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**ENVIRONMENTAL IMPACT STATEMENT
and
TREE CONSERVATION REPORT**

PROPOSED RESIDENTIAL DEVELOPMENT

**CARDINAL CREEK VILLAGE PHASE
OLD MONTREAL ROAD to SOUTH TRIBUTARY**

CITY of OTTAWA

A report prepared for:

Tamarack Homes

by *Muncaster Environmental Planning Inc.*

December 22, 2021



Bernie Muncaster, Principal, signed December 22nd, 2021

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1.0 INTRODUCTION

This Environmental Impact Statement (EIS) and Tree Conservation Report (TCR) is in support of a subdivision application in the south portion of the Cardinal Creek Village lands between Old Montreal Road and the South Tributary of Cardinal Creek, with Cox County Road to the east (Map 1). Cardinal Creek is approximately 600 metres to the west of the west site boundary. The municipal addresses for the site are 1296 and 1400 Old Montreal Road, with the site located in Lots 25 - 27, Concession 1 (Old Survey) of the Geographic Township of Cumberland.

The major natural environment features in the general area are the Cardinal Creek corridor to the west and the Ottawa River corridor, approximately one kilometre to the north. The closest provincially significant wetlands and Life Science Area of Natural and Scientific Interest (ANSI) are associated with Petrie Island, on the opposite side of Ottawa Road 174, about 1.5 kilometres to the northwest of the site. An Earth Science Area of Natural and Scientific Interest is along Cardinal Creek, with unique limestone cave structures (a karst formation) of earth science significance conveying the creek flow underground for a distance of approximately 250 metres. This feature is approximately 1.1 kilometres to the south of the southwest corner of the site.

The lands proposed for development are dominated by agricultural lands, with the west portion currently used for stockpiling coarse material. Significant valleylands and significant woodlands are associated with the forested South Tributary corridor. This corridor is part of the City's Natural Heritage System, including in the Greater Cardinal Creek Subwatershed Study (referred to in this report as the 'Subwatershed Study') (AECOM, 2014) and is identified as an Urban Natural Feature on Schedule C9 of the City's Official Plan. Two small treed areas, up to 0.4 hectares, are in the north portion of the site, south of Old Montreal Road. These areas are too small to meet the significant woodlands criterion for the urban area and are not identified as part of the City's Natural Heritage System. The site was outside of the Urban Area when the Urban Natural Areas Environmental Evaluation Study was completed. The South Tributary corridor is in the northeast portion of the Cardinal (Leonard) Creek Natural Area, as described by Brownell and Blaney (1997) and summarized in Section 3.4.

The EIS component addresses the presence of the adjacent South Tributary Corridor and associated significant woodlands, significant valleylands, and fish habitat, as well as potential fish habitat in the agricultural channels north of the South Tributary and potential Species at Risk utilization.

1.1 Scoping the Environmental Impact Statement

This EIS was prepared following the City's EIS and TCR Guidelines, with guidance from the Natural Heritage Reference Manual (OMNR, 2010). Many of the field surveys and this report were completed by Bernie Muncaster, who has a Master's of Science in Biology and over thirty-three years of experience in completing natural environment assessments. The purpose of the Tree Conservation Report component is to determine any tree stands that should be retained and

protected. Once a tree permit has been issued by the City, it is proposed to remove the woody vegetation not to be retained site in 2022, after the breeding bird season.

The major objective of this EIS is to determine whether the proposed changes in land use will negatively affect the significant features and functions of the Urban Natural Feature, Natural Heritage System, significant woodlands, significant valleylands, aquatic habitat, and other significant natural heritage features, and if so, can the impacts on the significant natural features and functions be mitigated. Mitigation measures are presented in Section 6 of this EIS to reduce the potential for impacts on the features and functions.

The following items were identified for particular attention in the EIS, recognizing that many of these issues are interrelated:

- what are the anticipated direct and indirect potential impacts on the South Tributary Urban Natural Feature and the features and functions of the associated significant woodlands and valleylands?;
- what is the extent of aquatic and wetland habitat on or adjacent to the site in addition to the South Tributary corridor?; and,
- what are the features and functions of the woody vegetation and other aspects of the natural environment in areas proposed for development, including potential Species at Risk utilization?

2.0 METHODOLOGY

This EIS identifies the natural environment features within and adjacent to the site, including the forested ravine of the South Tributary and adjacent tablelands area, including those proposed for development further to the north. Background information on the natural heritage features is summarized from the Ministry of Natural Resources and Forestry, Ontario Breeding Bird, and Rideau Valley Conservation Authority databases, and the Greater Cardinal Creek Subwatershed Study (AECOM, 2014) and the associated Existing Conditions Reports (MMM, 2007 and AECOM, 2009).

Aerial photography (1960 - 2019) was used to assess the natural environment features in the general vicinity of the site. In addition to surveys completed in 2011 and 2012 for the overall Cardinal Creek area, updated surveys were completed by Bernie Muncaster on February 11th, 2020 from 11:40 to 13:50 (air temperature of -4° C, calm winds, and overcast conditions), June 28th, 2020 from 07:40 to 10:30 (air temperature of 21° C, light air, and overcast), September 12th, 2020 from 09:15 to 11:40 (air temperature of 12° C, a light breeze, and sunny conditions), June 22nd, 2021 from 11:15 to 13:40 (an air temperature of 15° C, a light breeze, and partly sunny conditions), and December 16th, 2021 from 09:30 to 12:15 (an air temperature of 5° C, a light breeze, and partly sunny conditions). A detailed search for butternut was completed by Shaun St. Pierre of BCH Consulting Inc. on August 19th, 2020. On September 22nd, 2020, Shaun also completed soil moisture analysis for the meadow north of the South Tributary in the southeast portion of the site. Bowfin Environmental Consulting Inc. completed headwater drainage feature assessments for the on-site channels in the spring and summer of 2020. Please refer to Bowfin

(2021) for the methodology for the headwater drainage feature assessments. A summary of the key findings and associated management recommendations is provided in this EIS.

Birds were identified by sound and/or sight. Records of other wildlife were made through direct sightings and observations of tracks and scat. A search for raptor nests was completed by looking for evidence of nesting (such as stick nests, food caches, whitewashing of branches and foliage, accumulation of feathers/fur or prey remains on the ground or in shrubs as per the *Significant Wildlife Habitat Technical Guide* as well as the raptors themselves. Additional incidental wildlife observations were made on all field surveys. Important wildlife and vegetation observations were also gathered from the extensive information provided in the Greater Cardinal Creek Subwatershed Study Existing Conditions Report (MMM, 2007 and AECOM, 2009).

Ecological units were defined based on species present, the wetness index of the species, dominant species, drainage observations, health, age, topography and soil conditions. Other aspects of the surveys included photographs of site representative features and observations on the level of disturbance from human activities and other disturbances such as non-native flora.

For the purposes of this report, Old Montreal Road is considered to run in an east-west orientation.

3.0 EXISTING CONDITIONS

3.1 Geologic Conditions

Paterson (2021) summarized the surficial geology of the site as topsoil or fill overlying a stiff to very stiff silty clay deposit. Glacial till, consisting of silty clay with sand, gravel, cobbles and boulders was encountered by Paterson (2021) below the silty clay. Bedrock was noted below the glacial till at several of the test holes completed by Paterson (2021). Available geological mapping indicates that dolomite, limestone and shale are present, with the depth to bedrock generally up to 10 metres, extending up to 50 metres in the northwest portion of the site (Paterson, 2021). The groundwater table is expected to be between three and four metres below existing ground (Paterson, 2021).

Paterson (2021) reported that the slopes of the ravine associated with the South Tributary were stable, with some toe erosion noted where the channel is located in closer proximity to the valley corridor wall.

The only area identified as an important recharge area for the current site by PEEG (2013) is approximately 0.7 hectares in the northeast corner of the site. Figure 2.6 of the Subwatershed Study (AECOM, 2014) also shows the majority of the site as a lower recharge area, except for a similar portion of the northeast corner where a highly vulnerable aquifer is identified.

3.2 Aquatic Features

3.2.1 'South' East-West Cardinal Creek Tributary

An east-west tributary to Cardinal Creek is along the south edge of the site, approximately 600 metres south of Old Montreal Road and adjacent to the lands proposed for development. This channel is known as the 'South Tributary' and enters the site under County Cox Road near the intersection with Jonquille Way to the east. The tributary flows west to the confluence with Cardinal Creek approximately 600 metres west of the study area. Brook stickleback and creek chub were caught at all three sampling stations along the South Tributary, with between 70 and 78 fish netted at each station. The fork length size range for the creek chub and brook stickleback were between 29 and 250 mm and 25 and 50 mm, respectively. Typical wetted width and depths for the South Tributary are 1.3 metres and 9 cm, respectively. Closer to Cox County Road the South Tributary is straight, with a typical trapezoid channel cross-section and no riparian woody vegetation cover (Photos 1 and 2). PECG (2013) reported a flow of 5.3 L/s entering the site at Cox County Road. The portions of the South Tributary west and east of Cox County Road were considered intermittent by PECG (2013), with dry periods during the low flow summer period.

Further west, glide, riffle and run morphological units over a substrate of cobble, gravel, boulder, hard packed clay, and broader clay particles are common. Former pool habitat was removed when a historical beaver dam was breached approximately 300 metres west of Cox County Road. Riparian cover is generally very good along this reach of the South Tributary with forest cover on either side of the channel (Photo 3). PECG (2013) reported a series of springs, including observations of iron staining, along the Tributary within the forested area and the stream flow was noticeably greater, up to 27.4 L/s, than at Cox County Road. PECG (2013) concluded that the South Tributary in this area has permanent flow supported by groundwater baseflow. The majority of water in the South Tributary in this reach is locally derived from discreet locations of groundwater discharge (springs) likely from the exposed karst bedrock of the Bobcaygeon Formation to the south of the channel. PECG (2013) interpreted that the seepage is locally derived from the valleyland area around the South Tributary where the hydraulic gradient is strong enough to create a groundwater flux towards the channel. PECG (2013) noted that although some of the infiltration through the fractured bedrock discharges into the South Tributary, some of the infiltration also becomes deeper groundwater discharge, which ultimately discharges into the lower reaches of Cardinal Creek and the Ottawa River.

To the west of the site, culverts in poor condition and debris associated with an access lane create a barrier to fish movement between Cardinal Creek and the site (Photo 4). Also in this area PECG (2013) noted that the gradient of the South Tributary flattened out and much of the stream flow was interpreted to be lost to subsurface flow in thick sediments in this area, with an associated loss of defined channel.



*Photo 1 - South tributary looking west from culvert under Cox Country Road
(March 17th, 2020)*



Photo 2 – The South Tributary looking upstream, east, to Cox Country Road (May 4th, 2009)



Photo 3 – South tributary within the deciduous forest south of the lands proposed for development. View looking east (December 16th, 2020)



Photo 4 – Culverts and other debris impact the connectivity of the south tributary downstream (west) of the site. View looking west

3.2.2 Tableland Channels

A channel leading to South Tributary, referred to as the North Channel by Bowfin (2021) (see Figure 1) is approximately 210 metres south of Old Montreal Road, entering the site on the west side of Cox Country Road. This channel is poorly defined among cattails and has very limited flow. Only dip netting could be completed on April 18th, 2012 in limited areas. Most of the channel was dry. No fish were captured.

The channels between Old Montreal Road and the South Tributary were studied in detail in 2020 as part of a headwaters drainage features assessment completed by Bowfin (2021). The channels are generally straight, with a typical trapezoid-shape ditch cross-section (Photo 5). Bowfin (2021) also did not capture fish in the North Channel in 2020 and describe a fish barrier present in the form of a greater than two metre drop straight down the valley slope of the South Tributary (Photo 6), preventing the North Channel from being fish habitat

Other channels in the proposed development area were assessed by Bowfin (2021). Feature 1 (see Figure 1) is found on the east side of the site. It is a short feature (35 metres) that is connected to the North Channel. This channel is inclined to the north and there was a gradient barrier between it and Feature 2. This is compounded by a blocked culvert Bowfin (2021). Feature 2 is situated along the same alignment as Feature 1, but is inclined to the south towards the South Tributary. Its total length is 330 metres. There was no water present on the south (downstream) side during the initial visit in 2020 by Bowfin (2021) (which took place early in the season, ice/snow was still present on the downstream end). Note that the water levels within the lower (south) ± 10 metres of Feature 2 are the result of the water levels in the South Tributary. Feature 3 refers to the channel that is situated on the north and west sides of the upland ash deciduous forest. This feature is connected to both Feature 2 and the South Tributary. Very little of this channel has any incline. There was no flowing water in all but the very southwest section (last few meters) of Feature 3 which flowed down the valley bank of the South Tributary.

No fish were netted or observed in any of the on-site channels north of the South Tributary by Bowfin (2021). All channels were dry in the summer and were assigned a limited hydrology classification by Bowfin (2021).

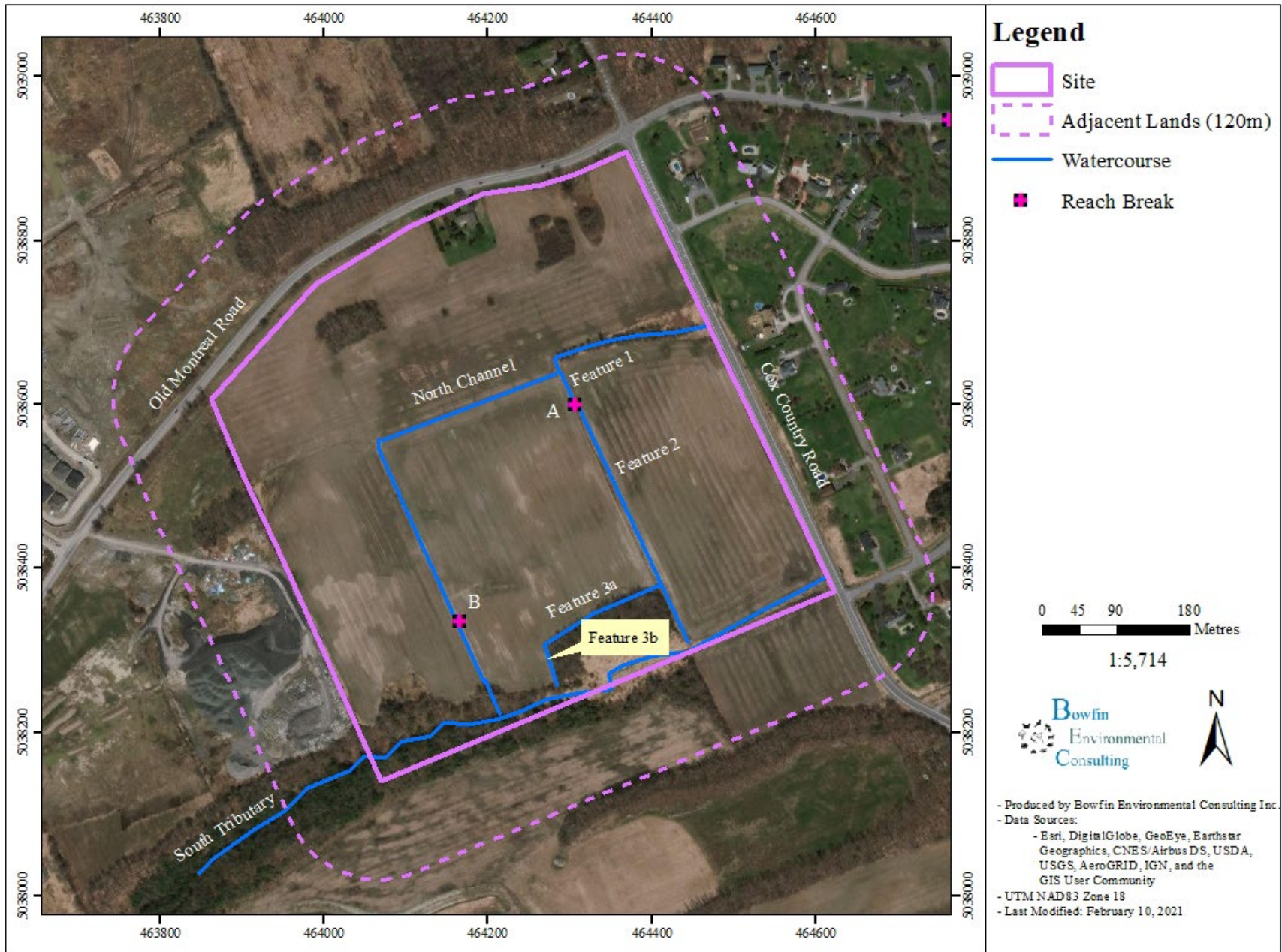


*Photo 5 - North Channel, approaching the forested corridor along the South Tributary.
View looking south (September 21, 2020)*



*Photo 6 - Downstream portion of the North Channel showing the physical barrier within the
South Tributary corridor. View looking north (April 6, 2020)*

FIGURE 1 – CHANNELS ASSESSED by BOWFIN (2021)



3.3 Terrestrial Features

The site is dominated by cultivated agricultural fields, with small areas of cultural meadows and woodlands, intermittent deciduous hedgerows and upland deciduous forests to the south of the limit of development (Maps 1 and 2).

3.3.1 Forests

Upland Sugar Maple Deciduous Forest

Sugar maple, bur oak, white ash, American beech, eastern hemlock, basswood, white cedar, large-toothed aspen, and red maple are common in the forests along the slopes of the South Tributary corridor, to the south of the proposed development area, with white birch, white spruce, black cherry, white ash, green ash and ironwood also present (Photos 7 and 8). Yellow birch is found near the base of the slopes in the vicinity of the South Tributary channel. There are several mature bur oak, sugar maple, American beech, and eastern hemlock trees. In the west portion of the site, the deciduous forest extends onto the tablelands for approximately 15 meters. Smaller trees are along the outer edge of the tableland portion as described below, with the maximum size generally in the 30cm – 40cm dbh range.

Regenerating maple, beech, white pine, ash, balsam fir, bur oak, and basswood stems are common in the understory along with hawthorn, red raspberry, white elderberry, prickly ash, black currant, and American yew shrubs. The ground flora communities show some disturbance with thicket creeper, common dandelion, reed canary grass, garlic mustard, wild grape, poison ivy, white avens, helleborine, flowering dogbane, small enchanter's nightshade, and purple-flowering raspberry. However, the extent of spring ephemerals is higher on the north (south facing) slope than the south slope and include high densities of white trillium and trout-lily, along with large-flowered bellwort, bloodroot, sharp-lobed hepatica, wild ginger, blue cohosh, red trillium, Canada mayflower and false Solomon's-seal. Christmas fern, oak fern, lady fern, red baneberry, foamflower, large-leaved aster, and hog peanut are other components of the ground flora.

The forest conditions along the north edge of the maple forest, closest to the proposed site disturbances, are generally dominated by trembling aspen, white ash, green ash, white elm, and bur oak, with the largest of the trees white ash up to 40cm dbh (Photo 9). Common buckthorn and tartarian honeysuckle shrubs are common along the outer forest edges. The maple trees become dominant beginning in the range of ten metres into the forest cover.

Upland Ash Deciduous Forest

In 2012 an upland ash forest north of the South Tributary in the southeast portion of the site was included in the Natural Heritage System for the Cardinal Creek Area, as well as the Subwatershed Study (AECOM, 2014). Surveys in 2020 and 2021 indicate that the condition of the ash trees have declined dramatically since these observations, with impacts of emerald ash borer extensive (Photos 10, 11, 13, and 16). In addition to the dominant white ash in poor

condition, sugar maple, white elm, green ash, bur oak, white birch, basswood, red maple, American beech, and bitternut hickory are present. Manitoba maple is common along the forest periphery and a few white cedar represent a small conifer component in the deciduous forest. Many of the white elm and white birch are also in poor condition with reduced leaf out and trunk/bark damage. Vine coverage is common on the lower branches of many of the trees and windthrow is extensive throughout the upland ash forest (Photo 14). The largest trees are white ash in very poor condition up to 58cm dbh and a 70cm dbh sugar maple and a 65cm dbh bur oak in much better condition. Healthy bitternut hickory are up to 50cm dbh (Photo 12). Due to the extent of dead or dying trees, the canopy cover is open in many areas of the ash forest.

The understory of the ash deciduous forest is very thick (Photo 15), with regenerating stems of ash and buckthorn shrubs abundant, along with extensive hawthorn shrubs around the periphery. Other regenerating stems include basswood, balsam fir, maple, Manitoba maple, poplar, bitternut hickory, ironwood, white spruce, and bur oak. In addition to the common hawthorn, red raspberry, beaked hazel, common buckthorn, glossy buckthorn, red-osier dogwood, and prickly ash shrubs are present. Pennsylvania sedge, June meadow grass, common strawberry, small enchanter's nightshade, common burdock, heart-leaved aster, calico aster, early goldenrod, Canada goldenrod, thicket creeper, wild grape, white avens, blue violet, yellow violet, purple flowering raspberry, and poison ivy (dominant in areas) indicate past disturbances in the forest with lady fern, ostrich fern, white snakeroot, Canada mayflower, white baneberry, starflower, sweet cicely, and false Solomon's seal also present.

Wildlife observed in the upland maple and ash forests included northern flicker, chipping sparrow, blue jay, grey catbird, house wren, red-winged blackbird, American woodcock, American robin, northern cardinal, common yellowthroat, black-capped chickadee, ovenbird, great-crested flycatcher, red-eyed vireo, pileated woodpecker, hairy woodpecker, song sparrow, white-throated sparrow, American goldfinch, yellow warbler, cedar waxwing, American crow, green frog, historical beaver cuttings, woodchuck, eastern garter snake, white-tailed deer and wild turkey tracks, and red squirrel. Scattered snags with potential wildlife cavities are in the maple forest along the South Tributary corridor. Other than one snag in the west outlet spillway, these snags are not anticipated to be removed or otherwise harmed. No rock fissure or stone piles were observed in the vicinity of the lands proposed for development and there was no evidence of raptor nesting, such as whitewash and stick nests.



Photo 7 – South side of deciduous forest along south tributary corridor



Photo 8 – Deciduous forest on the north slope of south tributary corridor



Photo 9 – Trees along the north edge of the South Tributary forest are smaller. View looking west (June 28th, 2020)



Photo 10 - Ash deciduous forest to the north of the South Tributary in the southeast portion of the site. View looking west to the east portion of the forest (September 12th, 2020)



*Photo 11 – Tree condition along the west edge of the ash deciduous forest.
View looking east (September 12th, 2020)*



Photo 12 - Bitternut hickory in apparently good condition in the central portion of the ash deciduous forest (June 22nd, 2021)



Photo 13 - Impact of emerald ash borer is extensive in the ash deciduous forest (March 20th, 2021)



Photo 14 - Windthrow is extensive in the ash deciduous forest. View looking south in the north-central portion of the ash deciduous forest (February 11th, 2020)



*Photo 15 - Understory is very thick in the ash deciduous forest in the southeast portion of the site
View looking south (June 28th, 2020)*

3.3.2 Agricultural Fields and Cultural Lands

Agricultural fields dominate much of the site. These fields were predominately planted in soybeans in 2020 and 2021 (Photos 16, 17, and 20). Since 2014 portions of the west fields have been used for stockpiling of coarse material.

Cultural Meadows

Once considered a meadow marsh in association with the former beaver dam (MMM, 2007), the open area to the north of the South Tributary approximately 300 west of Cox County Road has dried out and is now considered a cultural meadow on the north side of the South Tributary (Photo 18). The facultative reed canary grass is very dominant with Canada thistle, Canada goldenrod, field sow-thistle, flat-topped aster, red raspberry, wild parsnip, and white snakeroot also present, along with regenerating ash stems. Soil moisture sampling completed by BCH Consulting Inc. on September 22nd, 2020 identified this area as upland rather than wetland habitat with respect to soil conditions. The moisture regime within the reed canary grass meadow averaged moderately moist, which under the Ontario Wetland Evaluation System would not be considered wetlands. In combination with a scattering of upland vegetation amongst the very dominant facultative reed canary grass it is concluded that this meadow area represents upland rather than wetland habitat.

Areas of cultural meadows are also adjacent to the cultivated fields (Photo 19). Typical ground flora in these areas include Philadelphia fleabane, ox-eye daisy, bird's-foot trefoil, orchard grass,

June meadow grass, reed canary grass, timothy, common burdock, tall agrimony, wild grape, thicket creeper, tall goldenrod, Canada goldenrod, heart-leaved aster, white bedstraw, tufted vetch, tall cinquefoil, white bedstraw, common yarrow, yellow wood sorrel, bladder campion, wormseed mustard, lower hop clover, lesser stitchwort, common milkweed, common ragwort, yellow rocket, common plantain, common mullein, bull thistle, field sow-thistle, common strawberry, wild parsnip, and lamb's quarter. Regenerating white elm, poplar, and bur oak stems along with red raspberry and staghorn sumac shrubs are often common in this area.

Cultural Woodlands

White elm, bur oak, sugar maple, basswood, red maple, Manitoba maple, and white ash are the common tree species in the small areas of cultural woodlands in the north portion of the site (Photos 20 and 21). Many of the elm and ash are dead or had very little leaf-out. Windthrow is extensive in many areas. Basswood and sugar maple in apparently good condition are up to 40cm dbh.

The understory of the cultural woodlands is generally very thick with regenerating ash, elm, Manitoba maple, and bur oak stems, along with common buckthorn, tartarian honeysuckle, chokecherry, glossy buckthorn, prickly gooseberry, and red raspberry shrubs. The ground flora in the cultural woodlands is generally reflective of disturbed conditions, including a dominance of thicket creeper in many areas, along with wild grape, dame's rocket, white avens, white bedstraw, and Canada goldenrod. Remnants of false Solomon's seal, white trillium, and blue cohosh were also observed.

Deciduous Hedgerows

Intermittent deciduous hedgerows are scattered along the south side of Old Montreal Road and between some of the agricultural fields (Photo 22). Trembling aspen, crack willow, basswood, white elm, bur oak, sugar maple, white ash, and Manitoba maple are common tree species in the deciduous hedgerows. Larger trees include coppice basswoods on the south side of Old Montreal Road adjacent to the northwest and northeast portions of the site with individual trunks up to 70cm dbh, white elms in the 50cm dbh range adjacent to the north-central site boundary, and a 90cm dbh bur oak (Photo 24) along the south portion of the west site edge. A coppice Manitoba maple, with individual stems up to 40cm dbh adjacent to the northeast corner of the site has major trunk damage and has been extensively pruned. Many of the aspens have fungus and trunk damage, while reduced leaf-out and trunk damage are common on the elms and ash, though some of the white elm seemed to be in better condition (Photo 23).

Staghorn sumac, red raspberry, and common buckthorn shrubs and regenerating ash, elm, and bur oak stems are common among the hedgerow trees. Black swallowwort is abundant in stretches along the south side of Old Montreal Road. Wild grape coverage is common on the lower portions of several of the hedgerow trees.

Turkey vulture, wild turkey, American crow, killdeer, American goldfinch, American robin, northern cardinal, European starling, Canada goose, black-capped chickadee, white-breasted

nuthatch, yellow warbler, gray catbird, mourning dove, song sparrow, chipping sparrow, indigo bunting, red-winged blackbird, common grackle, gray treefrog, eastern chipmunk, woodchuck, grey squirrel and white-tailed deer were observed on and adjacent to the agricultural fields and cultural habitats. In 2012, two barn swallows, a Species at Risk as discussed below, were observed flying over the cultivated fields between Old Montreal Road and the South Tributary, but this species was not observed in the more recent surveys and there are no suitable structures for barn swallow nesting on the site.



Photo 16 – Cultivated field in the southeast portion of the site west of Cox Country Road. View looking west to ash deciduous forest north of the South Tributary (September 12th, 2020)



Photo 17 – Cultivated soybean field in the east portion of the site. View looking north to Old Montreal Road and forest off-site to the north of Old Montreal Road (September 12th, 2020)



Photo 18 - Meadow vegetation dominated by reed canary grass to the north of the South Tributary in the southeast portion of the site. View looking west (September 12th, 2020)



Photo 19 - Strip of cultural meadow between forest to the north of the top of slope to the right (south) and soybean field to the left (north). This location is a proposed infill work area for geotechnical purposes. View looking southeast (June 28th, 2020)



Photo 20 - Cultivated field in the north-central portion of the site and cultural woodland further to the north. View looking north (June 28th, 2020)



*Photo 21 – Cultural woodlot in the northwest portion of the site.
View looking southwest (June 28th, 2020)*



*Photo 22 - Deciduous hedgerow in the northeast portion of the site. View looking northeast
(May 27th, 2020)*



Photo 23 – White elm with good leaf-out along the south side of Old Montreal Road adjacent to the north-central portion of the site. View looking southeast (June 28th, 2020)



Photo 24 – Mature bur oak along the south portion of the west site boundary. View looking west (December 16th, 2021)

3.4 Cardinal (Leonard) Creek Natural Area

The South Tributary Corridor represents the northeast portion of the Cardinal (Leonard) Creek Natural Area, as identified in the Region of Ottawa-Carleton's Natural Environment System Strategy (Brownell and Blaney, 1997). The South Tributary Corridor is also part of the City's Natural Heritage System, including the Subwatershed Study (AECOM, 2014) and is identified as an Urban Natural Feature on Schedule C9 of the City's Official Plan (the site was not in the Urban Area when the Urban Natural Areas Environmental Evaluation Study was completed by Muncaster and Brunton (2005)). The Cardinal Creek Natural Area was rated moderate overall, with one criterion, rare vegetation community/landform type, scoring high and five other criteria (landscape attributes, endangered, threatened and rare species, vegetation community/landform and species diversity, hydrological features and condition of natural area) scoring moderate. Brownell and Blaney (1997) summarized the Natural Area as primarily sugar maple, poplar and white birch dominated upland forest on marine clay plain. The impact of alien species was considered low. The fragmentation and linear shape of the Natural Area resulted in a moderate amount of interior habitat. Brownell and Blaney (1997) assessed the vegetation community condition as fair. Seeps were reported along the Cardinal Creek valley. The rare vegetation community/landforms reported by Brownell and Blaney (1997) for the Cardinal Creek Natural Area included dry-fresh white birch deciduous forests, maple deciduous mineral swamps, dry-fresh white cedar coniferous forests and fresh sugar maple deciduous forests. A core upland deciduous forest of the Natural Area south of the South Tributary corridor was removed in 2009.

3.5 Potential Species of Interest and Other Significant Features

Species at Risk

The Ministry of Natural Resources and Forestry's biodiversity explorer website was reviewed on May 31st, 2021. This site allows for a search of threatened and endangered species covered by the *Endangered Species Act*, as well as other species of interest. A search conducted on the one km squares including the study area and adjacent lands (18VR63 – 38 and - 48) identified four Species at Risk, eastern meadowlark, bobolink, butternut and Blanding's turtle (west square only). In addition, one species of special concern – northern map turtle was identified for the west square only (18VR63-38). These two turtle species, along with snapping turtle, a species of special concern, are identified in the Ontario Reptile and Amphibian Atlas. No aquatic Species at Risk are identified for the South Tributary or on-site channels on the species at risk mapping maintained by the Department of Fisheries and Oceans. AECOM (2009) noted that no aquatic Species at Risk have been documented at any of the sampling sites along Cardinal Creek or the South Tributary for which information was provided.

The Breeding Bird Atlas results for the 10 km square 18VR63 were reviewed, with the threatened bobolink, eastern meadowlark, barn swallow, bank swallow, and chimney swift reported for the overall 10km square. Bobolink and eastern meadowlark utilize large grassland areas including hay fields. The cultivated fields that dominate the site are not suitable nesting habitat for these species. No structures were observed on or adjacent to the site that may be used

for nesting by chimney swift and barn swallow. Barn swallows were observed flying over the cultivated fields south of Old Montreal Road in 2012 but since that time they have not been observed and structures have been removed to the north and west of the site. The Greater Cardinal Creek Subwatershed Study Existing Conditions Report did not identify any habitat for grassland bird species on the site (AECOM, 2009). Barn swallows utilize sand faces such as those found at pits. The materials stockpiles in the west portion of the site are too large to be used as potential nesting habitat by bank swallow.

The potential Species at Risk in the City of Ottawa were also reviewed, with an emphasis on the endangered and threatened species historically reported in the overall City, including butternut, American ginseng, eastern prairie fringed-orchid, wood turtle, spiny softshell, Blanding's turtle, snapping turtle, musk turtle, Henslow's sparrow, loggerhead shrike, bald eagle, golden eagle, least bittern, eastern meadowlark, bobolink, barn swallow, bank swallow, eastern whip-poor-will, chimney swift, little brown myotis, northern long-eared bat, olive hickorynut, eastern cougar, common gray fox and American eel. The habitat requirements of these species along with those listed as special concern were reviewed.

Butternut is frequently encountered in eastern Ontario in a variety of habitats and is present on the portions of the Cardinal Creek development north of Old Montreal Road. No butternuts were observed on or within 50 metres of the current site during a detailed five-hour search for butternut completed by Shaun St. Pierre of BCH Consulting Inc. on August 19th, 2020 or during any of the other site reviews. Eastern whip-poor-will are not expected along the forested South Tributary corridor due to the lack of suitable adjacent open areas, which are dominated by cultivated fields both north and south of the corridor and the steeper slopes of the deciduous forest. No eastern whip-poor-will were heard calling during 2012 surveys completed with a survey point approximately 200 metres to the north of Old Montreal Road. No suitable turtle habitat is considered present on or adjacent to the site due to the minor flow in the channels, including the South Tributary, and lack of wetland habitat with standing water adjacent to the channels. Turtle usage is very common in the Petrie Island area and lake sturgeon, American eel, and spiny softshell are known from the Ottawa River corridor. These corridors are not in proximity to the current site and will not be impacted by the proposed development.

Significant Woodlands and Valleylands

A forested area is considered significant woodlands in the urban area of the City of Ottawa if the forest is 0.8 hectares in size or larger and is 60 years of age and older at the time of evaluation. Figure 2 shows the forest cover in 1960, with much of the South Tributary corridor forested. Thus, this area would be considered significant woodlands. Note the insert showing less forest cover in 1960 than current conditions for the ash deciduous forest. The polygon outline in red is less than 0.8 hectares (approximately 0.4 hectares). In 1960 the ash deciduous forest appears contiguous with the larger forested area to the southwest, but under current conditions the linkage is less than the required 60 metre minimum patch width (OMNR, 2010).

The South Tributary corridor would also be considered significant valleylands due to the well defined South Tributary channel at the base of the ravine, forested ravine slopes, and steep slopes associated with much of the ravine.

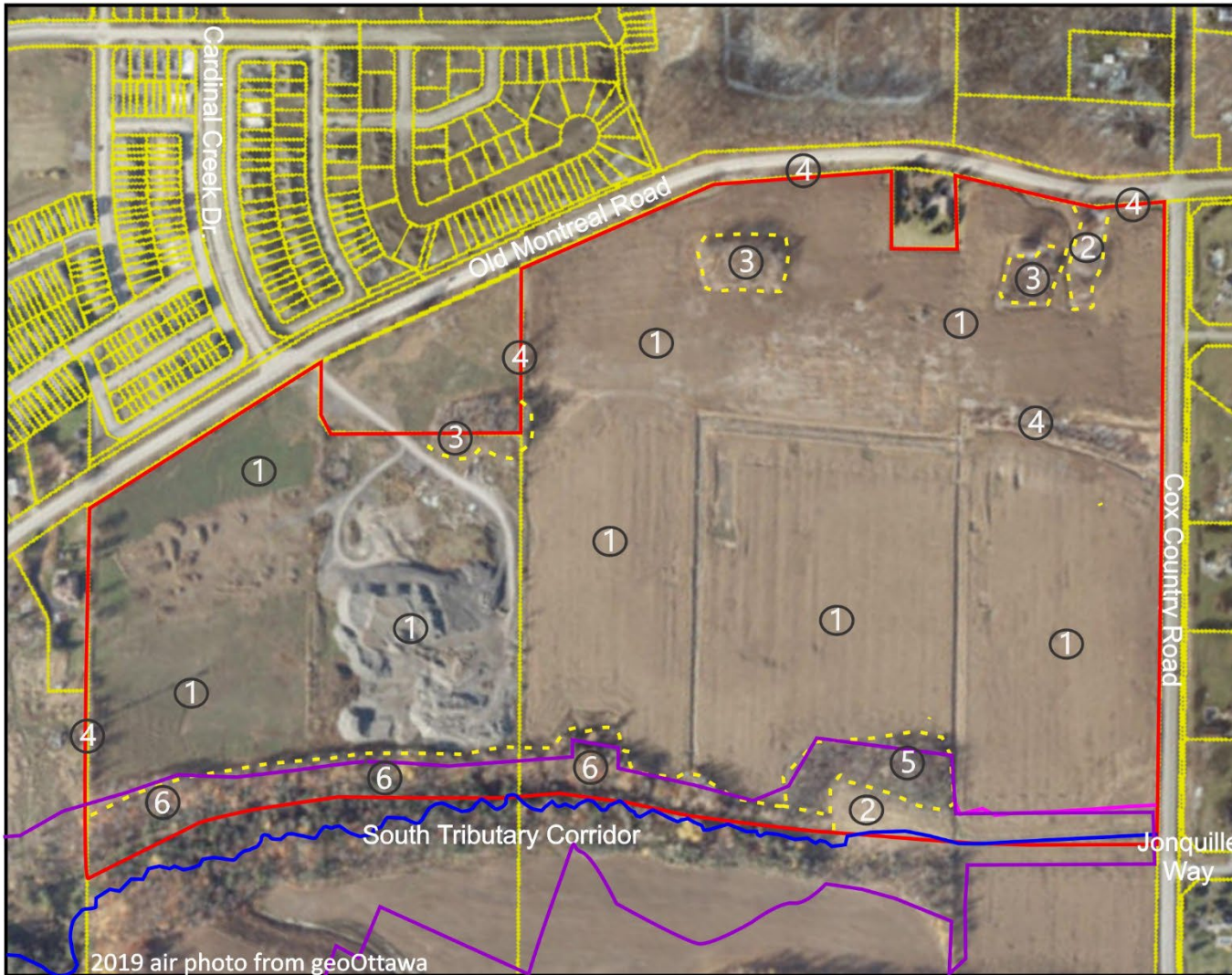
The cultural woodlands in the north portion of the site are too small to represent significant woodlands, though the trees and other components do provide some ecological functions including local wildlife habitat, and climate, air quality, wildlife, and nature appreciation benefits.

Significant Wildlife Habitat

The potential for significant wildlife habitat was assessed using the guidance in OMNR (2010) and MNRF (2015). No flora, fauna or ecological conditions identified in the background review or field survey that would trigger a significant wildlife habitat designation with respect to the ELC communities present were observed on the development portion of the site. For example, the cultural habitats do not support waterfowl stopover or staging areas, wetland habitat is not present, colonial nesting bird breeding habitat or other examples of seasonal concentration areas, rare vegetation communities as noted in MNRF (2015), or rare or specialized habitats including seeps or springs. The amphibians observed as part of the headwater drainage feature assessments were not in sufficient numbers or diversity to meet the thresholds in MNRF (2015) for a significant wildlife habitat designation.

The upland deciduous forests associated with the South Tributary corridor is not wide enough to support forest interior habitat and thus potential nesting of species of special concern such as wood thrush and eastern wood-pewee is unlikely. No evidence of raptor wintering areas was noted in proximity to the proposed development to the north, potential wildlife cavity trees were limited in number, and old growth forests are not present. Elsewhere along the South Tributary corridor and not in immediate proximity to the proposed development, areas of broken and fissured rock for potential use by snakes and other wildlife and seeps are present. These areas may represent significant wildlife habitat. Regardless, any wildlife usage of the South Tributary corridor is not anticipated to be impacted by the proposed development, provided the important mitigation measures discussed below, including those associated with the stormwater spillway areas, are properly implemented.

The linkage function provided by the site is reduced by the dominance of cultivated agricultural lands, extensive urban residential developments to the north, north of Old Montreal Road, and rural residential subdivisions to the east, east of Cox Country Road. Some linkage function likely occurs along the South Tributary corridor, west to the Cardinal Creek Valley. As discussed below the South Tributary corridor will be retained and protected.



Legend

-  Current Site
-  Vegetation Communities
-  Natural Heritage System per Schedule C9

Vegetation Communities

- ① Cultivated field/
Disturbed Lands
- ② Cultural meadow
- ③ Cultural woodlands
- ④ Deciduous hedgerow
- ⑤ Upland ash deciduous forest
- ⑥ Upland maple deciduous forest



Approx. Scale 1:6,300



Map 1

FILE: 08 - 58

November 23, 2021

Prepared for: Tamarack (Cardinal Creek) Corp.

Prepared by:

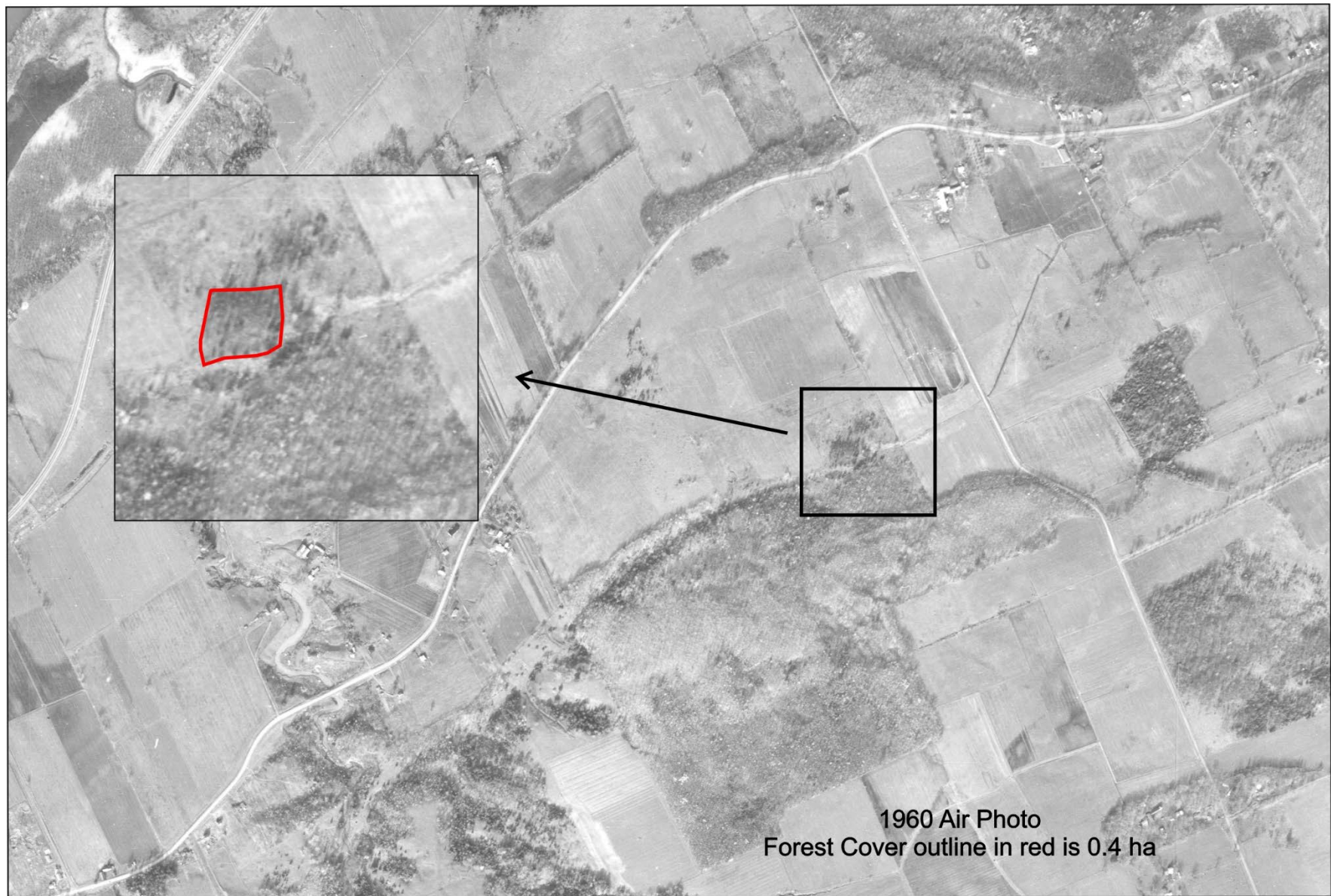


Muncaster
Environmental
Planning Inc.

**ENVIRONMENTAL IMPACT STATEMENT
Existing Conditions**

**Cardinal Creek Village, Initial South Phases
Cumberland, City of Ottawa**

FIGURE 2 – 1960 AERIAL PHOTOGRAPHY of the SITE



4.0 DEVELOPMENT PROPOSAL

4.1 Limit of Development

The limit of hazard lands determine by Paterson (2021) includes a six metre erosion access allowance, a stable slope allowance (where required), and a five metre toe erosion allowance from the top of stable slope. See Drawing PG5201-2 in Appendix 2 of Paterson (2021). The pink line on Map 2 of this report shows the greater distance from the South Tributary corridor of the limit of hazard lands, a 15 metre setback from the top of valley slope, or a 30 metre setback from the normal high water mark of the South Tributary. Generally, in the southeast portion of the site the 30 metre setback from the normal high water mark of the South Tributary is the greatest distance to the north, while the 15 metre setback from the top of slope is greatest in the southwest portion.

Table 2.9 of the final report of the Greater Cardinal Creek Subwatershed Study AECOM (2014) identifies a 25 metre setback from top of bank for permanent watercourses. It is not known whether top of bank refers to the top of valley slope or the channel bank. This distance is apparently based on a 2012 document prepared for the Credit Region Conservation Authority by Beacon Environmental Ltd titled *Ecological Buffer Guidelines*. This report was reviewed and although 25 metres is often mentioned in association with research projects as this was a distance studied for buffer effectiveness, we did not see a direct reference to a 25 metre setback. We are not aware of examples where these guidelines have been applied to features in the City of Ottawa. We are not aware of a 25 metres top of valley slope setback implemented, where not required by geotechnical factors, in the development portion of the City's Urban Area. There appeared to be no rationale provided in AECOM (2014) to support this extended setback on a channel or corridor specific basis.

As the headwater drainage feature assessment completed by Bowfin (2021) did not include a management recommendation of protection or conservation for the agricultural channels leading to the South Tributary, Paterson (2021) have recommended infilling the side slopes of the channels in two locations to the north of the top-of-slope and upland maple forest, shown as *infill work areas* on Drawing PG5201-2 of Paterson (2021). Tree removal in these areas is limited and will include a few white elm and trembling aspens up to 30cm dbh and smaller sugar maple (Photo 19). Regenerating poplar stem and red raspberry shrubs are also common in the proposed infill work areas. This infilling will result in a modification to the top of slope in these two areas and the fifteen metre top of slope setback in Paterson (2021) and this report has been modified to reflect the top of slope following the infilling.

4.2 Subdivision Plan

The subject lands are designated neighbourhood on Schedule B8 - Suburban (East) Transect of the new City of Ottawa Official Plan. Suburban Transect neighbourhood designations permit a range of low-rise housing types (HP Urban, 2021). Low-density residential uses, a local park, and two sites for elementary schools are proposed for the site. Figure 3 shows the proposed Plan

of Subdivision, which has a total of 758 units, including 168 back-to-back gallery townhomes, 276 townhomes, 10 semi-detached units, and 304 single family homes. A central park will be 2.5 hectares, with two school blocks, a 3.2 hectare parcel in the northeast and a 2.4 hectare parcel in the north-central portion of the site. The latter is attached to the central park. The proposed Plan of Subdivision would create 59 blocks and 17 streets including a new east west collector road connecting Old Montreal Road opposite the existing intersection with Cardinal Creek Drive with Cox Country Road Street (HP Urban, 2021).

As outlined in HP Urban (2021). The expectation is that the proposed development will contribute to the evolution towards a 15-minute neighbourhood by:

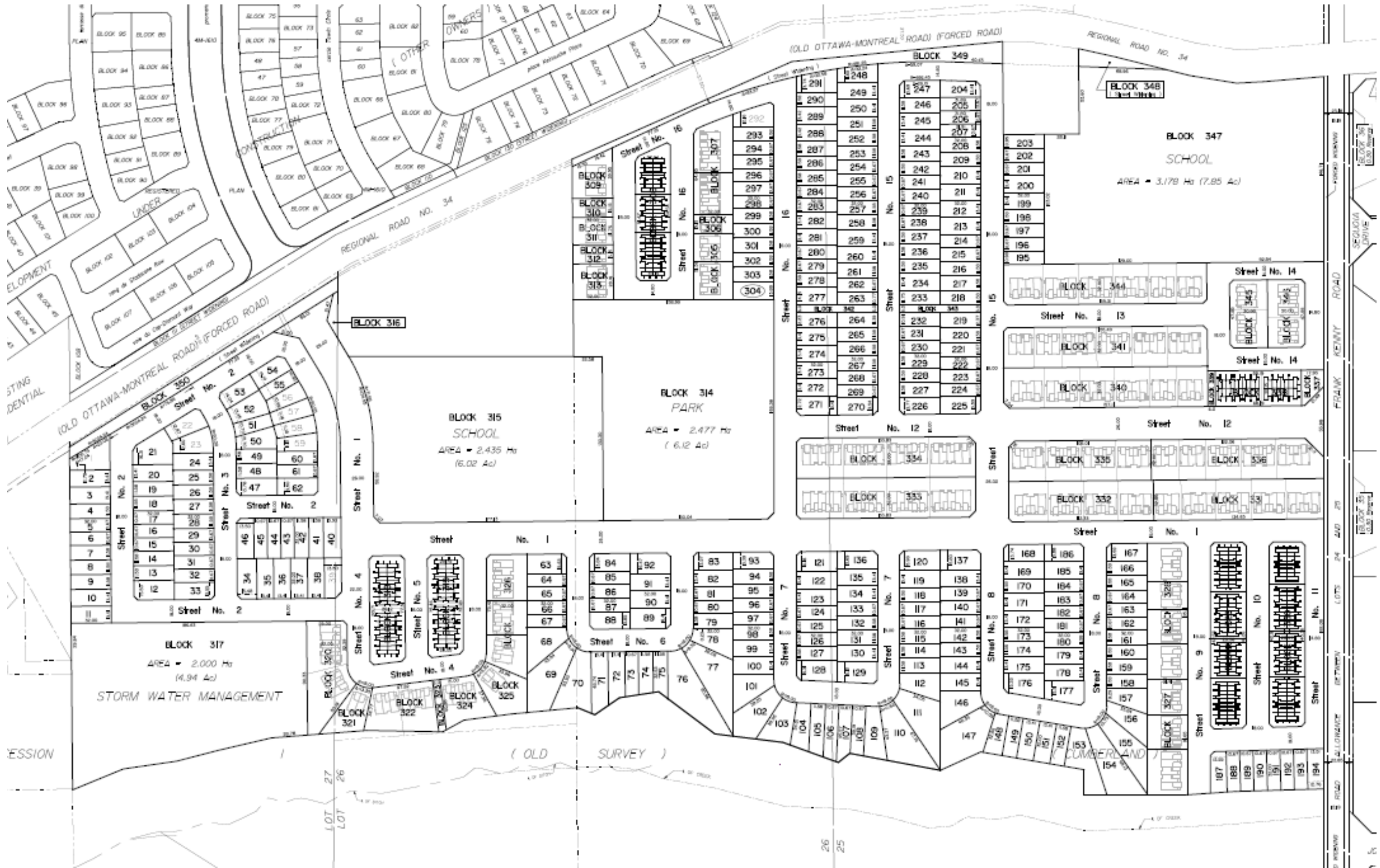
- Creating a high-quality public realm with parks & greenspaces and active transportation;
- Establishing a fine-grained, fully connected grid street network;
- Provides priority for sustainable modes of transportation, and the safety of vulnerable road users;
- Provides active transportation linkages to link to schools, retail and entertainment, parks, recreational facilities, and other positive community amenities;
- Preserving or creating treed corridors;
- Avoiding rear lotting on higher traffic streets; and,
- Having net residential densities shall strive to approach the densities of 36 units per net hectare.

As described in Section 6.2, stormwater quality and quantity service will be provided through gravity sewers ditches to a new stormwater management pond north of the South Tributary corridor, except for the northwest corner of the site where stormwater will be directed via existing storm sewers to the existing Pond 1 of Cardinal Creek Village south of Ottawa Road 174. The pond will be built within a two hectare parcel in the southwest corner of the site and will outlet to the South Tributary via a concrete outlet structure ending near the top -of-slope, with two spillways over the corridor ravine. Other servicing will be provided through extensions of the City's existing infrastructure including connections to water mains on Old Montreal Road and Cardinal Creek Drive. Wastewater sewers will outlet through the existing phases of the Cardinal Creek Village development before being directed to the Trim Road Collector Sewer.

Construction phasing of the site will occur in several phases, commencing in the west portion of the site, north of the stormwater management pond, and generally moving to the east. The phasing schedule will be based on market demands and landowner timing. The stormwater management pond will be required to be constructed prior to development of the contributing area to ensure that quality, quantity, and erosion controls are in place.

The Owner agrees that tree removal shall not occur in the subdivision lands in the absence of a tree permit issued under the Tree Protection By-law (No. 2020-340). A tree permit is also required for any early servicing and will be restricted to only those trees affected by the early servicing.

FIGURE 3 – DRAFT PLAN OF SUBDIVISION





Legend

- Current Site
- Vegetation Communities
- 30m NHWM/15m Top Slope Setback per Paterson (2021)
- Natural Heritage System per Schedule C9

Vegetation Communities

- ① Cultivated field/ Disturbed Lands
- ② Cultural meadow
- ③ Cultural woodlands
- ④ Deciduous hedgerow
- ⑤ Upland ash deciduous forest
- ⑥ Upland maple deciduous forest

Areas of Anticipated Tree Retention



Approx. Scale 1:6,300



Map 2

FILE: 08 - 58

December 15, 2021

Prepared for: Tamarack (Cardinal Creek) Corp.

Prepared by:



Muncaster
Environmental
Planning Inc.

ENVIRONMENTAL IMPACT STATEMENT
Proposed Conserved Vegetation

Cardinal Creek Village, Initial South Phases
Cumberland, City of Ottawa

5.0 IMPACT ASSESSMENT of NATURAL HERITAGE FEATURES

The significant Cardinal Creek, Ottawa River, and Petrie Island corridors are not in proximity to the current site and the proposed development is not anticipated to have the potential to impact these features.

The lands proposed for development are dominated by cultivated agricultural fields with limited natural heritage features. No Species at Risk were identified on or adjacent to the lands proposed for development and other than butternut, none would be anticipated given the habitats present. The pockets of cultural woodlands are too small to be considered significant woodlands.

The headwater drainage feature assessment by Bowfin (2021) concluded that no management was required for the on-site channels between Old Montreal Road and the South Tributary, with the exception of the North Channel on its downstream (south) side, where it experiences flowing water (Bowfin, 2021). This is restricted to the area that has eroded, creating a narrower channel with an incline. Further upstream, Bowfin (2021) concluded that the majority of the feature has a management recommendation of *No Management Required*. On the very downstream end of the North Channel, the valley is treed and will be retained as part of the South Tributary corridor. As such, Bowfin (2021) concluded that no additional measures are needed on the North Channel. Bowfin (2021) noted that the flow of the North Channel was causing erosion and impacting the valley of South Tributary. Bowfin (2021) recommended measures implemented to prevent this erosion from continuing, with the stormwater management of the site be designed to ensure that the water reaching the South Tributary is not negatively impacted in terms of quantity or quality.

PECG (2013) concluded that local seepage from the upper weathered overburden contributes only a small portion to flow in the South Tributary, does not contribute to baseflow during low flow periods, and is only prevalent following precipitation events and during the spring/wet seasons. The majority of groundwater baseflow to the South Tributary is derived from recharge areas located south of the South Tributary (PECG, 2013). Based on development of the lands between Old Montreal Road and the South Tributary, PECG (2013) estimated the potential reduction in baseflow to the South Tributary at 0.5 L/s. This amount is not considered significant and mitigation measures are presented in Section 6.2 to enhance baseflow contributions to the South Tributary. Figure 2.6 of the Subwatershed Study (AECOM, 2014) shows the majority of the site as a lower recharge area, except for the northeast corner where a highly vulnerable aquifer is identified.

The rationale for the setback from the top of slope of the South Tributary corridor is provided in Section 4.1. The upland ash deciduous forest in the southeast portion of the site, north of the South Tributary, was originally considered part of the Natural Heritage System in the 2013 analysis. Since that time the forest has been impacted significantly by the emerald ash borer, windthrow, and additional growth of non-native vegetation. This forest is no longer recommended for inclusion in the Natural Heritage System.

The South Tributary corridor, including the ash forest in the southeast portion of the site, is the portion of the Natural Heritage System identified by AECOM (2009) for the site. All

components of the Natural Heritage System on and adjacent to the site are identified by AECOM (2009) as *core elements*. A forested core area to the south of the South Tributary was removed in 2009. Except for the ash deciduous forest to the north of the South Tributary and minor tree removal associated with the proposed stormwater pond outlet and spillways, all other components of the Natural Heritage System, as delineate by AECOM (2009), are proposed for retention on and adjacent to the site.

The core elements of the Natural Heritage System were selected by AECOM (2009) on the basis of their ability to meet the following objectives:

- Representation of all landforms, rare vegetation types, and significant flora and fauna;
- Representation of all wetland types or, where wetland area is less than six percent of the subwatershed area, all wetland areas;
- Representation of all indicators of significant wildlife habitat, valleylands, and contiguous tableland forest;
- Representation of all contributors to the integrity of aquatic systems (e.g. riverine vegetation, headwater tributaries); and
- Representation of features with connectivity to features in adjacent subwatersheds

The ash deciduous forest does not meet the 0.8 hectare threshold for significant woodlands in the Urban Area based on the 1960 forest size, as shown in Figure 2. Though there appears to be a linkage to the forested lands of the South Tributary corridor to the southwest in 1960, current aerial photography shows this linkage as less than the required 60 metre minimum patch width (OMNR, 2010). Thus, the ash deciduous forest would not be considered significant woodlands or a contiguous tableland forest. The ash deciduous forest does not appear to provide a representation of any of the features described above.

West of Cox Country Road the setback to rear yards is less than 30 metres from the normal highwater mark of the South Tributary, though it will be more than 15 metres from top of slope. The normal high water mark setback will vary between 22 and 28 metres in this area to rear yards and will be at least 30 metres to the closest structure. As this current cultivated field naturalizes the functions of the setback will be much improved over the existing condition and are anticipated to be sufficient to protect the minimal aquatic habitat associated with the straight intermittent channel on the South Tributary in this location west of Cox Country Road.

Proper implementation of the Functional Servicing and Stormwater Management Report by DSEL (2021) will ensure water quality and quantity leaving the site at least mimics existing conditions.

The only work anticipated within the South Tributary corridor is an outlet and associated spillways from the stormwater management pond in the southwest portion of the site. Tree removal is required for the spillways but as discussed in Section 6.2, the spillways will be replanted following geotechnical preparations, including terracing of the slope with armour stone and placement of backfill material. It is important that trees outside of the footprint of the two spillway locations be retained to ensure the slope is naturally reinforced. The spillway locations

have been modified to minimize tree removal approaching the South Tributary. The west spillway will utilize a more open area (Photo 25) than an area of regenerating eastern hemlock to the east. Woody vegetation that will be removed for the outlet and associated spillway include sugar maples between 4 and 45cm dbh, and regenerating American beech and white pine stems. Most trees to be removed are less than 15cm dbh. A snag with potential wildlife cavities is also anticipated to be removed. The emergency spillway to the east will be placed in an area of existing erosion (Photo 26). After reenforcing with rock protection, the area will be replanted. Trees to be removed include sugar maples between 8 and 40cm dbh and eastern hemlock stems up to 20cm dbh.

No pathways are proposed for the South Tributary corridor. An access point for potential geotechnical work in the central portion of the south edge of the Plan of Subdivision will be fenced and gated. As indicated in Section 6.1, permanent fencing also is to be installed at the rear of the lots backing onto the South Tributary corridor.

Sections 6.2 and 6.3 provide mitigation measures to protect the downstream aquatic habitat, including the South Tributary, Cardinal Creek, and ultimately the Ottawa River. These potential impacts *could* include increase erosion in the channel from quicker and stronger runoff inputs during storm events, additional nutrient and contaminant inputs from residential activities such as automobile use and maintenance, application of fertilizers, pesticides and herbicides and improper disposal of solvents and other wastes. No work is proposed within the high water mark of the South Tributary. It is anticipated that closure of the on-site agricultural channels will reduce the extent of sedimentation into the South Tributary.



*Photo 25 – Location of outfall (west) spillway approaching the South Tributary.
View looking southwest (December 16, 2021)*



Photo 26 – Location of emergency spillway looking north towards top of valley slope from north of the South Tributary (December 16, 2021)

6.0 MITIGATION MEASURES AND RECOMMENDATIONS

This section outlines recommendations to minimize potential impacts to the natural environment features within and adjacent to the site. This section also provides a Tree Conservation Report.

6.1 Tree Conservation Report

The majority of the field surveys and this report were completed by Bernie Muncaster, who has a Master's of Science in Biology and over thirty-three years of experience in completing natural environment assessments. The purpose of this component is to establish which vegetation can be retained based on the building constraints on the site. The site is owned by Tamarack (Cardinal Creek) Corporation c/o Tamarack Homes (613-521-3000). As described in Section 4, the site is proposed for urban residential use, with two schools, a park, and a stormwater block. The woody vegetation not identified in this report for retention is proposed for removal in 2022, after the breeding bird season.

The majority of the site has minimal tree cover. Due to grading and the density of urban residential development and associated servicing, the small areas of cultural woodlands in the north portion of the site and the few hedgerows between the fields cannot be retained. As shown on Map 2, it is anticipated that a mature bur oak and other trees along a hedgerow in the south portion of the west site boundary can be retained. In addition, the vegetation along the South Tributary corridor will be retained save for the stormwater management pond outlet alignment

and two spillways. The tableland ash deciduous forest north of the South Tributary is proposed for removal.

Wherever feasible it is recommended that plantings be added to the site to improve the diversity of habitat relative to the existing cultivated fields. In addition, the currently non-forested portion of the South Tributary corridor is setback is to be planted with native trees and shrubs to encourage the naturalization process in the currently cultivated fields. A Tree Planting Plan will be developed as the development is finalized, including preparation of the detailed servicing requirements. Recommended native species for planting include a mix of coniferous and deciduous species such as sugar maple, red maple, basswood, red oak, white pine, and white spruce, along with nannyberry, elderberry, and native dogwood shrubs. Sourcing native species from local seed sources is strongly recommended to ensure adaptability and maximize ecological benefits and the likelihood of successful growing.

In addition to the recommended planting setbacks identified by Paterson (2021), due to the clay soils trees with higher water demands and faster growing such as poplars, willow, and Manitoba maples, are not recommended for this site.

It is important to provide sufficient below ground rooting space for all tree plantings, especially those that are planned to grow to a significant size. If root space is insufficient, good growth will not be possible and planted trees will not achieve their desired community purpose. Stress on trees is cumulative; one way to help ensure that a planted tree has the best possible chance to reach maturity and achieve its objective is to ensure that it has sufficient below ground space and that it is planted in good soil. A small tree must be provided with a minimum of 25 m³ of available soil volume and a medium tree must be provided with a minimum of 30 m³ of available soil volume. As noted by Paterson (2021) report, it is important that the soil is generally un-compacted when backfilling in street tree planting locations. With respect to soil volumes, as outlined in the Street Tree Manual, a medium size tree planted in clay soils must be provided with a minimum of 30 m³ of available soil volume (25 m³ where clay soils are not present), while a small size tree must be provided with a minimum of 25 m³ of available soil volume (20 m³ where clay soils are not present). The soil must be protected from excessive compaction during construction. Note that the soil volume calculation must be based on a depth of 1.5 metres below finished grade (e.g. 5m length x 4m width x 1.5m depth = 30 m³).

Paterson (2021) recommended the following tree planting setbacks for the development lands:

- Large trees (mature height over 14 metres) can be planted provided a tree to foundation setback equal to the full mature height of the tree can be provided (e.g. in a park or other green space); and,
- Tree planting setback limits may be reduced to 4.5 metres for small (mature height up to 7.5 metres) and medium size trees (mature tree height 7.5 to 14 metres), provided that the conditions identified by Paterson (2021) are met, including specifications on soil volumes, reinforced foundation walls, and grading.

Following the required geotechnical work in the spillways, topsoil, seeding, live stakes, and potted shrubs and small trees will be placed over and between the rock protection. It is anticipated that this re-naturalizing over time will significantly reduce impacts associated with the initial tree removal needed to prepare the spillways.

City Trees

A few trees are along the south edge of the Old Montreal Road allowance. These trees will not need to be removed for the subdivision construction but are anticipated to be removed as the ultimate Old Montreal Road configuration is constructed.

Beginning in the northwest, trees on the south side of the road allowance west of Cardinal Creek Drive include:

- A coppice basswood with the largest stem 70cm dbh. Major trunk damage was observed on the basswood;
- A 50 cm white elm with lower vine coverage; and,
- Regenerating white ash and white elm stems up to 15cm dbh and a few areas dominated by staghorn sumac shrubs.

A multi-stem white elm, with individual stems up to 50cm dbh appears to be in generally good condition in the road allowance just east of an existing haul road south off Old Montreal Road and east of Cardinal Creek Drive.

Adjacent to the northeast portion of the site, a 30cm dbh white elm, a white ash with major trunk damage and a coppice basswood with a 55cm dbh stem are in the south portion of the Old Montreal Road allowance. Regenerating ash stems are common, along with staghorn sumac and common buckthorn shrubs. Approaching Cox Country Road, a coppice Manitoba maple, with individual stems up to 40cm dbh in the road allowance of Old Montreal Road has major trunk damage and has been extensively pruned.

It is anticipated that retention and protection of the South Tributary corridor and associated vegetation and wildlife habitat shown on Map 2 will retain the significant features and functions of the site. Removal of the approximately 0.7 hectare ash deciduous forest north of the South Tributary will result in some loss of local wildlife habitat, although the South Tributary corridor is large enough to provide the required habitat for fauna currently using this small and highly disturbed forest.

The Functional Servicing and Stormwater Management Report (DSEL, 2021) noted that significant cuts and grade raises are proposed across the site to meet City of Ottawa's guidelines pertaining to road, lot grading and stormwater management requirements. DSEL's Grading Plan (Drawing No. 5, of Project 19-1153, December, 2021) shows the anticipated grading requirements. Thus, retention of trees outside of the proposed retention on Map 2 will be

unlikely achievable for most of the proposed urban development. The identified right of ways, residential lots, and servicing easements are expected to require clearing.

The following mitigation measures are recommended for the protection of retained trees:

- All trees to be retained are to be protected with sturdy temporary fencing installed before site alterations. The fencing is to be at least 1.2 metres in height. This tree protection fencing is to be installed along the outer edge critical root zone (ten times tree diameter) of the trees to be retained. The outer trees of the forest along the north edge of the South Tributary corridor range between 20 and 40cm dbh so the fencing would be placed between two and four metres from the tree trunks;
- No grading or activities that may cause soil compaction such as heavy machinery traffic and stockpiling of material are permitted on the non-work side of the fencing. The existing grade is not to be raised or lowered within the fencing and any digging within the fencing is to be done by tunneling or boring. The location of the tree protection fencing represents the limit of grading. No grading is permitted to extend into the tree retention areas beyond the limit of grading;
- Signs, notices or posters are not to be attached to any tree;
- The root system, trunk or branches of the trees to be retained are to be protected and not damaged. If any roots of the trees to be retained are exposed during site alterations, the roots shall be immediately reburied with soil or covered with filter cloth, burlap or woodchips and kept moist until the roots can be buried permanently. A covering of plastic should be used to retain moisture during an extended period when watering may not be possible. Any roots that must be cut are to be cut cleanly to facilitate healing and as far from the tree as possible;
- Exhaust fumes from all equipment during construction will not be directed towards the canopy of the trees identified for retention; and,
- All of the supports and bracing for the protective fencing should be placed outside of the protected area and should be installed in such a way as to minimize root damage.

To protect breeding birds, no tree or shrub removal is to occur between April 15th and August 15th, unless a breeding bird survey conducted by a qualified biologist within five days of the woody vegetation removal identifies no active nests in the trees or shrubs. The ideal time for tree removal with potential wildlife cavities is between August 15th and October 15th to protect both breeding birds and overwintering wildlife in cavity trees. Depending on the year, April may also be a suitable time. If winter tree removal is anticipated, surveys should be undertaken ahead of time to determine no overwintering wildlife use in trees with suitable cavities

Pruning by a certified arborist of branches on trees to be retained is recommended to improve the condition and anticipated longevity of the retained trees.

Many helpful wildlife oriented mitigation measures are detailed in the City's Protocol for Wildlife Protection during Construction (City of Ottawa, 2015). Contractors are to review in detail and understand the City's Protocol for Wildlife Protection during Construction prior to commencement of construction. The contractor is to be aware of the potential Species at Risk in

the vicinity of the site including butternut. Appendix 1 of City of Ottawa (2015) describes these species. Any Species at Risk sightings are to be immediately reported to the site supervisor and the Ministry of the Environment, Conservation and Parks, and work that may impact the species suspended immediately.

As recommended in City of Ottawa (2015) before each workday, the work areas are to be checked for wildlife by conducting a thorough visual inspection of the work space and immediate surroundings. See Section 2.5 of the City's Protocol for Wildlife Protection during Construction (City of Ottawa, 2015) for more recommendations on construction site management.

Any turtles and snakes are to be relocated to the South Tributary corridor. Animals should be moved only far enough to ensure their immediate safety. See Appendix 1 and the links in Section 4 of City of Ottawa (2015) for suggestions on how to effectively relocate turtles and snakes.

As only rear yards or the stormwater management pond back onto the South Tributary corridor, no impacts are anticipated from snow removal being deposited into the buffer areas adjacent to the top-of-slope. Permanent fencing is to be installed at the rear of the lots backing onto the South Tributary corridor. Gates are not permitted as part of the permanent fencing

Once a Tree Cut Permit has been issued by the City it is proposed to remove the woody vegetation not to be preserved in 2022, after the breeding bird season. A Planning Forester from the City of Ottawa is to be contacted after the protective fencing is installed and at least two (2) working days prior to any tree removal so that Staff can verify the fencing has been properly constructed.

6.2 Aquatic Habitat

The South Tributary will not be directly impacted by the proposed development, with mitigation measures described below to reinstate the spillways. PECG (2013) recommended a thirty metre buffer around the middle and lower reaches of the South Tributary to protect the local seepage contribution. This will be attained with the 15 metre top of valley slope setback. In addition, the existing agricultural drainage to the South Tributary will be maintained through the proposed stormwater management practices. PECG (2013) also noted that the granular bedding associated with buried services will have a much higher permeability than the existing marine clay or till. This would result in an increase in infiltration and groundwater recharge where the new services are placed on bedrock. Perforated pipes placed in rear yards on top of fractured Bobcaygeon Formation bedrock will greatly increase the infiltration and recharge potential of these areas.

All channels in the cultivated fields will be removed. If any water is present in the channels, prior to being filled in the channels are to be de-fished. Although not expected, fish are to be safely relocated to the South Tributary. A sampling permit will be required from MNR and the permit may take up to three weeks to obtain. Sediment control should be installed at the

downstream end of the channels to be filled in prior to work on the channels to ensure there is no downstream transport of sediments.

To protect surface water quality and the environment in general, the residence should be made aware of the importance of minimizing or preferably avoiding the use of fertilizers, herbicides and pesticides. Residents should consider using surface materials that allow rainwater to seep into the ground quickly on surfaces such as patios. Rain gardens are another excellent example of improving our local environment through recharging our groundwater supply and improving water quality. Rain gardens are designed with a dip at the centre to collect rain and snow melt.

6.3 Stormwater Mitigation and Other Servicing

DSEL (2021) has prepared a joint Functional Servicing and Stormwater Management Report, including an Erosion and Sediment Control Plan, in support of the proposed development. The report includes an assessment of the collection and treatment of stormwater runoff, including measures to mitigate the potential negative impacts of the development on natural systems.

The South Tributary and Cardinal Creek support fish communities, and the stormwater management plan has been designed accordingly, to ensure enhanced quality control of stormwater runoff (long-term average removal of 80 percent total suspended solids) and to manage erosion impacts within the South Tributary. A treatment train approach is identified, including a dual drainage system consisting of underground storm sewers (minor system) and overland flow routes (major system), and end-of-pipe stormwater management facility. Roof leaders will be discharged to grassed and natural areas to promote infiltration and reduce surface runoff. The proposed series of minor storm sewers will handle the runoff from frequent storm events, while during less frequent storm events, the balance of runoff in excess of the minor flow is accommodated by a system of rear yard swales and overland flow routes within streets and easements (called the major system). Both the minor system and the majority of major storm runoff from the majority of the site will be conveyed to the stormwater management pond in the southwest corner (DSEL, 2021). Stormwater from a 6.3 hectare parcel in the northwest corner of the site will be directed via existing storm sewers to the existing Pond 1 of Cardinal Creek Village south of Ottawa Road 174. For additional information on the proposed stormwater management approach, please refer to the Functional Servicing and Stormwater Management Report (DSEL, 2021).

6.4 Erosion and Sediment Controls and Monitoring

As outlined in the Functional Servicing and Stormwater Management Report (DSEL, 2021), the following mitigative construction techniques will be deployed to reduce sediment loadings as much as possible during construction:

- Prior to topsoil stripping, earthworks or underground construction, erosion and sediment controls will be implemented and will be maintained throughout construction;

- Silt fence will be installed around the perimeter of the site and will be cleaned and maintained throughout construction. Silt fence will remain in place until the working areas have been stabilized and re-vegetated;
- Mud mats will be installed at the construction accesses to prevent mud tracking onto adjacent roads;
- Construction of the southwest stormwater management facility will precede general construction. Should construction commence prior to the completion of the storm sewer network and stormwater management pond, groundwater will be pumped into a proper filter mechanism such as a sediment trap or filter bag prior to release to the environment. Following their construction, dewatering will be routed to the nearest storm sewer;
- Catch basins will have catch basin inserts installed during construction to protect from silt entering the storm sewer system;
- Extent of exposed soils will be limited at any given time, and exposed areas will be re-vegetated as soon as possible;
- Bulkhead barriers will be installed over the lower half of the outletting sewers to reduce sediment loadings during construction. The barriers will capture sediment laden flows;
- Exposed slopes will be protected with plastic or synthetic mulches;
- Stockpiles of cleared materials as well as equipment fuelling and maintenance areas will be located away from swales and other conveyance routes;
- Seepage barriers such as silt fencing, straw bale check dams and other sediment and erosion control measures will be installed in any temporary drainage ditches and around disturbed areas during construction and stockpiles of fine material. The control measures must be properly maintained to maximize their function during construction; and,
- The above measures will remain in place until streets are asphalted and curbed and the surrounding landscape is stabilized.

A qualified inspector will conduct frequent visits during construction, including after all precipitation events, to ensure that the contractor is constructing the project in accordance with the design drawings and mitigation measures are being implemented and maintained as specified. Bulkhead barriers and silt fencing may require removal of sediment and repairs. The inspector must ensure that construction vehicles and chemicals, fuels and other potentially hazardous materials remain in designated areas.

After build-out of each phase, applicable sewers will be inspected and cleaned. All sediment and construction fencing should be removed following construction, providing there is no exposed soil or other potential sources of sedimentation.

All sodding, seeding and tree and shrub planting are to be conducted correctly and as soon as weather and construction activity permits. The success of all vegetative plantings will be assessed for two years through visual inspections in the spring and autumn following planting. Any plantings that are dead or dying will be replaced.

7.0 CUMULATIVE EFFECTS and SUMMARY

The Canadian Environmental Assessment Agency (CEAA) defines cumulative effects as...*“the effects on the environment caused by an action in combination with other past, present, and future human actions...”* They occur when two or more project-related environmental effects, or two or more independent projects, combine to produce an augmented effect. These cumulative effects may be positive or negative.

The South Tributary corridor represents the vast majority of ecological features and functions associated with the site, with the balance dominated by cultivated agricultural fields. Disturbances within the corridor will be minimal in association with installation of the stormwater outlet and preparation of two spillways. The locations of the spillways have been modified to minimize tree removal and will be replanted after geotechnical work is completed. A 0.7 ha ash forest, heavily disturbed by windthrow, non-native species, and emerald ash borer is proposed for removal, along with pockets of cultural woodlands less than 0.5 hectares. Agricultural channels with no direct fish habitat and minimal intermittent flow will also be removed. With proper implementation of the mitigation measures described in this report, including extensive planting of native trees and shrubs, it is anticipated that the construction and operation of the residential subdivision will not have a detectable impact on the South Tributary corridor or the natural environment in general, including watercourses supporting fish habitat. These measures, in combination with the retained South Tributary corridor, are anticipated to avoid the potential for significant cumulative effects on the general landscape. No Species at Risk were observed on or adjacent to the proposed development lands.

All the community/landform types and flora and fauna species observed on the lands proposed for development are considered common on a local and regional basis.

Outside of the South Tributary corridor, the required grade raises and cuts will generally preclude tree retention. Native trees of local origin are recommended to help offset the loss of these local treed areas. Some tree retention will occur adjacent to the open space blocks where existing grades will be met.

This EIS identifies other mitigation measures for the woody vegetation and associated wildlife habitat to be retained and protected. The EIS concludes that the construction and operation of the proposed residential development will not have a significant impact on the adjacent South Tributary corridor provided the proposed mitigation measures are properly implemented. The following is a numbered summary of the main mitigation measures:

1. Retain on-site vegetation as shown in green shading on Map 2;
2. Where grading and other servicing constraints permit maximize tree and shrub retention in other locations wherever possible as part of the detailed design stage;
3. At a distance of 15 metres from the top of valley slope, protect the adjacent forested South Tributary corridor with a two to four metre setback of no major grade raises or excavations and installation of sturdy fencing prior to site alterations. The setback distance is a function of the distance of ten times the diameter of the outer adjacent trees

and is designed to protect the critical root zones of the adjacent retained trees. See Section 6.1 for further measures to protected the adjacent retained vegetation during construction;

4. A wildlife protection plan will be developed and implemented for the site. The contractor is to be aware of potential Species at Risk in the vicinity of the site including butternut. Appendix 1 of the Protocol for Wildlife Protection during Construction (City of Ottawa, 2015) describes these species. The project biologist for this project is Bernie Muncaster (613-748-3753). Any Species at Risk sightings are to be immediately reported to the project biologist and the Ministry of the Environment, Conservation, and Parks and activities modified to avoid impacts until further direction by the Ministry;
5. As recommended in the Protocol for Wildlife Protection during Construction (City of Ottawa, 2015) prior to beginning work each day, wildlife is to be checked for by conducting a thorough visual inspection of the work space and immediate surroundings. See Section 2.5 of City of Ottawa (2015) for additional recommendations on construction site management with respect to wildlife. Any turtles, snakes, or other sensitive wildlife in the work areas are to be relocated to the east. Animals should be moved only far enough to ensure their immediate safety. See Appendix 1 and the links in Section 4 of City of Ottawa (2015) for suggestions on how to effectively relocate turtles and snakes. Species at Risk can only be relocated by trained staff;
6. Native tree and shrub species of local stock are strongly recommended for site plantings;
7. Woody vegetation that must be removed is to be cut outside of the breeding bird period of April 15th to August 15th unless a breeding bird survey by a qualified biologist. The ideal time for tree removal with potential wildlife cavities is between August 15th and October 15th to protect both breeding birds and overwintering wildlife in cavity trees. Depending on the year, April may also be a suitable time. If winter tree removal is anticipated, surveys should be undertaken ahead of time to determine no overwintering wildlife use in trees with suitable cavities identifies no nesting activity within five days of the proposed vegetation removal;
8. Proper sediment and erosion control, as outlined in Section 6.4 and including properly installed and maintained silt fencing, is important for general environmental protection. These measures must be monitored and properly implemented;
9. To discourage wildlife from entering the work area during construction, the site should be kept clear of food wastes and other garbage, and proper drainage provided to avoid accumulation of standing water, which could attract amphibians, birds, and other wildlife to the work area;
10. Municipal by-laws and provincial regulations for noise will be followed and utilities will be located in the vicinity of the site prior to construction;
11. Waste will be managed in accordance with provincial regulations. The contractor will have a spill kit on-hand at all times in case of spills or other accidents;
12. Permanent fencing is to be installed at the rear of the lots backing onto the South Tributary corridor. Gates are not permitted as part of the permanent fencing;
13. Pets are to be kept under control at all times; and,
14. The stormwater management pond in the southwest corner will protect the water quality and quantity entering the downstream watercourses, including the South Tributary and Cardinal Creek, during operation of the residential development.

8.0 REFERENCES

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