Environmental Impact Statement with Headwaters Assessment for 4100 Innes Road/2025 Mer Bleue Road

File: 16041242

Prepared for:
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Prepared by:
Stantec Consulting Ltd.

December 14, 2016

Sign-off Sheet

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Prepared by _____ 2016.12.15 08:34:20 -05'00'

(signature)

Angela Lougheed, B.Sc.

Project Manager _____ 2016.12.14 17:23:00 -05'00'

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Tracy Dannell, H.B.Sc., EP

Reviewed by _____ Digitally signed by Loretta Hardwick Date: 2016.12.15 11:22:08 -05'00'

(signature)

Loretta Hardwick, M.Sc.

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Table of Contents

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1.0 INTRODUCTION

Stantec Consulting Ltd. (Stantec) was retained by SmartREIT, to prepare an Environmental Impact Statement (EIS) with Headwaters Assessment for 4100 Innes Road/2025 Mer Bleue Road, in Ottawa, Ontario.

1.1 PROJECT SITE

The Project Site, from now on referred to as the "Site", is located immediately southeast of the intersection of Innes Road and Mer Bleue Road in Orleans, in the City of Ottawa, Ontario (**Figure 1**).

The property is privately owned and is located at Concession 11, Lot 1 within the City of Ottawa. The Property Identification Numbers (PINs) are 145631328 and 145631329. The Site is approximately 210,000 square metres (m^2) (21 hectares (ha)). The land use designation is General Urban Area with a watercourse (Bilberry Creek) as outlined in the Official Plan, Schedule B (City of Ottawa, 2015a). Current zoning is Arterial Mainstreet for the section fronting on to Innes Road and General Industrial Zone for the section behind the adjacent property to the east of the Site (i.e., behind the Winners retail store) (City of Ottawa, 2015b).

The majority of the Site is currently used for agricultural row crops, specifically corn. Meadow areas occur in the northeast and northwest portions of the Site. Bilberry Creek, a Natural Heritage System Feature (City of Ottawa, 2015a), is located north of the Site and a remnant portion of Bilberry Creek is located in the northwest portion of the Site. A new culvert and interim ditch is located adjacent to Bilberry Creek, running east to north; aerial imagery indicates that it was constructed between 2012 and 2013. Aerial photos dating back to 1928 (City of Ottawa, 2015c) show that the Site and surrounding area was predominantly used for agricultural cropland; over the years, agricultural land north, east and west of the Site has been replaced by residential and commercial development.

1.2 PURPOSE

The City of Ottawa has identified the need to complete a detailed EIS because the watercourse–Bilberry Creek–that occurs on Site is designated as a Natural Heritage System Feature as per Schedule L1 of the City's Official Plan (City of Ottawa, 2015a) and the property was identified as potential habitat for species at risk (i.e., Bobolink and eastern Meadowlark)

The intent of this EIS is to identify and describe natural heritage features within and adjacent to the Site (i.e., within 120 m), to evaluate the environmental impacts of the proposed development on those identified natural heritage features, to recommend measures to avoid and mitigate potential impacts, and to recommend monitoring, if required.

INTRODUCTION
December 14, 2016

This EIS report has been prepared to meet the requirements of the City of Ottawa EIS Guidelines (City of Ottawa, 2015d).

Legend

Site

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Notes

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Client/Project
SmartREIT
EIS WITH HEADWATER ASSESSMENT

Figure No.
1

Title
Site Location

2.0 DESCRIPTION OF THE PROPOSED DEVELOPMENT

SmartREIT has proposed the construction of a multi-unit commercial development on the southeast corner of Innes Road and Mer Bleue Road in Orleans, in the City of Ottawa, Ontario.

The Site Plan provided by SmartREIT details a multi-phase plan (Phases 1, 2, and 3) which incorporates commercial and residential buildings along with associated roadways and parking areas throughout the Site (**Appendix A**). The current Site Plan Application to the City of Ottawa consists of development of Phase 1 in 2016-2017, with submission of Phase 2 and 3 at a later date. Phase 1 is planned for the northwest corner of the Site and will occupy approximately 4 ha; it will consist of commercial retail space, parking areas and an access road. Once all three phases are complete, the development will occupy a total area of approximately 21 ha.

It is assumed that connections to existing municipal water supply, sanitary sewer, electrical and communications services will be undertaken using existing services and that the interim ditch will be directed though piping underground. Additionally, it is expected that standard construction materials (e.g., steel, wood, metal, concrete, asphalt) will be used and that during construction all applicable safety codes, with reference to public health, fire protection, and structural sufficiency will be followed.

3.0 METHODS FOR DATA COLLECTION AND ANALYSIS

The collection and analysis of natural heritage feature data focuses on those natural heritage systems protected under the 2014 Provincial Policy Statement (Ministry of Municipal Affairs and Housing , 2014).

- Significant wetlands
- Significant woodlands
- Significant valleylands
- Significant wildlife habitat
- Significant areas of natural and scientific interest (ANSI)
- Fish habitat
- Habitat of endangered and threatened species (e.g., species at risk)

The information contained in this report is based on existing published data and data made available through various public agencies, web-based mapping programs, online databases and field investigations completed by Stantec biologists.

3.1 BACKGROUND INFORMATION

The natural heritage features of the Site were identified by reviewing the following background documents and information sources:

- City of Ottawa's Official Plan (City of Ottawa, 2015a)
- City Stream Watch Bilberry Creek 2015 Summary Report (RVCA, 2015)
- Agricultural Information Atlas (Ontario Ministry of Agriculture, Food and Rural Affairs, 2014)
- geoOttawa (City of Ottawa, 2015c)
- Satellite imagery (Google Earth Pro, 2013)
- Smart Centres Limited Application for Severances D08-01-11/B-0542-543 4100 Innes Road & 2035 Mer Bleue Road Fish Habitat and Community Summary (Muncaster Environmental Planning Inc., 2012)
- Innes Road Shopping Centres Servicing Corridors, Bobolink Surveys (Muncaster Environmental Planning, 2011)
- Tree Conservation Report for the proposed retail development at Innes Road and Mer Bleue Road (Levstek Consultants Inc. , 2016)
- Servicing Report – Orleans Development – 2025 Mer Bleue Road – Phase 1 (Stantec, 2016)

A list of species at risk species designated under the Ontario *Endangered Species Act*, *2007* (ESA, 2007) and/or the federal *Species at Risk Act* (SARA) as endangered, threatened or special concern with potential to occur in or adjacent to the Site was developed by reviewing the following sources:

- Natural Heritage Information Centre (NHIC) database (Natural Heritage Information Centre, 2015)
- Department of Fisheries and Oceans Species at Risk Mapping (2015)

- Atlas of Breeding Birds of Ontario (OBBA) (Cadman, 2007)
- Ottawa Bird Count (Ottawa Bird Count, 2015)
- eBird Canada (ebird, 2015)
- Ontario Reptile and Amphibian Atlas (Ontario Nature, 2015)
- Ontario Butterfly Atlas Online (Toronto Entomologists' Association, 2015)
- Atlas of the Mammals of Ontario (Dobbyn, 1994)

Some of the sources above provide data at a scale as large as 10 kilometres (km) by 10 km. Results were therefore screened to assess their relevance to the Site and species were removed from consideration if no suitable habitat was observed at or adjacent to the Site (e.g., fish species where no watercourses exist, or grassland species in an urban/forest habitat matrix).

3.2 CONSULTATION

Information regarding the Site and adjacent lands was requested from the Kemptville District Ministry of Natural Resources and Forestry (MNRF), the Rideau Valley Conservation Authority (RVCA) and South Nation Conservation (SNC) on May 30, 2016. Responses are provided in **Appendix B**.

3.3 SITE VISIT

Stantec biologists completed site visits to characterize the existing natural heritage features within and adjacent to the Site and to conduct a standard headwater assessment (**Table 1**).

Table 1: Site Visit Details

Date	Start/End Time	Field Surveys	Weather Conditions	Biologist
May 31, 2016	1100 - 1530	• Vegetation • Species at Risk Habitat • General Wildlife Habitat	Temperature: 21˚C Wind (Beaufort scale): 4 Cloud cover: 30%	Angela Lougheed
June 6, 2016	0900 - 1200	• Headwater Drainage Feature Assessment	Temperature: 19˚C Wind (Beaufort scale): 3 Cloud cover: 80%	Josh Mansell

3.3.1 Vegetation Survey

Characterization of existing vegetation communities was completed on May 31, 2016. Community characterizations (eco sites and vegetation types) were based on the Ontario Ecological Land Classification (ELC) system (Lee et. al., 2001).

3.3.2 Wildlife and Species at Risk Survey

A visual survey following a meandering transect was conducted within the Site to determine the presence of wildlife, species at risk and/or their potential habitat. Adjacent lands were visually assessed using binoculars. A GPS, a GPS camera and a field notebook were used to document observations.

3.3.3 Headwater Drainage Feature Assessment

The headwater drainage features (HDF) assessment followed the Toronto Region Conservation Authority and the Credit Valley Conservation (TRCA and CVC, 2014) protocol Evaluation, Classification and Management of Headwaters Drainage Features Guidelines. These guidelines use standardized survey methods and a tiered study design to determine the risk of functional impairment to an HDF through land development (See **Appendix C**).

4.0 SITE DESCRIPTION AND EXISTING NATURAL HERITAGE FEATURES

4.1 BACKGROUND INFORMATION AND CONSULTATION RESULTS

4.1.1 Significant Woodlands and Urban Natural Features

No significant woodlands are identified on or adjacent to the Site. The nearest Significant woodland occurs approximately 3 kilometres (km) south of the Site[1].

An Urban Natural Feature (UNF) associated with Bilberry Creek occurs approximately 140 m north of the Site[1].

4.1.2 Major Open Space

There are no areas of major open space on or adjacent to the Site. The nearest area of major open space occurs approximately 700 m north of the Site. Aerial imagery identifies this area as a city park with sports fields and play structures.

4.1.3 Significant Valleylands

There are significant valleylands located approximately 140 m north of the Site[2], which are also identified as areas with unstable slopes[3].

4.1.4 Significant Wildlife Habitat

The *Significant Wildlife Habitat Technical Guide* (MNR, 2000), identifies four general types of significant wildlife habitat: (a) seasonal concentration areas, (b) rare or specialized habitat, (c) habitat for species of conservation concern or (d) migration corridors. No significant wildlife habitat was identified on or adjacent to the Site.

[1] City of Ottawa Official Plan – Schedule B Urban Policy Plan (City of Ottawa, 2015a)
[2] City of Ottawa Official Plan Amendment 76 Annex 14 – Natural Heritage System (City of Ottawa, 2015a)
[3] City Of Ottawa Official Plan– Schedule K (City of Ottawa, 2015a)

Legend

- Site
- Watercourse
- Interim Ditch
- Agricultural Drain
- Unevaluated Wetland - MNR
- Urban Natural Feature
- Remnant Portion of Bilberry Creek

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Notes

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HEADWATERS DRAINAGE FEATURES ASSESSMENT

Figure No.
2

Title
Natural Features & Surface Drainage

4.1.5 Significant Wetlands

There are no Provincially Significant Wetlands within or adjacent to the Site. The nearest is Mer Bleue wetland, approximately 3.5 km southwest.

4.1.6 Significant Areas of Natural and Scientific Interest

There are no Significant Areas of Natural and Scientific Interest (ANSIs) within or adjacent to the Site. The nearest ANSI is the Mer Bleue provincially significant wetland and occurs approximately 3.5 km southwest of the Site (City of Ottawa, 2015c).

4.1.7 Surface Water and Fish Habitat

The south portion of the Site is within the jurisdiction of SNC and located in the Bear Brook subwatershed that flows easterly into the South Nation River; and the north half of the Site is located within the RVCA's Bilberry Creek subwatershed which outlets to the Ottawa River (City of Ottawa, 2011). The headwaters of Bilberry Creek include the Site and would have previously included the remnant portion of Bilberry Creek. The interim ditch is now connected to Bilberry Creek downstream (north of Innes) (**Figure 2**). Bilberry Creek flows north through a forested, highly incised valley between urban areas and residential subdivisions before discharging into the Ottawa River (RVCA, 2015).

Surface water features include a remnant portion of Bilberry Creek in the northwest corner of the Site, an interim ditch east-southeast of Bilberry Creek and agricultural drains to the southeast. A tributary of McKinnons Creek is located immediately south of the Site (**Figure 2**). The majority of the Bilberry Creek subwatershed area has been developed, resulting in numerous alterations to the watercourse such as channelization, piping and storm water drains. Bank erosion and contaminant levels have increased as a result of water course alterations associated with the development (RVCA, 2015). Bilberry Creek, immediately downstream (north) of the Site is buried and piped underneath a residential community and piped upstream (west) of the Site under current commercial development for an unknown distance (Muncaster Environmental Planning Inc., 2012).

The Bilberry Creek thermal classification ranged between cool water to cool-warm water and 33 fish species have been observed historically which includes 12 game fish species (RVCA, 2015).

In 2012, dip netting was completed at three locations in the remnant portion of Bilberry Creek within the Site as part of a Fish Habitat and Community Summary; no fish were caught (Muncaster Environmental Planning Inc., 2012).

There are no Municipal Drains within or adjacent to the Site (City of Ottawa, 2015c). An unevaluated wetland was identified west of the site near the southeast corner of Innes and Mer Bleue Road (**Figure 2**) in the NHIC database (Natural Heritage Information Centre, 2015);

however, aerial imagery indicates that commercial space now occupies this area and the wetland does not exist.

The SNC does not have any information relevant to the Site.

4.1.8 Vegetation

A Natural Heritage Information Centre (NHIC) search was conducted for an area of 1 km^2 surrounding the Site to determine previous records of rare vascular plant species.

The following regionally and/or provincially rare plant species and their "S"[4] rank have been documented to occur within 1 km of the Site:

- Cattail sedge (*Carex typhina*) (S2)
- Greene's rush (*Juncus greenei*) (S3)
- Large purple fringed orchid (*Platanthera grandiflora*) (S1)
- Lurking leskea (*Plagiothecium latebricola*) (S2)
- Northern long sedge (*Carex folliculate*) (S3)
- Twin-stemmed bladderwort (*Utricularia geminiscapa*) (S3)?
- Woodland Pinedrops (*Pterospora andromedea*) (S2)
- Southern Twayblade (*Neottia bifolia*)

Based on habitat descriptions (e.g., wet habitats, mixedwood forests) for the plants listed above (iNaturalist, 2016), the majority of the Site does not provide habitat required for these plants. Areas along the interim ditch may provide suitable habitat for some of the wetland plants listed above.

Stantec was provided a Tree Conservation Report that was prepared for the Site Plan Application. The report identified each tree 10 centimetres (cm) or more in diameter at breast height (dbh) and commented on the health of the trees (Levstek Consultants Inc. , 2016). The report identified three distinctive trees according to the City of Ottawa, Urban Tree Conservation By-law (i.e. dbh 50 cm or more) and no tree species at risk were found or identified (Levstek Consultants Inc. , 2016).

[4] The following is an explanation of the NHIC ranking codes used in this report, as outlined in the Southern Ontario Vascular Plant Species List (Bradley, 2013):

- S1 - Extremely rare in Ontario; usually 5 or fewer occurrences in the province, or very few remaining hectares
- S2 - Very rare in Ontario; usually between 6 and 20 occurrences in the province, or few remaining hectares
- S3 - Rare to uncommon in Ontario; usually between 21 and 80 occurrences in the province; may have fewer occurrences, but with some extensive examples remaining
- SH – An element is known historically for the province but it hasn't been verified in the past 20 years. It is not known conclusively to be extirpated in Ontario

4.1.9 Species at Risk

Desktop background review resulted in a list of 24 species at risk that have been previously documented or have potential to occur within or adjacent to the Site (**Table 2**).

Table 2: Species at Risk with the Potential to Occur Within or Adjacent to the Site

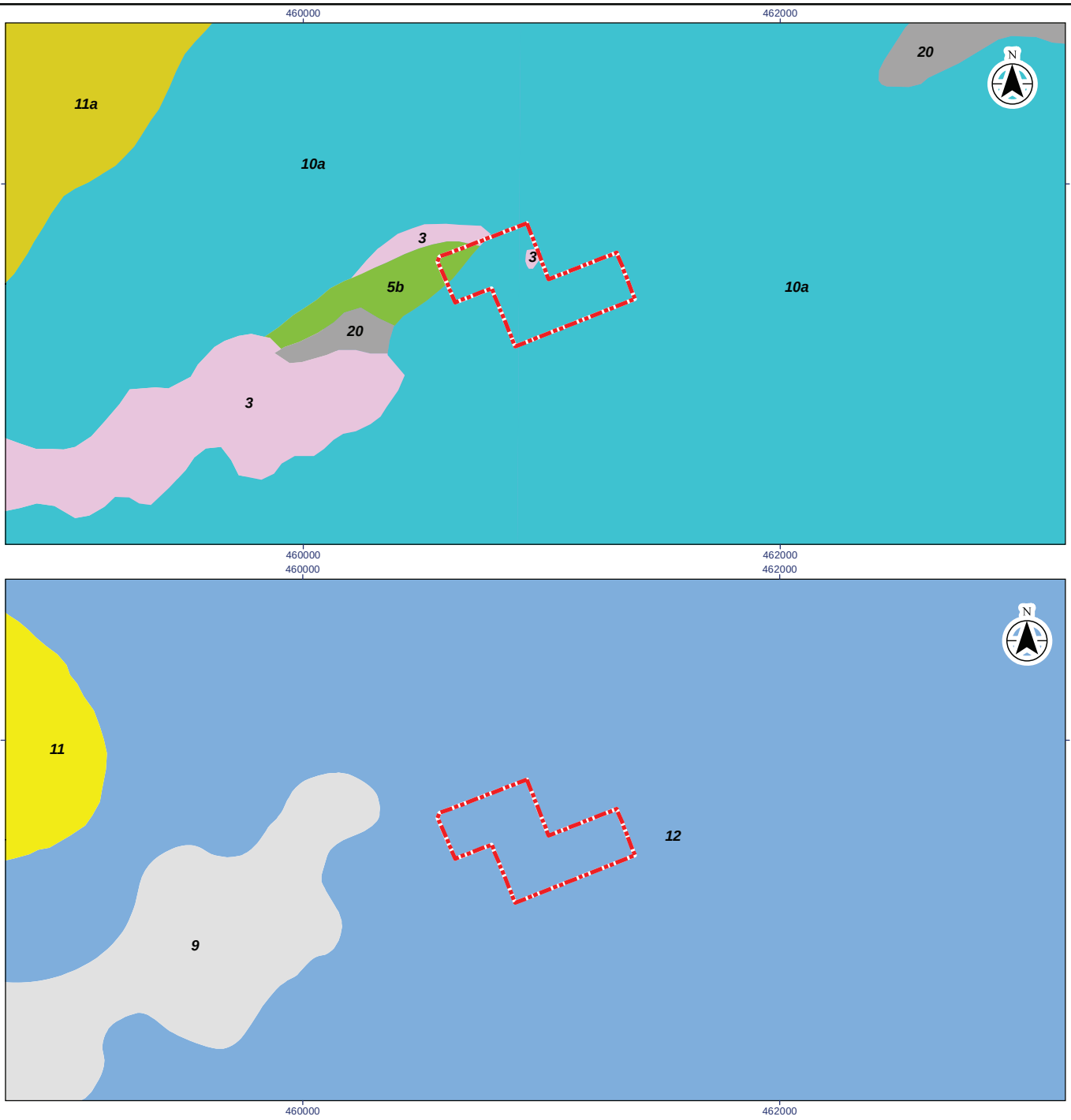
Species	Status	
	Ontario ESA, 2007	Federal *Species at Risk Act*, Schedule 1
Mammals		
Eastern small-footed myotis (*Myotis leibii*)[1]	Endangered	NA
Little brown myotis (*Myotis lucifungus*)[1]	Endangered	Endangered
Northern myotis (*Myotis septentrionalis*)[1]	Endangered	Endangered
Tri-colored bat (*Perimyotis subflavus*)[1]	Endangered	Endangered
Birds		
Least bittern (*Ixobrychus exilis*)[3]	Threatened	Threatened
Short-eared owl (*Asio flammeus*)[4]	Special concern	Special concern
Common nighthawk (*Chordeiles minor*)[3]	Special concern	Threatened
Eastern whip-poor-will (*Antrostomus vociferus*)[3]	Threatened	Threatened
Chimney swift (*Chaetura pelagica*)[3,8]	Threatened	Threatened
Eastern wood-pewee (*Contopus virens*)[3]	Special concern	NA
Bank swallow (*Riparia riparia*)[2,3]	Threatened	NA
Barn swallow (*Hirundo rustica*)[2,3,4]	Threatened	NA
Wood thrush (*Hylocichla mustelina*)[3]	Special concern	NA
Canada warbler (*Cardellina canadensis*)[3]	Special concern	Threatened
Bobolink (*Dolichonyx oryzivorus*)[2,3,4,7,8]	Threatened	NA
Eastern meadowlark (*Sturnella magna*)[3,4,7,8]	Threatened	NA
Henslow's sparrow (*Ammodramus henslowii*)[7,8]	Endangered	Endangered
Reptiles		
Snapping turtle (*Chelydra serpentina*)[5,8]	Special concern	Special concern
Northern map turtle (*Graptemys geographica*)[5]	Special concern	Special concern
Blanding's turtle (*Emydoidea blandingii*)[5,8]	Threatened	Threatened
Eastern milksnake (*Lampropeltis triangulum*)[5]	NA	Special concern
Amphibians		
Western chorus frog (*Pseudacris triseriata*)[5]	NA	Threatened
Insects		
Monarch (*Danaus plexippus*)[6,8]	Special concern	Special concern

Table 2 Notes:

[1] Atlas of Mammals of Ontario (Dobbyn, 1994)
[2] Ottawa Bird Count (point counts within 1 km of the Site) (Ottawa Bird Count, 2015)
[3] Atlas of Breeding Birds of Ontario (Cadman et. al., 2007) (10 x 10 km squares 18VR53 and 18VR63)
[4] eBird Point (point counts within 1 km of the Site) (ebird, 2015)
[5] Ontario Reptile and Amphibian Atlas (Ontario Nature, 2015) (10 x 10 km squares 18VR53 and 18VR63)
[6] Ontario Butterfly Atlas Online (10 x 10 km squares 18VR53 and 18VR63) (Toronto Entomologists' Association, 2015)
[7] NHIC database (1x1km squares 18VR6033 and 18VR6133) (Natural Heritage Information Centre, 2015)
[8] MNRF Response (**Appendix B**)

4.1.10 Geology and Topography

The Site is generally flat with the exception of a mounded area in the northeast corner; it lies within the Ottawa Valley Clay Plains physiographic region (Ontario Geological Survey, 2016). The surficial geology consists mainly of fine-textured glaciomarine deposits with inclusions of carbonate-derived silty and/or sandy till in the northwest corner and Paleozoic bedrock in the northeast as illustrated in **Figure 3**. Underlying bedrock is part of the Ottawa Formation, consisting of limestone with some shaly partings and sandstone (Natural Resources Canada, 2014).



Notes
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Legend

Site

Surficial Geology

- 20: Organic deposits
- 11a: Coarse-textured glaciomarine deposits (Deltaic deposits)
- 10a: Fine-textured glaciomarine deposits (Massive-well laminated)
- 5b: Stone-poor, carbonate-derived silty to sandy till
- 3: Paleozoic bedrock

Physiography

- 12: Clay Plains
- 11: Sand Plains
- 9: Limestone Plains

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Figure No.
3

Title
Soils and Geology

4.2 FIELD OBSERVATIONS

4.2.1 Vegetation

Vascular plant species observed within and adjacent to the Site consisted of commonly occurring species, invasive weeds and deciduous early successional tree species (**Appendix D**).

The majority of the Site consists of agricultural row crops. Meadow areas occur on the northeast and northwest portions of the Site. Fields within the Site are planted in corn. Meadow areas consist of a variety of grasses and forbs (**Table 3**). A residential neighbourhood occurs to the north, commercial development to the east and west, a driving range and thicket swamp occur to the south (**Figure 4**).

Table 3: Ecological Land Classification Vegetation Types

ELC TYPE	Community Description
Meadow (ME)	
Mixed Meadow (MEM)	
Dry – Fresh Mixed Meadow Ecosite (MEMM3)	This ecosite is found in the northeast and west portions of the Site and occupy approximately 3.5 and 6 hectares respectively (**Figure 4**). The meadow ecosite in the northeast contains a vegetated mounded area, presumed to be discarded fill from the adjacent development. Vegetation is dominated by mixed grasses (i.e., brome (*Bromus* sp.) and ryegrass (*Lolium* sp.)), common burdock (*Arctium minus*), Canada goldenrod (*Solidago canadensis*), milkweed (*Asclepias syriaca*), asters (Asteraceae), and wild carrot (*Daucus carota*). The following invasive species were also noted: garlic mustard (*Alliaria petiolate*), wild parsnip (*Pastinaca sativa*) and common buckthorn (*Rhamnus cathartica*).
Agricultural (AG)	
Open Agriculture (OAG)	
Annual Row Crops (OAGM1)	Corn was cultivated over the majority of the Site covering an area of approximately 14 hectares (**Figure 4**). Inclusions of Deciduous Thicket (THD) occur along the remnant portion of Bilberry Creek (approximately 0.10 hectares) and in the form of hedgerows in a southern portion of the Site (approximately 0.80 hectares). Vegetation within the inclusions is dominated by common buckthorn, Manitoba maple (*Acer negundo*), hawthorn (*Crataegus* sp.), and honeysuckle (*Lonicera* sp.). The following additional canopy tree species are present: willows (*Salix* spp.), white elm (*Ulmus americana*), trembling aspen (*Populus tremuloides*) and staghorn sumac (*Rhus typhina*).
Commercial and Institutional (CVC)	
Business sector (CVC_1)	Adjacent properties east and west of the Site consist of retail box stores and paved parking areas.

ELC TYPE	Community Description
Residential (CVR)	
CVR_3 and CVR_1 Single Family Residential and Low Density Residential	A neighbourhood consisting of single family and low density residential units is located immediately north of the Site.
Thicket Swamp (SWT)	
Organic Deciduous Thicket Swamp Ecosite (SWT05)	This ecosite occurs immediately adjacent to the Site to the southeast. The dominant shrub species present are willows and meadow sweet (*Spirea alba*). Other species include reed canary grass, trembling aspen, and hawthorn. A cattail (*Thypha* sp.) marsh inclusion is present along the southeast border of the Site.
Green Lands (CGL)	
Driving Range	The driving range occurs immediately adjacent to the Site to the southwest and consists of manicured turfgrass.

Legend

Ste

ELC Community

MEMM3	Dry-Fresh Mixed Meadow Ecosite
OAGM1	Annual Row Crops
CVC_1	Business Sector
CVR_3 & CVR_1	Single Family Residential and Low Density Residential
CGL	Green Lands
SWT	Organic Deciduous Thicket Swamp

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Figure No.
4

Title
Ecological Land Classification

4.2.2 Surface Water, Watercourses and Waterways

The Bilberry Creek remnant and the agricultural drains were dry at the time of the Site visits; the interim ditch exhibited standing water and portions with low flow (northward). There was no standing or flowing water observed at the time of the Site visit associated with McKinnons Creek; however, vegetation communities present on the surrounding land (e.g., cattail, willow, and spirea) indicate intermittent and/or seasonal flow.

A head water drainage assessment was completed and four HDFs were observed on-site which were further separated into six individual reaches. The following recommendations are based on flow characteristics and functions contributing to aquatic and terrestrial habitats:

- HDF 1 – Bilberry Creek (remnant)- No Management Required
- HDF 2 – Constructed Water Diversion Channel (interim ditch) - Mitigation
- HDF 3 – Agricultural Drain - No Management Required
- HDF 4 – Agricultural Drain - No Management Required
  - Reach 4-A – Agricultural Swale – No Management Required
  - Reach 4-B – Agricultural Drain - No Management Required

For summary description of reach characteristics and the evaluation of each HDF on the Site, please refer to **Appendix C**.

4.2.3 Wildlife

Wildlife habitat within the Site is typical of an agricultural setting. Common species are anticipated to occur within these habitat features. No amphibian or reptile species were observed during the wildlife survey. A groundhog was observed on the edge of the cornfield along Bilberry Creek, and three wild turkeys were observed in a cornfield in the southeast corner of the Site. The following common bird species were observed on or adjacent to the Site: black-capped chickadee, American crow, mourning dove, European starling, sparrow, American robin, common grackle, killdeer, house finch, and red-winged blackbird.

Concrete slabs, foundation remnants and brush piles were observed on the northwest portion of the Site; these features could provide basking, foraging and overwintering habitat for reptiles. An area of exposed bedrock with fissures throughout is located within the Deciduous Thicket inclusion (**Table 3**) in the southern portion of the Site and may also provide potential habitat for reptiles. Bilberry Creek is piped immediately north of Innes Road (a residential community occurs where the watercourse was historically present); the exposed watercourse occurs approximately 250 m north of the Site and may serve as a turtle migration corridor. The deciduous trees associated with the Bilberry Creek and various hedgerows could provide nesting habitat for migratory songbirds and small mammals. No other active bird nests were observed.

4.2.4 Species at Risk

No species at risk were identified on or adjacent to the Site. The list of potential species at risk identified during background review (**Table 2**) was assessed based on observations collected during the site visits to determine which species have the potential to occur on or adjacent to the Site (**Table 5**).

Table 4: Observed Species at Risk and Potential Species at Risk Habitat within or Adjacent to the Site

Species	On-site		Adjacent	Comments
	SAR observed (Yes/No)	Potential Habitat observed (Yes/No)	Potential Habitat observed (Yes/No)	
Mammals				
Eastern small-footed myotis	No	No	Yes	Potential roosting habitat in existing structures adjacent to the Site.
Little brown myotis	No	No	Yes	Potential roosting habitat in existing structures adjacent to the Site.
Northern myotis	No	No	Yes	Potential roosting habitat in existing structures adjacent to the Site.
Tri-colored bat	No	No	Yes	Potential roosting habitat in existing structures adjacent to the Site.
Birds				
Least bittern	No	No	No	
Short-eared owl	No	No	No	
Common nighthawk	No	No	No	
Eastern whip-poor-will	No	No	No	
Chimney swift	No	No	No	
Eastern wood-pewee	No	No	No	
Bank swallow	No	No	No	
Barn swallow	No	No	No	
Wood thrush	No	No	No	
Canada warbler	No	No	No	
Bobolink	No	Yes	Yes	Potential breeding habitat in MEMM3 on and adjacent to the Site.
Eastern meadowlark	No	No	No	
Henslow's sparrow	No	No	No	
Reptiles				
Snapping turtle	No	No	No	

Species	On-site		Adjacent	Comments
	SAR observed (Yes/No)	Potential Habitat observed (Yes/No)	Potential Habitat observed (Yes/No)	
Northern map turtle	No	No	No	
Blanding's turtle	No	No	No	
Eastern milksnake	No	Yes	No	Concrete slabs, areas of exposed bedrock, foundation remnants and brush piles could provide basking, foraging and overwintering habitat for reptiles.
Amphibians				
Western chorus frog	No	No	No	
Insects				
Monarch	No	Yes	No	Potential habitat observed on Site in meadow areas consisting of various species of milkweed (*Asclepias* sp.).

5.0 IMPACT ASSESSMENT

The environmental effects identified as being of potential concern as a result of the proposed development are identified and discussed in this section. Potential direct and indirect impacts, as well as short term and long term impacts have been considered for the construction and operation of Phase 1, 2, and 3 lands in general in terms of future anticipated development.

5.1 SURFACE WATER AND FISH HABITAT

Potential impacts associated with Phase 1, 2 and 3 of the proposed development include an increase in impervious surface cover and increased runoff from paved surfaces into the nearby storm drains. The design includes underground piping leading off Site, which will connect to the existing Wallflower Drive storm sewer system which connects downstream to Bilberry Creek. The design is engineered to handle storm water flows of a storm as large as a 100 year event. The commercial buildings associated with Phase 1 will have flat roofs with restricted release roof drains which will allow for storage on the roof top during rain events. The parking areas will also have capacity to store rain and a new interim ditch is included to provide additional storage and to handle drainage from the paved parking areas. The quality of the runoff will be handled with the installation of an oil and grit separator (OGS) designed and sized for an 80 % Total Suspended Solids (TSS) reduction from the Site eventually leading into Bilberry Creek (Stantec, 2016). The majority of impervious surfaces on-site are directed to the OGS unit, TSS within runoff generated by the development are not anticipated to have a deleterious impact on downstream watercourses.

The head waters drainage assessment for the Site (**Appendix C**) identified the following reaches and their associated management recommendations:

- Bilberry Creek (HDF 1) will be filled during Phase 1 of the development and there is no intended construction to HDF 3, HDF 4, Reach 4-A and Reach 4-B currently (see **Figure 5**). HDF 1 is the remnant, natural channel of Bilberry Creek that is no longer on-line and is not contributing to Bilberry Creek's downstream values. HDF 3 and Reach 4-A are ill-defined channels through agricultural fields and HDF 4 and Reach 4-B are engineered agricultural drains (See **Figure 5**). The five features have limited hydrological functions and all of them were dry at the time of the assessment. As per the HDF guidelines, No Management is recommended for these reaches (TRCA and CVC, 2014).

- The interim ditch (HDF 2) is an engineered temporary drainage corridor constructed with rip-rap that currently conveys flows from the automobile dealership at 2035 & 21107 Mer Bleue Road (See **Figure 5**). Flows within this feature are carried downstream and connect to the Bilberry Creek system at Innes Road. HDF 2 is choked with vegetation (e.g., broad-leaved cattail (*Typha latifolia*)) that is characteristic of an intermittent feature.

Legend

- Headwater Drainage Feature (HDF)
- Site
- Phase I Development

0 100 200 metres

1:6,000 (at original document size of 8.5x11)

Stantec

Project Location
4100 Innes Road/
2025 Mer Bleue Road
Ottawa, Ontario

160401242-0001 REVA
Prepared by Chitat Lee on 2016-12-13

Client/Project
SmartREIT
EIS WITH HEADWATER ASSESSMENT

Figure No.
5

Title
Headwater Features and Phase I of Development

Notes
1. Coordinate System: NAD 1983 UTM Zone 18T
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2016.
3. Orthoimagery © City of Ottawa, 2014.

The riparian buffer is mainly comprised of both a variety of forb (e.g., *Solidago spp.*) and graminoid (e.g. reed-canary grass (Phalaris arundinacea)) species, many of which are non-native. The reach did not contain fish or signs of fish (e.g., spawning redds) during the 2012 (Muncaster Environmental Planning Inc., 2012) and 2016 surveys. Bilberry Creek is currently piped both upstream of Mer Bleue Road and downstream of Innes Road (Muncaster Environmental Planning Inc., 2012). There is a lack of water in HDF 2 and the piped sections limit HDF 2 from providing direct fish habitat to Bilberry Creek. The lack of water in both HDF 1 and HDF 2, long piped sections and riparian vegetation conditions reduce the value to aquatic species (e.g. frogs, salamanders, turtles) (Muncaster Environmental Planning Inc., 2012).

The installation of HDF 2 and the associated culvert was approved by the RVCA in October of 2012 under the *Conservation Authority Act*, Section 28, Ontario Regulation 174/06 and was constructed on the Site, east of Bilberry Creek. The hydrological function of reach HDF 2 is considered to be contributing as it provides intermittent and/or ephemeral flow. The design proposes HDF 2 will be backfilled and replaced with a large diameter storm pipe. During construction of Phase 1, temporary ditching and a dry pond will be installed immediately north of HDF 2.

The management recommendation of Mitigation assigned to HDF 2 in the headwaters drainage assessment (**Appendix C**) come with the following mitigation suggestions as per the 2014 HDF guidelines (TRCA and CVC, 2014) which are as follows:

- Channel must remain open
- Maintain hydroperiod
- Maintain direct connection to downstream
- Replicate function through enhanced lot level conveyance (replicate using bioswales, vegetated swales or constructed wetlands)

The channel is not proposed to be left open as it was never intended to be a permanent feature and was constructed as an interim solution in regards to future development of the Site. As such, this management suggestion is not applicable to this feature as leaving the channel open when the upstream and downstream sections are piped will not provide any additional environmental value. Leaving it open could potentially increase negative values, allowing direct access to affecting the quality and quantity of water entering the feature (e.g., salt inputs from maintenance activities and litter). The intent of the channel remaining open and maintaining the hydrological regime is to maintain current flows into the downstream section of Bilberry Creek and to prevent flooding or erosion if flows are increased by piping. However, the increase of flows associated with the Site design is being addressed through the stormwater management (SWM) design. Currently, discharge from the majority of the Site is directed to a centrally located open channel within the future Phase 2 of the development. Upon development of Phase 2, it is the intent that storage currently provided within HDF 2 is to be relocated to an underground SWM storage facility under the Phase 2 parking area. The facility is to

maintain an open bottom set on a clear stone trench to allow captured flows to contact the relatively cool subsurface prior to controlled discharge to the receiving sewer. The chamber is also anticipated to delay runoff further than that proposed in the interim to promote further heat transfer to the subsurface. In the interim, contact with the grassed channel bottom will provide a modicum of thermal mitigation prior to discharge to the receiving sewer. As the majority of flows to the wildflower drive main originate from adjacent municipal roadways, the additional controlled flow from the ditch is not expected to have significant impact on downstream water temperature.

Temporary measures during construction and the final stormwater design are anticipated to manage flows on Site and to maintain the hydrological regime of Bilberry Creek.

The other management suggestions of the other HDF's on Site can and are being applied to the design of the development for Phase 1. The anticipated flows from Phase 1 will be discharged into the Wallflower Drive storm sewer system and ultimately into Bilberry Creek north of Innes Road, which will maintain the hydroperiod of Bilberry Creek downstream (Stantec, 2016).

Vegetated swales consisting of landscaped sections in the parking areas and around the buildings will act to covey stormwater to the applicable stormwater features and/or into the ground. With the implementation of mitigation measures during construction and design following Construction Specification for Temporary Erosion and Sediment Control Measures (Ontario Provincial Standard Specification, 2015) and other applicable guidelines and/or standards the alterations to all the reaches on Site are not anticipated to have adverse environmental effects.

The proposed development of Phase I is within 30 m of a watercourse and in the RVCA watershed jurisdiction and will require consultation and authorization from the RVCA under the *Conservation Authority Act*, Section 28, Ontario Regulation 174/06. Specifically for HDF 1 and HDF 2 associated with Phase 1 of the development (See **Figure 5**).

Under the *Fisheries Act*, work that is conducted in or near waterbodies that support fish (i.e., fish that are part of or support a commercial, recreational or Aboriginal fishery) must avoid serious harm to fish[5] unless authorized by the Department of Fisheries and Oceans Canada (DFO). DFO has established a self-assessment process for proponents to determine whether their project will result in serious harm to fish (DFO, 2015). DFO outlines criteria for types of waterbodies and types of projects that do not require review or authorization. DFO also provides guidance on measures to avoid causing serious harm to fish (DFO, 2013a) and advises proponents to request an authorization when it is not possible to avoid and mitigate the impacts of projects that are likely to cause serious harm to fish (DFO, 2013b).

[5] Serious harm to fish is defined in the *Fisheries Act* as "the death of fish or any permanent alteration to, or destruction of, fish habitat".

The potential effects to fish and fish habitat caused by the project were analyzed using DFO's Pathways of Effects diagrams (DFO, 2014). The project has the potential to affect fish and fish habitat through changes in water quality downstream in Bilberry Creek as a result of soil disturbance and stormwater runoff into HDF 2. Construction activities could result in a localized temporary disturbance within Bilberry Creek downstream of the Site. There is a potential for a change in sediment concentrations from exposed soils due to excavation, the use of industrial equipment and removal of the riparian vegetation.

Given the type of project, nature of the habitat, scale and magnitude of the potential impacts, duration of the potential impacts mitigation measures can be applied to reduce or eliminate the potential for adverse environmental effects to fish.

If DFO Measures to Avoid Causing Harm to Fish and Fish Habitat (DFO, 2013a)are implemented during the construction, the alteration of the interim ditch (HDF 2) is not anticipated to have permanent negative residual effects. However, because the project involves a change in the watercourse involving filling below the high water line, it is recommended that a Request for Review (RFR) be submitted to DFO to confirm that Authorization under the *Fisheries Act* is not required.

5.2 VEGETATION COVER

Tree and vegetation removal will occur within the Site prior to construction. The majority of the vegetation to be cleared consists of commonly occurring meadow species (e.g. grasses and forbs) and early succession deciduous forest species (see vegetation list, **Appendix D**). After construction activities are complete, restoration landscaping plans should incorporate native, non-invasive species. Trees adjacent to the Phase 1 area within the Site are assumed to be retained during construction and there is potential that they may be impacted during construction activities (e.g., heavy machinery may compact soil within the critical root zone, excavation within the critical root zone). Since multiple development phases are planned, all trees within the Site will ultimately be removed. The Tree Conservation Report outlines mitigation measures associated with this development (Levstek Consultants Inc. , 2016).

5.3 WILDLIFE

Displacement of wildlife (e.g., birds and groundhogs will likely occur as a result of this development); however, no significant impacts are anticipated for the populations of common wildlife species that have potential to occur within the Site. Concrete slabs, foundation remnants, brush piles and exposed bedrock on Site may provide potential habitat for snakes; construction and ongoing operation of the development may result in disturbance to snake species.

A temporary increase in noise, exhaust fumes and dust due to construction activities may result in the disruption of wildlife breeding and foraging behaviors. Generally, noise from construction

activities represents a short-term disturbance to wildlife using the Site and adjacent lands. It is expected that with the completion of construction, wildlife will quickly return to their normal use patterns within the natural areas adjacent to the development.

5.4 SPECIES AT RISK

There is potential for adverse environmental effects to species at risk potentially present within the Site (**Table 6**).

Table 5: Species at Risk and Species at Risk Potential Habitat Impact Assessment within or Adjacent to the Site

Species	Potential Impact
Eastern small-footed myotis	Potential roosting habitat in existing structures adjacent to the Site. No work will be occurring in the potential habitat and no negative effects are anticipated.
Little brown myotis	Potential roosting habitat in existing structures adjacent to the Site. No work will be occurring in the potential habitat and no negative effects are anticipated.
Northern myotis	Potential roosting habitat in existing structures adjacent to the Site. No work will be occurring in the potential habitat and no negative effects are anticipated.
Tri-colored bat	Potential roosting habitat in existing structures adjacent to the Site. No work will be occurring in the potential habitat and no negative effects are anticipated.
Bobolink	Current site conditions contain potential breeding habitat for Bobolink in MEMM3 on and adjacent to the Site. However the sections of MEMM3 habitat on Site are small in size (2 to 2.7 ha) and fragmented between the corn field (OAGM1). The section of MEMM3 habitat adjacent to the Site is also fragmented from nearby similar habitat and all sections are surrounded by ongoing residential and commercial development, mostly to the south and east of the Site (City of Ottawa, 2015c). Under current conditions there is low potential for breeding activities of Bobolink on and adjacent to the Site and low potential for the Phase 1 development to affect Bobolink. If conditions change prior to development Bobolink could return to breed.
Eastern milksnake	Concrete slabs, areas of exposed bedrock, foundation remnants and brush piles on the northwest portion of the Site could provide basking, foraging and overwintering habitat for eastern milksnake. There is potential for disturbance to eastern milksnake that may be encountered in the Site during site-clearing and construction activities.

Species	Potential Impact
Monarch	Potential habitat for monarch was observed on Site in the meadow areas. Monarch butterflies arrive in Ontario from their overwintering habitat in the south between March to May and begin breeding, staging and nectaring activities between May to October (COSEWIC, 2010). The species lays its eggs on the underside of milkweed leaves up to four times during this time period. Milkweed is the sole food source of the larval (caterpillar) stage. Once the adult emerges, it nectars on wildflowers in open meadows, grasslands, and pastures. If milkweed on Site is removed during the vegetation clearing activities, there is potential for loss of individual monarch, eggs, larvae or pupae. Adult monarch butterflies that may be passing through the Site are unlikely to be directly affected, as they are mobile species and are able to avoid the Site during construction. The potential interaction is not anticipated to result in a significant adverse environmental effect, as there will either be no loss or the loss of a few individuals and is not expected to result in a decline in the monarch population within Ottawa.

6.0 MITIGATION

Due diligence for the ecologically sensitive features of the adjacent watercourses and significant valleylands should include general mitigation measures to reduce or eliminate potential negative effects. These general mitigation measures are applicable to the construction activities and/or the ongoing operation associated with the development of the Site.

6.1 DRAINAGE, EROSION, SEDIMENT CONTROL AND PROTECTION OF FISH HABITAT

Appropriate erosion and sediment controls should be employed during all phases of construction to minimize erosion into Bilberry Creek to the north (downstream). The management option from the HDF assessment is to maintain hydrology, hydroperiod and connection with downstream features.

Mitigation measures to avoid negative impacts to fish habitat and water quality in Bilberry Creek should include the following:

- Implement project specific temporary erosion and sediment control measures according to the Ontario Provincial Standard Specification (OPSS) 805 for Construction Specification for Temporary Erosion and Sediment Control Measures (OPSS, 2015) prior to starting work.
- Do not stockpile soil in areas that allow sediment to enter the watercourses.
- Develop and implement a containment and spill management plan in order to prevent deleterious substances from entering the watercourse.
- Ensure machinery is clean and free of leaks.
- Keep an emergency spill kit on site.
- Maintain the flow of water to downstream Bilberry Creek.
- Stabilize disturbed soil upon completion of work.
- Avoid in-water work during the general timing windows for the Southern Region spring spawning species (March 15 to July 15) (DFO, 2013c).

6.2 MIGRATORY BIRDS

The loss of migratory bird nests, eggs and or nestlings due to tree cutting or other vegetation clearing can be avoided by limiting clearing of vegetation to outside of the general nesting period for migratory birds in this region as identified by Environment Canada (Environment Canada, 2015) (e.g., between early April and late August). If work must be performed within this window, a nest sweep should be conducted by a qualified biologist before work commences and additional mitigation measures (e.g., implementation of buffers during construction) identified, if required.

6.3 WILDLIFE MANAGEMENT

There is potential for wildlife to be present within the Site. To avoid adverse effects to wildlife, the following mitigation measures are recommended:

- Prior to beginning work each day, visually inspect the work area for wildlife presence
- Site clearing activities (e.g., vegetation removal) should commence in the northwest corner of the Site and move southeast; this will ensure that displaced wildlife is guided toward undisturbed habitat
- Do not feed any wildlife or leave food out that may attract wildlife
- If wildlife are encountered within the work area, keep distance and allow the animal to exit the work area

Additional mitigation measures should also be reviewed in the City of Ottawa's Protocol for Wildlife Protection during Construction (City of Ottawa, 2015e) before site clearing and construction activities commence.

6.4 SPECIES AT RISK

Prior to any site alterations the following mitigation measures are recommended:

- Implement a worker awareness program for construction staff that that includes species at risk identification and habitat characteristics
- Conduct a daily pre-construction search of the work area to identify presence of species at risk
- If threatened or endangered species are seen in or near the work area, stop work immediately
  - Take photographs if possible, but do not interact with the animal
  - Contact MNRF

In addition to the above the general mitigation measures for migratory birds are also protective of bird and bat species at risk.

There is potential for monarch to be present on the Site during construction, specifically within or around the various species of milkweed. General mitigation measures can be applied in order to mitigate effects to the species from the Site development. The following mitigation measures are recommended:

- Vegetation removal should be minimized to only what is required for the proposed works
- Exposed soils should be revegetated as soon as possible using a seed mix composed of native species, native trees and shrubs which are appropriate for the site conditions
- Re-vegetation should consist of vegetation native to the area and include various species of milkweed

The most current species at risk information available for the 4100 Innes Road/2025 Mer Bleue Road proposed development has been reviewed and reported in this EIS (**Tables 2, 5, 6**); however, because federal and provincial lists of species at risk are periodically updated to reflect changes in species status and occurrence data for these species is also subject to change, this information should be reviewed immediately prior to the commencement of on-site activities to confirm that any newly listed species at risk are adequately addressed.

7.0 SUMMARY AND RECOMMENDATIONS

This EIS provides an assessment of the potential impacts on the natural environment that may result from the proposed development. The impacts from this development to key natural features and functions identified within and adjacent to the Site include the following:

- Changes to hydrology and water quality in Bilberry Creek
- The loss of migratory bird nests, eggs and or nestlings due to tree cutting or other vegetation clearing
- Temporary disruption to wildlife within and adjacent to Site during construction activities
- Potential on-Site habitat for monarch that could be affected during construction activities

By following the mitigation measures recommended in this EIS, the proposed development project will not result in adverse environmental effects to the natural heritage features identified.

8.0 REFERENCES

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December 14, 2016

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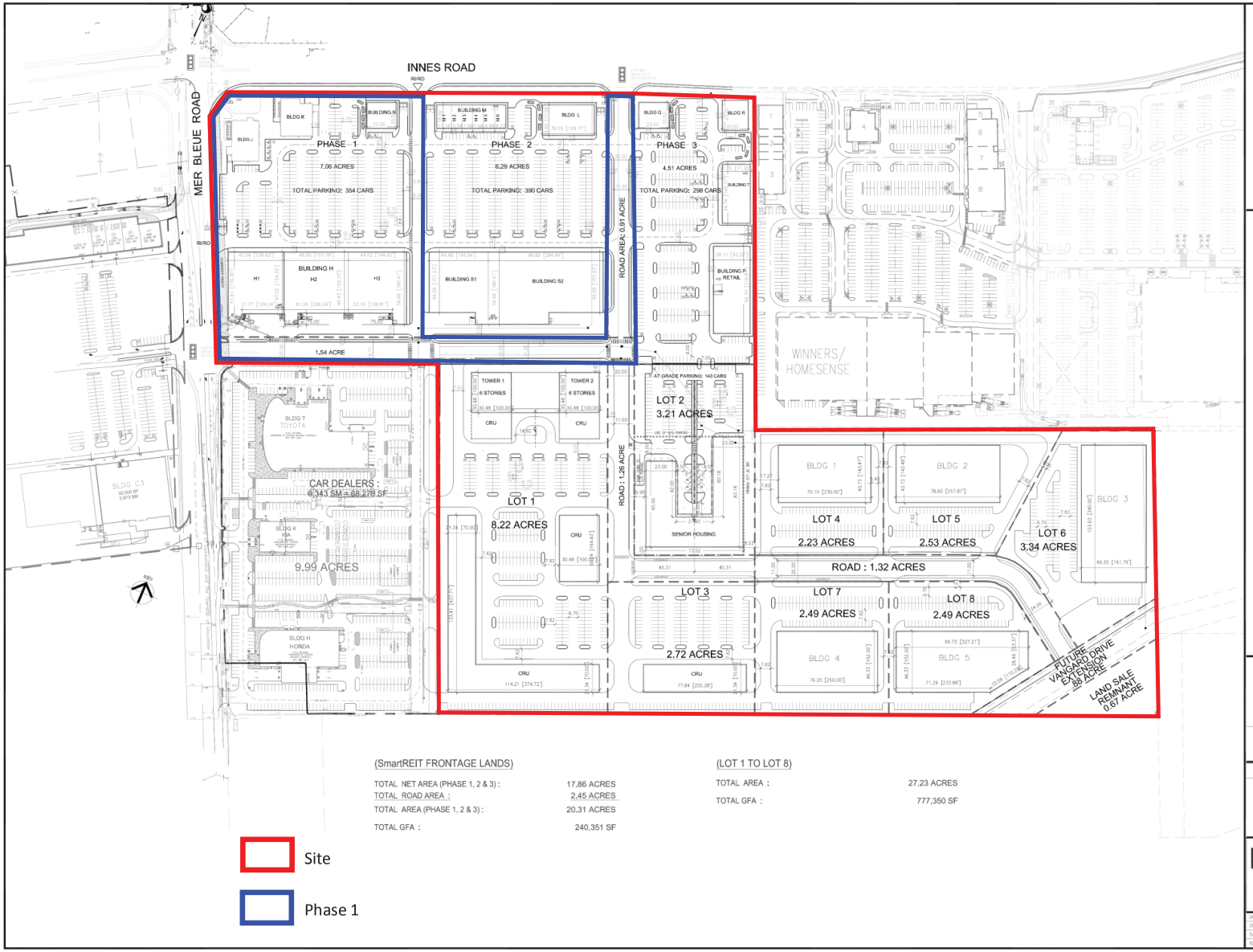
APPENDIX A
SITE PLAN



(SmartREIT FRONTAGE LANDS)

TOTAL NET AREA (PHASE 1, 2 & 3) :	17.86 ACRES
TOTAL ROAD AREA :	2.45 ACRES
TOTAL AREA (PHASE 1, 2 & 3) :	20.31 ACRES
TOTAL GFA :	240,351 SF

(LOT 1 TO LOT 8)

TOTAL AREA :	27.23 ACRES
TOTAL GFA :	777,350 SF

Site

Phase 1

SD-202

THIS SITE PLAN HAS BEEN PREPARED AS AN "ILLUSTRATION OF CONCEPT" ONLY, AND SUCH CONCEPT MUST BE CONFIRMED FOR ALL BUILDING CODE, FIRE EXPOSING FACE, AND RELATED ISSUES, BASED UPON INFORMATION TO BE PROVIDED REGARDING ALL EXISTING CONSTRUCTION, LOT LINE PROXIMITY ETC.

SITE PLAN

SCALE: 1:1500

COMMERCIAL DEVELOPMENT

INNES ROAD & MER BLEUE
ORLEANS, ONTARIO

SmartREIT

PETROFF PARTNERSHIP ARCHITECTS
PETROFF
260 TOWN CENTRE BLVD. SUITE 300
MARKHAM ONTARIO CANADA L3R 8H8
TEL. 905. 470. 7000 FAX. 905. 470. 2500

DRAWN BY	NR/AY/PC
CHECKED BY	MF
DATE	JUNE 14, 2016
ISSUED	APRIL 21, 2016

PROJECT No. 06099

DWG No. SD-202

APPENDIX B
AGENCY CORRESPONDENCE

From:	Dannell, Tracy
To:	"info@nation.on.ca"
Subject:	Information Request - Project # 160401242 - EIS for 2025 Mer Bleue Rd/4100 Innes Rd, Ottawa, ON - SNCA
Date:	Monday, May 30, 2016 3:27:00 PM
Attachments:	Fig. #1_160401242_Orleans_EIS.pdf

To whom it may concern,

On behalf of our client (SmartREIT) I am writing to request any information the South Nation Conservation Authority (SNCA) might have within, nearby, or from adjacent properties within the approximate boundaries of the study area/site location (please see attached PDF document) related to:

- Fish and Fish Habitat
- Water Quality & Quantity
- Natural Environment Features/Heritage Features (Species at Risk, etc.)
- Regulatory flows
- Floodplain mapping; and
- Water management studies

If any further information is required by Stantec to complete the information request do not hesitate to contact me directly.

Thank you in advance for the requested information.

Have a great day.

Cheers, Tracy

Tracy Dannell, Hons., B.Sc., EP

Environmental Scientist/Biologist
Stantec
400 - 1331 Clyde Avenue Ottawa ON K2C 3G4
Phone: (613) 784-2243
Cell: (613) 462-3794
Fax: (613) 722-2799
Tracy.Dannell@stantec.com

FIGURE 1: SITE LOCATION (outlined in Red)
STANTEC PROJECT # 160401242
Commercial Development at 2025 Mer Bleue Road/4100 Innes Road, Orleans, Ontario - SmartREIT

From: Kellie Iacovitti
To: Dannell, Tracy
Subject: Information Request - Project # 164001242 - EIS for 2025 Mer Bleue Rd/4100 Innes Rd, Ottawa, ON - RVCA
Date: Wednesday, June 01, 2016 1:35:42 PM
Attachments: image002.png
image004.jpg
image005.png
image006.png
image001.png
image003.png
image008.png
image009.png
image010.png
image011.png
image012.png
image013.png
CSW_report_Hyperlinktable.docx
Fig. #1_160401242_Orleans_EIS.PDF
Lot 11, Conc 1, formerly Cumberland.pdf

Good Afternoon Tracy,

Please find attached the RVCA regulation limit maps for the property in question. It would appear that the subject lands are located outside of the Conservation Authority's regulated limit area however please be informed that any alteration to a watercourse (ie. *the tributary to Bilberry Creek that appears to be present on the subject lands*) requires written approval from the Conservation Authority under the '*Alteration to Waterways'* section of the Development Policies (please refer to following link):

The following link may be referred to in regards to development in a regulated area and specifically to Ontario Regulation 174/06:
http://www.rvca.ca/plan-reg/PDF/10%20Development%20&%20Interference%20Regs.pdf

Please find the following links when applying for written approval for proposed development under Section 28 from the RVCA:

RVCA application forms, fee schedule and minimum guidelines, etc. links below:

Application Form:
http://www.rvca.ca/plan-reg/RVCA_application_for_development.pdf

Fee Schedule:
http://www.rvca.ca/plan-reg/2016_fees/151126_RVCA_FeeSchedules_Final.pdf

Minimum Application Requirements:
http://www.rvca.ca/plan-reg/RVCA_minimum_requirements_application.pdf

Please be informed that a permit is required for all alteration to waterway proposals. As stated, the tributary that is present on the subject lands is that of Bilberry Creek. This being said you may find the Bilberry Creek City Stream Water Report within the link below with regards to the information you seek for your analyses.

(Please refer to the attached word documents as well when referencing the below links for further assistance).

http://204.101.207.53/IM/Documents/Aquatics/City_Stream_Watch/Minireport_Bilberry2009_Final.pdf

http://rvca.ca/programs/streamwatch/index.html#reports

City Stream Watch Reporting

Year	2009	2010	2011	2012	2013	2014
Summary Report	2009 City Stream Watch Summary Report	2010 City Stream Watch Annual Report	2011 City Stream Watch Summary Report	2012 City Stream Watch Summary Report	2013 City Stream Watch Summary Report	2014 City Stream Watch Summary Report
Catchment Reports	Barrhaven Creek Bilberry Creek Mosquito Creek Stillwater Creek	No catchment reports available –see annual report above McEwan Creek, Brassils Creek, Graham Creek and Greens Creek	Becketts Creek Pinecrest Creek Stevens Creek	Black Creek Mud Creek (GCk) Nepean Creek Ottawa East Tributary Taylor Creek	Borthwick Creek Cranberry Creek Ramsay Creek Voyageur Creek	Black Rapids Creek Cardinal Creek Mud Creek Sawmill Creek

You may wish to undergo the **DFO self-assessment process (refer to correspondence below)**.

- On November 25, 2013, amendments to the *Fisheries Act*, Applications for Authorization (under Paragraph 35(2) (b) of the *Fisheries Act* Regulations) and Information Requirements Regulations came into force. As a result of these amendments and other changes within Fisheries and Oceans Canada (DFO), Conservation Authorities no longer provide regulatory review for works under the federal *Fisheries Act* and therefore the previous partnership agreements between DFO and Conservation Authorities are no longer in effect as of November 25, 2013. The implementation of the amended Act now brings about many changes in the way Fisheries and Oceans Canada conducts business. The focus is now on: Proponent self-assessment Streamlining regulatory reviews; and Greater emphasis on large-scale projects New *Fisheries Act* Self-Assessment Process With regard to the Federal *Fisheries Act*, effective November 25, 2013,

proponents must ensure their projects meet the DFO requirements under the self-assessment process.

The following links provide further information:

Does my project need a review? http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html

Measures to avoid harm: http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/index-eng.html

Request a review or authorization: http://www.dfo-mpo.gc.ca/pnw-ppe/reviews-revues/index-eng.html

The federal government announced its intention to amend the *Fisheries Act* in its Economic Action Plan 2012. The changes are intended to streamline administrative processes while strengthening environmental and fisheries protection. Please note that although RVCA no longer reviews projects under the Federal *Fisheries Act*, the Authority continues to deliver programs and services directed towards the protection, restoration and management of aquatic systems, including fish and fish habitat, as an integral component of watershed management.

Due to the type and scale (i.e. **new** culverts, shoreline stabilization, realignments, flow diversion, filling below the normal high water mark, etc.) of this project a self-assessment and review by DFO will likely be required to satisfy requirements of the *Fisheries Act*.

Please contact the Ontario Minsistry of Natural Resources and Forestry with regards to Species At Risk inquiries: genericinbox.forsar@mnrf or sar.kemptville@ontario.ca

It would also appear that a portion of the property on the south side is located within South Nation Conservation's watershed jurisdiction and therefore you may wish to contact their Conservation Authority as well for any information they may be able to provide (613-984-2948).

Respectfully, Kellie

Kellie Jennifer Iacovitti, Resource Specialist
Rideau Valley Conservation Authority/LRC
Box 599, 3889 Rideau Valley Drive, North
Manotick, ON K4M 1A5
613-692-3571 **ext. 1128**
Fax: 613-692-0831
E-MAIL: kellie.iacovitti@rvca.ca
WEBSITE: www.rvca.ca

From: Dannell, Tracy [mailto:Tracy.Dannell@stantec.com]
Sent: Monday, May 30, 2016 3:25 PM
To: RVCA Info <info@rvca.ca>
Subject: Information Request - Project # 164001242 - EIS for 2025 Mer Bleue Rd/4100 Innes Rd, Ottawa, ON - RVCA

To whom it may concern,

On behalf of our client (SmartREIT) I am writing to request any information the Rideau Valley Conservation Authority (RVCA) might have within, nearby, or from adjacent properties within the approximate boundaries of the study area/site location (please see attached PDF document) related to:

- Fish and Fish Habitat
- Water Quality & Quantity
- Natural Environment Features/Heritage Features (Species at Risk, etc.)
- Regulatory flows
- Floodplain mapping; and
- Water management studies

If any further information is required by Stantec to complete the information request do not hesitate to contact me directly.

Thank you in advance for the requested information.

Have a great day.

Cheers, Tracy

Tracy Dannell, Hons., B.Sc., EP
Environmental Scientist/Biologist
Stantec
400 - 1331 Clyde Avenue Ottawa ON K2C 3G4
Phone: (613) 784-2243
Cell: (613) 462-3794
Fax: (613) 722-2799
Tracy.Dannell@stantec.com

FIGURE 1: SITE LOCATION (outlined in Red)
STANTEC PROJECT # 160401242
Commercial Development at 2025 Mer Bleue Road/4100 Innes Road, Orleans, Ontario - SmartREIT

RIDEAU VALLEY CONSERVATION AUTHORITY

RVCA Regulated Limit Map
Lot 11, Conc 1, formerly Cumberland

Legend

- Township Municipal
- Geographic Township
- Parcel - Assesment
- Lot
- Regulation Limit
- 100yr Floodline
- Reg Limit Dominant Hazard
  - Floodplain
  - Geo-technical Hazard Limit
  - Meander Belt
  - Stable Slope
  - Top of Slope
  - Unstable Slope
  - Wetland
- Regulated Wetlands
- Municipal Drains
- OHN Watercourse
- Ottawa Parcels
- Conservation Authorities (East
- All Roads
  - Highway/Major
  - Arterial/Collector
  - Local
- Wetlands
  - Evaluated-Provincial (PSW)
  - non-PSW Wetlands
- Waterbody
- DRAPE 2014
  - Red: Band_1
  - Green: Band_2
  - Blue: Band_3
- DRAPE2014_MVC_rasterData
  - Red: Band_1
  - Green: Band_2
  - Blue: Band_3

N

1: 7,967

WGS_1984_Web_Mercator_Auxiliary_Sphere

404.7 0 202.36 404.7 Meters

Map created: 6/1/2016

Notes

City Stream Watch Reporting

Year	2009	2010	2011	2012	2013	2014
Summary Report	2009 City Stream Watch Summary Report	2010 City Stream Watch Annual Report	2011 City Stream Watch Summary Report	2012 City Stream Watch Summary Report	2013 City Stream Watch Summary Report	2014 City Stream Watch Summary Report
Catchment Reports	Barrhaven Creek Bilberry Creek Mosquito Creek Stillwater Creek	No catchment reports available – see annual report above McEwan Creek, Brassils Creek, Graham Creek and Greens Creek	Becketts Creek Pinecrest Creek Stevens Creek	Black Creek Mud Creek (GCk) Nepean Creek Ottawa East Tributary Taylor Creek	Borthwick Creek Cranberry Creek Ramsay Creek Voyageur Creek	Black Rapids Creek Cardinal Creek Mud Creek Sawmill Creek

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Tue. Jul 26, 2016

Tracy Dannell
Stantec
400-1331 Clyde Ave,
Ottawa, Ontario
K2C 3G4
(613) 784-2243
Tracy.Dannell@stantec.com

Attention: Tracy Dannell

Subject: Information Request - Developments
Project Name: EIS for Commercial Development - 2025 Mer Bleue Road, Orleans, ON
Site Address: 2025 Mer Bleue Road, Orleans, ON
Our File No. 2016_CUM-3602

Natural Heritage Values

The Ministry of Natural Resources and Forestry (MNRF) Kemptville District has carried out a preliminary review of the area in order to identify any potential natural resource and natural heritage values.

The MNRF works closely with partner agencies and local municipalities in order to establish concurrent approval process and to achieve streamlined and efficient service delivery. The MNRF strongly encourages all proponents to contact partner agencies (e.g. MOECC, Conservation Authority, etc.) and appropriate municipalities early on in the planning process. This provides the proponent with early knowledge regarding agency requirements and approval timelines.

Natural heritage features and values contribute to the province's rich biodiversity and provide habitat for a variety of species. The following Natural Heritage values were identified:

- Unevaluated Wetland (Not evaluated per OWES)

Municipal Official Plans contain additional information related to natural heritage features. Please see the local municipal Official Plan for more information such as specific policies and direction pertaining to activities which may impact natural heritage features. For planning advice or Official Plan interpretation, please contact the local municipality.

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Where natural values and natural hazards exist (e.g., floodplains), there may be additional approvals and permitting required from the local Conservation Authority. The MNRF strongly recommends contacting the local Conservation Authority for further information and approvals. Please see the MNRF Kemptville Information Guide (2012) for contact information pertaining to Conservation Authorities located within the Kemptville District area.

For additional information and online mapping tools, please see the Natural Heritage Information Centre (NHIC), where additional data and files can be downloaded in both list and digital format. In addition sensitive species information can be requested and accessed through the NHIC at NHICrequests@ontario.ca.

In Addition, the following Fish species were identified: bluntnose minnow, brook stickleback, central mudminnow, common shiner, creek chub, eastern blacknose dace, fathead minnow, longnose dace, northern redbelly dace, pearl dace, white sucker.

As per the Natural Heritage Reference Manual (Section 13; OMNRF 2010) the MNRF strongly recommends that an Ecological Site Assessment be carried out to more thoroughly determine the presence of natural heritage features, and Species at Risk and their habitat located on site. The MNRF can provide survey methodology for particular species at risk and their habitats. In addition, the local planning authority may have more details pertaining to the requirements of the assessment process, which will allow for the municipality to make planning decisions which are consistent with the Provincial Policy Statement (2014).

Species at Risk

It is important to understand which species and habitats exist in the area and the implications of the Endangered Species Act (ESA, 2007). A review of the Natural Heritage Information Centre (NHIC) and internal records and aerial photograph interpretation indicate that there is a potential for the following Threatened (THR) and/or Endangered (END) species on the site or in proximity to it:

- Blanding's Turtle (THR)
- Bobolink (THR)
- Butternut (END)
- Chimney Swift (THR)
- Eastern Meadowlark (THR)
- Henslow's Sparrow (END)
- **Sensitive Species (END)**

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All Endangered and Threatened species receive individual protection under section 9 of the ESA and receive general habitat protection under Section 10 of the ESA, 2007. Any potential works should consider disturbance of possible important habitat (e.g. nesting sites). Please note that as of June 30, 2013 general habitat protection applies to all Threatened and Endangered species. The habitat of these listed species is protected from damage and destruction and certain activities may require authorization(s) under the ESA.
Species receiving General Habitat protection:

- Blanding's Turtle (THR)
- Bobolink (THR)
- Butternut (END)
- Chimney Swift (THR)
- Eastern Meadowlark (THR)
- Henslow's Sparrow (END)
- **Sensitive Species (END)**

If the proposed activity is known to have an impact on the species mentioned above or any other SAR, an authorization under the Endangered Species Act, 2007 (ESA) may be required. It is recommended that MNRF Kemptville be contacted prior to any activities being carried out to discuss potential survey and mitigation measures to avoid contravention of the ESA.

Habitat has been identified within the project area that appears suitable for one or more species listed by SARO as Special Concern (SC). In Addition, one or more Special Concern species has been documented to occur either on the site or nearby. Species listed as Special Concern are not protected under the ESA, 2007. However, please note that some of these species may be protected under the Fish and Wildlife Conservation Act. Species of Special Concern for consideration:

- Monarch (SC)
- Snapping Turtle (SC)

If any of these or any other species at risk are discovered throughout the course of the work, and/or should any species at risk or their habitat be potentially impacted by on site activities, MNRF should be contacted immediately and operations be modified to avoid any negative impacts to species at risk or their habitat until further direction is provided by MNRF.

Please note that information regarding species at risk is based on documented occurrences only and does not include an interpretation of potential habitat within or in proximity to the site in question. Although this data represents the MNRF's best current available information, it is important to note that a lack of information for a site does not mean that additional features and

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values are not present. i.e.: Species at Risk (SAR) or their habitat could still be present at the location or in the immediate area. It is the responsibility of the proponent to ensure that species at risk are not killed, harmed, or harassed; or their habitat is not damaged or destroyed through the activities carried out on the site. The MNRF continues to strongly encourage ecological site assessments to determine the potential for SAR habitat and occurrences. When a SAR or potential habitat for a SAR does occur on a site, it is recommended that the proponent contact the MNRF for technical advice and to discuss what activities can occur without contravention of the Act. If an activity is proposed that will contravene the ESA (such as Section 9 or 10), the proponent must contact the MNRF to discuss the potential for a permit (Section 17). For specific questions regarding the Endangered Species Act (2007) or SAR, please contact a district Management Biologist at sar.kemptville@ontario.ca. For more information regarding the ESA (2007), please see attached ESA Information Sheet.

As of July 1, 2013, the approvals processes for a number of activities that have the potential to impact SAR or their habitat were changed in an effort to streamline approvals processes while continuing to protect and sustainably manage Ontario's natural resources. For those activities that require registration with the Ministry, businesses and individuals will be able to do so through a new online system. The online system will also include information to help guide individuals and businesses through the new processes. For further information on which activities are authorized through this new online registration process and how to apply, please refer to the following website: http://www.MNRF.gov.on.ca/en/About/2ColumnSubPage/STDPROD_104342.html. General inquiries may be directed towards Kemptville District MNRF, while questions and comments involving the new online forms can be directed to the Registry Approvals Service Centre (RASC) at 1-855-613-4256 or MNRF.rasc@ontario.ca.

Please note: The advice in this letter may become invalid if:

- The Committee on the Status of Species at Risk in Ontario (COSSARO) re-assesses the status of the above-named species OR adds a species to the SARO List such that the section 9 and/or 10 protection provisions apply to those species.
- Additional occurrences of species are discovered.
- Habitat protection comes into force for one of the above-mentioned species through the creation of a habitat regulation (see general habitat protection above).

This letter is valid until: Wed. Jul 26, 2017

MNRF is streamlining and automating its approvals processes for natural resource-related activities. Some activities that may otherwise contravene the ESA may be eligible to proceed without a permit from MNRF provided that regulatory conditions are met for the ongoing protection of species at risk and their habitats. There are regulatory provisions for projects that have attained

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a specified level of approval prior to, or shortly after, the specified species or its habitat became protected under the ESA. Their requirements include registering the activity with the Ministry of Natural Resources and Forestry, taking steps to immediately minimize adverse effects on species and habitat, and developing a mitigation plan. Anyone intending to use this regulatory provision is strongly advised to review Ontario Regulation 242/08 under the Endangered Species Act, 2007 for the full legal requirements.
For more information please check out the following link http://www.ontario.ca/environment-and-energy/development-and-infrastructure-projects-and-endangered-or-threatened-species

The MNRF would like to advise, by way of this letter, that we continue to be circulated on information with regards to this project. If you have any questions or require clarification please do not hesitate to contact me.

Sincerely,

Joffre Côté
(FLS) Management Biologist
joff.cote@ontario.ca

Encl.\
-ESA Infosheet
-NHIC/LIO Infosheet

APPENDIX C
HEADWATERS DRAINAGE FEATURE ASSESSMENT

Stantec Consulting Ltd.
400 - 1331 Clyde Avenue, Ottawa ON K2C 3G4

July 20, 2016
File: 160401242

Aaron Clodd, M.Sc. Pl, Senior Land Development Manager
SmartREIT
700 Applewood Crescent, Suite 200
Vaughan, ON L4K 5X3

Dear Mr. Clodd,

Reference: 4100 Innes Road/2025 Mer Bleue Road – Headwaters Drainage Features Assessment

1.0 INTRODUCTION

Stantec Consulting Ltd. (Stantec) was retained by SmartREIT, to complete a headwater drainage feature (HDF) assessment for 4100 Innes Road/2025 Mer Bleue Road, in Ottawa, Ontario in support of a Site Plan Application.

The Project Site, from now on referred to as the "Site", is located immediately southeast of the intersection of Innes Road and Mer Bleue Road in the City of Ottawa, Ontario (**Figure 1**). The property is privately owned and is located at Concession 11, Lot 1 within the City of Ottawa.

The purpose of the HDF assessment is to evaluate and classify HDFs within the Site and to identify appropriate management options for stormwater management and development design.

2.0 METHODS

The HDF assessment followed the Toronto Region Conservation Authority and the Credit Valley Conservation (TRCA and CVC, 2014) protocol *Evaluation, Classification and Management of Headwaters Drainage Features Guidelines*. These guidelines use standardized survey methods and a tiered study design to determine the risk of functional impairment to an HDF through land development.

The HDF assessment consists of the following steps:

1. Evaluation–consultation with the conservation authority, background data collection, field data collection
2. Classification–classification of the functions of each HDF with respect to hydrology, riparian vegetation, fish and fish habitat and terrestrial habitat
3. Management Recommendations–recommendation of management options for HDFs based on the classification

The following documents and information sources were consulted for background information on the sensitivity of the HDFs at the Site:

- Agricultural Information Atlas (Ontario Ministry of Agriculture, Food and Rural Affairs, 2014)
- geoOttawa (City of Ottawa, 2015c)
- Satellite imagery (Google Earth Pro, 2013)
- Natural Heritage Information Centre (NHIC) database (Natural Heritage Information Centre, 2015)
- Fisheries and Oceans Canada Fish Species at Risk Mapping (2015)
- City Stream Watch Bilberry Creek 2015 Summary Report (RVCA, 2015)
- Smart Centres Limited Application for Severances D08-01-11/B-0542-543 4100 Innes Road & 2035 Mer Bleue Road Fish Habitat and Community Summary (Muncaster Environmental Planning Inc., 2012)

Pre-consultation with Jennifer Lamourex, Aquatic and Fish Habitat Biologist, from the Rideau Valley Conservation Authority (RVCA) confirmed the approach and methods for the HDF assessment of this Site. RVCA asked that Stantec supplement this HDF assessment report with information collected in the Muncaster (2012) report. The combination of the two reports would be considered to be a standard evaluation method per the HDF guidelines (TRCA and CVC, 2014).

Habitat assessment and fish community sampling was carried out by Muncaster (2012) in April and May of 2012. The HDF by Stantec was completed in spring 2016, during a dry spring with drought conditions recorded in the Rideau River watershed. On June 5, 2016, 36.4 millimetres of rain fell at the Ottawa MacDonald-Cartier International Airport (EC, 2016). As per the RVCA's recommendations, the HDF assessment occurred on June 6, 2016 after a substantial rainfall event and during conditions which allowed for assessment of the riparian vegetation of the reaches.

3.0 HEADWATER DRAINAGE FEATURES ASSESSMENT

SITE CHARACTERISTICS

The 21 hectare site consists primarily of row crop agriculture with several small, previously disturbed deciduous thicket communities surrounded by urban development. A total of four HDFs were observed on-Site; Reach 4 consisted of two separate reaches (**Figure 1**):

- HDF 1–Bilberry Creek
- HDF 2–Constructed Water Diversion Channel
- HDF 3–Agricultural Drain
- HDF 4–Agricultural Drain
  - Reach 4-A – Agricultural Swale
  - Reach 4-B – Agricultural Drain

SUMMARY OF 2012 ASSESSMENT RESULTS

The assessment of HDFs by Muncaster (2012) used the Toronto Region Conservation Authority and the Credit Valley Conservation (TRCA and CVC, 2009) *Evaluation, Classification and Management*

of Headwater Drainage Features: Interim Guidelines. The 2012 HDF assessment took place over four visits completed on April 17, 27, 28 and May 11, 2012. The 2012 HDF assessment focused on Bilberry Creek (identified by Stantec as HDF 1). The report summarizes background data collected (e.g., downstream fish assemblage) and provides a summary of flow characteristics and channel form at four stations along the feature. **Tables 1** and **2** provide a summary of the data obtained during the Muncaster (2012) HDF assessment.

Table 1 - Summary of Flow in HDF 1 in 2012 (Muncaster Environmental Planning Inc., 2012)

Date	Average Wetted Width (m)	Average Depth (range)(cm)
April 17, 2012	0.92	3 (0.5-9)
April 27 – 28, 2012	0.82	1 (0-11)
May 11, 2012	0.79	2 (0-9)

Table 2 - Summary of Channel Form in HDF 1 in 2012 (Muncaster Environmental Planning Inc., 2012)

Station	Bank Height (cm)	Bank Width (m)	Channel Stability	Morphology	Bank Material	Substrate Material	Discharge Points (e.g., seeps, tile outlets)
H1	36	1.6	No signs of erosion	Pool	Fines	Fines	none
H2	17	1.2	No signs of erosion	Pool	Fines	Fines	none
H3	2	0.4	No signs of erosion	Pool	Fines	Fines	none
H4	3	0.4	No signs of erosion	Pool	Fines	Fines	none

HEADWATER DRAINAGE FEATURE EVALUATION–2016

During the 2016 field visit, stations H3 and H4 identified by Muncaster for HDF 1 where no identifiable Between 2012 and 2016 HDF 2 was constructed as an interim ditch realignment, under a permit received from the RVCA, to accommodate for Site development. The characteristics and existing conditions of each HDF identified in 2016 are summarized in **Table 3**.

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Table 3 - Headwater Drainage Feature Characteristics

HDF	Length (m)	Channel Dimensions		Hydrology			Riparian Vegetation					Private/Tractor Crossings (#)	Straightened	Hardened Shoreline	Municipal Drain (OMAFRA)	Agricultural Ditch	Agricultural Tilling in Channel	Description
		Width (m)	Bankfull Depth (m)	Water Present (Y/N)	Depth (mm)	Flow (Y/N)	Crops	Grass	Shrubs	Trees	Wetland							
1	375	0.75	2	N	n/a	n/a	✓	✓	✓	✓		2	✓			✓		Historical, natural channel of Bilberry Creek.
2	295	2.5	3+	Y	200	Y	✓	✓					✓	✓		✓		Engineered feature that now conveys the flows from the historical, natural channel of Bilberry Ck.
3	210	n/a	n/a	N	n/a	n/a	✓		✓	✓			✓			✓	✓	Ill-defined channel through an active agricultural field
4	215	n/a	n/a	N	n/a	n/a	✓	✓	✓	✓			✓			✓		Engineered agricultural drain along east border of the Site
4-A	150	n/a	n/a	N	n/a	n/a	✓						✓			✓	✓	Ill-defined channel through an active agricultural field
4-B	225	n/a	n/a	N	n/a	n/a	✓	✓	✓	✓	✓		✓			✓		Engineered agricultural drain along south border of the Site

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CLASSIFICATION AND MANAGEMENT RECOMMENDATIONS

This section compiles the information collected during the reach characteristic and evaluation phase to classify hydrological, riparian, fish and fish habitat and terrestrial components in order to recommend management decisions for each feature or reach.

Management recommendations are based on flow characteristics and functions contributing to aquatic and terrestrial habitats. **Figure 2** depicts the process to identify management recommendations based on the classification of the HDF functions (TRCA and CVC, 2014).

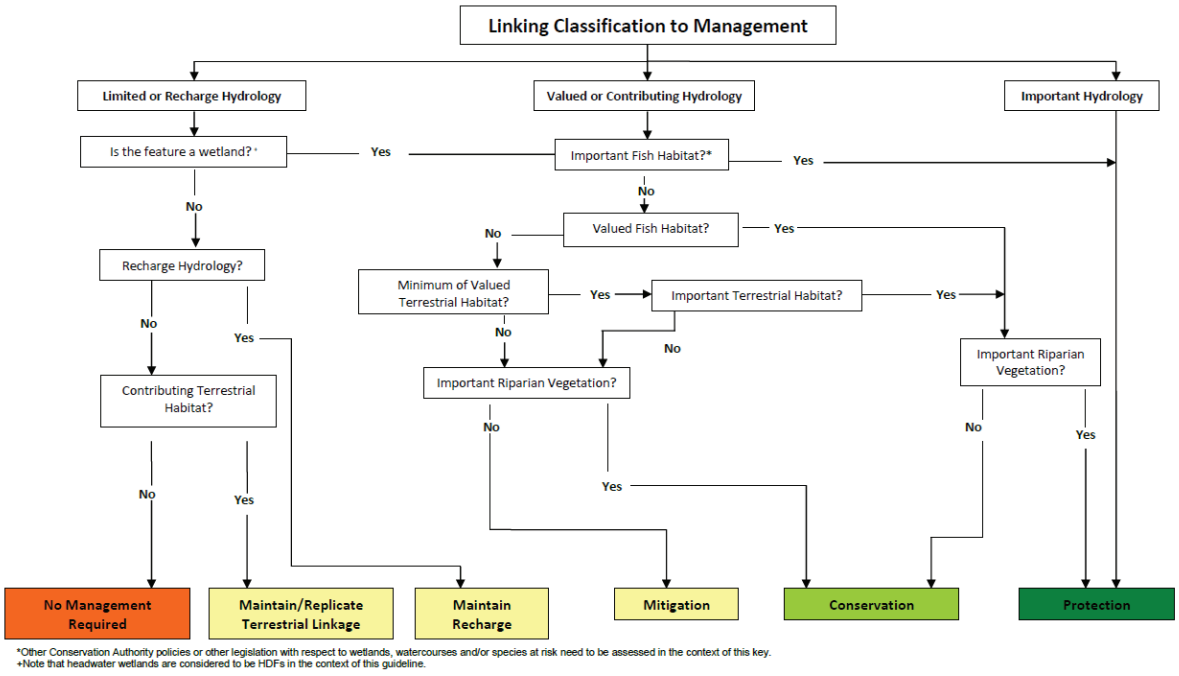

Figure 2 - Flow Chart Providing Direction on Management Options (TRCA and CVC, 2014)

The classification and management recommendation of each reach are summarized below in **Table 4** and shown in **Figure 3** attached. Five of the six features are considered to have limited function with respect to hydrology, they are not wetland features, limited contribution to recharge hydrology (due to clay soils (RVCA, 2015)), and limited contribution to terrestrial habitat; therefore no management is required for these five features. HDF 2 was classified as having a contributing function to hydrology, which indicates mitigation should be applied. Mitigation should include maintaining hydrology, hydroperiod and connection with downstream features.

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Table 4- Summary of HDF Functional Classifications and Management Recommendations

Reach	Step 1		Step 2	Step 3	Step 4	Management Recommendation
	Hydrology	Modifiers	Riparian	Fish Habitat	Terrestrial	
1	Limited	Historical, natural channel of Bilberry Creek that is no longer on-line	Important	Contributing	Limited	No Management Required
2	Contributing	Engineered feature that now conveys the flows from the historical, natural channel of Bilberry Creek.; completed constructed with rip-rap	Limited	Contributing	Limited	Mitigation
3	Limited	Active agricultural field; tilling on-going	Limited	Contributing	Limited	No Management Required
4	Limited	Active agricultural field; tiling occurring right up to edge of feature	Limited	Contributing	Limited	No Management Required
4-A	Limited	Active agricultural field; tilling on-going	Limited	Contributing	Limited	No Management Required
4-B	Limited	Active agricultural field; tiling occurring right up to edge of feature	Limited	Contributing	Limited	No Management Required

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400 - 1331 Clyde Avenue, Ottawa ON K2C 3G4

4.0 SUMMARY

A head water drainage assessment was completed and four HDFs were observed on-site which were further separated into six individual reaches. The following recommendations are based on flow characteristics and functions contributing to aquatic and terrestrial habitats:

- HDF 1–No Management Required
- HDF 2–Mitigation
- HDF 3–No Management Required
- HDF 4–No Management Required
  - Reach 4-A–No Management Required
  - Reach 4-B–No Management Required

With respect to HDF 1, Bilberry Creek, Stantec has determined that mitigation is not required. Muncaster (2012) suggested that the recommended management action for Bilberry Creek was Mitigation 2, which derived from the 2009 interim guidelines. However, since Muncaster's assessment, HDF 1 has been replaced in function with HDF 2. Mitigation should be applied to HDF 2 and should include maintaining hydrology, hydroperiod and connection with downstream features.

Regards,

Stantec Consulting Ltd.

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Attachments:
1. Figure 1 – Headwater Drainage Features Observed within the Site
2. Figure 3 – Management Recommendations for Headwater Drainage Features within the Site
3. Photographic Record of Headwater Drainage Features On-Site
4. Headwaters Drainage Features Field Data Sheets

5.0 REFERENCES

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Legend

- Project Area
- Headwater Drainage Feature (HDF)

0 100 200 metres

1:6,000 (at original document size of 8.5x11)

Notes

1. Coordinate System: NAD 1983 UTM Zone 18T
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2016.
3. Orthoimagery © City of Ottawa, 2014.

Stantec

Project Location
4100 Innes Road /
2025 Mer Bleue Road
Ottawa, Ontario

160401242-0001 REVA
Prepared by AB on 2016-12-13

Client/Project
SmartREIT
HEADWATERS DRAINAGE FEATURES ASSESSMENT

Figure No.
1

Title
Headwater Drainage Features Observed within Study Area

Figure 1

Legend

- Project Area
- **Headwater Drainage Feature**
- Mitigation
- No Management Required

0 100 200 metres

1:6,000 (at original document size of 8.5x11)

Stantec

Project Location
4100 Innes Road/
2025 Mer Bleue Road
Ottawa, Ontario

160401242-0001 REVA
Prepared by AB on 2016-12-13

Client/Project
SmartREIT
EIS WITH HEADWATER ASSESSMENT

Figure No.
3

Title
Headwater Drainage Feature Management Recommendations

Figure 1

Notes
1. Coordinate System: NAD 1983 UTM Zone 18T
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2016.
3. Orthoimagery © City of Ottawa, 2014.

Photo 1 – Reach 1 at confluence with Reach 2 looking upstream – note the confluence has been filled and it is no longer connected

Photo 2 – Typical instream conditions of Reach 1 – note no water or saturated soil

Photo 3 – Middle section of Reach 1 looking upstream – note agricultural fields adjacent to feature

Photo 4 – Reach 1 at Mer Bleue Road looking downstream

Photo 5 – Reach 2 at culvert discharge/origin of water looking downstream

Photo 6 – Typical instream conditions of Reach 2 – note standing water and density of vegetation

Photo 7 – Typical instream conditions at the 90º bend of Reach 2 – note water is flowing through rip-rap looking downstream

Photo 8 – Reach 2 looking upstream at Innes Road – note Reach 2 is piped downstream of this location

Photo 9 – Reach 3 in planted agricultural field looking downstream

Photo 10 – Typical instream conditions of Reach 3 – note no water or saturated soils

Photo 11 – Reach 3 in planted agricultural field looking upstream

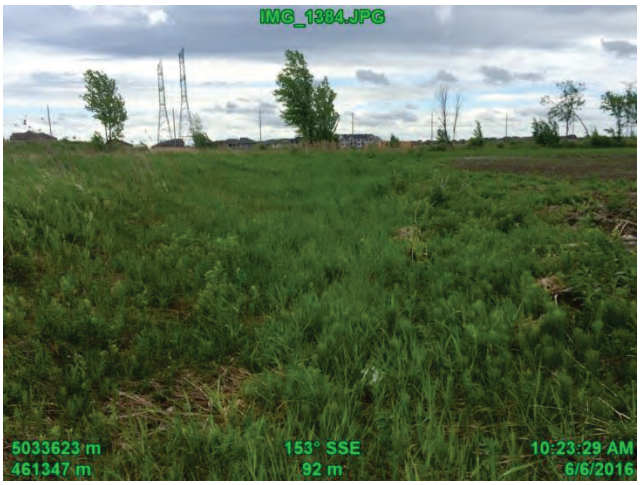

Photo 12 – Reach 4 looking downstream – note terrestrial plants throughout feature

Photo 13 – Reach 4 at confluence of Reach 4-A – note hydrophytic vegetation downstream of confluence

Photo 14 – Reach 4-A in a planted agricultural field – note ill-defined channel

Photo 15 – Reach 4-B looking upstream – note defined channel with no water or saturated soils

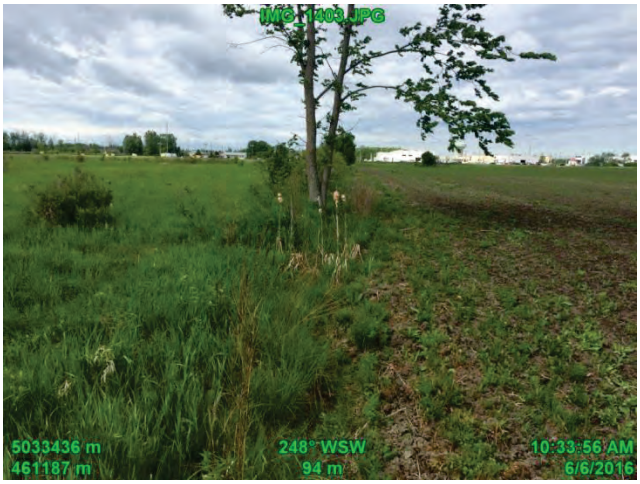

Photo 16 – Reach 4-B looking upstream – note adjacent terrestrial vegetation communities

Headwater Drainage Features - Up- and Down- Stream

Stream Code	Site Code	Zone	Easting	Northing	Date (YYYY)	(MM)	(DD)	Time (24hr)
CK22	HW1	18T	460765	5033609	2016	06	06	09:00

Stream Name: Bilberry Creek

Discharge Approximates Baseflow? ○ Baseflow ○ Freshnet ● Spate

ApproxSite Length (m): 40

Access Route: Access is off Toyota entrance. East of Mt Blvd. Rd.
Access is a dead-end.

Site Description: Headwater feature of Bilberry Ck. that crosses through an agricultural landscape. @ corner of Mt Blvd. + Innis Rd.

Optional Features

Water Temp (C)	Air Temp (C)	pH	Conductivity (Ns)	Turbidity (NTV)	Dissolved O_2 (ppm)
n/a	18	n/a	n/a	n/a	n/a

Number of upstream features: 1

Upstream Roughness	Photo #	Photo Name
4	n/a	See photographic record.
	/	/

Upstream Feature(s)

Feature Number	Distance (m)	Bearing	Type	Flow	Sediment Transport Adjacent	Sediment Transport Valley	Sediment Deposition	Width MT	Feature Width (m)	Bankful Width (m)	BF Depth (mm)	Entrenchment Width (m)	Feat. Veg	Riparian Vegetation 0-1.5 m Left	0-1.5 m Right	1.5-10 m Left	1.5-10 m Right	10-30 m Left	10-30 m Right	Upstream Longitudinal Gradient Method Used	Distance (m)	Elevation Rise (cm)
Primary Feature 1	HW1	252°	2	1	1	1	1	4	0.75	4.5	2	n/a	3	4	4	3	3	3	3	/	/	/
2																						
3																						
4																						

Upstream Flow Measure(s)

Record EITHER Hydraulic Head OR Volume OR Distance

Feature Number	Wetted Width (m)	Depth (mm) 1	Depth (mm) 2	Depth (mm) 3	Hydraulic Head (mm) 1	Hydraulic Head (mm) 2	Hydraulic Head (mm) 3	Volume (lt) 1	Volume (lt) 2	Volume (lt) 3	Distance (m) 1	Distance (m) 2	Distance (m) 3	Time (sec) 1	Time (sec) 2	Time (sec) 3
1	0	0	0	0	0	0	0	/	/	/	/	/	/	/	/	/

Comments

HW1 does not have any water in feature → no flow ~15-20 mm rain fell yesterday.
HW1 is dominated by Reed-canary grass in channel. Riparian area a shrub/meadow mix w/ Green Ash + Manitoba Maple.

n/a - see photographic record *If more than 1 downstream feature, complete a second Headwater Drainage form*

Photo #	Photo Name	Photo #	Photo Name
/	/	/	/

Downstream Feature

Type	Flow	Sediment Transport: Adjacent	Sediment Transport: Valley	Sediment Deposition	Width MT	Approx Site Length (m)	Feature Width (m)	Bankfull Width (m)	BFDepth (mm)	Entrenchment Width (m)	Perched Ht (mm)	Jumping Ht (mm)	Feature Roughness	Feat Veg	Riparian Vegetation 0-1.5 m Left	0-1.5 m Right	1.5-10 m Left	1.5-10 m Right	10-30 m Left	10-30 m Right	Dstrm Longitudinal Gradient: Method Used	Distance (m)	Elevation Rise (cm)
2	1	1	1	1	4	40	0.75	4.5	2	n/a	n/a	n/a	4	3	4	4	3	3	4	3	/	/	/

Downstream Flow Measure

Record EITHER Hydraulic Head OR Volume OR Distance

Wetted Width (m)	Depth (mm) 1	Depth (mm) 2	Depth (mm) 3	Hydraulic Head (mm) 1	Hydraulic Head (mm) 2	Hydraulic Head (mm) 3	Volume (lt) 1	Volume (lt) 2	Volume (lt) 3	Distance (m) 1	Distance (m) 2	Distance (m) 3	Time (sec) 1	Time (sec) 2	Time (sec) 3
0.75	0	0	0	0	0	0	/	/	/	/	/	/	/	/	/

Upstream and Downstream Site Features

	Category Value	Comments
Major Nutrient Sources Upstream	4	
Potential Contaminant Sources Upstream	4	
Channel Hardening	2	several farm-access culverts
Dredging or Straightening	2.	
Barriers and/or Dams in proximity	1	* No water *
On-line ponds upstream	4	
Springs or Seeps at the Site	4	
Evidence of channel scouring/erosion	4	
BMPs or restoration activities	4	

CHANNEL CONNECTIVITY (to downstream): ☐ Surface ☐ Unconnected

* No water

Connected: A surface water flow connection is apparent from the contributing feature to the downstream watercourse with existing or potential overland flow.

Unconnected: A water flow feature that is not connected to the drainage network except by groundwater infiltration. These features could be wetlands or ponds etc. that have no outlet to the drainage network except via groundwater.

Site Feature Categories
1. Ongoing and active
2. Historical evidence
3. No evidence but reported
4. No evidence
5. Unknown

Downstream Comments

Identical to U/S features

Crew Leader (Initial & Last name)	Crew	Recorder
J Morrell		

Headwater Drainage Features - Up- and Down- Stream

Stream Code	Site Code	Zone	Easting	Northing	Date (YYYY)	(MM)	(DD)	Time (24hr)
CH22	HW2	10T	460866	5093611	2016	06	06	0940

Stream Name: Unnamed - Bilberry Creek?

Discharge Approximates Baseflow? ○ Baseflow ○ Freshnet ● Spate

ApproxSite Length (m): 40

Access Route: Access is off of Toyota entrance East of Mer Bleue Road. Access is a dead-end.

Site Description: Feature is a newly constructed, engineered water conveyance feature. Engineered banks through agriculture.

Optional Features

Water Temp (C)	Air Temp (C)	pH	Conductivity (Ns)	Turbidity (NTV)	Dissolved O_2 (ppm)
15	17	n/a	n/a	n/a	n/a

Number of upstream features: 1

Upstream Roughness: 4

Photo #: n/a

Photo Name: See photocatalogue record

Upstream Feature(s)

Feature Number	Distance (m)	Bearing	Type	Flow	Sediment Transport Adja-cent	Valley	Sediment Deposition	Width MT	Feature Width (m)	Bankful Width (m)	BF Depth (mm)	Entrenchment Width (m)	Feat. Veg	Riparian Vegetation 0-1.5 m Left	0-1.5 m Right	1.5-10 m Left	1.5-10 m Right	10-30 m Left	10-30 m Right	Upstream Longitudinal Gradient Method Used	Distance (m)	Elevation Rise (cm)
Primary Feature 1	HW2	263°	2	2	1	3	1	4	2.5	14	n/a	n/a	3	4	4	3	3	3	3	/	/	/
2																						
3																						
4																						

Upstream Flow Measure(s)

Record EITHER Hydraulic Head OR Volume OR Distance

Feature Number	Wetted Width (m)	Depth (mm) 1	Depth (mm) 2	Depth (mm) 3	Hydraulic Head (mm) 1	Hydraulic Head (mm) 2	Hydraulic Head (mm) 3	Volume (lt) 1	Volume (lt) 2	Volume (lt) 3	Distance (m) 1	Distance (m) 2	Distance (m) 3	Time (sec) 1	Time (sec) 2	Time (sec) 3
1	2.5	200	180	200	0	0	0	/	/	/	/	/	/	/	/	/

Comments

HW2 originates from an underground storm sewer pipe → replaces the function of HW1. Standing water is found throughout feature → flow is observed at several places at the 90° bend, where water becomes interstitial.

n/a - see photographic record

If more than 1 downstream feature, complete a second Headwater Drainage form.

Photo #	Photo Name	Photo #	Photo Name
-	-	-	-

Downstream Feature

Type	Flow	Sediment Transport: Aggradation	Sediment Transport: Water	Sediment Deposition	Width MT	Approx Site Length (m)	Feature Width (m)	Bankfull Width (m)	BFDepth (mm)	Entrenchment Width (m)	Perched Ht (mm)	Jumping Ht (mm)	Feature Roughness	Feat Veg	Riparian Vegetation 0-1.5 m Left	0-1.5 m Right	1.5-10 m Left	1.5-10 m Right	10-30 m Left	10-30 m Right	Dstrm Longitudinal Gradient: Method Used	Distance (m)	Elevation Rise (cm)
2	2	1	3	1	4	40	25	14	n/a	n/a	n/a	n/a	4	3	4	4	3	3	3	3	-	-	-

Downstream Flow Measure

Record EITHER Hydraulic Head OR Volume OR Distance

Wetted Width (m)	Depth (mm) 1	Depth (mm) 2	Depth (mm) 3	Hydraulic Head (mm) 1	Hydraulic Head (mm) 2	Hydraulic Head (mm) 3	Volume (l) 1	Volume (l) 2	Volume (l) 3	Distance (m) 1	Distance (m) 2	Distance (m) 3	Time (sec) 1	Time (sec) 2	Time (sec) 3
2.5	200	180	200	0	0	0	-	-	-	-	-	-	-	-	-

Upstream and Downstream Site Features

	Category Value	Comments
Major Nutrient Sources Upstream	4	
Potential Contaminant Sources Upstream	4	
Channel Hardening	2	
Dredging or Straightening	2	
Barriers and/or Dams in proximity	2	Rip-rap @ 90 corner a barrier.
On-line ponds upstream	4	
Springs or Seeps at the Site	4	
Evidence of channel scouring/erosion	4	
BMPs or restoration activities	4	

CHANNEL CONNECTIVITY (to downstream):

- ■ Surface
- ☐ Unconnected

Connected: A surface water flow connection is apparent from the drainage feature to the downstream watercourse with existing or potential riparian link.

Unconnected: A water flow feature that is not connected to the drainage network except by groundwater infiltration. These features could be wetlands or ponds etc. that have no outlet to the drainage network except via groundwater.

Site Feature Categories

1. Ongoing and active
2. Historical evidence
3. No evidence but reported
4. No evidence
5. Unknown

Downstream Comments

Indentical to U/S features

Crew Leader (Initial & Last name)	Crew	Recorder
S Mosell		

Headwater Drainage Features - Up- and Down- Stream

Stream Code	Site Code	Zone	Easting	Northing	Date (YYYY)	(MM)	(DD)	Time (24hr)
n/a	HW3	18T	461156	5033595	2016	06	06	1020

Stream Name: n/a

Discharge Approximates Baseflow? ○ Baseflow ○ Freshnet ● Spate

ApproxSite Length (m): 40

Access Route: Accessed behind HomeSense/Winners outlet.

Site Description: Agricultural

Optional Features

Water Temp (C)	Air Temp (C)	pH	Conductivity (Ns)	Turbidity (NTV)	Dissolved O_2 (ppm)

Number of upstream features:

Upstream Roughness:

Photo #:

Photo Name:

Upstream Feature(s)

Feature Number	Distance (m)	Bearing	Type	Flow	Sediment Transport Adja-cent	Sediment Transport Valley	Sediment Deposition	Width MT	Feature Width (m)	Bankful Width (m)	BF Depth (mm)	Entrenchment Width (m)	Feat. Veg	Riparian Vegetation 0-1.5 m Left	0-1.5 m Right	1.5-10 m Left	1.5-10 m Right	10-30 m Left	10-30 m Right	Upstream Longitudinal Gradient Method Used	Distance (m)	Elevation Rise (cm)
Primary Feature 1																						
2																						
3																						
4																						

Upstream Flow Measure(s)

Record EITHER Hydraulic Head OR Volume OR Distance

Feature Number	Wetted Width (m)	Depth (mm) 1	Depth (mm) 2	Depth (mm) 3	Hydraulic Head (mm) 1	Hydraulic Head (mm) 2	Hydraulic Head (mm) 3	Volume (ft) 1	Volume (ft) 2	Volume (ft) 3	Distance (m) 1	Distance (m) 2	Distance (m) 3	Time (sec) 1	Time (sec) 2	Time (sec) 3

Comments

If more than 1 downstream feature, complete a second Headwater Drainage form.

Photo # | Photo Name | Photo # | Photo Name

Downstream Feature

Type	Flow	Sediment Transport: Aggrad	Sediment Transport: Valley	Sediment Deposition	Width WT	Approx Site Length (m)	Feature Width (m)	Bankful Width (m)	BFDepth (mm)	Entrenchment Width (m)	Perched Ht (mm)	Jumping Ht (mm)	Feature Roughness	Feat Veg	Riparian Vegetation 0-1.5 m Left	0-1.5 m Right	1.5-10 m Left	1.5-10 m Right	10-30 m Left	10-30 m Right	Dstrm Longitudinal Gradient: Method Used	Distance (m)	Elevation Rise (cm)

Downstream Flow Measure

Record EITHER Hydraulic Head OR Volume OR Distance

Wetted Width (m)	Depth (mm) 1	Depth (mm) 2	Depth (mm) 3	Hydraulic Head (mm) 1	Hydraulic Head (mm) 2	Hydraulic Head (mm) 3	Volume (l) 1	Volume (l) 2	Volume (l) 3	Distance (m) 1	Distance (m) 2	Distance (m) 3	Time (sec) 1	Time (sec) 2	Time (sec) 3

Upstream and Downstream Site Features

	Category Value	Comments
Major Nutrient Sources Upstream		
Potential Contaminant Sources Upstream		
Channel Hardening		
Dredging or Straightening		
Barriers and/or Dams in proximity		
On-line ponds upstream		
Springs or Seeps at the Site		
Evidence of channel scouring/erosion		
BMPs or restoration activities		

CHANNEL CONNECTIVITY (to downstream):

☐ Surface ☐ Unconnected

Connected: A surface water flow connection is present from the contributing feature to the downstream watercourse with existing or potential wetted flow.

Unconnected: A water flow feature that is not connected to the drainage network except by groundwater infiltration. These features could be wetlands or ponds etc. that rise to influence the drainage network except via groundwater.

Site Feature Categories
1. Ongoing and active
2. Historical evidence
3. No evidence, but reported
4. No evidence
5. Unknown

Downstream Comments

Crew Leader (Initial & last name) | Crew | Recorder

Headwater Drainage Features - Up- and Down- Stream

Stream Code	Site Code	Zone	Easting	Northing	Date (YYYY)	(MM)	(DD)	Time (24hr)
n/a	HW4	18T	461354	5033609	2016	06	06	1055

Stream Name: n/a

Discharge Approximates Baseflow? ○ Baseflow ○ Freshnet ● Spate

ApproxSite Length (m): 40

Access Route

Site Description

Optional Features

Water Temp (C)	Air Temp (C)	pH	Conductivity (Ns)	Turbidity (NTV)	Dissolved O_2 (ppm)

Number of upstream features:

Upstream Roughness:

Photo #	Photo Name

Upstream Feature(s)

Feature Number	Distance (m)	Bearing	Type	Flow	Sediment Transport Adja-cent	Sediment Transport Valley	Sediment Deposition	Width MT	Feature Width (m)	Bankful Width (m)	BF Depth (mm)	Entrenchment Width (m)	Feat. Veg	Riparian Vegetation 0-1.5 m Left	Riparian Vegetation 0-1.5 m Right	Riparian Vegetation 1.5-10 m Left	Riparian Vegetation 1.5-10 m Right	Riparian Vegetation 10-30 m Left	Riparian Vegetation 10-30 m Right	Upstream Longitudinal Gradient Method Used	Upstream Longitudinal Gradient Distance (m)	Upstream Longitudinal Gradient Elevation Rise (cm)
Primary Feature 1																						
2																						
3																						
4																						

Upstream Flow Measure(s)

Record EITHER Hydraulic Head OR Volume OR Distance

Feature Number	Wetted Width (m)	Depth (mm) 1	Depth (mm) 2	Depth (mm) 3	Hydraulic Head (mm) 1	Hydraulic Head (mm) 2	Hydraulic Head (mm) 3	Volume (lt) 1	Volume (lt) 2	Volume (lt) 3	Distance (m) 1	Distance (m) 2	Distance (m) 3	Time (sec) 1	Time (sec) 2	Time (sec) 3

Comments

* NO Water *

If more than 1 downstream feature, complete a second Headwater Drainage form.

Photo # | Photo Name | Photo # | Photo Name

Downstream Feature

Type	Flow	Sediment Transport Adjacent	Sediment Transport Valley	Sediment Deposition	Width MT	Approx Site Length (m)	Feature Width (m)	Bankful Width (m)	BF Depth (mm)	Entrenchment Width (m)	Perched Ht (mm)	Jumping Ht (mm)	Feature Roughness	Feat Veg	Riparian Vegetation 0-1.5 m Left	0-1.5 m Right	1.5-10 m Left	1.5-10 m Right	10-30 m Left	10-30 m Right	Dstrm Longitudinal Gradient Method Used	Distance (m)	Elevation Rise (cm)

Downstream Flow Measure

Record EITHER Hydraulic Head OR Volume OR Distance

Wetted Width (m)	Depth (mm) 1	Depth (mm) 2	Depth (mm) 3	Hydraulic Head (mm) 1	Hydraulic Head (mm) 2	Hydraulic Head (mm) 3	Volume (lt) 1	Volume (lt) 2	Volume (lt) 3	Distance (m) 1	Distance (m) 2	Distance (m) 3	Time (sec) 1	Time (sec) 2	Time (sec) 3

Upstream and Downstream Site Features

	Category Value	Comments
Major Nutrient Sources Upstream		
Potential Contaminant Sources Upstream		
Channel Hardening		
Dredging or Straightening		
Barriers and/or Dams in proximity		
On-line ponds upstream		
Springs or Seeps at the Site		
Evidence of channel scouring/erosion		
BMPs or restoration activities		

CHANNEL CONNECTIVITY *(to downstream)*:

☐ Surface ☐ Unconnected

Connected: A surface water flow connection is present from the drainage feature to the downstream watercourse with existing or potential overland flow.

Unconnected: A drainage feature that is not connected to the drainage network except by groundwater infiltration. These features could be wetlands or ponds etc. that have no outlet to the drainage network except via groundwater.

Site Feature Categories

1. Ongoing and active
2. Historical evidence
3. No evidence, but reported
4. No evidence
5. Unknown

Downstream Comments

Crew Leader (initial & last name) | Crew | Recorder

Headwater Drainage Features - Up- and Down- Stream

Stream Code	Site Code	Zone	Easting	Northing	Date (YYYY)	(MM)	(DD)	Time (24hr)
n/a	HW4-A	18T	461361	5033573	2016	06	06	1105

Stream Name: n/a

Discharge Approximates Baseflow? ○ Baseflow ○ Freshnet ● Spate

ApproxSite Length (m): 40

Access Route

Site Description

Optional Features

Water Temp (C)	Air Temp (C)	pH	Conductivity (Ns)	Turbidity (NTV)	Dissolved O_2 (ppm)

Number of upstream features:

Upstream Roughness:

Photo #	Photo Name

Upstream Feature(s)

Feature Number	Distance (m)	Bearing	Type	Flow	Sediment Transport Adja-cent	Sediment Transport Valley	Sediment Deposition	Width MT	Feature Width (m)	Bankful Width (m)	BF Depth (mm)	Entrenchment Width (m)	Feat Veg	Riparian Vegetation 0-1.5 m Left	0-1.5 m Right	1.5-10 m Left	1.5-10 m Right	10-30 m Left	10-30 m Right	Upstream Longitudinal Gradient Method Used	Distance (m)	Elevation Rise (cm)
Primary Feature 1																						
2																						
3																						
4																						

Upstream Flow Measure(s)

Record EITHER Hydraulic Head OR Volume OR Distance

Feature Number	Wetted Width (m)	Depth (mm) 1	Depth (mm) 2	Depth (mm) 3	Hydraulic Head (mm) 1	Hydraulic Head (mm) 2	Hydraulic Head (mm) 3	Volume (lt) 1	Volume (lt) 2	Volume (lt) 3	Distance (m) 1	Distance (m) 2	Distance (m) 3	Time (sec) 1	Time (sec) 2	Time (sec) 3

Comments

* No Water *

If more than 1 downstream feature, complete a second Headwater Drainage Form.

Photo # | Photo Name | Photo # | Photo Name

Downstream Feature

Type	Flow	Sediment Transport: Aggrad	Valley	Sediment Deposition	Width MT	Approx Site Length (m)	Feature Width (m)	Bankfull Width (m)	BFDepth (mm)	Entrenchment Width (m)	Perched Ht (mm)	Jumping Ht (mm)	Feature Roughness	Feat Veg	Riparian Vegetation: 0-1.5 m Left	0-1.5 m Right	1.5-10 m Left	1.5-10 m Right	10-30 m Left	10-30 m Right	Dstrm Longitudinal Gradient: Method Used	Distance (m)	Elevation Rise (cm)

Downstream Flow Measure

Record EITHER Hydraulic Head OR Volume OR Distance

Wetted Width (m)	Depth (mm) 1	Depth (mm) 2	Depth (mm) 3	Hydraulic Head (mm) 1	Hydraulic Head (mm) 2	Hydraulic Head (mm) 3	Volume (lt) 1	Volume (lt) 2	Volume (lt) 3	Distance (m) 1	Distance (m) 2	Distance (m) 3	Time (sec) 1	Time (sec) 2	Time (sec) 3

Upstream and Downstream Site Features

	Category Value	Comments
Major Nutrient Sources Upstream		
Potential Contaminant Sources Upstream		
Channel Hardening		
Dredging or Straightening		
Barriers and/or Dams in proximity		
On-line ponds upstream		
Springs or Seeps at the Site		
Evidence of channel scouring/erosion		
BMPs or restoration activities		

CHANNEL CONNECTIVITY (to downstream):

☐ Surface ☐ Unconnected

Connected: A surface water flow connection is apparent from the contributing feature to the downstream watercourse. No existing or potential overland flow.

Unconnected: A water flow feature that is not connected to the conveyance network (except groundwater infiltration). These features could be wetlands or ponds etc. that have no outlet to the drainage network except via groundwater.

Site Feature Categories

1. Ongoing and active
2. Historical evidence
3. No evidence, but reported
4. No evidence
5. Unknown

Downstream Comments

Crew Leader (initial & last name) | Crew | Recorder

Headwater Drainage Features - Up- and Down- Stream

Stream Code	Site Code	Zone	Easting	Northing	Date (YYYY)	(MM)	(DD)	Time (24hr)
n/a	HW4-B	18T	464348	5033501	2016	06	06	11 20

Stream Name: n/a

Discharge Approximates Baseflow? ○ Baseflow ○ Freshnel ● Spate

ApproxSite Length (m): 40

Access Route

Site Description

Optional Features

Water Temp (C)	Air Temp (C)	pH	Conductivity (Ns)	Turbidity (NTV)	Dissolved O_2 (ppm)

Number of upstream features

Upstream Roughness

Photo #

Photo Name

Upstream Feature(s)

Feature Number	Distance (m)	Bearing	Type	Flow	Sediment Transport Adja-cent	Valley	Sediment Deposition	Width MT	Feature Width (m)	Bankful Width (m)	BF Depth (mm)	Entrenchment Width (m)	Feat. Veg	Riparian Vegetation 0-1.5 m Left	0-1.5 m Right	1.5-10 m Left	1.5-10 m Right	10-30 m Left	10-30 m Right	Upstream Longitudinal Gradient Method Used	Distance (m)	Elevation Rise (cm)
Primary Feature 1																						
2																						
3																						
4																						

Upstream Flow Measure(s)

Record EITHER Hydraulic Head OR Volume OR Distance

Feature Number	Wetted Width (m)	Depth (mm) 1	Depth (mm) 2	Depth (mm) 3	Hydraulic Head (mm) 1	Hydraulic Head (mm) 2	Hydraulic Head (mm) 3	Volume (l) 1	Volume (l) 2	Volume (l) 3	Distance (m) 1	Distance (m) 2	Distance (m) 3	Time (sec) 1	Time (sec) 2	Time (sec) 3

Comments

* No Water

If more than 1 downstream feature, complete a second Headwater Drainage form.

Photo #	Photo Name	Photo #	Photo Name

Downstream Feature

Type	Flow	Sediment Transport: Aggrad	Sediment Transport: Vary	Sediment Deposition	Width MT	Approx Site Length (m)	Feature Width (m)	Bankful Width (m)	BFDepth (mm)	Entrenchment Width (m)	Perched Ht (mm)	Jumping Ht (mm)	Feature Roughness	Feat Veg.	Riparian Vegetation 0-1.5 m Left	Riparian Vegetation 0-1.5 m Right	Riparian Vegetation 1.5-10 m Left	Riparian Vegetation 1.5-10 m Right	Riparian Vegetation 10-30 m Left	Riparian Vegetation 10-30 m Right	Dstrm Longitudinal Gradient: Method Used	Dstrm Longitudinal Gradient: Distance (m)	Dstrm Longitudinal Gradient: Elevation Rise (cm)

Downstream Flow Measure

Record EITHER Hydraulic Head OR Volume OR Distance

Wetted Width (m)	Depth (mm) 1	Depth (mm) 2	Depth (mm) 3	Hydraulic Head (mm) 1	Hydraulic Head (mm) 2	Hydraulic Head (mm) 3	Volume (lt) 1	Volume (lt) 2	Volume (lt) 3	Distance (m) 1	Distance (m) 2	Distance (m) 3	Time (sec) 1	Time (sec) 2	Time (sec) 3

Upstream and Downstream Site Features

	Category Value	Comments
Major Nutrient Sources Upstream		
Potential Contaminant Sources Upstream		
Channel Hardening		
Dredging or Straightening		
Barriers and/or Dams in proximity		
On-line ponds upstream		
Springs or Seeps at the Site		
Evidence of channel scouring/erosion		
BMPs or restoration activities		

CHANNEL CONNECTIVITY (to downstream)

☐ Surface ☐ Unconnected

Connected: A surface water connection is present from the contributing feature to the downstream watercourse with existing or potential overland flow.

Unconnected: A water flow feature that is not connected to the drainage network except by groundwater infiltration. These features could be wetlands or ponds etc. that relate to a particular drainage network except via groundwater.

Site Feature Categories

1 Ongoing and active
2 Historical evidence
3 No evidence, but reported
4 No evidence
5 Unknown

Downstream Comments

Crew Leader (Initial & last name)	Crew	Recorder

APPENDIX D
VASCULAR PLANT LIST

Vegetation Observed on Site

Aster (Asteraceae)

Birdsfoot trefoil (*Lotus corniculatus*)

Black medic (*Medicago lupulina*)

Brome grass (*Bromus* spp.)

Canada goldenrod (*Solidago canadensis*)

Cattail (*Typha* spp.)

Cherry (*Prunus* spp.)

Clover (*Trifolium* spp.)

Common bedstraw (*Galium aparine*)

Common buckthorn (*Rhamnus cathartica*)

Common burdock (*Arctium minus*)

Common winter cress (*Barbarea vulgaris*)

Dandelion (*Taraxacum officinale*)

Elderberry (*Sambucus nigra*)

Evening primrose (*Oenothera* spp.)

Garlic mustard (*Alliaria petiolate*)

Glossy buckthorn (*Rhamnus frangula*)

Green Ash (Fraxinus *pennsylvanica*)

Hackberry (*Celtis occidentalis*)

Hawthorn (*Crataegus* sp.)

Honeysuckle (*Lonicera* spp.)

Horsetail (*Equisetum* spp.)

Lambsquarters (*Chenopodium album*)

Manitoba Maple (*Acer negundo*)

Meadow sweet (*Spirea alba*)

Milkweed (*Asclepias syriaca*)

Mint (*Mentha* sp.)

Mullein (*Verbascum* sp.)

Poplar (*Poplar* sp.)

Purple loosestrife (*Lythrum salicaria*)

Reed canary grass (*Phalaris arundinacea*)

Red Osier dogwood (*Cornus sericea*)

Rye grass (*Lolium* spp.)

Sedge (*Carex* spp.)

Silver maple (*Acer saccharinum*)

Trembling aspen (*Populus tremuloides*)

Common vetch (*Vicia sativa*)

White elm (*Ulmus americana*)

Wild carrot (*Daucus carota*)

Wild grape (*Vitis* sp.)

Wild parsnip (*Pastinaca sativa*)

Willow (*Salix* spp.)