APPENDIX C

ENVIRONMENTAL CONDITIONS REPORT

Banwell Road – Class Environmental Assessment Land Use / Natural Features Existing Conditions

Prepared for
Giffels Associates Limited

Submitted by
Gartner Lee Limited

September, 2007

Gartner Lee

Banwell Road – Class Environmental Assessment Land Use / Natural Features Existing Conditions

Prepared for

Giffels Associates Limited

September, 2007

Reference: **GLL 70-312**

Distribution:

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Gartner Lee

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1. Introduction

This report documents the existing environmental conditions in the study area associated with the Banwell Road Class Environmental Assessment (EA) for improvements to Banwell Road within the City of Windsor (City) and the Town of Tecumseh (Town). To accommodate the anticipated growth in the City, transportation infrastructure improvements are anticipated within the Banwell Road corridor particularly at the intersecting roadways to accommodate ultimate traffic growth that will be designed to meet the City's mobility and safety needs. As part of the Class EA, an inventory of the existing environmental conditions in the study area was undertaken and involved background data collection, inventories, and reporting as follows:

a) Land Use/Social Environment; and
b) Natural Environment (aquatic/fisheries and terrestrial resources).

This information will be used to assess the various alternatives being considered as part of the Class EA.

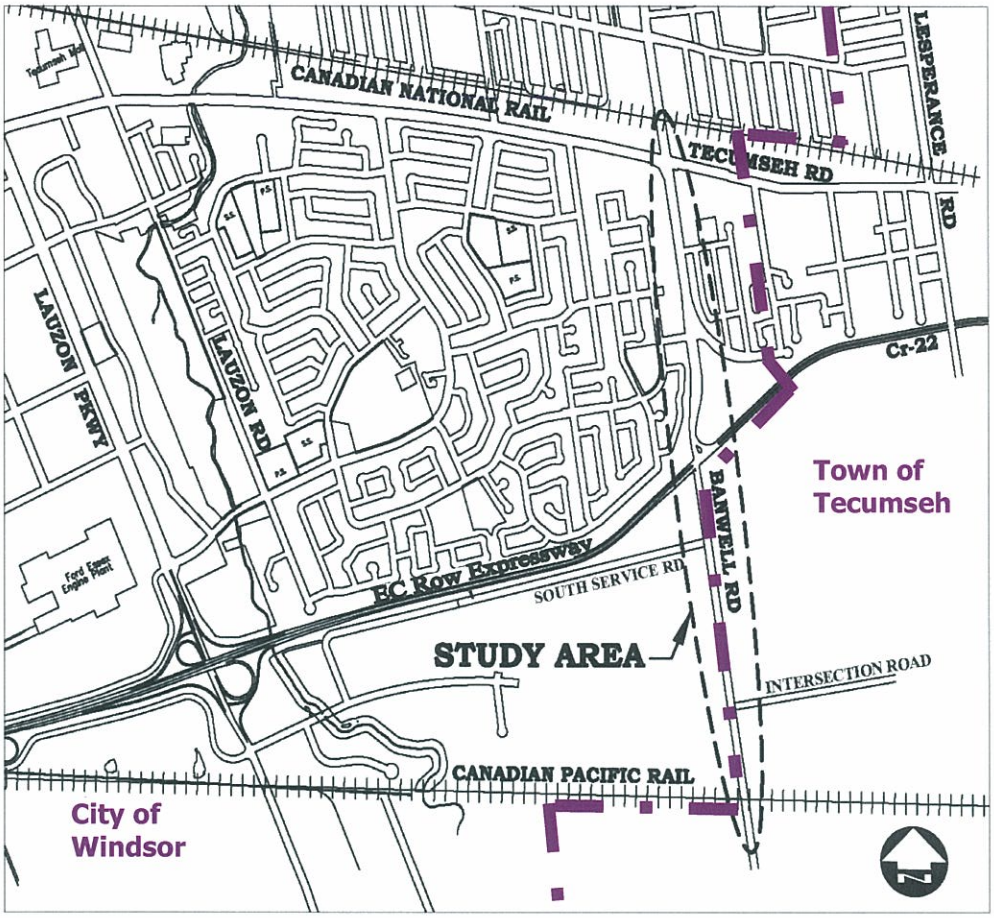
1.1 Study Area Overview

The study area extends from Tecumseh Road East to the railway tracks south of Intersection Road (Figure 1). The study area is divided by the municipal boundary between the Town of Tecumseh and the City of Windsor (Figure 1). The northern portion (north of EC Row Expressway) of the study area is former agricultural land that is being converted to residential housing with some commercial (development mainly on the west side of Banwell Road. The southern portion of the study area is dominated by active agricultural land, with a few sparse deciduous hedgerows separating individual cultivation fields. Currently, there is active construction along Banwell Road north of the EC Row Expressway for the construction of a trunk sanitary sewer. Construction is expected to continue until the end of the summer *(http://www.citywindsor.ca/DetoursandConstruction/ConstructionAreaMaps/banwelltrunksewer.jpg).*

2. Land Use/Social Environment

As part of the Banwell Road Class EA, a land use assessment was undertaken. The assessment included a "windshield survey", and review of secondary source information. The following sections document the results of the land use assessment, including an overview of the land use planning context (Official Plan designations, zoning and development, etc.) as well as a description of existing land uses within the study area.

Figure 1. Study Area Overview



2.1 Land Use Planning Context

2.1.1 Official Plans

The Official Plan (OP) of Essex County establishes the broader policy framework and guidance for future development and growth for both the County and its lower tier municipalities. In addition, the City of Windsor is governed by its own Official Plan that guides the physical development of the municipality over a 20-year period. In accordance with this OP, the City of Windsor is divided into a total of 19 planning districts which provide the basis for developing more detailed planning policies (Windsor's Official Plan: http://www.citywindsor.ca/000990.asp, 3 July 2007). Specifically, the study area lies within the Forest Glade Planning District according to Schedule A – Planning Districts and Policy Areas of the City of Windsor Official Plan (September, 2000).

The recently transferred lands from the Town of Tecumseh (2,532 hectares) fall under the jurisdiction of the former Official Plan for Sandwich South. It is expected that a comprehensive Official Plan amendment will be prepared in 2004 to bring the new land under the guidance of the City Official Plan (City of Windsor Official Plan, September 2000).

The lands on either side of Banwell Road are designated as follows *(See Figure 2)*:

- adjacent and to the south of the CPR tracks is designated Ontario Hydro Right-of-Way (ROW);
- from the CPR tracks northerly to County Rd 22 and to the west of Banwell Road is designated Business Park;
- between the CPR tracks northerly to County Rd 22 and to the east of Banwell Road is designated Hamlet Development with a smaller land parcel designated as Low Density Residential;
- from County Road 22 northerly to Tecumseh Road East and to the west of Banwell Rd is designated as Residential and Commercial Corridor; and
- from County Road 22 northerly to Tecumseh Road East and to the east of Banwell Road is designated as Hamlet Development and Medium Density Residential.

2.1.2 Zoning By-Laws

The lands adjacent to Banwell Road between the CPR tracks and Tecumseh Road East are zoned as follows: MD2 (Industrial District (Heavy), HRD2 (Residential District – Medium Density) (under holding provision), HCD1 (Commercial District - Neighbourhood) (under holding provision), HCD2 (Commercial District – General) (under holding provision), and CD2 (Commercial District – General) based on Zoning District Map 15 as provided on the City of Windsor's Web Site *(http://www.citywindsor.ca/)*.

2.2 Existing Land Uses

As part of this study, a "windshield survey" was undertaken on June 19, 2007 to identify existing land uses within the study area. In general, land uses within the study area were found to be a mixture of residential and commercial.

- ***Banwell Road between Tecumseh Road East southerly to EC Row Expressway***

  In the northern portion of the study area, particularly between Tecumseh Road East and EC Row Expressway, land use along Banwell Road is comprised of both institutional, industrial, commercial. Specific land use features observed included a lumber yard, day care, hair salon, coffee shop, convenience store, and a shopping plaza. Both existing residential development as well as residential areas currently under construction were also observed.

Basemapping from Ontario Ministry of Natural Resources

Legend

- Study Area
- Transmission Line
- Railway

City of Windsor Land Use (Official Plan, Schedule D: Land Use, September 2000)

- Business Park
- Commercial Corridor
- Industrial
- Residential

Techumseh Hamlet Urban Area Land Use Plan (Official Plan, Schedule "A-1", Township of Sandwich South)

- Business Park
- Hamlet Development
- Low Density Residential
- Medium Density Residential
- Ontario Hydro Right of Way

Roads

- Freeway
- Major Road
- Local Road
- Ramp

m
0 100 200 400
1:10,000
UTM Zone 17N, NAD 83

Tecumseh, Ontario

Land Use

April 2007
Project 70312

Gartner Lee

Figure 2

Map Document: (N:\Projects\2007\70312\2007\Final\GISSpatial\MXDs\70312LandUse.mxd)
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- Banwell Road between EC Row Expressway southerly to Rail Tracks

  In the southern portion of the study area, particularly between EC Row Expressway and the CPR tracks, land use adjacent to Banwell Road was found to be vacant land immediately south of EC Row Expressway, with agricultural and scattered residential development. A small land parcel located at the northeast corner of Banwell Road and Intersection Road is residential.

3. Natural Environment Existing Conditions

Gartner Lee Limited (GLL) staff completed a field visit on June 19, 2007. According to the climate station at the Windsor Airport (Climate ID: 6139525), there was no precipitation in the Windsor area for ten days prior to the field visit. Photographs of the study area are presented in Appendix A.

3.1 Terrestrial Resources

The northern portion of the study area is former agricultural land that is being converted to residential / commercial development. Some new single deciduous trees have been planted in the competed development areas. The southern portion of the study area is dominated by active agricultural land, with a few sparse deciduous hedgerows separating individual cultivation fields. The vegetation characteristics described above are not expected to support any ecological functions beyond support of common, disturbance-tolerant species.

3.2 Aquatic Resources

A desktop analysis was completed for the study area using aerial photography and topographic maps. Existing fisheries and aquatic information was obtained from the Ontario Ministry of Natural Resources (MNR) Chatham District Office, Essex Region Conservation Authority (ERCA) and Fisheries and Oceans Canada (DFO). ERCA has recently completed mapping of the drainage features within the study area. The study area encompasses seven drains: Lachance Drain, Gouin Drain, Banwell Drain, Robinet Drain, Parent Outlet Drain and two unnamed drains. According to the ERCA mapping (Figure 3), all drains are classified as Class F – Channelized and eventually discharge into Little River, which is a warmwater tributary of Lake St. Clair.

3.2.1 Background Fisheries Information

ERCA and MNR provided historical fisheries information for Little River and McGill Drain both of which are outside the study area but no information for the drains within the study area was available (Figure 3; provided by the ERCA). Background fisheries data for the Little River and McGill Drain are provided in Table 1. The fish community is diverse although most of the species are common warmwater species that are tolerant to environmental disturbance. No Species-At-Risk (SAR) fish have been documented at any of the sites for which information was provided.

Drain Classification/Fish Data

Banwell Rd

DRAFT

0 0.4 0.8 1.6 Kilometers

1:25,000

Source: SUPERTOM F:\B_layers\FishData\Dillion\Manning & CR 22 - Jan 2007\Manning and CR22 - Jan 2007.mxd
TD 2/7/2007

Of particular interest is the presence of the round goby (*Neogobius melanostomus*), an aggressive, invasive species in the Little River. It was first introduced to Ontario in ballast water and reported in the St. Clair River in 1990. The round goby is rapidly expanding its range. It is tolerant of low dissolved oxygen and a wide range of water temperatures.

3.2.2 Field Investigations

Field investigations were conduced on June 19, 2007. On that day, 5.6 mm of rain fell before noon. All assessments (Figure 4) were completed after the rainfall. Electrofishing (under MNR Licence No. 1039353) was conducted in isolated pools, where possible. No fish were captured at any of the sites. These drains would seasonally contribute to downstream fish habitat during times of high flow (e.g., spring freshet) but are otherwise for drainage purposes only. Photographs of the study area are presented in Appendix A.

- ***Unnamed Drain along Banwell Road/Parent Outlet Drain*** *(Figure 4: Site GLL1; Appendix A: Photos 1 to 3)*

  The drains run parallel to Banwell Road. During the site visit, construction was occurring on Banwell Road from Wildwood Road to Tecumseh Road East. The drains had recently been re-constructed and were mainly dry during the site visit. New corrugated steel pipe (CSP) culverts had been installed under driveways/roads. There was some standing water on the west side of Banwell Road, north of Wildwood Road but it was a result of the earlier rainfall. Some banks had been planted with sod (including along the bottom of the channel) while other banks remained bare.

- ***Unnamed Drain along EC Row Expressway*** *(Figure 4: Site GLL2; Appendix A: Photos 4 to 8)*

  The drain on the northwest corner had been reconfigured as part of the construction work. Near the road, there was some standing water. This was due to the earlier rainfall and a partial blockage in the culvert under Banwell Road.

  On the east side of Banwell Road, the channel was filled with a mixture of terrestrial grasses and cattails with very little standing water. The road right-of-way on the western side of Banwell Road had recently been re-seeded.

- ***Robinet Drain*** *(Figure 4: Site GLL3; Appendix A: Photo 9)*

  The drainage channel on the east side of Banwell Road had a small pool of standing water near the culvert. This was due to the earlier rainfall and the partial blockage in the culvert under Banwell Road. Upstream of Banwell Road, the channel was completely filled with terrestrial grasses.

- ***Banwell Drain*** *(Figure 4: Site GLL4; Appendix A: Photo 10)*

  The Banwell Drain was poorly defined and terrestrial grasses were growing throughout. The terrestrial grasses were over 2 m tall. There was a minimal amount of standing water due to the earlier rainfall.

- ***Gouin Drain*** *(Figure 4: Site GLL5; Appendix A: Photos 11 to 12)*

  On the east side of Banwell Road, there was a minimal (<0.02 m) amount of standing water. The channel was 50-75% full of emergent aquatic vegetation (e.g., cattails) which became more dense further upstream. The channel bottom was composed of fine sediments and covered in green filamentous algae. The banks were well vegetated with terrestrial grasses. On the west side of Banwell Road, the drain parallels Anchor Drive. There was a similar amount of water as on the east side and the bottom sediments were also similar. There was much less emergent vegetation was present in the channel, which suggests that the drain has been dredged in recent years. The south side of the drain was lined with a deciduous hedgerow. On the north side, the banks were bare near the water but had terrestrial grasses higher up the bank. Water was conveyed under the road through a partially buried CSP culvert. There was an isolated pool of water in the CSP culvert under Banwell Road. The pool was electrofished and no fish were captured. The absence of fish and the lack of connectivity suggest that the pool dries up during the summer months.

- ***Lachance Drain*** *(Figure 4: Site GLL6; Appendix A: Photos 13 to 18)*

  On the east side of Banwell Road, a drainage channel runs parallel to Intersection Road. The channel is congested with emergent vegetation (e.g., cattails). The banks were well vegetated with grass. On the west side of the road, the channel banks were well defined and well vegetated with grasses. Minimal vegetation was present in the channel and it was usually comprised of terrestrial species. A local resident informed GLL staff that the drain on the west side of Banwell Road had been dredged within the last 3 years and that the drain dries up completely every summer.

  Water is conveyed under Banwell Road through a partially buried corrugated steel pipe (CSP) culvert. There was minimal standing water (<0.02 m) in the drain and an isolated pool of water approximately 0.05-0.1 m deep was observed in the culvert under the road. The water was likely from the earlier precipitation event. The channel would normally be dry during the summer months. The pool was electrofished and no fish were captured. This suggests that the drain is dry during the summer months.

  Lachance Drain has been classified by DFO as "Protected" due to the possible presence of fish Species-At-Risk (SAR) within the drain and downstream (Appendix B). The reason for this classification is the direct connection of Lachance Drain with the Little River which discharges to Lake St. Clair. Several SAR fish species are present in Lake St. Clair. Fisheries surveys (Table 1) indicate that no SAR fish have been captured in Little River for over 20 years. No fish were captured in Lachance Drain on June 19, 2007.

4. Summary

As part of the Banwell Road Improvements Class EA, existing conditions within the study area were inventoried and documented with respect to Land Use/Social features and the Natural Environment (Aquatic and Terrestrial Resources).

Land uses within the study area were found to be residential/commercial (both complete and under construction) in the northern portion of the study area and mainly agricultural in the southern part of the study area. With the construction of a new trunk sewer, future urban development will likely occur within the study area.

With regard to aquatic resources, several drains are present within the study area. DFO has classified all of these drains as Class F – Channelized. Class F drains are intermittent and contain no sensitive fish species. All drains are likely dry for most of the summer, except after significant rainfall events. These drains contribute seasonally to fish habitat during times of high flow (i.e., spring freshet) but are otherwise for drainage purposes only and do not provide direct fish habitat.

Lachance Drain has been classified by DFO as "Protected" (Appendix B) due to its indirect connection to Lake St. Clair in which several SAR species are present. The probability of encourntering a SAR speies (particularly during the summer months) is minimal however, particular care should be taken to ensure that the proper mitigation measures are being used while working near this drain. Various mitigation measures (e.g. timing windows) for work in and around drains can be found in the DFO's "*The Drain Primer*" (Appendix C or http://www.dfo-mpo.gc.ca/regions/central/pub/drain-on/index_e.htm). Suggestions include completing the work during the summer months when the drains are dry and the installation of sediment and erosion control measures (e.g., sediment fencing).

In terms of terrestrial habitat, the main features are deciduous hedgerows planted between agricultural fields. All plant species recorded are considered common and widespread throughout southern Ontario and not expected to support any ecological functions beyond support of common, disturbance-tolerant species.

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Table 1. Background Fish Information

Site No.	Stream/Drain	Scientific Name	Common Name	COSEWIC	OMNR	S Rank	1984	2000	2001	2004
Site #1	Little River	*Fundulus diaphanus*	banded killifish	NAR	NAR	S5	--	X	--	X
		Ameiurus melas	black bullhead			S3	--	X	--	
		Pimephales notatus	bluntnose minnow	NAR	NAR		--	X	--	X
		Umbra limi	central mudminnow				--		--	X
		Cyprinus carpio	common carp		SE		--	X	--	
		Luxilus cornutus	common shiner				--	X	--	
		Semotilus atromaculatus	creek chub				--	X	--	X
		Notropis atherinoides	emerald shiner				--		--	X
		Pimephales promelas	fathead minnow				--	X	--	X
		Gobiidae	goby family				--	X	--	
		Carassius auratus	goldfish		SE		--	X	--	
		Lepomis cyanellus	green sunfish	NAR	NAR	S4	--		--	X
		Nocomis biguttatus	hornyhead chub	NAR	NAR		--	X	--	
		Lepomis gibbosus	pumpkinseed			S5	--	X	--	
		Carpiodes cyprinus	quillback			S4	--	X	--	
		Neogobius melanostomus	round goby				--		--	X
		Micropterus dolomieui	smallmouth bass			S5	--	X	--	
		Notropis hudsonius	spottail shiner				--		--	X
		Luxilus chrysocephalus	striped shiner	NAR	NAR	S4	--	X	--	X
		Catostomus commersoni	white sucker			S5	--		--	
		Ameiurus natalis	yellow bullhead			S4	--	X	--	
		Perca flavescens	yellow perch			S5	--		--	X
Site #2	Little River	*Pimephales notatus*	bluntnose minnow	NAR	NAR		--	--	--	X
		Cyprinus carpio	common carp		SE		--	--	--	X
		Semotilus atromaculatus	creek chub				--	--	--	X
		Notropis atherinoides	emerald shiner				--	--	--	X

Table 1. Background Fish Information

Site No.	Stream/Drain	Scientific Name	Common Name	COSEWIC	OMNR	S Rank	1984	2000	2001	2004
Site #2	Little River	*Carassius auratus*	goldfish		SE		--	--	--	X
		Lepomis cyanellus	green sunfish	NAR	NAR	S4	--	--	--	X
		Carpiodes cyprinus	quillback			S4	--	--	--	X
		Cyprinella spiloptera	spotfin shiner				--	--	--	X
		Notropis hudsonius	spottail shiner				--	--	--	X
		Catostomus commersoni	white sucker			S5	--	--	--	X
		Perca flavescens	yellow perch			S5	--	--	--	X
Site #3	Little River	*Pimephales notatus*	bluntnose minnow	NAR	NAR		X	--	X	--
		Cyprinus carpio	common carp		SE		X	--		--
		Luxilus cornutus	common shiner				X	--	X	--
		Semotilus atromaculatus	creek chub				X	--	X	--
		Notropis atherinoides	emerald shiner				X	--		--
		Pimephales promelas	fathead minnow				X	--	X	--
		Gobiidae	goby family					--	X	--
		Carassius auratus	goldfish		SE		X	--	X	--
		Lepomis cyanellus	green sunfish	NAR	NAR	S4	X	--	X	--
		Micropterus salmoides	largemouth bass			S5		--	X	--
		Ambloplites rupestris	rock bass			S5		--	X	--
		Cyprinella spiloptera	spotfin shiner					--	X	--
		Luxilus chrysocephalus	striped shiner	NAR	NAR	S4		--	X	--
		Catostomus commersoni	white sucker			S5	X	--		--
Site #4	McGill Drain	*Umbra limi*	central mudminnow				--	--	--	X
		Semotilus atromaculatus	creek chub				--	--	--	X
		Pimephales promelas	fathead minnow				--	--	--	X
Site #5	Little River	*Fundulus diaphanus*	banded killifish	NAR	NAR	S5		X	--	--
		Pimephales notatus	bluntnose minnow	NAR	NAR		X	X	--	--
		Cyprinus carpio	common carp		SE			X	--	--

Table 1. Background Fish Information

Site No.	Stream/Drain	Scientific Name	Common Name	COSEWIC	OMNR	S Rank	1984	2000	2001	2004
Site #5	Little River	Luxilus cornutus	common shiner					X	--	--
		Semotilus atromaculatus	creek chub				X	X	--	--
		Pimephales promelas	fathead minnow				X	X	--	--
		Cyprinidae	Minnow Family					X	--	--
		Lepomis gibbosus	pumpkinseed			S5		X	--	--
		Notropis hudsonius	spottail shiner					X	--	--
		Catostomus commersoni	white sucker			S5	X	X	--	--
Site #6	Little River	Fundulus diaphanus	banded killifish	NAR	NAR	S5	--	X	--	X
		Pimephales notatus	bluntnose minnow	NAR	NAR		--	X	--	
		Umbra limi	central mudminnow				--	X	--	
		Semotilus atromaculatus	creek chub				--	X	--	
		Pimephales promelas	fathead minnow				--	X	--	X
		Ambloplites rupestris	rock bass			S5	--	X	--	
		Cyprinella spiloptera	spotfin shiner				--	X	--	
		Luxilus chrysocephalus	striped shiner	NAR	NAR	S4	--	X	--	
		Catostomus commersoni	white sucker			S5	--	X	--	

Notes: NAR - Not At Risk

SE - Species Exotic

S3 - Vulnerable; vulnerable in the province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation

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 province

-- - Not Sampled

Basemapping from Ontario Ministry of Natural Resources
Orthoimagery: 2000

Legend

- Gartner Lee Aquatic Field Investigation Sites
- Transmission Line
- Railway
- Freeway
- Major Road
- Local Road
- Ramp
- Drain
- Study Area
- Municipal Division

m
0 100 200 400
1:9,500
UTM Zone 17N, NAD 83

Tecumseh, Ontario

Gartner Lee Aquatic Field Investigation Sites

September 2007
Project 70312

Gartner Lee **Figure 4**

Map Document: (N:\Projects\2007\70312\2007\Final\GISSpatial\MXDs\70312NaturalFeatures.mxd)
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Appendix A

Photographs

Photographs

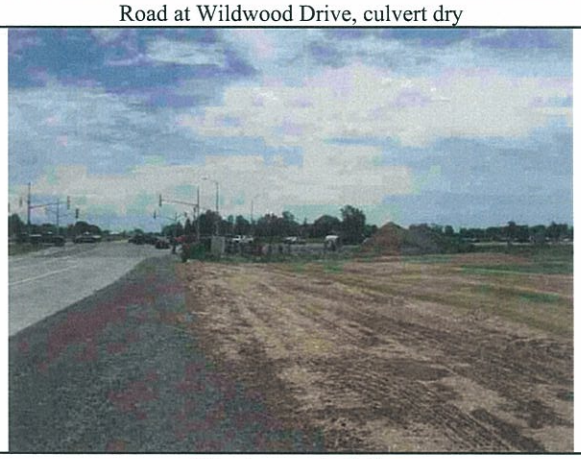
Banwell Road Environmental Existing Conditions Report

June 19, 2007

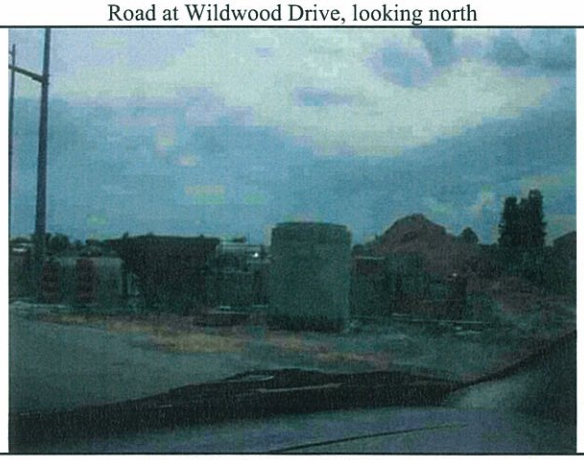
Photograph 1 ↑
No Name Drain/Parent Outlet Drain – West side of Banwell Road at Wildwood Drive, looking south

Photograph 2 ↑
No Name Drain/Parent Outlet Drain – West side of Banwell Road at Wildwood Drive, culvert dry

Photograph 3 ↑
Unnamed Drain/Parent Outlet Drain – West side of Banwell Road at Wildwood Drive, looking north



Photograph 4 ↑
Banwell Road – Looking south at EC Row Expressway, pit for tunnelling machine on northwest corner



Photograph 5 ↑
Banwell Road – Pit for tunnelling machine on northwest corner of Banwell Road and EC Row Expressway

Photograph 6 ↑
No Name Drain – West side of Banwell Road, north of EC Row Expressway, standing water due to culvert blockage (see photo 8), culvert dry upstream in cattails

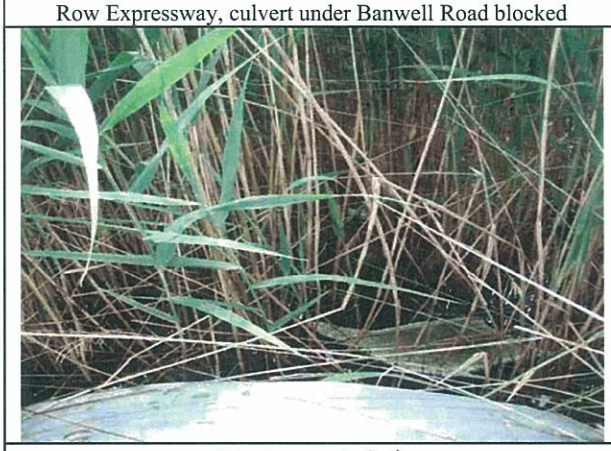
Photographs

Banwell Road Environmental Existing Conditions Report

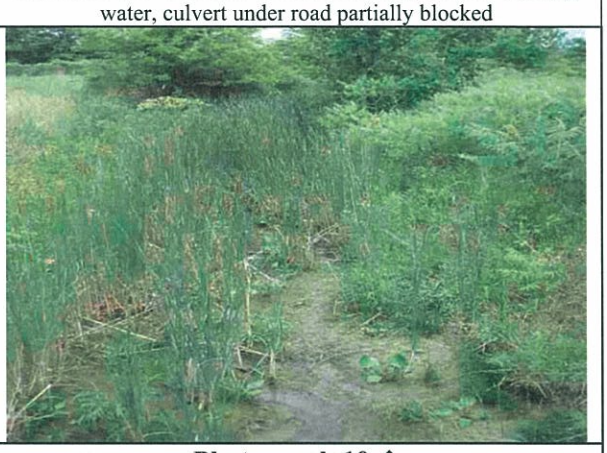
June 19, 2007

Photograph 7 ↑
No Name Drain – West side of Banwell Road, north of EC Row Expressway, culvert under Banwell Road blocked

Photograph 8 ↑
Robinet Drain – East side of Banwell Road, shallow standing water, culvert under road partially blocked



Photograph 9 ↑
Banwell Drain – West side of Banwell Road, shallow standing water



Photograph 10 ↑
Gouin Drain – East side of Banwell Road, looking east

Photograph 11 ↑
Gouin Drain – West side of Banwell Road, looking west

Photograph 12 ↑
Lachance Drain – East side of Banwell Road, looking east

Photograph 13 ↑
Lachance Drain – East side of Banwell Road, culvert

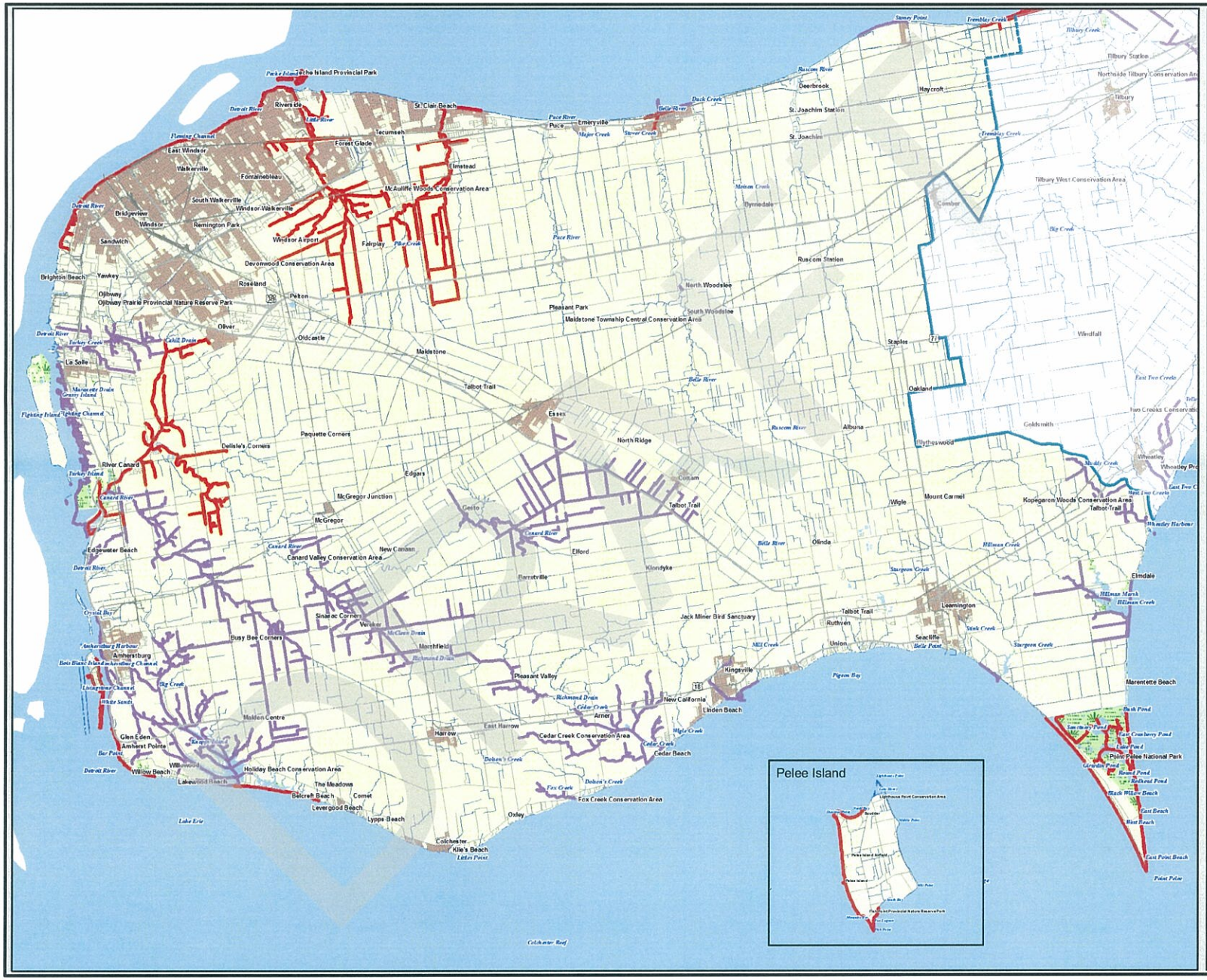
Photograph 14 ↑
Lachance Drain – East side of Banwell Road, drainage pipe and culvert

Photograph 15 ↑
Lachance Drain – West side of Banwell Road, looking west

Photograph 16 ↑
Lachance Drain – West side of Banwell Road, collapsed road/culvert reinforecement

Appendix B

Essex Region Conservation Authority
Species-At-Risk (SAR) Maps



Distribution of Fish Species at Risk

Essex Region Conservation Authority

Legend

Species at Risk Distribution

- Protected under SARA (EX, EN, TH)
- To be listed in 1yr+ (EN,TH)
- All Special Concern Species (Sch. 1,3 and newly listed)

- Railway
- River/Stream
- Highway
- Road
- Conservation Authority Boundary
- Waterbody
- Wetland
- First Nations Land Claim
- Built-up Area

Key Map - Southern Ontario

Watershed SAR Listing

COMMON NAME	COSEWIC	LISTING DATE	COLOUR
channel darter	THR	2006	Red
eastern sand darter	THR	2003	Red
lake chubsucker	THR	2003	Red
northern madtom	END	2003	Red
pugnose shiner	END	2005	Red
spotted gar	THR	2003	Red
American eel	SC	2007/8	Purple
bigmouth buffalo	SC	2007	Purple
black buffalo	SC	2007	Purple
grass pickerel	SC	2006	Purple
greenside darter	SC	2007	Purple
lake sturgeon	SC	2008/9	Purple
northern brook lamprey	SC	2007	Purple
orangespotted sunfish	SC	2007	Purple
pugnose minnow	SC	2003	Purple
silver chub	SC	2003	Purple
spotted sucker	SC	2003	Purple
warmouth	SC	2003	Purple

0 1.25 2.5 5 km

Map produced on September 21, 2006.
Valid until March 31, 2007.

Fisheries and Oceans Canada | Pêches et Océans Canada

Distribution of Mussel Species at Risk

Essex Region Conservation Authority

Legend

Species at Risk Distribution

- Protected under SARA (EX, EN, TH)
- To be listed in 1yr+ (EN,TH)
- All Special Concern Species (Sch. 1,3 and newly listed)

- Railway
- River/Stream
- Highway
- Road
- Conservation Authority Boundary
- Waterbody
- Wetland
- First Nations Land Claim
- Built-up Area

Key Map - Southern Ontario

Watershed SAR Listing

COMMON NAME	COSEWIC	LISTING DATE	COLOUR
Kidneyshell	END	2005	Red
Northern Riffleshell	END	2003	Red
Rayed Bean	END	2003	Red
Round Hickorynut	END	2005	Red
Round Pigtoe	END	2005	Red
Salamander Mussel	END	2003	Red
Snuffbox	END	2003	Red
Wavyrayed Lampmussel	END	2003	Red
Mapleleaf	THR	2007/8	Orange
Rainbow	END	2007/8	Orange

0 1.25 2.5 5 km

Map produced on September 22, 2006.
Valid until March 31, 2007.

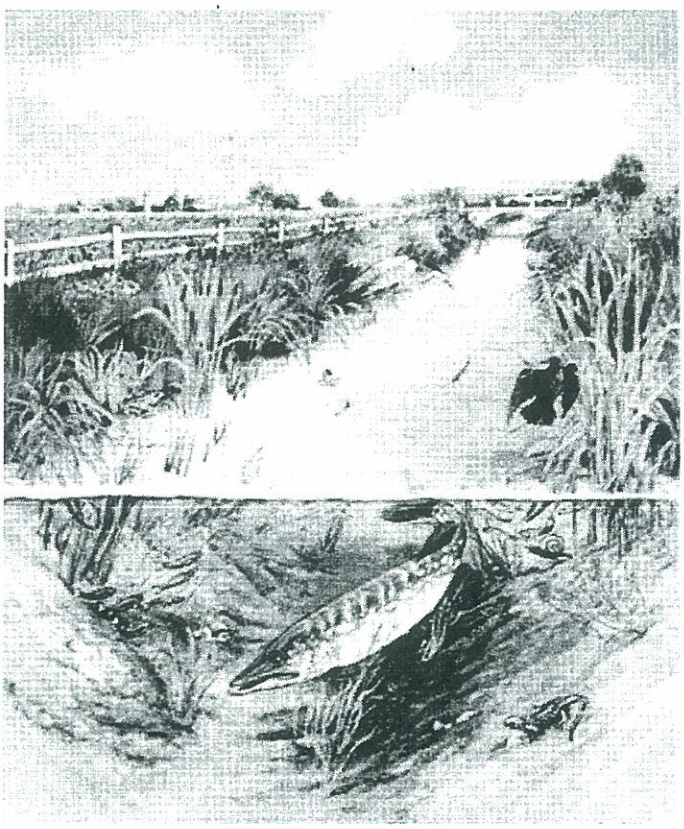
Fisheries and Oceans Canada | Pêches et Océans Canada

Appendix C

The Drain Primer

The Drain Primer:
Guide to Maintaining and Conserving Agricultural Drains and Fish Habitat

By Cliff Evanitski



Produced by
Drainage Superintendents Association
of Ontario and
Ontario Federation of Agriculture
in association with
Fisheries and Oceans Canada

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Last updated: 2007-03-12

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The Drain Primer

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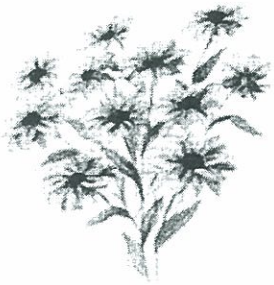

What's the Scoop?
Getting the Info on Drain Maintenance

- Open Drain Maintenance - Why is it a normal business practice?

There's No Place Like Home

- Exactly what is a fish habitat?
- How are the two connected - Why are drains important to fish habitat?
- Why seek approval before doing maintenance on an open drain?
- The *Fisheries Act*
- The *Drainage Act*
- The *Conservation Authorities Act*

Help!! I Need Somebody!

- Where do I start?
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- How does the Class Authorization System work?
- What if the open ditch is a private, agreement or creek drain?
- What does one do to maintain these types of drains?
- Timing
- Sediment Controls
- Erosion Control and Bank Stabilization

The Drain Primer

What's the Scoop?
Getting the Info on Drain Maintenance

This primer is a guide to provide information for a variety of groups in Ontario. For farmers and municipalities, this primer will assist in finding ways to maintain the effectiveness of open drains while limiting the impact on the local environment. For the general public, the primer explains the necessity of open drains and the need to maintain them. For everyone, this document will demonstrate that the environment and agriculture can co-exist.

Open Drain Maintenance - Why is it a normal business practice?

Agriculture, like so many other industries, faces not only the challenge of doing business in a worldwide market, but increasingly doing so in a manner that is protective of local resources such as groundwater and habitat. A farmer's ability to produce high quality food for the rest of us depends on the natural environment - decent weather, productive land and workable soil. However, farmers sometimes have to modify the natural environment in order to grow their crops. One of these changes involves draining surface and subsurface water from their land.

Typically this has been done by constructing ditches, often referred to as open drains, which effectively remove excess water from the surrounding land. Improved drainage allows fields to be planted earlier in the spring, eliminates excess water that might hurt plant growth, and helps to dry up fields that normally would be too wet to support the weight of heavy tractors.

For more than a century and up to the present day, a network of open drains has been developed throughout Ontario with the majority being in the southwestern and eastern parts of the province.

Types of Drains

A ditch is a ditch and a drain is a drain, right? So how can there be "types" of drains? Well, yes of course, a ditch is a ditch, but ditches or drains can be constructed in different ways that give them different legal status.

Excess water can make fields unworkable for farmers

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Municipal drains are created under the authority of the *Drainage Act* and have three key elements. Firstly, the drain is requested by the community through petition and involves a number of public meetings to address landowners' concerns and desires. If the need for drainage work is there, the municipality requests an engineer's report to identify the proposed solution to the drainage problem and how the costs will be shared. Secondly, after any appeals have been dealt with, the municipality passes a by-law adopting the engineer's report, giving the municipality the legal authority and responsibility to construct the drain. Finally, once the drain has been constructed, the maintenance becomes part of the municipality's infrastructure. The municipality, through its drainage superintendent, is now responsible for repairing and maintaining the drain.

Municipal drains are either open channels or a closed system of tiles buried in the ground. Open channel municipal drains can either be completely manmade ditches or they can be natural watercourses that have been modified through the *Drainage Act* process to improve drainage. This latter type is commonly known as a "creek drain."

Private drains are essentially ditches or a system of underground tiles that farmers construct on their own properties in order to drain their farmland.

Mutual Agreement Drains are private drains that have been constructed through an agreement between two or more property owners. To ensure that the agreement drain continues to serve its original purpose should one or more of the benefiting properties change ownership, the agreement is registered on the property title through the Land Registry Office.

Award drains are drainage systems that have been constructed under legislation called the *Ditches and Watercourses Act*. This *Act* was repealed in 1963, but some old award drains that were constructed prior to that date still exist. Each landowner along an award drain is responsible for maintaining their section of the drain. Maintenance of such drains is not the responsibility of the municipality.

No matter what the type of drain is, they all serve the same purpose - to remove excess water from agricultural lands.

Regardless of whether the open drain is natural or artificial, sediment gradually starts to build-up in these watercourses. Plants and other vegetation, both in the water and along the drain's bank, begin to take root. Pools begin to form and the watercourse will begin to wander back and forth from one bank to the other. As these various elements begin to take shape, the open drain starts looking more like a natural stream. And of course, this natural stream now has the features that provide habitat attractive to fish and other aquatic life. However, the flow of the water through the drain also starts to become restricted, perhaps to the point where the drain is no longer capable of removing excess water from the neighbouring lands. Thus maintenance, repairs or improvements are required to restore the drain's function in order to maintain the productivity of the agricultural land.

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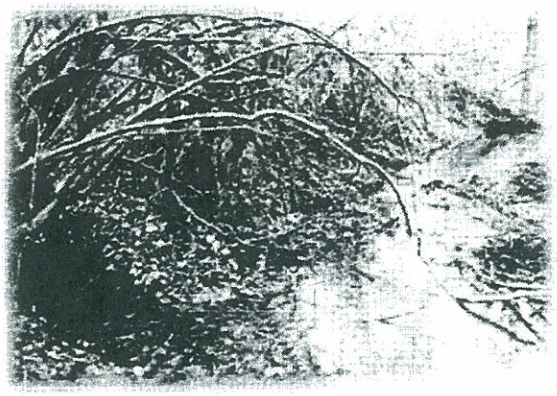
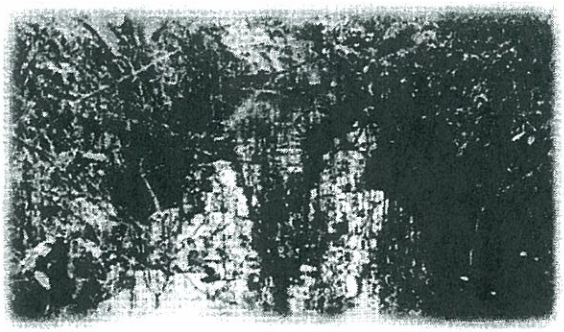
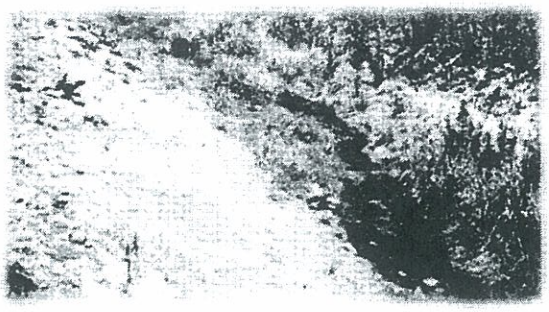


Landowners along Award Drains are responsible for maintaining their section of the ditch .



Municipal Drains are legally part of the local municipality's infrastructure.

Regardless of whether the drain is Private, such as the one above - or a Municipal, Mutual or Award Drain - all look alike and can easily be mistaken for each other.



Mutual Agreement
Drains are registered on the property title to ensure that regardless of who owns the abutting properties, the original purpose of the drain is protected.

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The Drain Primer

There's No Place Like Home

Exactly what is fish habitat?

The *Fisheries Act*, federal legislation that protects Canada's fisheries resources, defines fish habitat as those parts of the environment that fish rely upon, directly or indirectly, in order to go through the various stages of their life cycle. This life cycle depends on three basic elements - food, ability to reproduce, and cover. While these features can vary depending on the type of fish, typically all three are not always found in the same place. As such, migratory routes are also needed to allow fish to move from one place to another. In addition, fish need good water quality in order to survive, grow and reproduce.

How the two are connected - Why are drains important to fish habitat?

Open agricultural drains may at first glance look like artificially created ditches with little or no value as fish habitat. That might be true in some cases. However, just because fish are absent in the drain, does not mean the drain is not fish habitat. One must also keep in mind that all water flows somewhere and eventually it is going to find its way to a place where fish do exist.

There are many open drains, especially well established ones that have been around a few years and have not been cleaned out on a regular basis, which have developed the characteristics of providing good fish habitat. Trees, shrubs and other plants growing along the banks of the ditch not only produce food for the fish (insects fall off the overhanging branches into the water), but also shade the water providing cooler temperatures that are preferable for certain species of fish. Branches and other woody debris fall into the water providing cover for fish from predators. The meandering of the waterway from one side of the ditch to the other changes water flow, which depending on the species, can be favourable for spawning and other fish activities.

Some studies suggest that these older open drains are important to fish production in that they contain larger numbers of fish, as well as, a greater variety of species when compared to the main watercourses into which they feed. The habitat provided by open agricultural drains has also played a significant role in setting a standard of environmental quality that people have come to expect. After all, a healthy fish community is a sign that the local human environment is also in good shape.

However, people also expect to eat and there often does come a

time when open drains eventually need to be cleaned in order to enhance the effectiveness of farming operations. Therefore, drain maintenance must be managed carefully in order to protect habitat while ensuring the ability of the drain to function efficiently.

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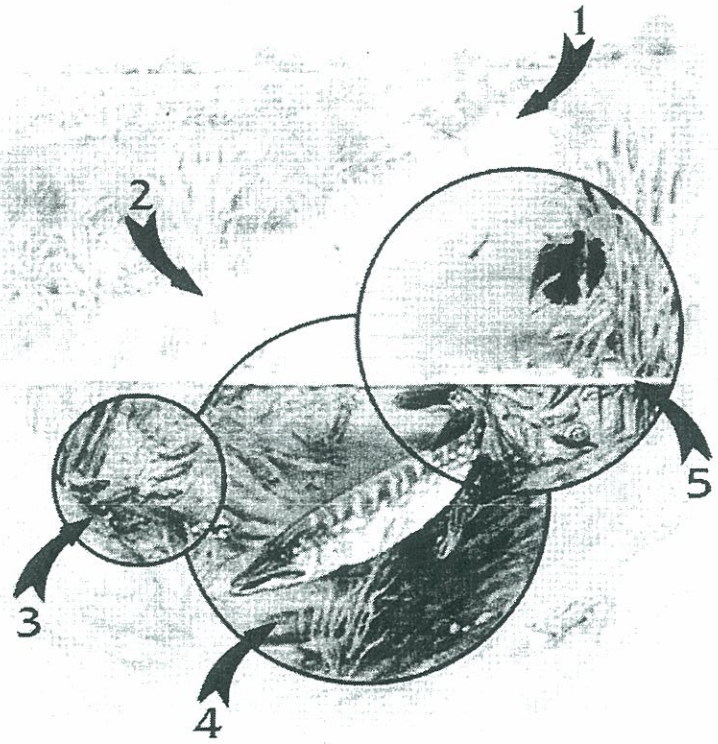

1. Water Quality
Typically good water quality means the water is well oxygenated, cooler in temperature and relatively clear of silt. However, all fish species have specific water quality requirements - in fact, coldwater species have higher standards than warmwater species. Regardless, local water quality should be maintained at levels acceptable to local fish species.

2. Migratory Corridors
Migration areas consist of streams, creeks or rivers allowing passage of fish from one part of the watershed to another. Barriers such as beaver dams, perched culverts and low water flows can stop fish from reaching or leaving either their spawning or over-wintering habitats. Other barriers include small culverts with so much water flowing through them that the velocity of the water prevents the fish from reaching upstream spawning areas.

3. Food
Small fish typically eat tiny organisms such as plankton and algae, as well as, insects, larvae and dragonflies. Bigger fish may feed on smaller fish, worms, crayfish, insects or other invertebrates.

4. Reproduction
Most fish need specific surroundings, water temperature and water velocity in order to successfully spawn. For example, coldwater species such as rainbow trout like gravel-bottomed shallows in a stream with cooler temperatures and moderate water flows. Yet, the Northern Pike, a coolwater species, prefers spawning areas with slow moving water such as wetlands or submerged vegetated floodplains.

5. Cover
Rocks, woody debris, undercut banks, overhanging plants, aquatic vegetation and deep water can all provide hiding places for fish from their enemies.

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Why seek approval before doing maintenance on an open drain?

After time many agricultural ditches, whether they are private, municipal or agreement drains, can start looking alike. If a property has changed ownership, the new landowner may not know whether the watercourse is some type of drain or a stream. Even if one does know, the next question is whether the watercourse is fish habitat. It can get confusing. One may believe that the ditch is poor habitat for fish and, that they are perfectly within their rights to clean their ditch out. However, it is better to be safe than to be sorry. The law may require formal approvals before any drain maintenance work can be done.

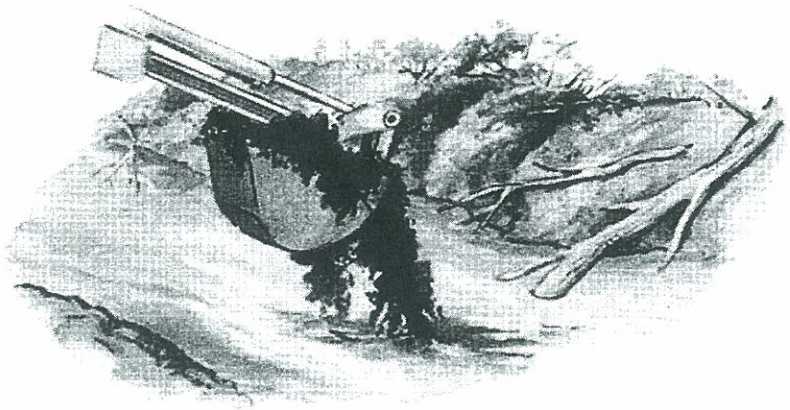
Environmentally, drain maintenance can often change the characteristics that make an open ditch good fish habitat. The removal of plants, shrubs and other vegetation eliminates both food sources and cover for fish. Digging a deeper and wider channel may change both the speed of the flow and water temperature - two important factors contributing to good fish habitat. While the work is taking place, the disturbances that are occurring can create a barrier for those fish that might be attempting to migrate upstream. As well, digging stirs up sediment which makes the watercourse that much less livable for fish. Suspended sediments cloud the water, which can suffocate, cover and destroy spawning habitat.

Aside from the potential damage to fish habitat, landowners may also find themselves in violation of various provincial and federal laws should they proceed without approval. Some of these laws may apply, but not necessarily, to open drain maintenance.

The *Fisheries Act* (Federal)

The *Fisheries Act* applies to all fishing zones, territorial seas and inland waters of Canada and is binding on federal, provincial and territorial governments. Furthermore, federal legislation overrides provincial legislation when the two conflict with each other. The

goal of the Policy for the Management of Fish Habitat is to increase the productive capacity of fish habitat. This is done through the conservation of existing habitat, restoration of damaged habitat and development of new habitat. When it comes to drain maintenance, Section 35(1) of the *Fisheries Act* is the part that most frequently applies. This section prohibits the harmful alteration, disruption or destruction of fish habitat, also known as a "HADD," unless authorized by the Minister of Fisheries and Oceans Canada. Unauthorized drain work that results in a HADD could result in a fine of up to $1,000,000 and/or imprisonment. While work on open drains is done to meet requirements under the *Drainage Act*, requirements under the *Fisheries Act* must also be addressed.



Changes or alterations can occur to fish habitat. It is only when such changes are expected to result in a HADD that an authorization is required to avoid liability.

The *Drainage Act* (Provincial)

Ontario has had drainage legislation in place for over 150 years. The current statute, the *Drainage Act*, balances the rights of landowners living along watercourses with the rights of property owners who do not have access to a stream or creek in order to drain their lands. This *act* is administered by the Ontario Ministry of Agriculture and Food (OMAF) and provides a legal means for the construction and maintenance of sufficient outlets to drain surface and subsurface water. Ownership of these Municipal Drains remains with the owners of properties originally involved with the construction. However, local municipalities are responsible and liable for maintaining these drains and then distributing the costs over the properties located in the watershed.

The *Conservation Authorities Act* (Provincial)

Conservation Authorities are responsible for conserving, restoring, developing and managing natural resources within their jurisdiction. Under their *Fill, Construction and Alteration of Waterways Regulations*, conservation authorities can control development proposals and other work located in or near watercourses and their floodplains. Open drains are usually reviewed with special interest by conservation authorities.

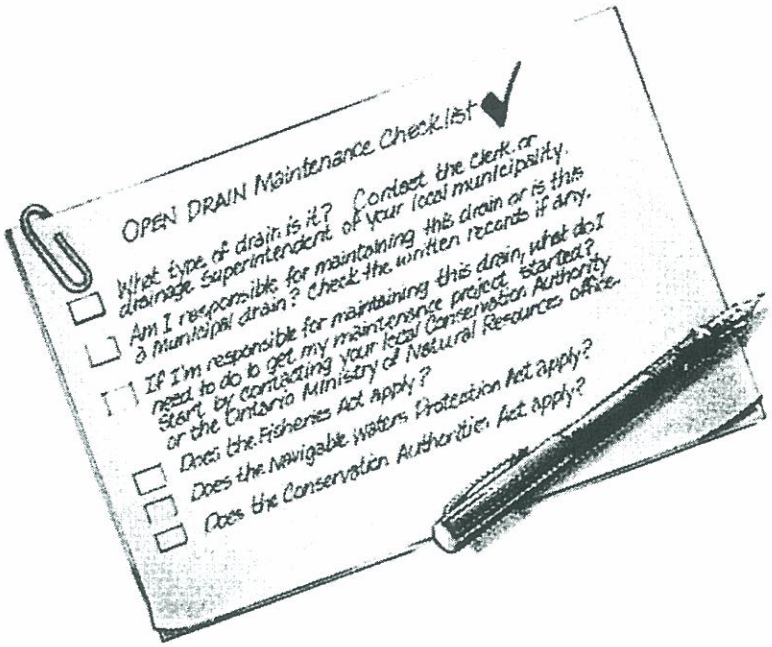
The Drain Primer

Help!! I Need Somebody!

Where do I start?

The first step a landowner should take before starting any kind of ditch maintenance is to determine the type of drain it is. The local drainage superintendent should be contacted in order to determine if the ditch is a municipal drain constructed under the *Drainage Act*. If it is, then the landowner should not undertake any maintenance on the drain since this is a municipal responsibility and liability. If it is not a municipal drain, the local municipality may also be able to tell the landowner if it is an Award Drain, Mutual Agreement Drain or a Private Drain. If it is a Private Drain, the maintenance of the ditch is the property owner's responsibility. If it is an Award Drain or Mutual Agreement Drain, the landowner needs to find the written records for that drain to determine if they are responsible for performing maintenance.

If the landowner finds that they are responsible for maintaining the drain, the next step they should take before starting any kind of drain maintenance is to call the local conservation authority or the Ontario Ministry of Natural Resources (OMNR) office. Both can assist in getting information dealing with reviews and approvals for drain maintenance work that might impact fish habitat. Chances are the conservation authority will also have the expertise to help the landowners develop a proper drainage maintenance plan.



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The Drain Primer

Speeding Up the Process

Conservation Authorities; Fisheries and Oceans Canada; and other agencies have been working together to develop a Class Authorization System to help streamline the process of reviewing fisheries concerns for maintenance proposals. This Class Authorization System is **only applicable to Municipal Drains**, the ones most frequently being maintained across Ontario. Without this system, all drain maintenance activities that might be harmful to fish habitat would be subject to individual review and may require a separate authorization under the *Fisheries Act*. Since there are many municipal drains being maintained across Ontario, this could be a very time consuming process and cause delays for landowners needing improved drainage, as well as, for drainage superintendents trying to coordinate their work schedules. The Class Authorization System cuts through much of that red tape. It allows municipalities, through their drainage superintendents, to complete work such as bottom clean outs, on less sensitive drains. Drainage superintendents can save time on planning since they will know in advance what kind of work and timing is required for certain maintenance projects. The Class Authorization System also helps municipalities and drainage superintendents identify projects that might need a more in-depth examination.

The Class Authorization System is only applicable to Municipal Drains.

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How does the Class Authorization System work?

While all open drains serve the same function of removing excess water from the land, not all are alike when it comes to the habitat they provide for fish. Open drains may differ in the type and sensitivity of the habitat they contain depending upon the drain's characteristics. For habitat management purposes, the Class Authorization System classifies municipal drains according to their flow characteristics, water temperatures, fish species present and time since the last full clean out.

Drainage superintendents, conservation authorities and other agencies are classifying all municipal drains in Ontario with the goal of putting this information onto maps to help municipalities and their drainage superintendents identify the correct steps in maintaining a particular drain. As characteristics of the drains change, the new information is used to update the classification.

Call your local drainage superintendent, conservation authority or OMNR to get assistance on how to maintain Creek Drains like the one above.

What if the open ditch is a Private, Agreement or Creek drain? What does one do to maintain these types of drains?

Call your municipal drainage superintendent, local conservation authority or OMNR office before digging. They can provide information on a number of different options for drain maintenance that are not only endorsed by many agricultural organizations, but are also both environmentally-friendly and cost about the same as traditional methods. When considering these options, a number of different factors need to be examined before starting any open drain maintenance project.

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Mitigation Measures

Timing

Digging should be done so as to avoid local fish spawning or nursing periods. If done at the wrong time, suspended sediments from the maintenance work might prevent spawning, smother eggs or kill young fish.

Option: Do Project in the Summer

Summer may be a good time to do maintenance work when drains

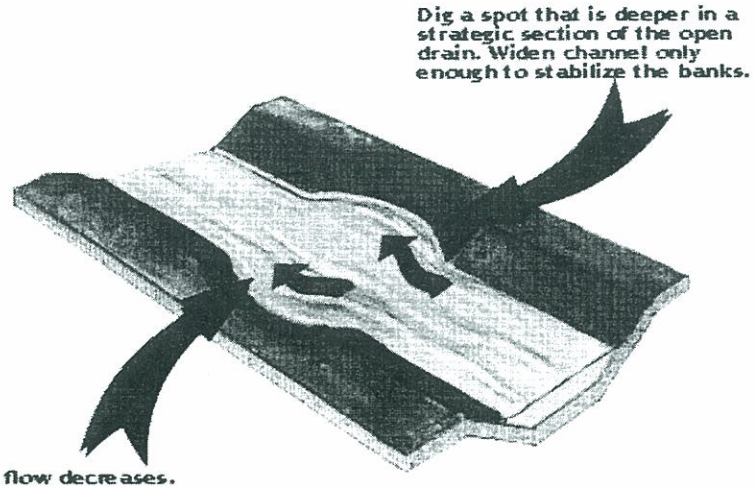
are dry or have little flow. This way the crane or backhoe operators can see exactly what needs to be cleaned out without the obstruction of clouded water. Doing the work when the ditch is relatively dry also ensures that little if any sediment will float downstream where it might impact fish. As well, maintenance should be done as quickly as possible in order to limit the amount of disruption to fish migration and habitat.

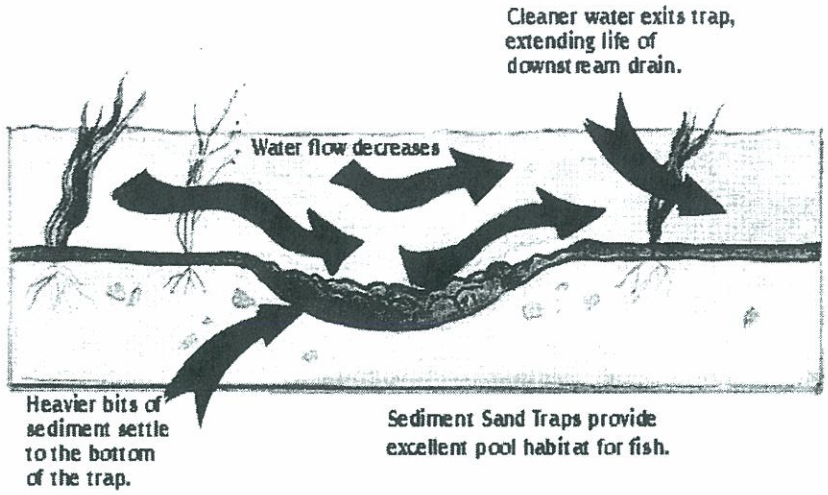
Sediment Controls

If work is undertaken while water is still flowing in the drain, there need to be controls to prevent the flow of sediment downstream. The following options are essentially designed for areas with sandy or sandy loam soils.

Option: Sediment Sand Traps

Sediment Sand Traps are created by strategically digging a spot that is deeper in the open drain. Excessive widening of the channel should be avoided, however the channel should be widened enough to stabilize the banks. This larger hole acts as a settling pond, slowing down water as it drops into the deeper spot. As the water flow decreases, heavier sediments and debris settle to the bottom of the trap, somewhat improving the quality of the water leaving the trap and moving downstream. The sediment sand trap technique can be low cost when compared to other conventional methods. Farmers and municipalities need only worry about cleaning the trap out, which is a lot cheaper than paying for a full-scale clean out. Less of the drain is disturbed and clean out is quicker. Sand traps should be placed in spots easily accessible so as to avoid having to drive over planted crops in order to get maintenance equipment to the site.





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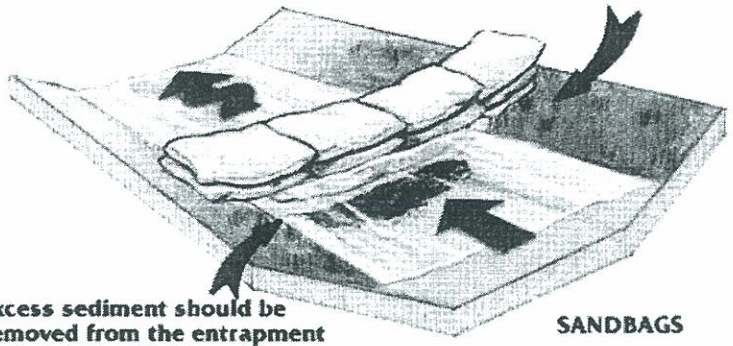
Option: Silt Fences /Straw Bales/Sandbags

Silt fences (those little black curtains we see between construction sites and watercourses), straw bales and sandbags are inexpensive ways to prevent the flow of sediments downstream. Silt fences or straw bales need to be staked into place downstream of the maintenance site. These two options act as filters removing sediment from water. More than one set of curtains or bales may be required.

Sandbags act much like sand traps. By sandbagging the water back, one creates a settling pond where heavier sediment can drop out, allowing relatively cleaner water to flow downstream.

Any of these light weight channel flow controls are only good for handling relatively low flows in small drainage areas for short periods of time. These options only work when they are properly maintained. Care also needs to be taken when removing these controls. Excess sediment should be removed from the entrapment before taking it down. That way the sediment captured will not be released back into the stream.

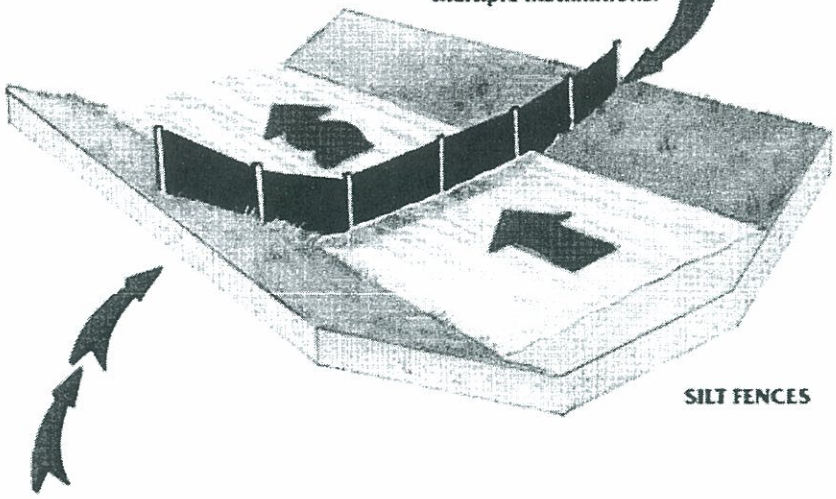
By sandbagging the water back, a settling pond is created. Heavier sediment drops to the bottom, allowing relatively cleaner water to flow downstream.



Excess sediment should be removed from the entrapment before taking it down. That way the sediment captured will not be released back into the stream.

SANDBAGS

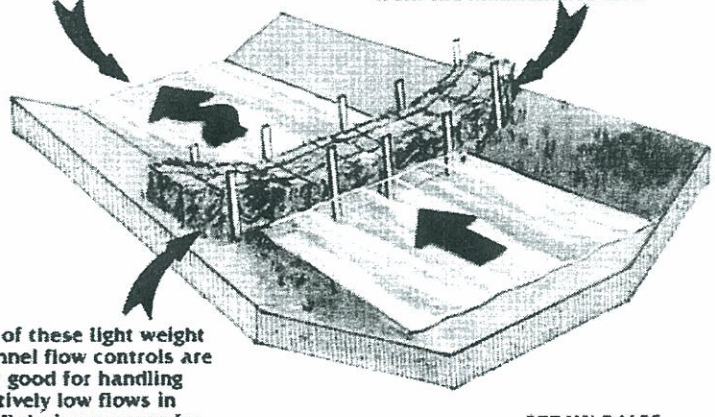
Silt fences or straw bales need to be staked into place downstream of the maintenance site and may require multiple installations.



SILT FENCES

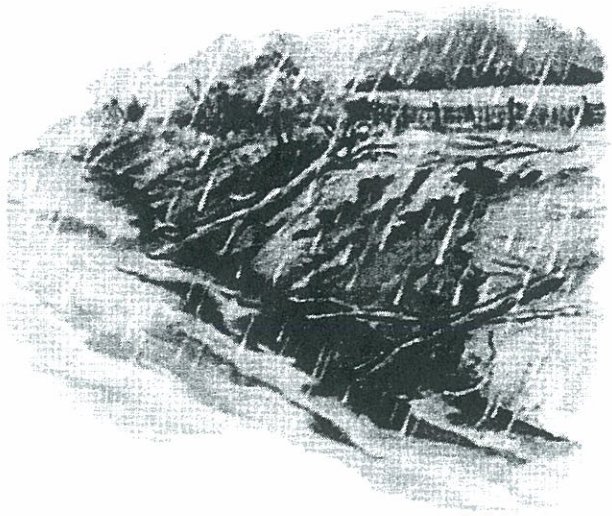
These two options only work when they are properly maintained.

Silt fences and straw bales act as filters removing sediment from water moving downstream from the maintenance site.



Any of these light weight channel flow controls are only good for handling relatively low flows in small drainage areas for short periods of time.

STRAW BALES



To extend drain life, save money on routine maintenance and enhance fish and wildlife habitat, banks need to be protected from erosion

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Erosion Control and Bank Stabilization

Eroding drain banks can be costly to farmers, municipalities and the environment. The more soil collapses into a drain, the more that drain's flow is disrupted. The extra soil entering the system is unlikely to be carried in the water very far. This results in more sediment being deposited, which in turn fills the drain. Eroding banks may lead to trees and other vegetation falling into the watercourse, further diverting and slowing water flow and leading to more erosion. Eventually the ability of the open ditch to drain surrounding land is hampered and further maintenance is required sooner than was originally planned. To extend the life of the drain, save money and help the environment, a number of techniques can be used.

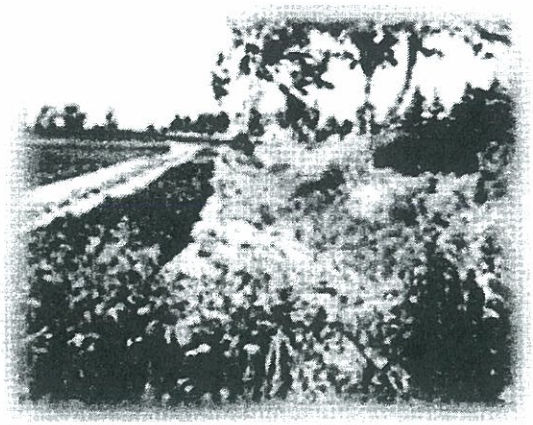
Option: Leave the Banks Alone

Bank erosion is best prevented by not disturbing them at all. Stable banks usually have grass, shrubs and trees growing along them. Vegetation adjacent to the bank helps slow down runoff from the fields, which in turn helps to minimize erosion of the bank. As well, the root systems of vegetation along the banks hold the sides together and stabilize the slopes. Environmentally, the stalks and leaves from the different types of plants slow down runoff and act as a filter by trapping sediment, pesticides and other pollutants - improving the quality of water entering the drain.

Option: Plant Bigger Buffers

Other means to prevent erosion, extend the life of the drain and improve habitat is to plant shrubs, trees and/or increase the size of the vegetated buffer between the field and drain. Bigger buffers can help remove more of the sediment carried by field runoff into the open ditch, and thus minimize the need for drain maintenance. This option might involve taking productive land out of operation. The alternative may be to look at planting such crops as hay or

alfalfa as buffers along the drain. Once these crops are planted, the land can go a number of years without need for being plowed up, crops can be harvested annually, and the root systems remain undisturbed.



Conservation cropping such as the soy beans planted to the left of the drain above, can help stabilize the bank, reduce future drain maintenance and improve habitat for a wide variety of species

Option: Work from One Side of Drain

If vegetation needs to be removed from a ditch, it would be best to remove it from one side only. This way, one side of the ditch is better protected from erosion, less movement of equipment is needed, clean out is quicker and there is less disruption. Where applicable, it is best to leave the south side of the drainage bank alone as that will ensure shade, cover and food sources for fish.

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Option: Remove Vegetation at Intervals

Depending on various circumstances, another option may be to remove vegetation at certain intervals. If an open drain has gone several years without maintenance - trees, shrubs and other brush may have grown to the point where removal of vegetation is required to allow a crane or backhoe access for proper drain clean out. Rather than clearing out all the vegetation, one can remove for example, 20 metres of vegetation on one side of the bank, skip 20 metres, and then continue so on down the one side of the drain. Then to ensure total bottom clean out, do the same on the opposite bank. Later when one needs to maintain the drain, vegetation removal and drain maintenance can be done from the spots that were originally left untouched. While this option may be a bit more costly and time-consuming, the landowner is always guaranteed that there will be mature vegetation along the drain to help stabilize it.

Mature or young trees should be left on either bank. These trees help stabalize the ditch, provide cover and insect food for fish, shade the banks and the water. The shade from the trees also helps prevent the growth of vegitation that may create blockages to drain flow

Option: Brushing

Brushing involves using large mowers to cut the vegetation along the bank. The removal of the plants and shrubs should improve water flow and thus, cause the drain to naturally deepen on its own as faster water tends to scour a watercourse. As well, runoff from the surrounding land is less impeded by mature vegetation when entering the drain. Brushing can also be a helpful step in providing access spots for maintenance equipment to the drain bottom. Regardless of the reason for using the technique, the key to brushing is that it leaves the root system untouched. Thus the drain's banks are stabilized, the mulch from the mowing protects the surface from wind and rain erosion, and reseeding the slope is unnecessary. Care must be taken to make sure the mulch from the brushing that ends up in the waterway is removed so that the drain does not get clogged downstream.

Brushing leaves the root systems intact, stabalizing the banks from erosion. Debris from the brushing protects the banks from winda and rain erosion.

Gentle bank slpoes help reduce erosion by reducing runoff speed

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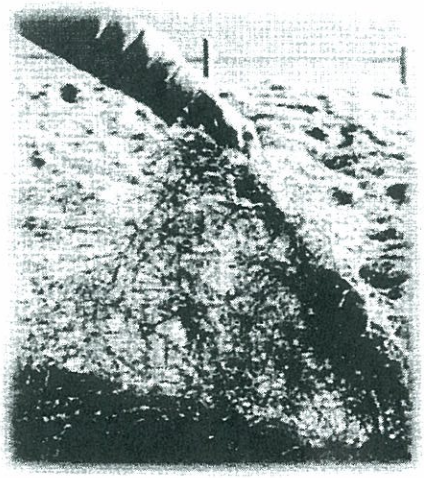
Option: Reseeding

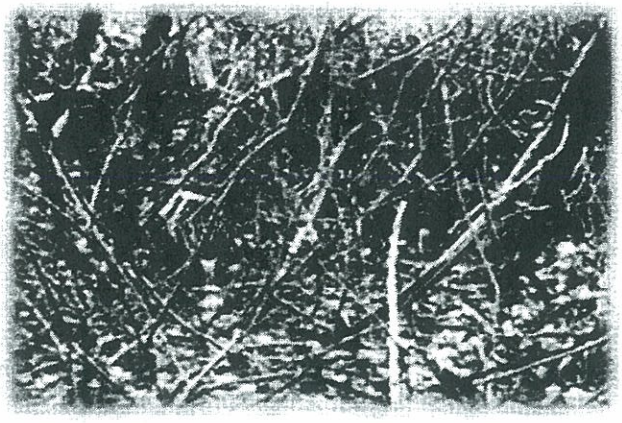
As soon as the drain maintenance is done, one should consider levelling the spoils created from clearout and reseed the work area while the soil is still moist in order to reestablish vegetation and stabilize the bank. If immediate revegetation is not an option (maybe the growing season has passed) then using filter cloth, various mulches or erosion blankets made of natural material might help in protecting the banks from erosion.



Straw blankets, such as the one seen above help protect the exposed area from the wind and rain erosion, and incorporate natural materials to help vegitation get reestablished.

Option: Sloping

When maintaining a drain, it is preferable to have gentle slopes on the banks rather than steep ones. The steeper the grade, the quicker the water enters the drain, the more unstable banks become, and the more likely erosion will take place.



Natural channel design features can be incorporated into drains where appropriate. Natural channels are efficient at moving both water and sedimate, as well as providing long-term stability for the drain and enhancing fish habitat.

Farming and Fish Can Co-Exist

It is hoped that this guide has demonstrated that the needs of farming and the local environment can co-exist in a mutually beneficial manner. Farmers are typically the best stewards of the land; after all, they live on it, make their living from it and are in contact with it daily. This document is designed simply to show that there are a number of cost-effective options that incorporate the natural environment, such as vegetation and its root systems, which will help minimize drain maintenance costs while benefiting the environment at the same time. Thanks to farming organizations, concerned individuals, community groups, conservation authorities, drainage superintendents and many other partners, documents such as this primer and other Best Management Practices have been developed to ensure that farming and the environment endure for future generations of Canadians.

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The Drain Primer

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