

Greenbank (Burnett Municipal Drain)

Headwaters Report

Prepared for:

Claridge Homes (South Nepean) LP

Prepared by:

Bowfin Environmental Consulting
and
Muncaster Environmental Planning Inc.

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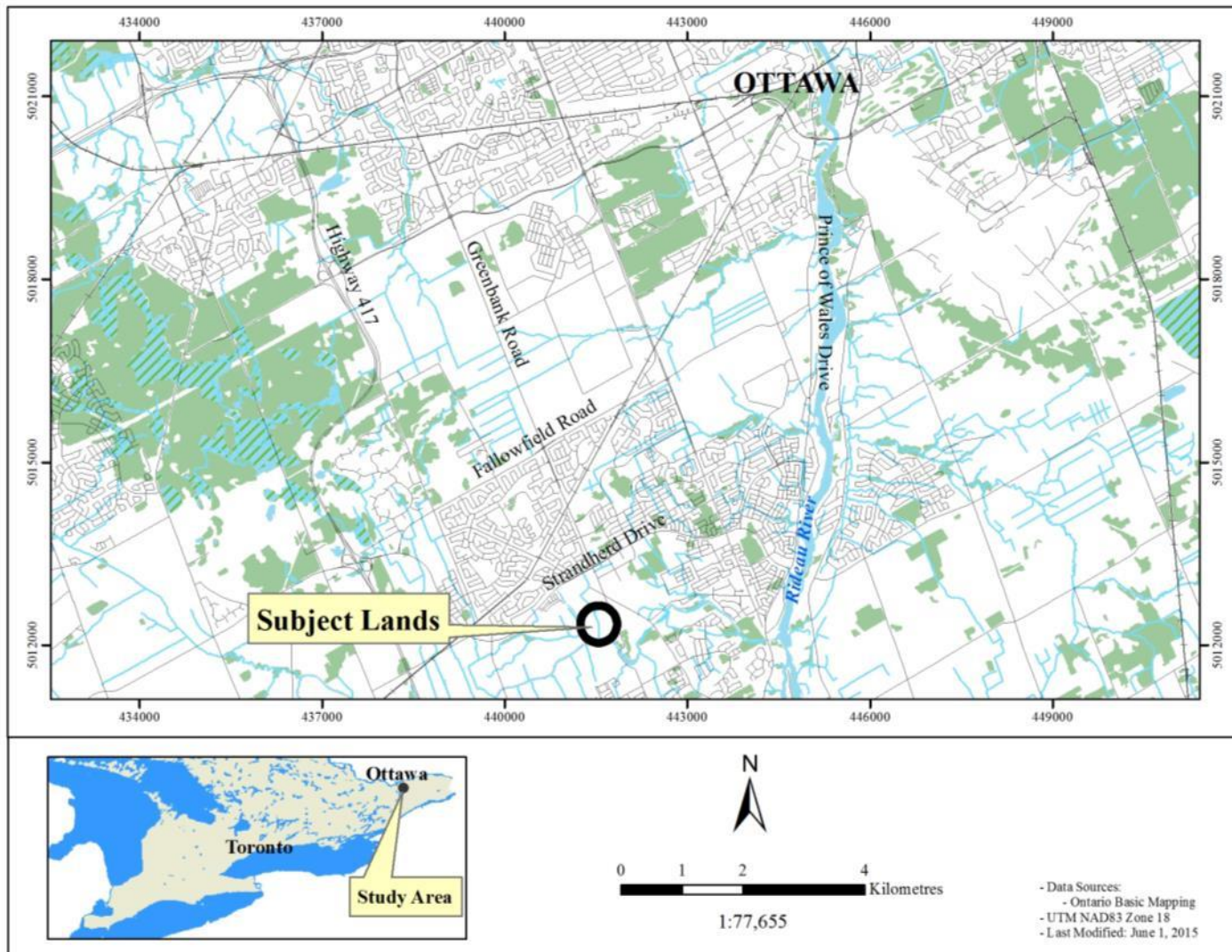
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1.0 INTRODUCTION

Muncaster Environmental Planning has been retained by Claridge Homes (South Nepean) LP to complete an assessment of the fish habitat in the Burnett Municipal Drain. The study area is to the west of Greenbank Road, north of the Jock River corridor and is within Lot 13 and 14, Concession 3, Geographic Township of Nepean, City of Ottawa. This report, completed by Bowfin Environmental Consulting, provides a summary of the fisheries habitat and communities findings along with an evaluation of the headwaters as per the *Evaluation, Classification and Management of Headwater Drainage Features Guidelines* created by Credit Valley Conservation and Toronto Region Conservation (approved July 2013, finalized January 2014).

Figure 1 Location of Study Area



2.0 METHODOLOGY

2.1 Review of Background Information

The review of background information was conducted in order to augment the data collected during the site visit. Background information regarding fish species was obtained by reviewing Distribution of Fish Species at Risk maps published by the Conservation Authorities, a search of the Natural Heritage Information Centre (NHIC) databases, and a search of the Land Information Ontario databases and other consulting reports, when available.

2.2 Habitat Description

The fish habitat features within the study area was described based on the MTO *Environmental Guide for Fish and Fish Habitat October 2006* and the *Ontario Stream Assessment Protocol*. Information on the channel morphology was collected (channel width, wetted width, bankfull and wetted depths, cover type and abundance, and substrate type). The location of specific features mentioned in the text is shown on Figure 2.

2.3 Fish Community Sampling

Fish community sampling was performed to document the use. The community was sampled utilizing backpack electrofishing.

2.4 Headwater Drainage Features

The headwater drainage features within the study area were assessed based on the *Evaluation, Classification and Management of Headwater Drainage Features* (here after referred to as the Guidelines) (prepared by Credit Valley Conservation Authority and Toronto and Region Conservation, approved July 2013, finalized January 2014). The Guidelines are divided into three parts. Part 1 is the Evaluation and discusses various suggested study designs/methods. Part 2 determines the appropriate Classification following the outcome of Part 1. Finally, Part 3 outlines the Management Recommendations.

Incidental observations of wildlife/plant species using the features were noted (Appendix A).

2.5 Amphibian Surveys

The *Environment Canada Marsh Monitoring Program* (MMP) guide was followed as described below:

- Three surveys were completed during the spring and early summer.

Table 1 Summary of the Marsh Monitoring Criteria

Survey Number	MMP Estimated Survey Period	MMP Temperature Criteria (°C)	Survey Date	Minimum Temperature (°C)
1	April 15-30 th	>5	April 28	5.8
2	May 15-30 th	>10	May 25	14.8
3	June 15-30 th	>17	June 22	14.5

- Observations began 30 minutes after sunset and end before midnight;
- Each station was surveyed for 3 minutes during which time the species and the calling code were recorded for each of the following distances: 0-50m, 50-100m, and >100m. The calling codes were recorded as one of:
 - Code 1: Calls not simultaneous, number of individuals could be accurately counted
 - Code 2: Some calls simultaneous, number of individuals could be reliably estimated
 - Code 3: Full chorus, calls continuous and overlapping, number of individuals could not be reliably estimated
- Surveys were only conducted if the wind strength was Code 0, 1, 2 or 3 on the Beaufort Wind Scale.
- If multiple Amphibian survey stations are necessary they would be separated by at least 500 m.

In addition to the point counts a walk around the areas surrounding the features was completed to confirm presence/absence within the subject lands.

3.0 RESULTS

3.1 Review of Background Information

The NHIC databases, Land Information Ontario, OMNRF, and RVCA indicate that there were no fish species at risk within a 10 km radius of the study area.

3.2 Site Investigations

3.2.1 Summary of Visits and Sampling Site Locations

Seven visits were completed between April 28th, 2015 and July 27th, 2015. Environmental conditions for each visit are described in Table 2 below.

The aquatic habitats were described primarily on May 1st, May 21st, June 2nd, and July 27th, 2015. Additional notes were collected on the habitats during other visits and were included where applicable. The fish community was sampled using backpack electrofishing. Sampling took place on the May 1st, 2015 visit, no additional sampling was conducted during the summer as the sites contained insufficient water. The electrofishing settings utilized were 65 volts and 1.9 amps. Figure 2 provides the locations of the sampling stations and features described below.

Table 2 Summary of Dates, Times of Site Investigations

Date	Time (h)	Staff	Staff Hours	Air Temperature (Min-Max) °C	Weather	Purpose
April 28, 2015	2115-2130	M. Lavictoire	0.5	16.0 (4.4-20.6)	2% cloud cover, no wind	- Amphibian Monitoring
May 1, 2015	1215-1330	M. Lavictoire C. Fontaine	2.5	17.0 (8.0-21.5)	25% cloud cover, light air	- Fish Community Sampling -Headwater Assessment
May 21, 2015	1245-1400	S. St. Pierre C. Fontaine	2.5	20.0 (6.2-20.6)	10-20% cloud cover, gentle breeze changing to 30% cloud cover, gentle breeze	- Headwater Assessment
May 25, 2015	2345-2400		0.5	16.0 (14.2-18.9)	10% cloud cover, no wind	- Amphibian Monitoring

Date	Time (h)	Staff	Staff Hours	Air Temperature (Min-Max) °C	Weather	Purpose
June 2, 2015	1315-1400	S. St. Pierre	0.75	17.0 (5.8-16.5)	100% cloud over, light air changing to 100% cloud cover, light breeze	- Headwater Assessment
June 22, 2015	2315-2345	S. St. Pierre C. Fontaine	1	22.0 (15.4-27.8)	Overcast, light air	- Amphibian Monitoring
July 27, 2015	1100-1200	S. St. Pierre	1	27.0-29.0 (18.3-31.8)	Clear skies, light air changing to 10% cloud cover, light breeze	- Headwater Assessment

M. Lavictoire – Michelle (Nunas) Lavictoire – M.Sc. Natural Resources
 S. St. Pierre – Shaun St. Pierre – B. Sc. Biology and Fisheries and Wildlife Technologist
 C. Fontaine - Cody Fontaine - Fisheries and Wildlife Technologist

*Min-Max Temp Taken From: Environment Canada. National Climate Data and Information Archive. Ottawa International Airport. Available <http://climate.weatheroffice.gc.ca/> [July 31, 2015]

3.2.2 Habitat and Fish Community Descriptions

There were four watercourses within the subject lands: The Burnett Municipal Drain and three tributaries to the Burnett Municipal Drain. One station was established on each watercourse (stations 1-4).

Tables 3 provide a summary of the water temperatures and other parameters collected at the stations during 2015. The water temperatures varied between 15.0-19.9° C, with air temperatures varying between 17.0-20.0° C. Note that snow pack of winter 2014-2015 melted prior to ice off resulting in low peak flows in 2015. This was followed by a period of low precipitation and cooler than normal temperatures until approximately the last week of April when the air temperatures were above seasonal. Temperatures returned to near average by May 13th, 2015.

Figure 2 Location of Headwater Features and Stations



Table 3 Features and sampling parameters from Burnett Municipal Drain and its tributaries (Figure 2)

Station No.	Date	Time (h)	Air Temp (°C)	Water Temp (°C)	pH	TDS (ppm)	Conductivity (µ)	Ave. Depth (cm)	Ave. Wetted Width (m)	Ave. Channel Width (m)
<i>Burnett Municipal Drain</i>										
1	May 1, 2015	1220	17.0	19.9	N/A	704	1387	5.0	1.3	2.1
	May 21, 2015	1300	20.0	19.7	8.68	703	1412	2.0	0.3	
	June 2, 2015	1326	17.0	15.0	8.55	1041	1326	5.0	0.7	
	July 27, 2015						DRY			
<i>Tributary 1</i>										
2	May 1, 2015									1.1
	May 21, 2015						DRY			
	June 2, 2015									
	July 27, 2015									
<i>Tributary 2</i>										
3	May 1, 2015									2.5
	May 21, 2015						DRY			
	June 2, 2015									
	July 27, 2015									
<i>Tributary 3</i>										
4	May 1, 2015									1.6
	May 21, 2015						DRY			
	June 2, 2015									
	July 27, 2015									

Burnett Municipal Drain

The Burnett Municipal Drain is a tributary to the Jock River and travels through the centre of study area. This drain flowed north to south and its total length (inside and outside of the study area) was estimated at 1.3 km. At a distance of approximately 550 m upstream of the confluence with the Jock River the drain is piped under a driving range for a distance of approximately 170 m (Photo 1). The channel was confined with a straight pattern. There is a potential for fish to access the site during the spring under high flows but based on the observations made during spring 2015 the duration of the connection would be short lived. The culvert was old and flow was travelling through holes in the culvert and under it during the May 1st visit (Photo 2). By the May 21st, 2015 visit the upstream portion of the channel, beginning immediately upstream of the station, was dry (Figure 2). The whole of the drain was dry come summer.



Photo 1 Looking upstream at downstream end of the piped section of the Burnett Municipal Drain (May 21, 2015)



Photo 2 Looking from the upstream end of the culvert to downstream end at the connection to Jock River (May 1, 2015)

Station 1

Station 1 was located approximately 74 m upstream of the confluence with the Jock River and was 55 m in length. The average channel and wetted widths were 2.1 m and 0.3 m respectively. The average bankfull depth was approximately 16 cm. The average water depth on May 21st was 2 cm (range 1-5 cm). The site was dry by July 27th, 2015 (Table 4). The habitat type consisted of glide morphological units. The substrate consisted of fines. The in-water cover consisted of overhanging vegetation. The canopy cover was poor. There were no signs of erosion throughout the station.

The top of the banks were fully vegetated with herbaceous vegetation and the occasional woody species. The most common species were: reed canary grass, spotted jewel-weed, Virginia creeper, hawthorn species, wild red raspberry, tartarian honeysuckle, American elm and green ash

During the May 1st, 2015 site visit the station was shocked for 255 seconds over an area of approximately 72 m². The average wetted width and water depth present during the spring sampling were 1.3 m and 5 cm (range 3-12 cm), respectively. No fish were captured.

The site was not sampled during the summer visit due to lack of water.

Table 4 Summary of Fish Community Sampling

Date	Wetted Width (m)	Average Depth (range) (cm)	Effort	Results (species, numbers and fork lengths)
May 1, 2015	1.3	5 (3-12)	4 s/m ²	no fish caught or observed
May 21, 2015	0.3	2 (1-5)	n/a	No fish observed
June 2, 2015	0.7	5 (4-9)	n/a	No fish observed
July 27, 2015	DRY			



Photo 3 Station 1 looking upstream from the downstream end (May 1, 2015)



Photo 4 Station 1 looking upstream from the downstream end (July 27, 2015)

Tributary 1 off of Burnett Municipal Drain

Station 2 was located within a tributary on the east bank of the Burnett Municipal Drain. This tributary flowed east to west, was located 500 m upstream of the confluence with the Jock River, and was approximately 260 m in length.

Station 2

Station 2 was located approximately 30 m upstream of the confluence with Burnett Municipal Drain and was 50 m in length. The station was dry. The average channel width and average bank height were 1.1 m and 18 cm. The substrate consisted of fines. Cover consisted of aquatic vegetation, (reed canary grass). There was no canopy cover present. The station had no signs of erosion.

The top of the banks were fully vegetated with herbaceous vegetation and the occasional woody species. The most common species were: reed canary grass, spotted jewel-weed, Virginia creeper, hawthorn species, wild red raspberry, tartarian honeysuckle, American elm, and green ash.

No sampling was conducted at this station due to lack of water and dense vegetation.



Photo 5 Tributary 1 (Station 5) looking upstream from the downstream end (May 1, 2015)



Photo 6 Station 2 looking upstream from the downstream end (May 21, 2015)



Photo 7 Station 2 looking upstream from the downstream end (July 27, 2015)

Tributary 2 off of the Burnett Municipal Drain

Station 3 was located within a tributary on the east bank of the Burnett Municipal Drain. This tributary flowed east to west, was located 560 m upstream of the confluence with the Jock River, and was approximately 110 m in length.

Station 3

Station 3 was located approximately 20 m upstream of the confluence with Burnett Municipal Drain and was 52 m in length. This site was dry. The average channel width and bank height were 2.5 m and 24 cm respectively. The substrate consisted of fines. Cover consisted of aquatic vegetation (narrow-leaved cattail). There was no canopy cover. No signs of erosion were noted.

The top of the banks were completely vegetated with herbaceous vegetation. The most common species were: reed canary grass and smooth bedstraw.

No sampling was conducted at this station due to lack of water and dense vegetation.



Photo 8 Tributary 3 (Station 6) looking upstream from the downstream end (May 1, 2015)



Photo 9 Station 3 looking upstream from the downstream end (July 27, 2015)

Tributary 3 off of the Burnett Municipal Drain

Station 4 was located within a tributary on the west bank of the Burnett Municipal Drain. This tributary flowed west to east, was located 560 m upstream of the confluence with the Jock River, and was approximately 160 m in length.

Station 4

Station 4 was located approximately 10 m upstream of the confluence with Burnett Municipal Drain and was 95 m in length. The station was completely dry during all visits. The average channel width and bank height were 1.6 m and 24 cm respectively. The substrate consisted of fines. Cover consisted of aquatic vegetation (reed canary grass). The canopy cover was poor. There were no signs of erosion throughout the station.

The top of the banks were fully vegetated with herbaceous vegetation and the occasional woody species. The most common species were: reed canary grass, common dandelion, pussy willow, Manitoba maple and crack willow.

No sampling was conducted at this station due to lack of water and dense vegetation.



Photo 10 Tributary 3 (Station 4) looking upstream from the downstream end (May 1, 2015)



Photo 11 Station 4 looking downstream from the upstream end (July 27, 2015)

4.0 Headwater Drainage Features Assessment

4.1 Classification

This classification follows the four step process of the Headwater Guidelines using the information collected from the portion of the tributaries in the subject lands. The four steps are: hydrology classification, riparian classification, fish and fish habitat classification and terrestrial classification.

4.1.1 Step 1: Hydrology Classification

In step 1 the flow is classified based on the amount recorded during the three visits. These are summarized in Table 5 (as per OSAP S4.M10).

Note that there is no appropriate feature type code for these systems with the exception of the municipal drain. All of the tributaries are constructed water courses and not ‘natural headwater features’. A review of the geoOttawa mapping indicates that all were present since before 1976 and that the fields on both sides of the drain and its tributaries were cropped since prior to 1976.

All of these watercourses could meet one of three possible codes for the Feature Type:

- (2) Channelized
 - This code requires there to have been a natural channel that shows signs of channelization. This applies to the Burnett Municipal Drain.
- (7) Swale
 - This definition fits the best for the three unnamed tributaries to the municipal drain with the exception of the ill-defined banks. Since it had been dug down the banks are well defined. However the description of a system that carries water flow during rainstorms or snowmelt matches. The three unnamed tributaries were all dry throughout the spring and summer. Note that these systems only would carry water during snow melt (no flowing water during rainstorms – June 2, 2015 visit was completed after a rain event).
- (8) Roadside Ditch
 - This definition fits with the constructed nature of the features however there is no roadway.

Based on Table 4 in the guidelines the drain would be considered Values Function as in water was present in the spring until June-July (had a substantial surface flow) and this drain was channelized.

The tributaries would be considered Limited as in Late April-May and after a rainfall event they had no surface (dry) and consisted of a swale.

The soil map for the area indicates that North Gower and Carp soils which are described as being imperfect to very poorly drained. These types of soils prevent the area from matching the Recharge Function description of the guidelines.

Table 5 Hydrology classification features using data from OSAP S4.M10.

Tributary ID	Definitions of Flow Influence	Flow Conditions	Types of Headwater Drainage Features	Hydrology Classification
Burnett Municipal Drain	Spring Freshet or rainfall events	3.4l/s (5)*	Channelized	Valued Functions
	Late April-May	(5)*		
	July-August	N/A (dry)		
Tributary 1	Spring Freshet or rainfall events	N/A (dry)		
	Late April-May			
	July-August			
Tributary 2	Spring Freshet or rainfall events	N/A (dry)	Constructed agricultural drain (Swale)	Limited
	Late April-May			
	July-August			
Tributary 3	Spring Freshet or rainfall events	N/A (dry)		
	Late April-May			
	July-August			

*(5) – surface flow substantial (>0.5l/s)

The amount of rainfall recorded in the seven days preceding each station visit is summarized in Table 6 to provide context to the water depths in Table 3.

Table 6 Summary of Rainfall for the 7 Days Preceding the Field Surveys

Dates	Total Rainfall (mm)
April 23, 2015 to April 30, 2015	0.0
May 13, 2015 to May 20, 2015	2.2
May 26, 2015 to June 1, 2015	20.4
July 19, 2015 to July 26, 2015	6.8

Total Rainfall taken from: Environment Canada. 2015. National Climate Data and Information Archive – Ottawa INTL. On-line (<http://climate.weatheroffice.gc.ca>) accessed February 10, 2015.

4.1.2 Step 2: Riparian Classification

Terrestrial and wetland habitats adjacent to HDF can provide important functions and attributes for the HDF. As such, the surrounding habitat is also included in the evaluation criteria. This habitat was assessed based on OSAP S4.M10. When the value of the land type differs from one bank to the other, the highest functioning habitat is used.

Based on this criterion Burnett Municipal Drain and Tributary 1 are listed as limited function due to cropped land while tributaries 2, and 3 are listed as limited to contributing function due to the cropped land and manicured lawn (riparian vegetation codes 3 and 2, respectively) (Table 7).

Table 7 Riparian Classification

Tributary	Riparian Classification	Comments
Burnett Municipal Drain	Limited Functions	Within the subject land the drain flows within very small windrow and cropped land. The dominate being cropped land.
Tributary 1		Within the subject land the tributary flows within cropped land.
Tributary 2 Tributary 3	Limited to Contributing Functions	Within the subject land the south bank of these tributaries flows within cropped lands, while the north bank consists of a manicured grass (driving range).

4.1.3 Step 3: Fish and Fish Habitat Classification

These watercourses did not provide any direct fish habitat. They were sampled during the May 1st, 2015 visit. Note that additional sampling during April 2012, upstream of the site as part of another project on the Burnett Municipal Drain, also found no fish (Bowfin 2012). No fish were captured or observed within these reaches and the lack of flow (even during periods of significant rainfall) limits the potential of the reaches to even contribute to fish habitat. There was potential for fish access to the Burnett Municipal Drain however the poor condition of the culvert at its mouth resulted in the low flows travelling through the holes under the culvert. Later on in the season the water level in the Jock River is lower than the mouth of the drain resulting in a gradient barrier. At best, the Burnett Municipal Drain is considered to be contributing and the three tributaries have no fish value (no flow during any visit).

Table 8 Fish and Fish Habitat Classification

Tributary	Fish and Fish Habitat Classification	Comments
Burnett Municipal Drain	Contributing	Contributing fish habitat: Transport of allochthonous materials (detritus, insects, etc.) to downstream fish-bearing reaches provides sources of food.
Tributary 1	No value – dry throughout spring and summer	
Tributary 2		
Tributary 3		

4.1.4 Step 4: Terrestrial Habitat Classification

Step 4 of the guidelines classifies the value of the HWF as it relates primarily to amphibian breeding habitat and its ability to provide movement corridors. It is assessed through the use of both the OSAP S4.M10 and Marsh Monitoring Protocol. The feature must meet both of these protocols for each class. Only those features with both wetland habitat (Feature Type Code 6 - wetland) and amphibians calling can be deemed Important.

The Burnett Municipal Drain contained little water throughout the survey period and was dry by the second half of July. The drain is not connected with any wetland features and the lands upstream are entirely developed. Only a single American toad was heard calling and only during the one visit.

Table 9 Terrestrial Habitat Classification

Tributary	Terrestrial Habitat Classification	Comments
Burnett Municipal Drain	Limited Functions	- One American Toads was heard calling on May 25, 2015. - OSAP Riparian Condition = 3 - OSAP Feature Type = 2
Tributary 1		- OSAP Riparian Condition = 3 - OSAP Feature Type = 7
Tributary 2		- OSAP Riparian Condition = 2 and 3
Tributary 3		- OSAP Feature Type = 7

4.2 Part 3 – Management Recommendations

The management recommendations are grouped into six categories: protection, conservation, mitigation, maintain recharge, maintain/ replicate terrestrial linkage, and no management required. Utilising the guideline and the data collected at each tributary the management recommendations for the Burnett Municipal Drain would be mitigation and its tributaries would be no management required (Table 10)

Table 10 Evaluation, Classification and Management Summary and Study Conclusion

Drainage Feature Segment	Hydrology Classification	Riparian Classification	Fish and Fish Habitat Classification	Terrestrial Habitat Classification	Guideline’s Management
Burnett Municipal Drain	Valued Functions		Contributing		Mitigation
Tributary 1		Limited Functions			
Tributary 2	Limited Functions		None	Limited Functions	No Management Required
Tributary 3		Limited to Contributing Functions			

REFERENCES

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- Stanfield L. (Ed.) (2013). Ontario Stream Assessment Protocol. Version 9, Fish and Wildlife Branch. Ontario Ministry of Natural Resources. Peterborough, Ontario

Appendix A

Incidental Observations

Common Name	Scientific Name	SRank	Provincial Status (SARO)	Federal Status (SARA)	Coefficient of Conservatism
AMPHIBIANS					
American Toad	<i>Bufo americanus</i>	S5			
Green Frog	<i>Rana clamitans</i>	S5			
BIRDS					
Canada Goose	<i>Branta canadensis</i>	S5			
Killdeer	<i>Charadrius vociferus</i>	S5B, S5N			
PLANTS					
Manitoba Maple	<i>Acer negundo</i>	S5			0
Common Dandelion	<i>Taraxacum officinale</i>	SNA			
Spotted Jewelweed	<i>Impatiens capensis</i>	S5			4
Tartarian Honeysuckle	<i>Lonicera tatarica</i>	SNA			
Green Ash	<i>Fraxinus pennsylvanica</i>	S4?			3
Hawthorn sp.	<i>Crataegus sp.</i>				
Wild Red Raspberry	<i>Rubus idaeus ssp. strigosus</i>	S5			0
Smooth Bedstraw	<i>Galium mollugo</i>	SNA			
Pussy Willow	<i>Salix discolor</i>	S5			3
Crack Willow	<i>Salix fragilis</i>	SNA			
American Elm	<i>Ulmus americana</i>	S5			3
Virginia Creeper	<i>Parthenocissus inserta</i>	S5			3
Reed Canary Grass	<i>Phalaris arundinacea</i>	S5			0

Status Updated February 12, 2016

SRANK DEFINITIONS

S4 Apparently Secure, Uncommon but not rare; some cause for long-term concern due to declines or other factors.

S5 Secure, Common, widespread, and abundant in the nation or state/province.

SNA Not Applicable, A conservation status rank is not applicable because the species is not a suitable target for conservation activities.

S#S# Range Rank, A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species or community. Ranges cannot skip more than one rank (e.g., SU is used rather than S1S4).

? Inexact Numeric Rank—Denotes inexact numeric rank

S#B Breeding

S#N Non-Breeding

Coefficient of conservatism ranking criteria

- 0 Obligate to ruderal areas.
- 1 Occurs more frequently in ruderal areas than natural areas.
- 2 Facultative to ruderal and natural areas.
- 3 Occurs less frequent in ruderal areas than natural areas.
- 4 Occurs much more frequently in natural areas than ruderal areas.
- 5 Obligate to natural areas (quality of area is low).
- 6 Weak affinity to high-quality natural areas.
- 7 Moderate affinity to high-quality natural areas.
- 8 High affinity to high-quality natural areas.
- 9 Very high affinity to high-quality natural areas.
- 10 Obligate to high-quality natural areas.