

8.7.1 Ecosystem Setting

The Site is located within the Mixedwood Plains Ecozone, an area underlain by Paleozoic limestones and dolostone bedrock. Within the larger Ecozones are nested Ecoregions, areas defined by characteristic climate patterns. The Site is located within the Lake Simcoe Rideau Ecoregion, which extends southward from a line connecting Lake Huron in the west to the Ottawa River in the east. This area contains extensive agricultural lands, as well as deciduous and mixed forests (MNR, 2007).

The following natural features are located in the general area of the Site:

- Mer Bleue (Earth Science Provincially significant Area of Natural and Scientific Interest (ANSI)) is located approximately 3.5 kilometres to the northwest of the Site. This 3,500 hectare conservation area contains the second largest bog in southern Ontario, providing habitat to many species of regionally rare and significant plants, birds and other wildlife (NCC, 2013a).
- The Cumberland Forest, which is managed by the City of Ottawa, is spread over three blocks of properties with a total size of 598.56 hectares. The largest portion of the Cumberland Forest is located approximately 1.3 kilometres northeast of the northern Site boundary across Highway 417. The centre portion of the forest is located east of Vars and includes part of the Limoges Wetland Complex, a provincially significant wetland (Nancy Young, pers. comm., 2013). The portion of the Limoges Wetland Complex nearest to the Site is located approximately 6.5 kilometres to the east of the Site boundary. The western portion of the Cumberland Forest includes a portion of the Vars West Life Science Area, which consists primarily of young poplar and red maple swamp and upland forest (MNR, 2013a). The Life Science Area continues west of the Cumberland Forest and at its closest point is approximately 100 metres to the northeast of the Site, across Highway 417.
- Carlsbad Springs Southwest (Life Science Area) is located approximately 950 metres northwest of the Site across Highway 417. Most of this natural area is owned by the NCC. It is located just south of Mer Bleue and contains mainly red maple swamp and white cedar forest on acidic sand plain (MNR, 2013a).
- Edwards (Life Science Area) is located approximately 500 metres from the main CRRRC Site area across Boundary Road. This forest is dominated by red maple and poplar on non-acidic sand. All of the forest is indicated as upland in the City of Ottawa Geographic Information System (GIS) database (MNR, 2013a).

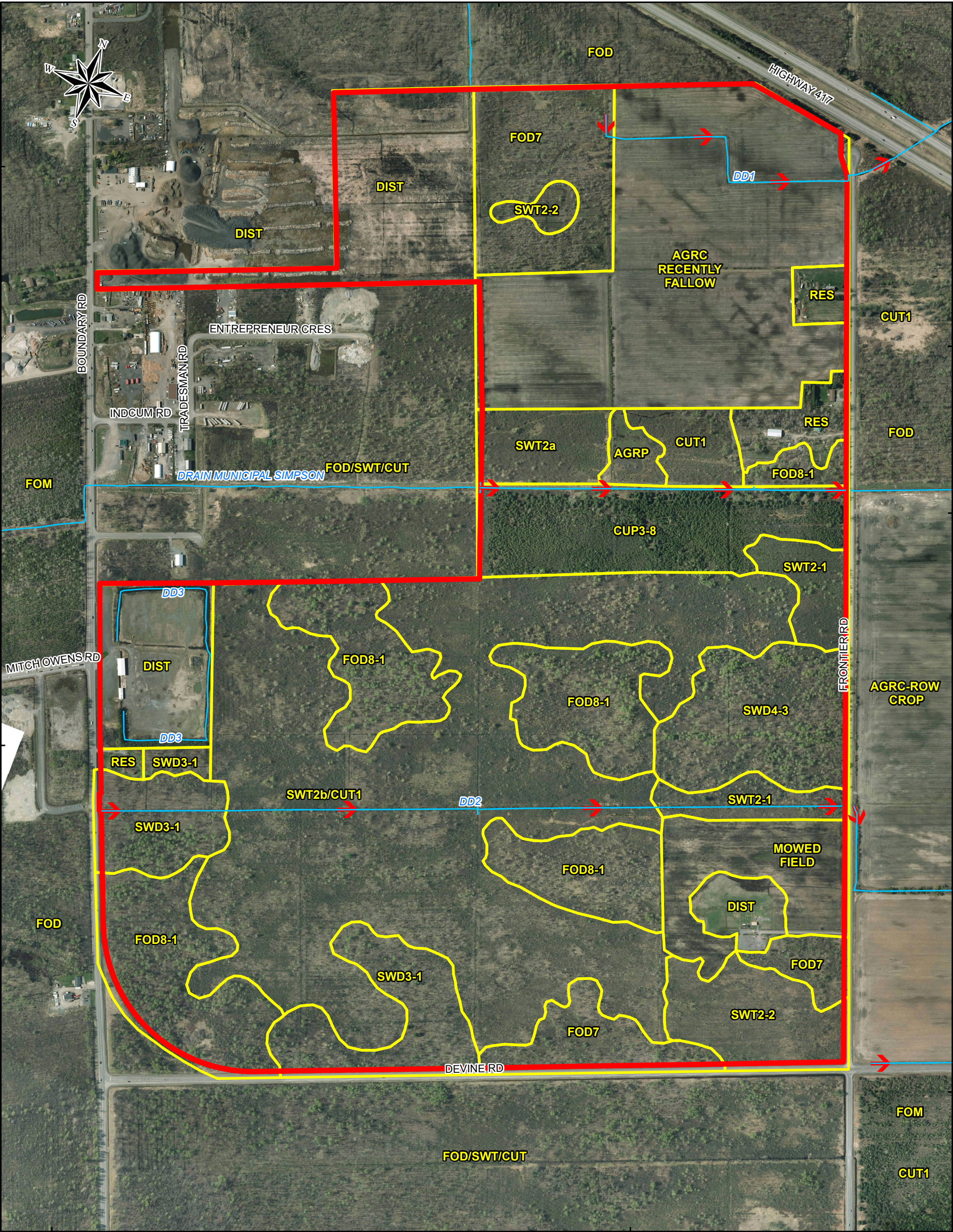
The Capital Context Greenbelt Concept identifies an Ecological Corridor extending from the Cumberland Forest through the Vars Forest, across Highway 417 and the Site and then to the west of Boundary Road (NCC, 2013b)

8.7.2 Ecological Land Classification

There were 13 distinct vegetation communities identified on the Site based on the Ecological Land Classification system (Lee et al., 1998; 2008). These communities are shown on Figure 8.7.2-1 and are summarized in TSD #4.

Overall the Site is characterized by a mix of thickets, immature deciduous forests, swamps, agricultural fields and limited residential structures, and disturbed areas.

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LEGEND

- ECOLOGICAL LAND CLASSIFICATION
- PROPERTY BOUNDARY
- SURFACE WATER FEATURE

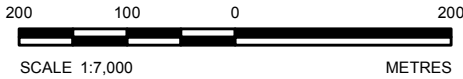
- ECOLOGICAL LAND CLASSIFICATION:
- AGRC : ROW CROP
 - AGRC : HAYFIELD
 - AGRP : HORSE PASTURE
 - CUP3-8 : WHITE SPRUCE PLANTATION
 - CUT1 : DECIDUOUS THICKET
 - DD-1-2 : DRAINAGE DITCHES
 - DIST : DISTURBED LANDS FOR VARIOUS USES
 - FOD : DECIDUOUS FOREST
 - FOD7 : MOIST EUROPEAN WHITE BIRCH - POPLAR DECIDUOUS FOREST
 - FOD8-1 : FRESH-MOIST POPLAR - RED MAPLE - EUROPEAN WHITE BIRCH DECIDUOUS FOREST
 - FOM : MIXED FOREST
 - RES : RESIDENTIAL
 - SWD3-1 : RED MAPLE MINERAL DECIDUOUS SWAMP
 - SWD4-3 : POPLAR-EUROPEAN WHITE BIRCH MINERAL DECIDUOUS SWAMP
 - SWT2A : ALDER-WILLOW-GLOSSY BUCKTHORN MINERAL THICKET SWAMP
 - SWT2B/CUT1 : GLOSSY BUCKTHORN MINERAL THICKET SWAMP/DECIDUOUS THICKET COMPLEX
 - SWT2-1 : SPECKLED ALDER-GLOSSY BUCKTHORN MINERAL THICKET SWAMP
 - SWT2-2 : WILLOW MINERAL THICKET SWAMP
 - SWT - MINERAL THICKET SWAMP


NOTE

THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING REPORT

REFERENCE

BACKGROUND IMAGERY - BING MAPS AERIAL (C) 2010 MICROSOFT CORPORATION AND ITS DATA SUPPLIERS.
AERIAL PHOTOGRAPHS PURCHASED FROM THE CITY OF OTTAWA.
LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2012.
PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 18



PROJECT				
ENVIRONMENTAL ASSESSMENT OF THE CAPITAL REGION RESOURCE RECOVERY CENTRE				
TITLE				
ECOLOGICAL LAND CLASSIFICATION				
		PROJECT No. 12-1125-0045		SCALE AS SHOWN
		DESIGN	FN	DEC. 2013
		GIS	BR/PM	DEC. 2013
		CHECK	PLE	AUG. 2014
		REVIEW	PAS	AUG. 2014
FIGURE 8.7.2-1				

8.7.3 Vegetation

A total of 195 species of plants were observed during all field surveys. In general, the Site has moderate plant species richness. The tree species dominance in the deciduous forests on the Site varies, but the most abundant species include red maple (*Acer rubrum*) and European white birch (*Betula pendula*). The thicket areas and the forest understory and ground cover is very dense throughout the Site and includes thick stands of shrubs such as glossy buckthorn (*Rhamnus frangula*) and speckled alder (*Alnus incana*). Within several of the plant communities there is a large component of alien and alien invasive species such as glossy buckthorn and European white birch. Given the large number of glossy buckthorn seedlings observed on Site, it appears that this species will continue to increase in dominance, especially within the swamps where it is up to 80% of the ground cover in some areas.

None of the plant species or plant communities identified on the Site, or in the Site-vicinity are rare or significant in the region or Ontario (MNR, 2013a; Brunton, 2005). None of the SAR that have ranges that overlap with the Site, including butternut, were observed on the Site, nor is there suitable habitat available.

8.7.4 Breeding Birds

A total of 61 bird species were identified during all breeding season field investigations. The majority of bird species were detected during morning point counts. American robin (*Turdus migratorius*), a habitat generalist (Sallabanks and James, 1999), was the most abundant species observed. Additional abundant species included forest and thicket species such as red-eyed vireo (*Vireo olivaceus*) and yellow warbler (*Setophaga petechia*).

During crepuscular and nocturnal point counts, one additional species not observed during the morning surveys was detected: Wilson's snipe (*Gallinago delicata*).

Although no raptor nests were located during surveys, four raptors were detected: American kestrel (*Falco sparverius*), Cooper's hawk (*Accipiter cooperii*), northern harrier (*Circus cyaneus*) and red-tailed hawk (*Buteo jamaicensis*). Potential nesting habitat for these species does exist on Site, however no nests were observed and potential nesting habitat is abundant on the adjacent properties and the surrounding area.

Three species identified on the Site during breeding bird surveys, including ovenbird (*Seiurus aurocapilla*), veery (*Catharus fuscescens*) and yellow-bellied sapsucker (*Sphyrapicus varius*) are considered woodland area sensitive (MNR, 2012).

The bird community is typical for the habitats that occur on the Site. All species are common in the region and in southern Ontario (MNR, 2013a, Cadman et al., 2007). No SAR or rare species were identified during field investigations with the exception of barn swallow. Barn swallow is not uncommon, but is listed under the ESA as threatened due to long term population declines. At least three active nests and three pairs were observed in the vicinity of the barns and outbuildings of the farm in the northeastern corner of the Site. Adults were observed feeding over the fields on Site in the vicinity of this farm, but also on the adjacent properties to the east where an abundance of foraging habitat exists.

Habitat for secretive marsh birds was limited to openings and patches of marsh vegetation within thicket swamps on the Site. Only two individuals of one species of secretive marsh birds, sora, was observed during these surveys.

The MNRF indicated that there is the potential for eastern whip-poor-will, Henslow's sparrow (*Ammodramus henslowii*), bobolink (*Dolichonyx oryzivorus*), eastern meadowlark (*Sturnella magna*) and short-eared owl (*Asio flammeus*) on the Site. It was determined through the field surveys that there is no suitable habitat on the Site for any of the significant species identified in the SAR screening, or for those species identified by the MNRF. In addition, there were no other observations of significant bird species during any of the field surveys.

8.7.5 Dragonflies and Butterflies

A total of 20 species of dragonflies and butterflies were identified during all breeding season field surveys on the Site. Species diversity and abundance fluctuated through the seasons, but generally the most abundant butterfly species identified on the Site were cabbage white (*Pieris rapae*) and clouded sulphur (*Colias philodice*). The dragonfly community identified on the Site was dominated by common species whose preferred habitats include small ponds and wetlands, and open upland areas, including white-faced meadow hawk (*Sympetrum obtrusum*) and common whitetail (*Plathemis lydia*) (Jones, et al., 2008).

None of the butterfly species identified on the Site are unusual for the habitats in the area, or uncommon in the region, or in southern Ontario. No threatened, endangered, or special concern species were identified on the Site, nor was suitable habitat found for any SAR.

8.7.6 Mammals

A total of 11 mammals (other than bats, which are discussed below), were observed through the surveys on the Site, including the track and sign surveys and the motion sensor cameras. The wildlife community observed on the Site is what would be expected in the region, based on the habitat types. In general, the highest amount of mammal activity, with the exception of rodents that were distributed and active throughout the Site, appeared to be in the edge habitats. Beaver activity was concentrated around the Simpson Drain.

Six bat species were recorded at the three survey stations. The most common species observed was big brown bat (*Eptesicus fuscus*), recorded most often at station BAT01. Two bat species, both listed as endangered under the ESA, were recorded only at station BAT02. Little brown myotis (*Myotis lucifugus*) was recorded four times on June 30 and July 12, 2013. Small-footed Myotis (*Myotis leibii*) was recorded once on June 30, 2013.

If little brown myotis and small-footed myotis were breeding on the Site (i.e., if the Site provided maternity roosting habitat), numerous recordings of these species over several nights would be expected. The recordings would be representative of the bat emergence and return to maternity roosts for a large number of bats, or repeated recordings of the same bat, which was not observed on the Site for either of these species. Because there was no maternity roosting habitat identified on the Site, and the acoustic data substantiate that finding, it is likely that these recordings were indicative of little brown myotis and small-footed myotis "flyovers", or a small number of bats moving from one habitat to another in the area. This assessment was confirmed by the MNRF (Erin Thompson-Seabert, personal communication, August 27, 2013).

Aside from the recordings of little brown myotis and small-footed myotis, there were no mammals observed on the Site that are designated threatened or endangered. All other mammals are considered common and widespread in southern and eastern Ontario.

None of the other SAR that have ranges that overlap with the Site were observed, nor was there suitable habitat identified on the Site.

8.7.7 Herpetofauna

A total of five amphibians, including American toad (*Bufo americanus*), grey tree frog (*Hyla versicolor*), northern leopard frog (*Rana pipiens*), spring peeper (*Pseudacris crucifer*) and wood frog (*Rana sylvatica*) were observed during all of the field surveys. There were no survey stations that had particularly higher levels of activity of frogs or toads than others. Because the Site is generally wet in the spring, the distribution of amphibians was relatively homogeneous across the Site. There were no significant amphibian species identified, nor was there suitable habitat found on the Site.

No suitable habitat for salamanders was identified on the Site.

Although there is habitat for snakes throughout the Site, eastern garter snake (*Thamnophis sirtalis*) was the only reptile observed on the Site. Although milksnake (*Lampropeltis triangulum*), listed as a special concern under the ESA, was not observed on the Site, it is a cryptic species that can be difficult to find during field surveys. The habitat on the Site is suitable and there are records for this species in the area (MNR, 2013a), so there is moderate potential for individuals to use the Site or the Site-vicinity.

The only habitat on the Site that has the potential to be suitable for turtles is associated with DD3 on the property on the west central side of the Site. Overall, there was minimal suitable habitat for turtles on the Site. No individuals were observed during any of the basking surveys, or during any of the other field surveys.

None of the other SAR that have ranges that overlap with the Site were observed, nor is there suitable habitat for these species on the Site.

8.7.8 Fish and Fish Habitat

There are four surface water features on the Site, consisting of DD1, Simpson Drain, DD2 and DD3 (Figure 8.7-1). A summary of the fish captured in each of the surface water features is included in Table 8.7.8-1, while the quality of fish habitat in each feature is discussed in the subsequent sections.

Table 8.7.8-1: Fish Community on the Site in 2012 and 2013

Surface Water Feature	Date Sampled	Pumpkinseed	Finescale dace	Brown bullhead	Brassy minnow	Brook stickleback	Creek chub	Central Mudminnow	Total Catch
2012									
Simpson Drain A (F10)	Oct 2	2	0	0	0	1	2	1	6
Simpson Drain B (F11)	Oct 2	3	0	0	0	0	1	0	4
DD2 (F9)	Oct 11	0	0	0	0	0	0	0	0
2013									
DD1 (F7)	Sept 3	0	0	2	0	1	0	0	3
Simpson Drain A (F10)	Sept 3	0	0	0	0	7	2	6	15
Simpson Drain B (F11)	Sept 3	0	0	0	0	0	0	0	0
DD2 (F8)	Sept 3	0	0	0	0	0	0	0	0
DD3 (F1-F6)	Sept 20	121	2	2	1	9	0	1	136

8.7.8.1 DD1

The reach of DD1, on the Site, is a disturbed, channelized intermittent feature. During the 2012 survey, DD1 was dry along its entire length. During the September 6, 2013 survey, it was dry in the agricultural field and the channel was overgrown with grasses and sparse cattail. There was an approximately 5-metre section with pooled water that had an estimated wetted width of one metre and average depth of 0.45 metres at the time of the survey. There was no measurable flow in this pool. The substrate was comprised of approximately 50% organic material and 50% sand/silt. The fish habitat in DD1 is marginal and poor quality.

8.7.8.2 Simpson Municipal Drain

In terms of aquatic habitat characteristics on the Site, the Simpson Drain is divided into two distinct reaches: Simpson Drain A and Simpson Drain B, as shown on Figure 8.7-1.

Simpson Drain A is a shallow, narrow channel approximately 290 metres in length that flows from west to east through a corrugated steel pipe culvert under Frontier Road. The average water depth was approximately 0.1 metres with an estimated average wetted width of 1.2 metres and an average bankfull width of 3.3 metres. The flow was measured at 0.02 metres per second and the substrate was comprised of approximately 50% fines and 50% coarse material. The riparian vegetation along Simpson Drain A was comprised of approximately 60% shrubs and trees and 40% grasses providing an estimated 15% of overhanging vegetation.

Simpson Drain B begins at the upstream reach of Simpson Drain A where there is a beaver dam, approximately 300 metres to the west of Frontier Road (between F10 and F11 on Figure 8.7-1), with an approximate size of 4 metres by 0.7 metres, which regulates flow. The beaver dam impounds water, resulting in a flooded area approximately 170 metres long with a generally uniform wetted width of approximately 5 metres and depth of approximately 0.8 metres. The average bankfull width was approximately 6.2 metres and the flow was measured at 0.01 metres per second at the time of the survey. The substrate composition and riparian vegetation was uniform along both A and B reaches of Simpson Drain.

Although the beaver dam in Simpson Drain likely obstructs some fish passage, there is generally good quality fish habitat in this surface water feature.

8.7.8.3 DD2

The majority of DD2 was dry during the survey conducted in September 2012 and 2013. The water in the central reach of DD2, with a length of approximately 100 metres, was stagnant and there was no measurable flow. The wetted width ranged from approximately 0.75 to 1.0 metres, the average bankfull width was approximately 2.5 metres and the water depth in this reach ranged from approximately 0.15 to 0.3 metres. The substrate was comprised of approximately 60% organic matter and 40% fines. The riparian vegetation was dominated by speckled alder, buckthorn and grasses. This reach was also characterized by approximately 65% overhanging vegetation. There is no direct fish habitat in DD2.

8.7.8.4 DD3

DD3 is a manmade surface water feature, approximately 800 metres in length, nearly encircling the former scrapyard property on the west central side of the Site. The feature ranges in wetted width between 2.9 and 8.5 metres with very steep banks. Depth was estimated greater than 1.5 metres, but there was no measurable flow. Overhanging vegetation (grasses and shrubs) provided approximately 50% canopy along the shoreline of the feature. The substrate was comprised of approximately 30% fines and 70% coarse material.

8.7.8.5 Summary

There were no fish captured in DD2 and it appears that there is only flowing water in this surface feature following high water events such as storm events or spring freshet. During the remainder of the year, water is pooled in low depressions in some reaches along its length. DD2 would not be considered direct fish habitat. DD3 is an isolated relatively deep, incised constructed channel that may have a tenuous connection with DD2 during periods of high water, such as following a storm event or spring freshet. The direct fish habitat in DD1 is minimal and of poor quality. The fish community sampled on the remainder of the Site (DD1, Simpson Drain and DD3) is indicative of a common warmwater baitfish community. No aquatic SAR were observed during any of the field surveys, nor was there suitable habitat noted.

8.7.9 Benthic Invertebrates

Stations B5 and B6 were sampled in 2012, whereas B1, B2, B3, B7, B8 (reference) and B9 (reference) were sampled in 2013. In general, the dominant substrate at each benthic sampling station was silt, or fines. There was little or sparse aquatic vegetation and no benthic algae was observed.

Taxonomic richness was greatest at station B6 with 24 taxa and the average richness value observed was 21 taxa. Station B5 had the lowest richness with 19 taxa (Table 8.7.9-1).

Table 8.7.9-1: Benthic Indices on the Site in 2012 and 2013

Indices	B1	B2	B3	B5	B6	B7	B8 (Ref)	B9 (Ref)
Abundance (no. org)	394	231	121	5744	1522	576	310	825
Richness (no. of taxa)	22	26	18	19	24	20	25	22
Percent Dominance (%)	26.40	32.03	19.00	42.90	34.16	18.05	3.13	28.12

In all of the surface water features, the benthic community was comprised of Naididae representing 42% of the population present. The remainder of the population was composed of Tubificidae representing 34% and the remaining 24% of combined taxa that contributed to less than 5% of the population. Of all the taxa at all of the stations, including at the reference stations, the most common species were the worms (Order Oligochaeta, Family Tubificidae and Family Naididae), followed by the roundworms (P. Nemata) and water scuds (Order Amphipoda, Family Crangonyctidae).

An EPT Index measures the relative density of Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies) in a benthic sample. EPT Index is based on the premise that high-quality streams generally have the greatest species richness. The relative density of Ephemeroptera/Plecoptera/Trichoptera (EPT) indicates that all stations, including the reference stations, have low to no populations of Trichoptera,

Plecoptera and Ephemeroptera. Typically, these species prefer habitat types of flowing, well oxygenated waters over a gravel to cobble substrate. The structure of the habitats on the Site and in the Site-vicinity is generally not suitable for these species.

In general, the abundance of worm species and the low EPT index in the surface water features in the Site-vicinity (including the two reference stations) indicate systems with low productivity. The structure of the benthic communities from all of the sampling stations (i.e., not particularly diverse or abundant) suggests that the surface water features are stressed and have been impacted by historic and ongoing agricultural and other activities and conditions.

8.7.9.1 *Sediment*

The sediment quality at each of the benthic stations (Table 8.7.9-2) was compared with Provincial Sediment Quality Guidelines (MOE, 2008). The sediment guidelines are considered to provide a level of human health and sensitive ecosystem protection consistent with background levels. These guidelines establish three levels of effect: (1) the No Effect Level (NEL), which indicates a concentration of a chemical in the sediment that does not affect fish or sediment-dwelling organisms; at this level, there is a negligible transfer of chemicals through the food chain and no effect on water quality is expected; (2) Lowest Effect Level (LEL), which indicates the upper level of contamination that has no effect on the majority of sediment-dwelling organisms. Sediments meeting the LEL are considered clean to marginally polluted; and (3) the Severe Effect Level (SEL), which indicates a level of contamination that is expected to affect the health of the majority of sediment-dwelling organisms. Sediments exceeding the SEL are considered heavily contaminated (MOE, 2008).

The LEL for chromium, iron and nickel was exceeded at both reference stations (B8 and B9), likely due to inputs from the adjacent roads. The LEL for copper was exceeded at B2 and B8. The LEL for total organic carbon was exceeded at B2, B6 and B9. The SEL was not exceeded at any location.

The sediments at the benthic stations were generally found to be coarser at B1, B2 and B3, relatively even with respect to percent of fines and coarse materials at B5, B6, B7 and B8, and very fine at B9. Substrate particle size influences benthic community composition, where a wider range of substrate sizes generally supports a more diverse community than a limited substrate size. As such, it would be expected that the benthic invertebrate community at B1, B2, B3 and B9 would be more limited than at the other stations.

Table 8.7.9-2: Sediment Quality at Benthic Stations

Parameter	RDL	PSQG LEL	PSQG SEL	B1	B2	B3	B5	B6	B7	B8 (Ref)	B9 (Ref)
*Arsenic (µg/g)	1	6	33	1	1	<1	1.2	1.5	1.0	2	2
*Cadmium (µg/g)	0.1	0.6	10	0.1	0.2	<0.1	0.10	0.13	<0.10	<0.1	0.2
*Chromium (µg/g)	1	26	110	22	19	11	14	25	18	44	35
*Copper (µg/g)	0.5	16	110	11	21	5.8	7.1	11	6.8	20	14
*Iron (µg/g)	50	20,000	40,000	13,000	1,300	6,900	8,000	13,000	9,000	22,000	23,000
*Manganese (µg/g)	1	460	1100	180	100	81	100	160	85	310	260
*Mercury (µg/g)	0.05	0.2	2	<0.05	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050	<0.050
*Nickel (µg/g)	0.5	16	75	13	10	6.3	8.5	14	9.8	25	19
*Zinc (µg/g)	5	120	820	42	61	16	36	49	30	50	64
Total Organic Carbon	500	10,000	100,000	6,900	12,000	2,300	7,800	12,000	7,800	4,800	21,000

Notes:

* Acid Extractable

µg/g - micrograms per gram

RDL - Reportable Detection Limit

PSQG - Provincial Sediment Quality Guidelines

LEL - Lowest Effect Level

SEL - Severe Effect Level

Bold - A level exceeding PSQG LEL