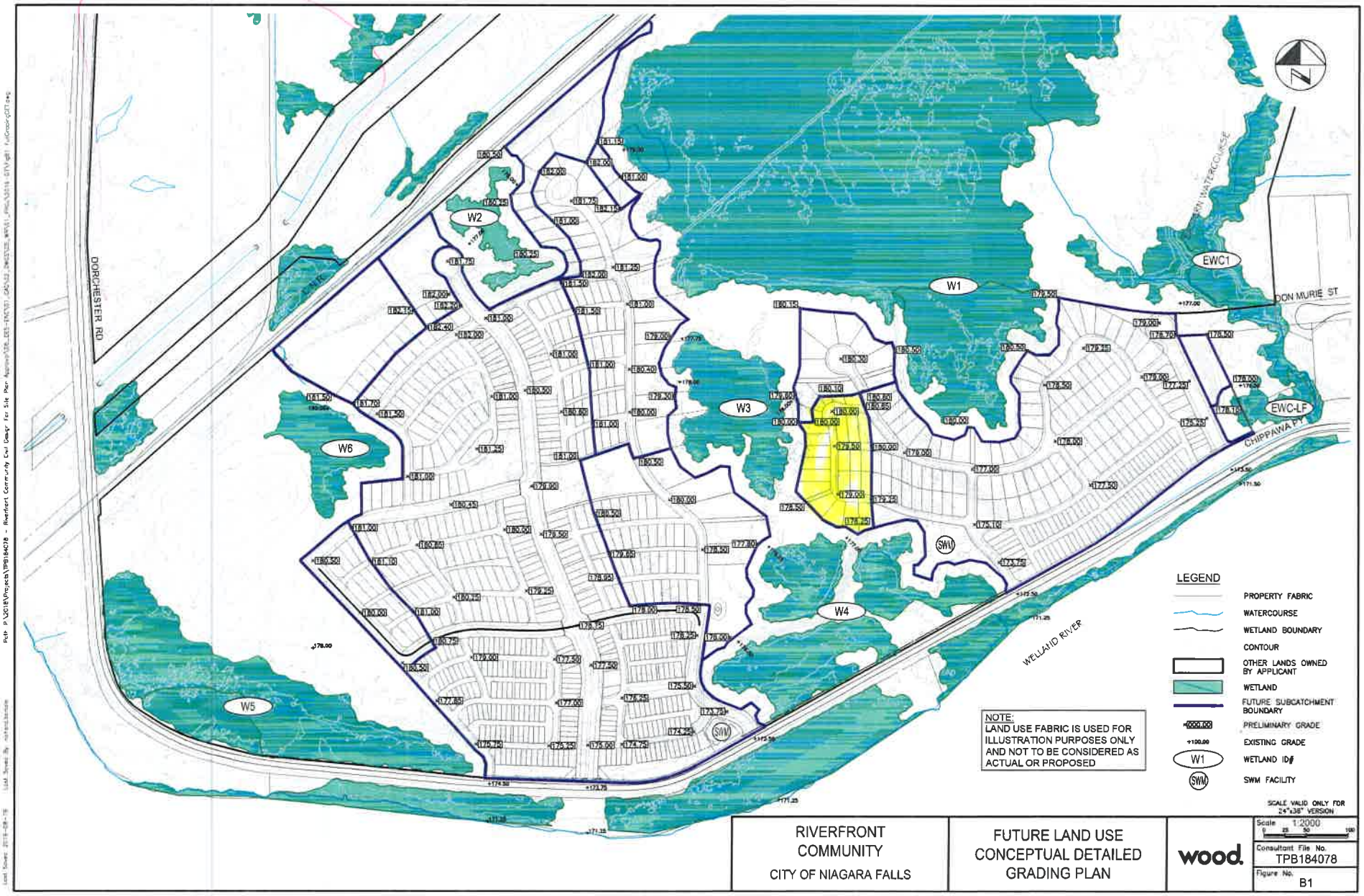
RBS/kf
Attach.



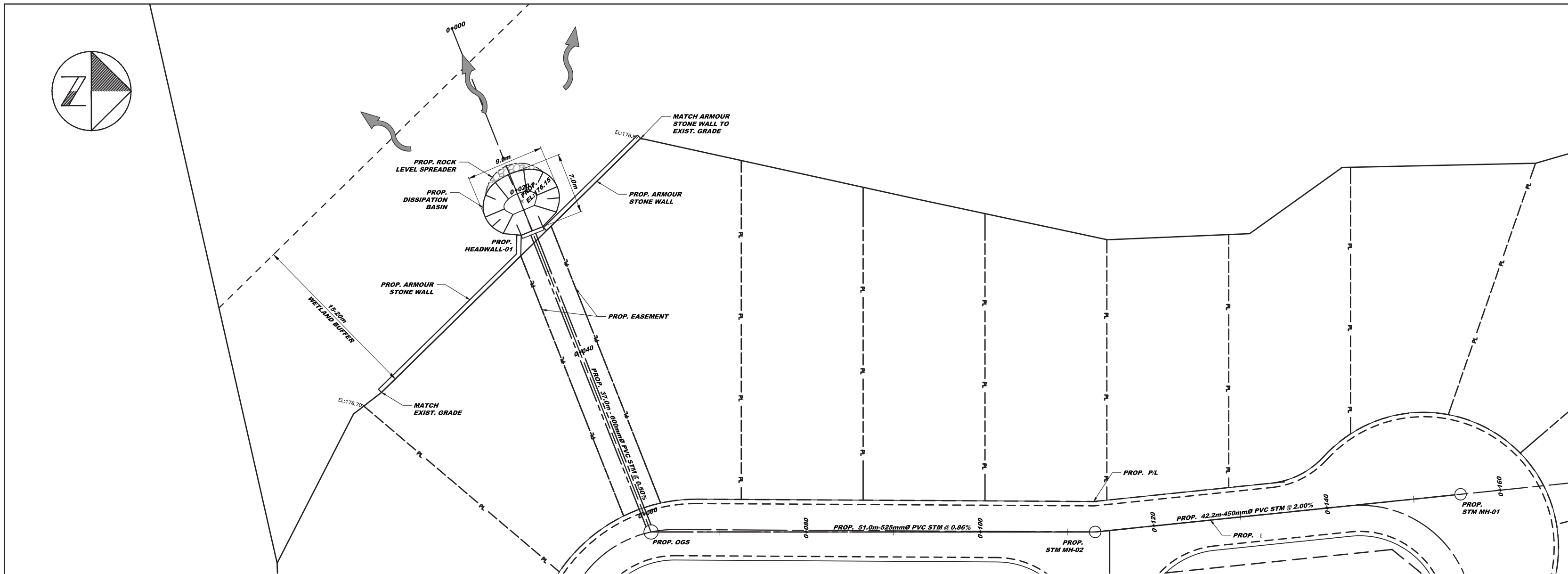
LEGEND

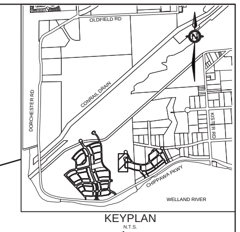
- PROPERTY FABRIC
- WATERCOURSE
- WETLAND BOUNDARY
- CONTOUR
- LANDS OWNED BY APPLICANT
- WETLAND
- EXISTING SUBCATCHMENT BOUNDARY
- FUTURE SUBCATCHMENT BOUNDARY
- W1 / 25.0ha — SUBCATCHMENT ID# / SUBCATCHMENT AREA
- PROPOSED DEVELOPMENT AREAS DRAINING TO WETLANDS FOR WATER BUDGET (TREATMENT VIA LID/BMPs)
- PROPOSED DEVELOPMENT AREAS NOT DRAINING TO WETLANDS (TREATMENT VIA WET POND AND/OR LID/BMPs)
- FLOW DIRECTION

RIVERFRONT COMMUNITY CITY OF NIAGARA FALLS	SUBCATCHMENT BOUNDARY PLAN (PROPOSED LAND USE CONDITIONS)	wood.	SCALE VALID ONLY FOR 24"x36" VERSION Scale 1:4000 Consultant File No. TPB184078 Figure No. 2.4

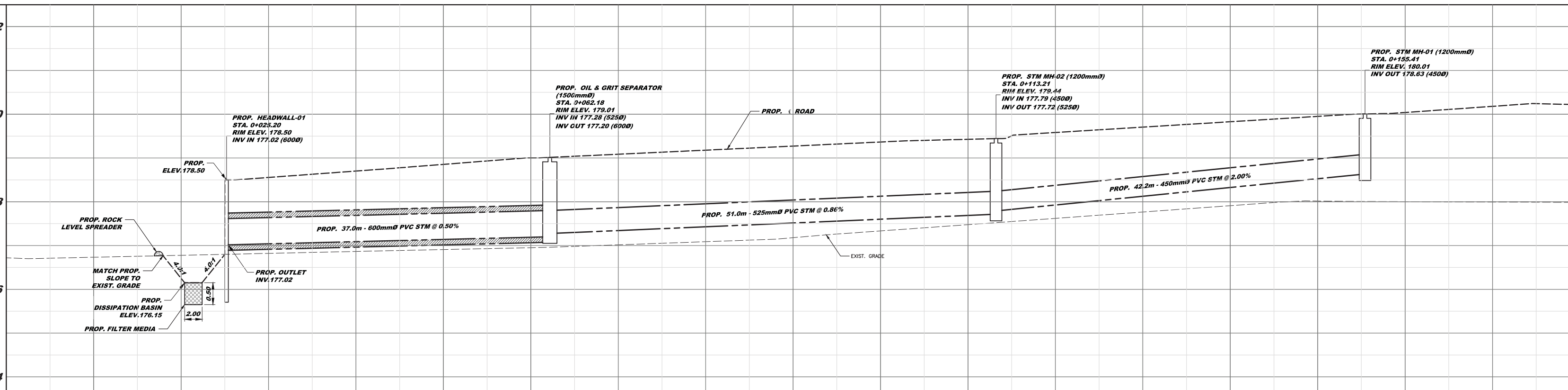

DORCHESTER RD
W1
W2
W3
W4
W5
W6
EWC1
EWC-LF
SWM
DON MURIE ST
CHIPPAWA PY
WELLAND RIVER
LEGEND
PROPERTY FABRIC
WATERCOURSE
WETLAND BOUNDARY
CONTOUR
OTHER LANDS OWNED BY APPLICANT
WETLAND
FUTURE SUBCATCHMENT BOUNDARY
PRELIMINARY GRADE
EXISTING GRADE
WETLAND ID#
SWM FACILITY
NOTE:
LAND USE FABRIC IS USED FOR ILLUSTRATION PURPOSES ONLY AND NOT TO BE CONSIDERED AS ACTUAL OR PROPOSED
SCALE VALID ONLY FOR 24"x36" VERSION
Scale 1:2000
0 25 50 100
Consultant File No. TPB184078
Figure No. B1
RIVERFRONT COMMUNITY
CITY OF NIAGARA FALLS
FUTURE LAND USE CONCEPTUAL DETAILED GRADING PLAN
wood.

MUNICIP90D





STORM PIPE



STATION	℄ EXIST.ELEV	℄ PROP. ELEV
0+010	176.73	
0+020	176.78	176.252
0+030	176.82	178.555
0+040	176.87	178.701
0+050	176.91	178.854
0+060	176.95	179.000
0+070	177.02	179.085
0+080	177.09	179.178
0+090	177.18	179.271
0+100	177.33	179.364
0+110	177.48	179.426
0+120	177.62	179.582
0+130	177.77	179.704
0+140	177.91	179.827
0+150	178.02	179.950
0+160	178.00	180.038
0+170	177.99	180.179
0+180	177.99	

PROP. STM. INVERTS: 177.02 — 37.0m - 600mm ∅ STM. SEWER @ 0.5% — 177.20 | 177.28 — 51.0m - 525mm ∅ STM. SEWER @ 0.9% — 177.72 | 177.79 — 42.2m - 450mm ∅ STM. SEWER @ 2.0% — 178.63

PROP. SAN. INVERTS

NO.	REVISION	DATE	INIT.
0	ISSUED FOR REVIEW	YYYY/MM/DD	X.X.

DRAFTING X.X.
DESIGN X.X.
CHECKED BY X.X.
APPROVED BY X.X.

BENCHMARK DATUM
(PLACE # HERE)
(PLACE DESCRIPTION HERE)
ELEVATION - XXX.XXX

GR INVESTMENT GROUP — GR CAN.
CITY OF NIAGARA FALLS
WOOD

XX-1234
RIVERFRONT COMMUNITY DEVELOPMENT
PROP. OUTLET PIPE NETWORK
NIAGARA FALLS
CIVIL

CONSULTANT FILE No. TPB184078
DATE 2018/06/27
SCALE HOR: 1:250m VER: 1:50m
SHEET No. 038 OF XXX
DWG No. PP-038
REV. ----