GUIDANCE FOR MAINTAINING AND REPAIRING MUNICIPAL DRAINS IN ONTARIO

Version 1.1

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BY

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1. Introduction

Starting in the late 1800's and continuing to the present, an extensive network of agricultural drains developed throughout Ontario with the greatest concentration being in the southwest. Drains constructed and/or maintained under the auspices of the Ontario *Drainage Act* are also referred to as municipal drains.

Although many of the municipal drains have been constructed, natural watercourses have also been channelized and deepened for land drainage. Open municipal drains designed to receive flow from tile drains are often deeper and wider than those designed to deal only with surface water runoff. These drains need to be deeper to allow for the tile (pipe) outlet which must be above the water level of the receiving open drain. Most municipal drains are wider than natural streams with low gradients and they will often fill with sediment over time. Aquatic (instream) and bank vegetation will become established and the characteristics (e.g. meanders, pools, and riffles) of natural streams form in municipal drains over time. These features provide habitat for fish and other aquatic life.

When the capacity of the municipal drain to move water is reduced, maintenance and repair activities may be required. During these types of activities, the aquatic habitats provided by the municipal drain may be permanently altered or destroyed. In many cases, adverse effects on fish habitat resulting from drain maintenance can be minimized or eliminated through modification of maintenance methods, using good construction practices, and adhering to appropriate timing considerations. However, fish communities and supporting habitats found in Class D and E drains are more sensitive to disturbances associated with drain maintenance activities and these activities can have longer term impacts. This does not mean these types of drains cannot be maintained; however, more rigorous mitigation or offsetting measures may need to be applied to ensure that drain maintenance does not result in unacceptable adverse effects. Depending on the activity, the serious harm that may result to fish, and the type of municipal drain, a Class Authorization or a *Fisheries Act* Authorization may be required.

Under section 35(1) of the *Fisheries Act*, "No person shall carry on any work, undertaking or activity that results in *serious harm to fish* that are part of a commercial, recreational, or Aboriginal fishery, or to fish that support such a fishery."

Fisheries and Oceans Canada (DFO) interprets *serious harm to fish* as:

- the **death of fish**;
- a **permanent alteration** to fish habitat of a spatial scale, duration or intensity that limits or diminishes the ability of fish to use such habitats as spawning grounds, or as nursery, rearing, or food supply areas, or as a migration corridor, or any other area in order to carry out one or more of their life processes;
- the **destruction of fish habitat** of a spatial scale, duration, or intensity that fish can no longer rely upon such habitats for use as spawning grounds, or as nursery, rearing, or food supply areas, or as a migration corridor, or any other area in order to carry out one or more of their life processes.

DFO along with the agricultural community recognize that agriculture is a vital component of the economies of Ontario and Canada. At the same time, the economic value of the fishery resources as well as the importance of diverse self-sustaining fish communities to the quality and health of the environment cannot be overlooked. The need for adequate drainage and the need to conserve and protect fish habitat are not exclusive. Drains and fish can coexist. With this in mind, DFO has worked with other agencies and agricultural organizations to develop procedures to allow maintenance and repair of municipal drains to proceed without adversely affecting the fish habitat that these drains provide.

The purpose of this guidance document is to:

1. Outline the regulatory review process for the maintenance of drains in Ontario, with regards to the federal *Fisheries Act* and the *Species at Risk Act* (SARA);
2. Outline roles and responsibilities of other agencies with a regulatory interest in Municipal drain maintenance projects; and
3. Provide user-friendly resources and tools for the drainage community when submitting maintenance activities for review by DFO.

This document is directed primarily toward drain maintenance and repair activities. Non-maintenance undertakings, such as drain enclosure, or works requiring new Drainage Engineer's Reports are discussed briefly in Section 3.4 but are considered separately by DFO. This document includes 13 appendices which collectively provide guidance on submitting drain maintenance projects to DFO for review:

1. **Applicable Legislation** – a summary of federal and provincial legislation applicable to municipal drains.
2. **Step-by- Step Process for Submitting Drains for Review Under the *Fisheries Act*** – an outline of the necessary steps and information required when submitting drain maintenance or repair projects for review.
3. **Municipal Drain Maintenance and Repair Activities Not Requiring DFO Review** – lists of activities that do not need to be submitted to DFO for review; one list for Class A-E and Unrated drains and a separate list for Class F drains.
4. **Best Management Practices** - BMPs for beaver dam removal and culvert replacements in municipal drains.
5. **Avoidance, Mitigation & Offsetting Measures**– a description of the measures listed on the Notification of Drain Maintenance or Repair form.
6. **Municipal Drain Class Fact Sheets** – a series of fact sheets detailing the characteristics of each drain class and the approval process for each.
7. **Sample Class Authorizations**
8. **Notification of Drain Maintenance or Repair Form User Guide** – a guide on how to complete the Notification of Drain Maintenance or Repair form.
9. **Site Specific Reviews** – an outline of the site specific review process, describing when a site specific review is required and what to submit to DFO.
10. **How to Classify a Drain** – standard methods for classifying a municipal drain.
11. **The Science of Drains** – references of relevant scientific papers on fish habitat in municpal drains.
12. **Quick References & Resources** – links to helpful websites and agency contacts.
13. **Glossary**

2. Fish Habitat and Municipal Drains

2.1 What is Fish Habitat?

The *Fisheries Act* is federal legislation that protects Canada's fisheries resources. It defines fish habitat as spawning grounds and any other areas, including nursery, rearing, food supply, and migration areas, on which fish depend directly or indirectly in order to carry out their life processes. It is recognized that fish also require good water quality in order to survive, grow, and reproduce.

Spawning and Nursery Habitat

The type of habitat used by fish for spawning will vary greatly depending on the species present. Boulders, cobble, gravel, instream vegetation, and logs are examples of the types of materials that may be used. In order to be useful, the spawning substrate should not be covered in sediment. Most fish need specific materials, water temperature, and water velocity in order to successfully spawn. For example, coldwater species such as rainbow trout like gravel-bottomed shallows in streams 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.

Nursery habitat is more difficult to define. In general, it can be considered to be any shallow habitat near spawning habitat that provides cover to small fish and is not easily accessible by larger fish.

Cover

Cover provides important habitat for a number of aquatic organisms. It can include areas of deep water, dark coloured waters, instream vegetation, large woody debris (e.g. logs), overhanging bank vegetation, unembedded instream rock and boulders, and undercut banks.

Fish Movement and Migration

Fish move from one area to another to feed, grow, overwinter, or spawn. There may be instances when fish movement and migration is either impeded or completely blocked in streams. Degraded watercourses can lose their thalweg (deepest part in a cross-section of the main channel of a waterway) and pool-riffle pattern. The thalweg provides fish passage during periods of low flow while pools provide important cover and resting areas during low and high flow periods. Thus, in low flow situations there may not be enough water depth for fish movement and migration, and in higher flows there may be faster velocities and nowhere to rest.

Culverts, dams, debris jams, and other structures may also hinder fish passage. Problems with culverts can occur if they are either misaligned with the watercourse or installed on an improper slope on the streambed. If these problems are not corrected, a culvert may become perched (set high off the stream bed at the downstream end), thus totally blocking fish migration. Undersized culverts can also block migration by creating conditions where so much water is flowing through them that the velocity of the water prevents the fish from reaching upstream spawning areas.

Many types of fish undertake migrations on a regular basis, on time scales ranging from daily to annual, and with distances ranging from a few metres to thousands of kilometres.

Riparian Vegetation

Riparian vegetation is found along the banks of a watercourse. It is a key component to fish habitat. Bank vegetation provides a number of benefits to streams including bank stability, cover, food (e.g. insects), nutrient input, and shade.

Riffles-Pools and Step-Pools

Natural streams consist of a series of runs, riffles and pools, or steps and pools (higher gradient streams). Average pool and riffle spacing varies from 5 – 7 channel widths. Pools provide cover, help regulate water temperature, aid in fish passage, and are refuges for fish during low flow periods.

Water Quality

Typically, good water quality means the water is well oxygenated, cooler in temperature, and relatively clear of silt. Some species (e.g. trout species) may be more sensitive to changes in water quality than others.

2.2 Why are Drains Important to Fish Habitat?

Open municipal drains vary from natural watercourses that meander through woodlots and wetlands to highly channelized man-made watercourses adjacent to agricultural fields. Trees, shrubs, and other plants growing along the banks of a municipal drain produce food for fish (insects fall off the overhanging branches into the water) and they also shade the water, providing cooler temperatures for fish. Branches and other woody debris that fall into the water provide cover and materials for spawning. As the watercourse begins to meander, pool and riffle habitats develop.

At first glance, the highly channelized man-made watercourses appear to offer little or no value as fish habitat. However, there may be more fish species present in these drains than most people realize. In some cases, even a drain that remains dry for most of the year may contain important fish habitat. Northern Pike, for example, may use the seasonally flooded vegetation in F drains for spawning in the early spring. Even if no fish species use a municipal drain it can still indirectly support the life processes of fish by providing water, nutrients, and food to a fish population in a connected watercourse. There are many open drains,

especially well established ones that have not been cleaned out on a regular basis, which have developed the characteristics of good fish habitat. Some studies suggest that older, open drains are important to fish production in that they contain larger numbers of fish, as well as a high variety of species. Therefore, drain maintenance must be managed carefully in order to protect habitat while ensuring the ability of the drain to function efficiently.

2.3 Effects of Drain Maintenance Activities on Fish Habitat and Measures to Avoid, Mitigate, or Offset Harm

Drain maintenance and repair activities can affect fish and fish habitat in a number of ways (Table 1). Although the greatest effect of drain maintenance activity is at or near the work site, the impacts may be evident for some distance downstream. Until the municipal drain can renaturalize, the suitability of habitat is reduced and this can affect the diversity of the aquatic community residing in the drain.

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

Although drain maintenance and repair activities can have detrimental effects on fish and their habitats, a number of things can be done to minimize or even eliminate adverse effects arising from these activities. In most cases, adverse effects can be avoided or mitigated through modification of the drain maintenance and repair methods, employing good construction practices, adhering to timing considerations, and using site specific measures to control the sources of these effects. However, incorporating these techniques may require a departure from traditional practices. **Avoidance** and **mitigation** measures that are applicable to most drain maintenance and repair activities are presented in Appendix 5. Some of these measures are listed in Table 1. These measures should be incorporated as routine practices for drain maintenance and repair projects whenever possible and where they are applicable. With the exception of timing restrictions, the suggested measures simply represent good construction practices that should extend the life of the drain. By implementing the recommended mitigation measures, proper drainage can be achieved while avoiding serious harm to fish.

When serious harm is unavoidable, **offsetting** measures are used to counterbalance the loss of fisheries productivity, resulting from a project. These measures are implemented to support and enhance the sustainability and ongoing productivity of the fish and fish habitat present in the drain.

Table 1. Drain Maintenance Activities, Impacts to Fish and Fish Habitat, and Measures to Avoid, Mitigate, or Offset Harm

Activity	Impact to Fish and Fish Habitat	Possible Avoidance, Mitigation and Offsetting Measures (Refer to Appendix 5)
Channelization of the watercourse through deepening, straightening, widening, or smoothing out the bottom	Increased velocity at high flows Loss of riffle and pool habitat Shallower thalweg (main channel) during low flows Increased temperature Decreased bank stability Increased erosion and sedimentation of bank and bed Changes to flow regime (especially baseflows) Lowering of the water table in adjacent wetlands Loss of substrate (e.g. gravel)	Construct rock ramps (e.g. Newbury riffles) and refugia pools to create riffle, run, and pool features Create two-stage low flow channel Leave vegetation and tree canopy on west and south banks Reseeding and riparian planting Bank stabilization (preferably using bioengineering methods) Spot cleanout Avoid gravel substrate areas (potential groundwater upwelling) Replace substrate
Narrowing or blocking of watercourse	Loss of fish passage	Replace perched culverts Staged cleanout Adhere to restricted activity timing windows to avoid spawning periods Create two-stage low flow channel
Removal of aquatic vegetation (instream)	Loss of cover Loss of vegetation for spawning Loss of nutrients, food, and habitat for aquatic insects Decreased channel/bank stability to the receiving watercourse Increased erosion and sedimentation in the drain	Stage cleanout over multiple seasons Spot cleanout Adhere to restricted activity timing windows Install temporary flow check dams during maintenance works to minimize erosion
Removal of riparian vegetation (along the banks)	Loss of shade which increases stream temperature and can cause stress to fish, particularly cold water species (e.g. trout) Loss of nutrients and food for aquatic insects Loss of trees will prevent new woody debris from being added to the drain Decreased channel/bank stability to the receiving watercourse Increased erosion and sedimentation in the drain	Leave vegetation and tree canopy on west and south banks Use bioengineering techniques to stabilize banks and increase structure for cover Limit works to spot cleanout or bottom only cleanout Reseeding of disturbed areas (may be done in combination with temporary erosion control mats) Install silt fencing or straw bales along bank or as flow check dam across the channel
Removal of substrate	Loss of spawning substrate (e.g. gravel) Loss of riffle and pool habitat Loss of aquatic insects Disturbance to the banks and the bottom of ditches from the use of equipment Decreased channel/bank stability to the receiving watercourse	Spot cleanout Avoid or replace gravel substrate areas (potential groundwater upwelling) Construct rock ramps (e.g. Newbury riffles) and refugia pools to create riffle, run, and pool features and trap sediment Install rounded river stone on the bottom of the drain (instead of riprap) to add substrate diversity

	Increased erosion and sedimentation in the drain Mortality of eggs, juveniles, and adult fish	
Removal of woody debris	Loss of cover Loss of woody debris for spawning Increased velocity in the drain Decreased channel/bank stability to the receiving watercourse Increased erosion and sedimentation in the drain	Stage cleanout over multiple seasons Spot cleanout only Construct rock ramps (e.g. Newbury riffles) and refugia pools/sediment traps to create riffle, run, and pool features, diversify flow rates, and trap sediment Use bioengineering techniques to stabilize banks and increase structure for cover Install rootwads
Sedimentation of the work and/or impact zone	Impacts to Fish: • Changing their behavior such as blocking migration or forcing them out of preferred habitat; • Causes clogging of fish gills, which impacts breathing and affects their ability to resist parasites and disease; • Sediment that settles out can smother fish eggs or larvae; and • Mortality. Impacts to Fish Habitat: • Sediment can cover spawning substrate; • Sediment can cover boulders and other types of cover habitat; • Sediment can cover or smother important fish food such as insects and algae; • High sediment loads can bury riffles and reduce the size of pools or fill them in completely (pools are important refuges in the summer and winter); and • Decrease in dissolved oxygen if the bottom substrate is very rich in organic matter.	Work in low or no flow Staged cleanout/construction Limit work to spot cleanout Install silt fence or straw bale barrier along bank Install temporary flow check dam(s) to prevent sediment movement downstream Reseeding of disturbed areas (may be done in combination with temporary erosion control mats) Construct Newbury riffles and refugia pools/sediment traps to create riffle, run, and pool features, diversify flow rates, and trap sediment Create (and maintain) sediment traps Adhere to restricted activity timing windows

3. DFO Review of Municipal Drain Maintenance and Repair Projects

Recent science has demonstrated that municipal drains have similar fish species, diversity, and biomass as natural watercourses and support commercial, recreational, and Aboriginal fisheries (CRA). The maintenance and repair of most municipal drains are subject to the *Fisheries Act,* SARA*, Endangered Species Act* (ESA)*, Conservation Authorities Act,* and *Drainage Act*, which are administered by several different agencies. To facilitate the maintenance and repair of municipal drains, DFO has created a list of maintenance and repair activities that do not require review by DFO (Appendix 3). NOTE: Your project may still need to be submitted to the Conservation Authority and other municipal, provincial, and/or federal legislation may apply. If your drain maintenance or repair activity is not on the list or you cannot meet the required conditions, you should submit your project to DFO for review.

3.1 Classification of Drains

Not all drains 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. DFO, with support from the Drainage Superintendents and Conservation Authorities (CAs), has developed the "Class Authorization Process for the Maintenance of Municipal Drains" (Class Authorization Process) to streamline approvals under the *Fisheries Act* and SARA for certain types of drains. Municipal drains have been mapped and classified into seven categories based on their sensitivity, using parameters such as fish presence and flow (Table 2).

Table 2. Summary of key characteristics of drain classification types.

Class	Flow	Restricted Activity Timing Window[1]	Species	Time Since Last Cleanout[2]	Authorization
A	Permanent	Fall or Combination Spring/Fall	No sensitive fish species present	Not applicable	Class A
B	Permanent	Spring	Sensitive fish species present[5]	Less than 10 years	Class B
C	Permanent	Spring	No sensitive fish species present	Not applicable	Class C
D	Permanent	Fall or Combination Spring/Fall	Sensitive fish species present[5]	Not applicable	Site specific
E	Permanent	Spring	Sensitive fish species present[5]	Not applicable	Class E
F	Intermittent	Periods of Flow[4]	Not applicable	Not applicable	None[3] - if work cannot be done when drain is dry, frozen, or there is no flow
Unrated	Unknown	Unknown	Unknown	Unknown	Class Authorization or Site Specific[6]

Note:

[1]Restricted activity timing windows vary by geographic location and fish species present. Additional guidance is available at: www.dfo-mpo.gc.ca/pnw-ppe/timing-periodes/index-eng.html.

[2]Time since last cleanout is no longer collected as part of the Drain Classification Project as per a decision made by the Drainage Action Working Group (DAWG) in 2010. No new Class B drains will be assigned and any existing Class B drains will not change classification unless new data becomes available to support the reclassification.

[3]If work was to occur during a period of flow (e.g. spring), a site specific review will be required.
[4]Flow is defined as the movement of water between two points.
[5]For details, see Appendix 10 – Sensitive Fish Species List.
[6]If there is data on flow and fish species for the drain, a Class Authorization may be issued; otherwise, a site specific review will be required.

3.1.1 Drain Class A-C, E: The Class Authorization Process

The Class Authorization Process allows drainage superintendents to receive their authorization for maintenance and repair activities in certain drains (i.e. Class A, B, C, and E) much faster than the usual *Fisheries Act* Authorization. A Class A, B, C, or E Authorization can be issued to permit serious harm to fish when undertaking maintenance and repair activities in those classes of municipal drains. Serious harm could include incidental death of fish through dredging activities, and/or the permanent alteration and destruction of fish habitat.

Class Authorizations are only applicable to maintenance and repair activities that are undertaken under Sections 74, 77, and 78 of the *Drainage Act* as follows:

74. Maintenance of drainage works and cost

77. Deepening, widening or extending without report of engineer, or

78. Improving, upon examination and report of engineer.

A list of low-risk activities for Class A-E and Unrated drains not requiring DFO review is provided in Appendix 3. If the activity is not listed or the conditions specified cannot be met, a Notification of Drain Maintenance or Repair form (Appendix 8) should be completed and the Step-by-Step Process for submitting drains for review (Appendix 2) should be followed. After receiving approval, the work must be undertaken according to conditions specified in the Authorization which are based on the type and sensitivity of fish habitat found in the drain. Example Class Authorizations are provided in Appendix 7. If for some reason the work cannot be undertaken according to the conditions of the Class Authorization, a site specific review will be required and additional time will be required to complete this review.

3.1.2 Drain Class D, Unrated, and Drains Containing Species at Risk (SAR) Species: The Site Specific Review Process

As with other drain classes, some low risk maintenance activities may be undertaken in Class D drains without DFO review. A list of low-risk activities in Class A-E and Unrated drains not requiring DFO review is provided in Appendix 3. If the activity is not listed or the conditions specified cannot be met, work proposed on Class D drains will require a site specific *Fisheries Act* review and, if required, a project specific *Fisheries Act* Authorization. A Class D drain has sensitive fish species in them and contain higher quality habitat that may be significantly impacted by maintenance activities. (A list of sensitive fish species is provided in Appendix 10.) As such, a site specific review is needed to ensure that adequate mitigation measures are taken to prevent serious harm, or that appropriate offsetting measures are implemented when serious harm cannot be avoided.

Drains that have been classified as “Unrated” are those drains where data (particularly fish sampling data) has not been collected in the field. Unless there is adequate data to characterize the municipal drain, a site specific review is required. DFO will determine if there is any data available that can be used to classify the drain.

To obtain a drain classification for an Unrated drain, the protocol, Guide to Classifying Ontario Municipal Drains, in Appendix 10 must be followed. DFO must be contacted to discuss and coordinate an approach to sampling Unrated drains.

A site specific review is required for drains that contain aquatic Species at Risk (SAR) present (fishes or mussels) that are listed on SARA Schedule 1 as threatened and endangered, and/or their critical habitat. If SAR and/or critical habitat are present in the drain or a connecting water body, it is best to plan ahead and review DFO's SAR Maps on the following website: http://www.dfo-mpo.gc.ca/species-especes/fpp-ppp/index-eng.htm. To obtain specific information about aquatic SAR presence and/or critical habitat to help with project planning, proponents may also contact DFO at: 1-855-852-8320 or by email at FisheriesProtection@dfo-mpo.gc.ca. See Section 3.3 below for more information.

3.1.3 Drain Class F

Some drains are intermittent systems providing habitat for a portion of the season to fish species. Class F drains are intermittent watercourses dry for at least 3 months of the year and works can typically proceed without DFO review using appropriate mitigation measures (e.g. work during no flow) and Best Management Practices. DFO has created a list of maintenance and repair activities that do not require review by DFO in F drains (Appendix 3). If the activity is not listed or the conditions specified cannot be met, a Notification of Drain Maintenance or Repair form (Appendix 8) should be completed and the Step-by-Step Process for submitting drains for review (Appendix 2) should be followed.

Note: If SAR or their critical habitat are found in the work of impact zone of an F drain, the drain maintenance or repair project must be submitted for a site specific review as described in section 3.1.2 above. Snow/ice-free photographs along various sections of the drain should also be submitted.

3.2 Submitting a Drain Maintenance Project to DFO for Review

The Step-by-Step process for submitting drain maintenance and repair projects for review by DFO is provided in Appendix 2. It is recommended that this summary be referred to regularly when submitting drain maintenance and repair projects for review.

To request a review by DFO, the applicant should review current Drain Classification Maps (available at the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) AgMaps website: http://www.omafra.gov.on.ca/english/landuse/gis/portal.htm) and SAR Maps (available at the website: http://www.dfo-mpo.gc.ca/species-especes/fpp-ppp/index-eng.htm). A copy of these maps with the drain maintenance and repair activities clearly marked on the map should be submitted to DFO along with the completed Notification of Drain Maintenance or Repair form (Appendix 8). **Snow/ice-free photographs along various sections of the drain should also be submitted.**

In many cases, the check boxes on the Notification of Drain Maintenance or Repair form do not provide adequate details of the work proposed, or *why* the works are required. Any notes that can be provided on the form, or in a cover email, are helpful to the reviewing biologist to understand the need for the maintenance/repair and the works planned. The more information that can be provided up front, the faster the review can be completed. Often, conversations with drainage superintendents reveal important information that could not be derived from the information submitted.

Page two of the Notification of Drain Maintenance or Repair form lists common options for Avoiding, Mitigating, and Offsetting serious harm to fish and fish habitat.

Select the appropriate offsetting options that can be successfully implemented. The number and size of the offsetting measures used should reflect the scale and extent of the disturbance. Note: No offsetting is required for F drains (Section 6C of the form). Forms without these sections completed will be considered to be incomplete and will be returned to the drainage superintendent for completion. It is important to provide the details and dimensions of the options you select along the right hand side of the form. ***Important:*** ***Once you have signed and submitted the form, the options selected in this section become a legal requirement which is enforceable and needs to be implemented as part of the proposed works.*** The applicant must be prepared to implement the selected options and these options should be relevant to the proposed work. Each of the listed measures are discussed in Appendix 5.

The completed and signed Notification of Drain Maintenance or Repair form, photographs, mapping, and any other relevant information is submitted by email to fisheriesprotection@dfo-mpo.gc.ca. Where applicable, it is recommended that you copy the CA on the email. Plan ahead and submit your notification form early to avoid project delays.

Once the submission has been received, DFO verifies the drain class, screens for SAR, signs off on the notification form and, for Classes A, B, C, and E issues the Class Authorization, allowing the applicant to proceed with their work. The Class Authorization review process is much faster in comparison to the site specific review process.

For Class D and Unrated drains, a site specific review is conducted. If it is determined that the proposed works are not likely to cause serious harm to fish and fish habitat, a letter of advice will be issued. If it is determined the proposed works are likely to cause serious harm and will require a *Fisheries Act* Authorization, the applicant will be notified and will be required to submit an offsetting plan and letter of credit to DFO (Appendix 9). Drains with federal SAR are reviewed by DFO and may require a SARA Permit or Authorization. If the proposed drainage work will impact provincial SAR, an ESA Authorization may be required. For more information about ESA Authorizations and regulatory exemptions, see the Government of Ontario's website at: http://www.ontario.ca/environment-and-energy/endangered-species-permits-and-authorizations. Figure 1 illustrates the submission process for proponents and Figure 2 outlines the DFO review and approval process for municipal drain maintenance and repair projects.

Please note: If there is reason to believe that a drain's classification is incorrect, a request to update its classification can be made (Appendix 10).

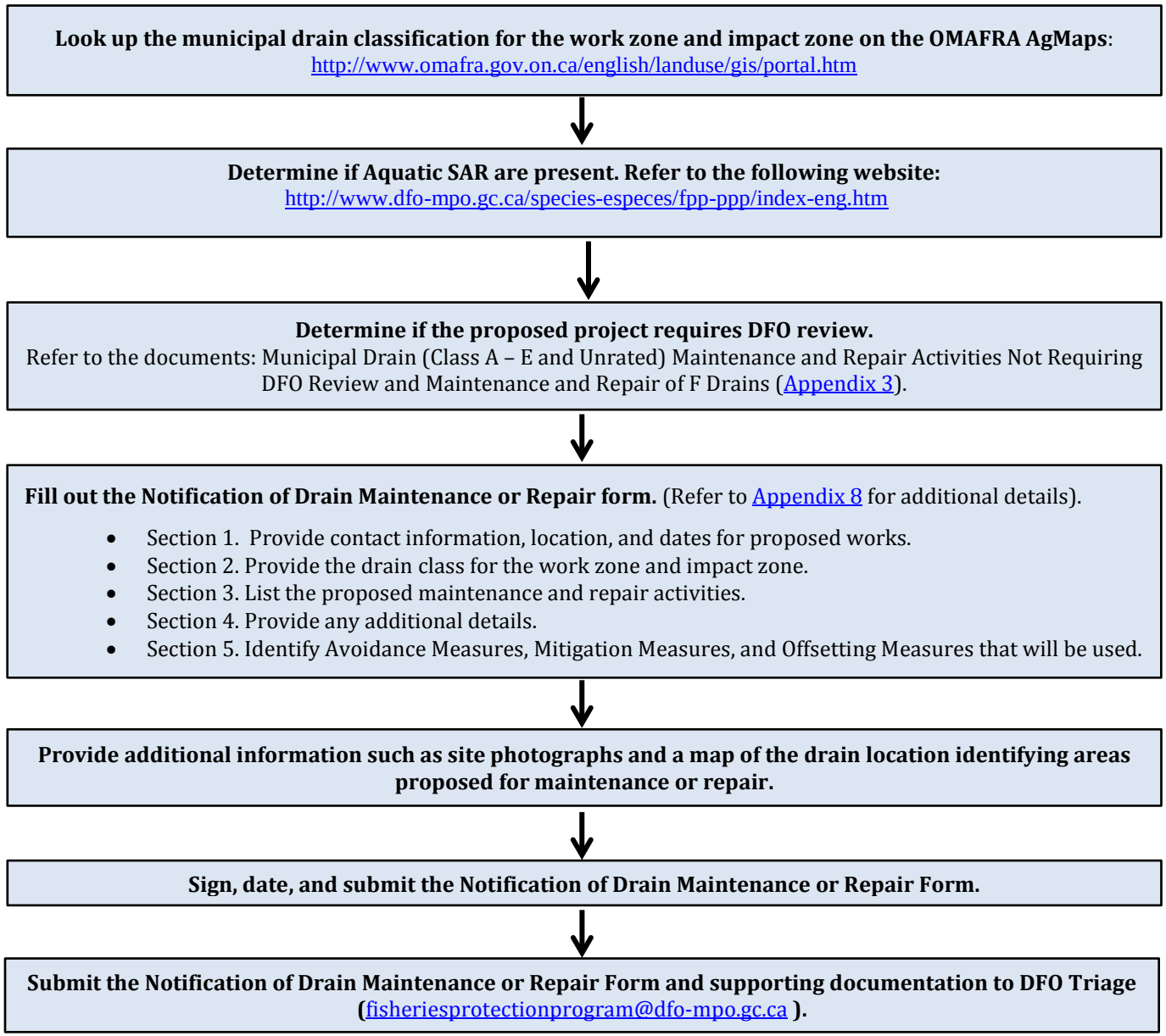

Figure 1. Proponent submission process (for additional information refer to Appendix 2 and Appendix 9).

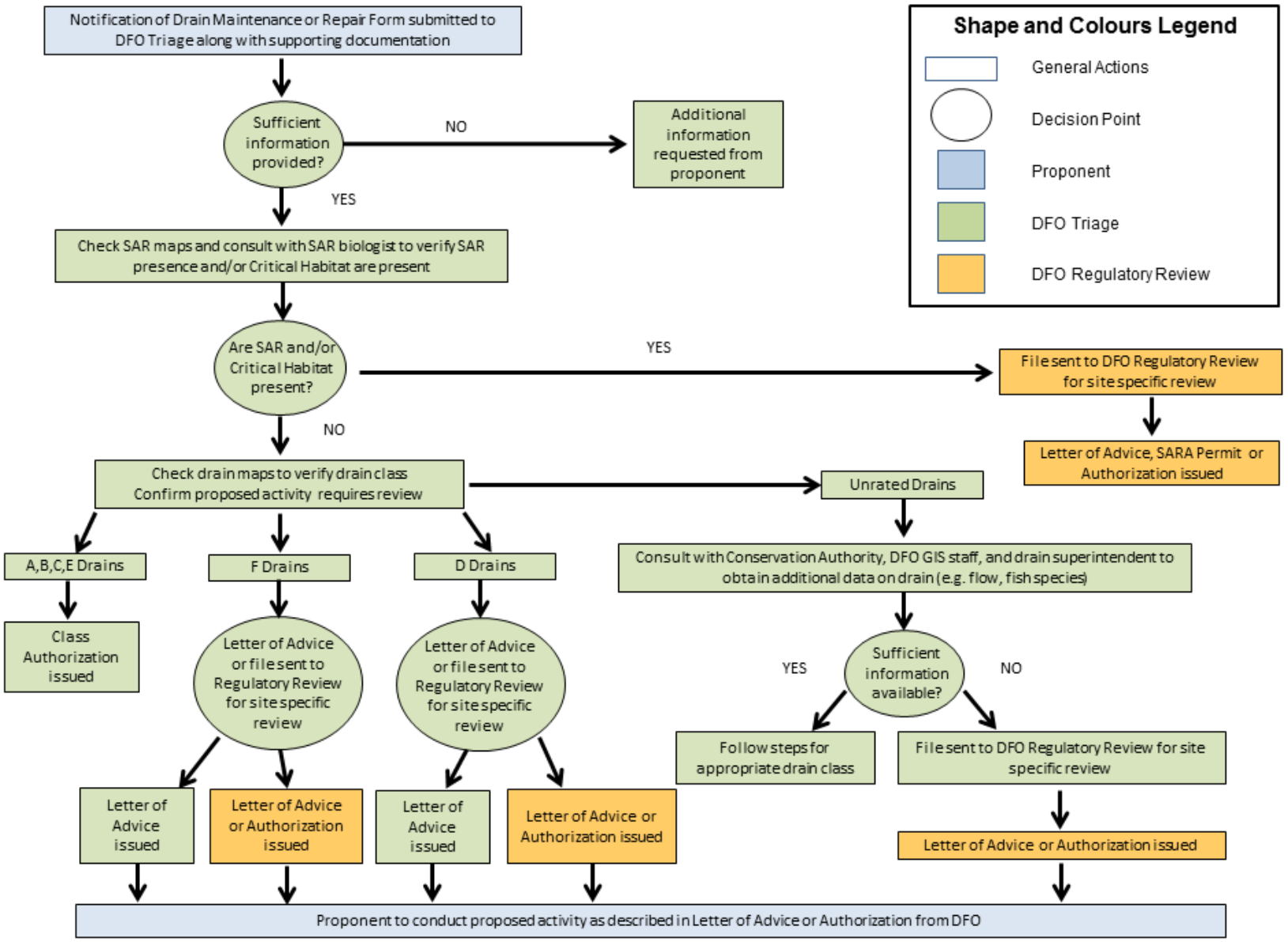

Figure 2. DFO drain review and approval process

3.3 Additional Considerations for Aquatic SAR

To aid proponents and agencies in the review of project proposals that may impact federally listed aquatic SAR and their habitats, a series of distribution maps has been developed. These distribution maps were designed to help streamline the integration of SARA into the referral process and to ensure that DFO meet their responsibilities to protect aquatic SAR.

To determine if SAR are found in the work zone or impact zone (1 km downstream), refer to the following website: http://www.dfo-mpo.gc.ca/species-especes/fpp-ppp/index-eng.htm. These maps are used as a screening tool to determine whether aquatic SAR or areas containing their critical habitat may be present at proposed project sites including municipal drains.

Projects that have the potential to contravene SARA must be referred to DFO for review to ensure compliance with SARA. DFO will review projects under SARA to determine whether SAR and/or critical habitat will potentially be impacted (work zone and/or impact zone) by proposed project activities. This review is completed concurrently with a review under the *Fisheries Act* in order to streamline regulatory processes. Aquatic SAR will be protected through the implementation of mitigation measures, by project redesign, or the authorization of the project may be denied.

If a proposed drain maintenance and repair project is likely to impact aquatic SAR and/or critical habitat, the proponent should complete the Notification of Drain Maintenance or Repair form, check off the SAR option in Section 2 of the form, and submit it to FisheriesProtection@dfo-mpo.gc.ca.

3.4 Non-Maintenance Project Reviews by DFO

The Class Authorization System applies to municipal drain work that constitutes maintenance and repair. Review of "non-maintenance" works (new drain creation, drain enclosure, etc.) needs to follow the normal regulatory review process (i.e. a site specific review).

Non-maintenance drain project proposals are submitted to DFO by completing a request for review form found on the website: www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html and emailing the form to DFO (FisheriesProtection@dfo-mpo.gc.ca). A biologist from the Fisheries Protection Program will conduct a review of the project to determine whether the proposed works are likely to cause serious harm to fish or fish habitat.

When a Drainage Superintendent proposes work for newly constructed and/or modified drains (sections 4 and/or 78 of the *Drainage Act*), a Notification of Drain Maintenance or Repair form can be sent to DFO and the local CA. A drainage superintendent should clearly outline (on a map) the location and extent of the new drain. DFO's SAR Maps should be referenced to determine whether there are federal aquatic SAR and/or critical habitat present (http://www.dfo-mpo.gc.ca/species-especes/fpp-ppp/index-eng.htm).

Return to:

TOA

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APPENDIX 1

APPLICABLE LEGISLATION

1. *FEDERAL LEGISLATION*
   - 1.1 *DFO AND THE FEDERAL FISHERIES ACT*
   - 1.2 *DFO AND THE SPECIES AT RISK ACT (SARA)*
2. *PROVINCIAL LEGISLATION*
   - 2.1 *OMAFRA AND THE DRAINAGE ACT*
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APPLICABLE LEGISLATION

1 Federal Legislation

The protection of fish and fish habitat is a federal responsibility under the *Fisheries Act* and is administered by Fisheries and Oceans Canada (DFO). DFO also administers the *Species at Risk Act* (SARA) for aquatic species (fish and mussels). Within DFO, there are a number of sectors involved in the protection of fish and fish habitat in drains.

DFO Science: responsible for research on fish and fish habitat in drains, providing the science behind DFO's regulatory decision-making.
Fisheries Protection Program: responsible for the regulatory review and monitoring of projects in and around municipal drains where fish and/or fish habitat could be impacted.
Species at Risk (SAR) Program: responsible for the protection of aquatic SAR (fish and mussels) wherever they are found including municipal drains.
Conservation & Protection: responsible for **compliance and enforcement** of the *Fisheries Act* and SARA to ensure protection of fish and fish habitat.

1.1 DFO and the *Fisheries Act*

The Fisheries Protection Program's specific responsibilities for the management and protection of fish, fish habitat, and promotion of fish passage appear in sections 20, 21, 35, and 37 of the *Fisheries Act*. The 2012 changes to the *Fisheries Act* include a prohibition against causing serious harm to fish that are part of or support a commercial, recreational, or Aboriginal fishery (section 35), provisions for flow and passage (sections 20 and 21), and a framework for regulatory decision-making (sections 6 and 6.1). Section 6.1 of the *Fisheries Act* sets out the purpose of the fisheries protection provisions *to provide for the sustainability and ongoing productivity of commercial, recreational and Aboriginal fisheries*. These provisions guide the Minister's decision-making process in order to provide for sustainable and productive fisheries (a summary of the *Fisheries Act* sections and an overview of the Regulation-making Authorities under the Act appear in the Fisheries Protection Policy Statement (2013) found at http://www.dfo-mpo.gc.ca/pnw-ppe/pol/index-eng.html). These sections, along with the policy statement and the "Fisheries Productivity Investment Policy: A Proponent's Guide to Offsetting" (DFO, 2012) found at http://www.dfo-mpo.gc.ca/pnw-ppe/offsetting-guide-compensation/index-eng.html, provide the legislative and policy guidance for the Fisheries Protection Program.

Under section 35(1) of the *Fisheries Act*, "No person shall carry on any work, undertaking or activity that results in *serious harm to fish* that are part of a commercial, recreational, or Aboriginal fishery, or to fish that support such a fishery."

DFO interprets *serious harm to fish* as:

- the **death of fish**;
- a **permanent alteration** to fish habitat of a spatial scale, duration or intensity that limits or diminishes the ability of fish to use such habitats as spawning grounds, or as nursery, rearing, or food supply areas, or as a migration corridor, or any other area in order to carry out one or more of their life processes;
- the **destruction of fish habitat** of a spatial scale, duration, or intensity that fish can no longer rely upon such habitats for use as spawning grounds, or as nursery, rearing, or food

supply areas, or as a migration corridor, or any other area in order to carry out one or more of their life processes.

The **Fisheries Protection Program** of DFO reviews project proposals in and around water under both the *Fisheries Act* and SARA. When serious harm to fish may result from a proposed activity, the project must be submitted to DFO for review. When a project is referred to DFO, staff conduct their own review of the project information to determine whether fish or fish habitat will be affected by the project. Biologists at DFO will work with the proponent to avoid and mitigate impacts where possible. The subsection 35(1) prohibition will be applied to those projects that have the potential to cause serious harm to fish. These projects are likely to reduce the ability of the fish habitat to directly or indirectly support the life processes of fish or result in the death of fish.

When proponents are unable to completely avoid or mitigate serious harm to fish, their projects will normally require authorization under subsection 35(2) of the *Fisheries Act* in order for them to proceed without contravening the Act. DFO staff will work with the proponent to offset the impacts and issue an Authorization, or the Authorization could be denied.

1.2 DFO and the *Species at Risk Act* (SARA)

The federal SARA was brought into force to prevent wildlife species from becoming extinct. It requires Canada to provide for the recovery of SAR due to human activity, and to manage species of special concern, in order to prevent them from becoming endangered or threatened. SARA prohibits the killing, harming, harassing, capturing, or taking of SAR and makes it illegal to damage or destroy their residences and destroy critical habitats.

The Minister of Fisheries and Oceans is responsible for aquatic SAR, except for those located in national parks, national historic sites, or other protected heritage areas under the administration of the Parks Canada Agency (PCA).

The review of any proposed projects will take into consideration the protection of SAR by ensuring compliance with the prohibitions of SARA as described below or any prohibitions identified in section 80 Emergency Orders. Section 32, 33, and 58 prohibitions only apply to endangered or threatened species listed on Schedule 1 of SARA, and to extirpated species only if a SARA-compliant Recovery Strategy recommends its reintroduction to Canada, whereas activities prohibited by a section 80 Emergency Order apply to the species targeted by the Order.

The section 32, 33, and 58 prohibitions under SARA are:

> 32(1). No person shall kill, harm, harass, capture, or take an individual of a wildlife species that is listed as an extirpated species, an endangered species or a threatened species...
>
> 33. No person shall damage or destroy the residence of one or more individuals of a wildlife species that is listed as an endangered species or a threatened species or that is listed as an extirpated species if a recovery strategy has recommended the reintroduction of the species into the wild in Canada…
>
> 58(1). Subject to this section, no person shall destroy any part of the critical habitat of any listed endangered species or of any listed threatened species or of any listed extirpated species if a Recovery Strategy has recommended the reintroduction of the species into the wild in Canada…

The list of species subject to SARA is revised periodically by the Minister of the Environment and the Minister of Fisheries and Oceans in response to bi-annual assessments conducted by the *Committee on the Status of Endangered Wildlife in Canada* (COSEWIC). For an up-to-date list of wildlife species, refer to the SARA Public Registry at: www.sararegistry.gc.ca.

SARA permits may be necessary when the individuals, the residences, or the critical habitat of extirpated, endangered, or threatened fishes or mussels listed under SARA may be negatively affected by a proposed project activity. A SARA permit will be required prior to initiation of any project construction activities when:

- Project activities may cause incidental harm to a SAR, in particular the contravention of any one of the three SARA prohibitions (sections 32, 33, and 58);
- Field surveys are proposed to detect fish or mussel SAR, including any monitoring programs for SAR; and
- Mitigation strategies include either SAR mussel relocations or fish salvage operations.

DFO will assess the project under the *Fisheries Act* and SARA to determine whether a SARA permit or SARA compliant-*Fisheries Act* Authorization will be required or if the project may be denied.

If a SARA permit only is required, DFO will send the proponent the application form. Once it has been completed and received by DFO, DFO has 90 days to issue or refuse a SAR permit under the "Permits Authorizing an Activity Affecting Listed Wildlife Species Regulations" http://laws-lois.justice.gc.ca/eng/regulations/SOR-2013-140/FullText.html.

All of the following SARA permitting pre-conditions must be met or the work will not be permitted:

- All reasonable alternatives to the activity that would reduce the impact on the species have been considered and the best solution has been adopted;
- All feasible measures will be taken to minimize the impact of the activity on the species or its critical habitat or the residences of its individuals; and
- The activity will not jeopardize the survival or recovery of the species.

2 Provincial Legislation

2.1 OMAFRA and the *Drainage Act*

Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) is responsible for the general administration of the *Drainage Act*. This provincial statute permits property owners to petition their local municipality for a solution to their drainage problems. The local municipality is responsible for administering the communal process under the *Drainage Act*, and once a drainage system is designed and adopted by municipal by-law, the project is constructed. Project costs are assessed to the properties in the catchment area of the drain that benefit from or

contribute water to the drainage system. Once constructed, it is known as a "municipal drain" and the municipality is responsible for all aspects of managing this drainage infrastructure. Physical changes to a municipal drain can only be made by working through the municipality responsible for managing the drainage system. The *Drainage Act* also empowers the municipality to take action against anyone who blocks or damages (including unauthorized changes) a municipal drain.

The *Drainage Act* delegates responsibility for drainage to Drainage Superintendents who represent the municipalities. Private drains constructed on agricultural land have no legal status under the *Drainage Act*, but they are subject to review under the other pieces of legislation: *Fisheries Act,* SARA, ESA*, and Conservation Authorities Act*.

Municipal drains are constructed under the "petition drain" procedures of the *Drainage Act*. The municipality passes a by-law that adopts a drainage engineer's report containing plans, profiles, and specifications. This report forms the basis for municipal drain approvals, construction, and maintenance works. Sections 4 and 78 are key sections of the *Drainage Act*. Section 4 deals with the construction of a new municipal drain where no municipal drain existed. This could include the excavation of a new drain out of dry land or modifying an existing watercourse to meet the drain requirements. Section 78 deals with the modification or improvement to an existing municipal drain.

2.2 OMNRF Approvals and Authorizations

Lakes and Rivers Improvement Act (LRIA)
It should be noted that approval is not required by Ontario Ministry of Natural Resources and Forestry (MNRF) under the *Lakes and Rivers Improvement Act* (LRIA) for the installation or maintenance of a municipal drain, subject to the provincial *Drainage Act*. Note: This exemption would not apply to situations when dams (e.g. water control structures, pump stations) are constructed under the authority of the *Drainage Act*.

LRIA approval may be required for the construction or maintenance of a drain not subject to the *Drainage Act*, under the circumstances outlined in Ontario Regulation 454/96. Work permits under the *Public Lands Act* (PLA) administered by MNRF are required for drainage works involving dredging and filling of shore lands.

Endangered Species Act, 2007 (ESA)
In 2007, Ontario took steps to strengthen the protection of its Ontario SAR and their habitat by replacing the *Endangered Species Act, 1971* with updated legislation. The *Endangered Species Act, 2007* (ESA) came into force in June 2008. The purpose of the ESA is:

- To identify Ontario SAR based on best available scientific information, including information obtained from community knowledge and aboriginal traditional knowledge;
- To protect Ontario species that are at risk and their habitats, and promote the recovery of species that are at risk; and
- To promote stewardship activities to assist in the protection and recovery of Ontario species that are at risk.

The ESA provides:

- Science-based assessment: species are assessed by an independent body based on the best-available science and Aboriginal Traditional Knowledge

- Automatic species protection: species classified as endangered or threatened automatically receive legal protection
- Habitat protection: when a species is classified endangered or threatened, its habitat is also protected

There are timelines in the law for producing strategies and plans to recover at-risk species. There are also tools to help reduce the impact of human activity on species and their habitats and to encourage protection and recovery activities.

The government protects SAR by restricting activities that may affect threatened and endangered SAR or their habitats. In some cases, a broad restriction may not be practical or even possible. Under the ESA, the MNRF can grant different types of permits or other Authorizations for activities that would otherwise not be allowed, with conditions that are aimed at protecting and recovering SAR. These Authorizations are intended to ensure that Ontario's businesses and residents continue to prosper while protecting and recovering the province's at-risk animals and plants.

Municipalities need to follow certain rules if they are improving, maintaining, or repairing a drain ditch that could affect a protected species or habitat or if the project was approved to a certain stage before or within two years of a species being listed. Different rules apply if you are building a new drain or ditch. For more information about ESA Authorizations and regulatory exemptions, see the Government of Ontario's website at: http://www.ontario.ca/environment-and-energy/endangered-species-permits-and-Authorizations.

Information collected by municipalities to inform/notify DFO and the Conservation Authority (CA) as per the Notification of Drain Maintenance or Repair form can help inform decisions regarding the ESA. The local MNRF district office can also be contacted for information and/or technical advice.

2.3 Conservation Authorities (CAs) and the *Conservation Authorities Act*

CAs are watershed-based, resource management agencies created through legislation by the province at the request of two or more municipalities in accordance with the requirements of the *Conservation Authorities Act* which is administered by the MNRF. Under the *Conservation Authorities Act*, CAs undertake programs to further the conservation, restoration, development, and management of natural resources in their jurisdictions for the province and as approved and developed in conjunction with municipalities through the municipal representation that comprises each CA Board.

CAs may have at their disposal extensive fish habitat information and may have prepared fisheries/fish habitat management plans that would benefit program development in their watersheds. CAs, where resources allow, provide technical advice and information related to fisheries and aquatic resources during the planning and/or early design of projects in their jurisdiction.

Under regulations of the *Conservation Authorities Act* approved by the MNRF, CAs regulate development and activities in or adjacent to river or stream valleys, Great Lakes and inland lakes shorelines, watercourses, hazardous lands and wetlands. Section 28 of the *Conservation Authorities Act* defines the legislative authority and the following subsection has been enacted in Ontario regulations:

28(1) Subject to the approval of the Minister, an authority may make regulations applicable in the area under its jurisdiction,

(b) prohibiting, regulating, or requiring the permission of the authority for straightening, changing, diverting, or interfering in any way with the existing channel of a river, creek, stream or watercourse, or for changing or interfering in any way with a wetland;

(c) prohibiting, regulating or requiring the permission of the authority for development if, in the opinion of the authority, the control of flooding, erosion, dynamic beaches, or pollution or the conservation of land may be affected by the development.

The areas regulated by a CA are defined in the written text of their individual Ontario Regulations consistent with section 28.

Further information can be found on the MNRF's website at: https://www.ontario.ca/page/conservation-authorities and on Conservation Ontario's website at: www.conservationontario.ca.

2.4 *Drainage Act* and *Conservation Authorities Act* Protocol

OMAFRA and MNRF, based on work developed by the *Drainage Act* & (Section 28) Regulations Team (DART) released the *Drainage Act and Conservation Authorities Act Protocol* in November, 2012. The protocol is intended to provide best practices for good working relationships between municipalities and CAs and to streamline the process of receiving permissions under *Conservation Authorities Act* regulations for drain maintenance and repair work under the *Drainage Act*. The DART is a multi-stakeholder team, led by staff, from both agencies, and with representatives from the drainage sector, agricultural sector, CAs, and municipalities.

The protocol streamlines permissions by providing a set of Standard Compliance Requirements (SCRs) for routine drain maintenance and repair activities. The SCR contains basic standards that would need to be upheld in carrying out the maintenance or repair activity in order to be in compliance with the *Conservation Authorities Act* requirements. CA staff can use these SCRs to provide permission for an activity rather than using a regular permit process. CA staff signing off on the use of a SCR constitutes written permission under the *Conservation Authorities Act* regulations. The protocol also uses a Notification of Drain Maintenance or Repair form which combines CA and DFO requirements and must be sent directly to each organization by the Drainage Superintendent, if required, to advise them of the proposed project.

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APPENDIX 2

STEP-BY-STEP PROCESS FOR SUBMITTING DRAINS FOR REVIEW UNDER THE *FISHERIES ACT*

STEP-BY-STEP PROCESS FOR SUBMITTING DRAINS FOR REVIEW UNDER THE *FISHERIES ACT*

When drain maintenance or repair is required on a municipal drain:

☐ **Look up the current municipal drain classification for the work zone and impact zone (1 km downstream of the work area)** on the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) AgMaps website: http://www.omafra.gov.on.ca/english/landuse/gis/portal.htm. Please note: If there is concern with a specific drain's current classification, refer to Appendix 10.

☐ **Determine whether Aquatic Species at Risk (SAR) may be found in or near your site** by referring to the current SAR Mapping on the following website: http://www.dfo-mpo.gc.ca/species-especes/fpp-ppp/index-eng.htm.

☐ **Refer to the documents *Municipal Drain (Class A – E and Unrated) Maintenance and Repair Activities Not Requiring DFO Review* and *Maintenance and Repair of F Drains*** (Appendix 3).

- If your drain maintenance or repair activity is on one of the lists and you can meet the specified conditions, you do not need to submit your project to DFO for review. NOTE: Your project may still need to be submitted to the Conservation Authority for review.
- If your activity is not on one of the lists, proceed to the next step.

☐ **Refer to the Drain Class Fact Sheet for the appropriate drain classification** (Appendix 6). These forms identify the characteristics of each drain type, the conditions of Class Authorizations (Class A, B, C, and E only), and information requirements for submitting your project to DFO for review.

☐ **Fill out the Notification of Drain Maintenance or Repair form (See Appendix 8 for guidance).**

- ☐ Section 1: Complete details and identify the drain class for both the work zone and the impact zone (1 km downstream of the work area). The geographic location coordinates and lot and concession information for your project area should be included on the form.
- ☐ Section 2: Provide the drain classification information from the OMAFRA site, including whether SAR may be present in the work zone or impact zone.
- ☐ Section 3: Identify the drain type, *Drainage Act* Section, and identify the type of maintenance or repair proposed. If submitting forms for multiple drains at one time, please provide specific details for each drain. Often multiple forms are received by DFO at once and all indicate the same type of activity (e.g. bottom cleanout) when in fact the required work is different for each drain.
- ☐ Section 4: In many cases, the check boxes on the notification form do not provide adequate details of the work proposed, or *why* the works are required. Any notes that can be provided in this section are helpful to the reviewing biologist to understand the need for the maintenance/repair and the works planned. The more information that can be provided up front, the faster the review can be completed. Often, conversations with drainage superintendents reveal important information that could not be derived from the information submitted. Use Section 5 or provide more details in the cover email when submitting your completed form.
- ☐ Section 5: This section outlines common options for Avoiding, Mitigating, and Offsetting serious harm to fish and fish habitat. Select the appropriate offsetting options that can be successfully implemented. The number and size of the offsetting measures used should reflect the scale and extent of the disturbance. Note: No offsetting is required for F drains.

  Forms without these sections completed will be considered to be incomplete and will be returned to the drainage superintendent for completion. It is important to provide the details

and dimensions of the options you select along the right hand side of the form. ***Important: Once you have signed and submitted the form, the options selected in this section become a legal requirement which needs to be implemented as part of the proposed works.*** Be sure to select options that are most relevant to the proposed work and that you are prepared to implement. More information on each of these measures is provided in Appendix 5.

☐ **For Class D and (possibly) Unrated drains, as well as drains where SAR may be present, a site specific review may be required.** Refer to the site specific review checklist (Appendix 9) for additional information that may be required for review by DFO.

☐ Additional information provided should include ***site photographs*** and a ***map of the drain location*** identifying areas proposed for maintenance or repair. Photographs provide a reviewer with a much better idea of the habitat in a drain and in many cases can reduce response time and may eliminate the need for a site visit. (Note: The AgMaps site from Step 1 is a helpful tool which can be used to generate a map to submit with your notification form.)

☐ **Sign, date, and submit the Notification of Drain Maintenance or Repair form.** Submit the completed form, photographs, mapping, and any other relevant information by email to fisheriesprotection@dfo-mpo.gc.ca. Where applicable, it is recommended that you copy the Conservation Authority on the email.

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APPENDIX 3

MUNICIPAL DRAIN MAINTENANCE AND REPAIR ACTIVITIES *NOT* REQUIRING DFO REVIEW

1. Municipal Drain (Class A – E and Unrated) Maintenance and Repair Activities Not Requiring DFO Review
2. Maintenance and Repair of F Drains

MUNICIPAL DRAIN (CLASS A – E AND UNRATED) MAINTENANCE AND REPAIR ACTIVITIES NOT REQUIRING DFO REVIEW

Many rural watercourses in Ontario have been managed as municipal drains under the *Drainage Act, 1990* and under previous versions of the *Drainage Act*. These municipal drains are classified into a number of categories to facilitate the review and approval of drain maintenance and repair activities with respect to fishes and fish habitat. This is done under a Class Authorization Process developed by Fisheries and Oceans Canada (DFO). This document lists the maintenance and repair activities that can be conducted in a municipal drain (Class A – E and Unrated) without a review by DFO.

This list does not apply to any drains in which aquatic Species at Risk are present in the work zone or impact zone. (Note: Impact Zone = 1 km section of drain/watercourse immediately downstream of proposed works). To confirm there are no aquatic Species at Risk present, refer to the following website at: http://www.dfo-mpo.gc.ca/species-especes/fpp-ppp/index-eng.htm.
All municipal, provincial, or federal legislation that applies to the work being proposed must be adhered to also.

Table 1 lists the drain maintenance and repair activities that do not require review by DFO and the key considerations when conducting this type of activity.

How to use Table 1:

1) Check to see if your activity is listed.
2) If listed, confirm your proposed activity meets the definition listed in the table.
3) Note the key considerations associated with your activity and confirm that you can incorporate these and the Standard Measures to Avoid Causing *Serious Harm to Fish* listed below.
4) If yes to all of the above, you can proceed with your project without formal review by DFO; No notification form is required for DFO. **If you cannot meet the requirements, submit a Notification of Drain Maintenance or Repair form to DFO.**

Note: If your project must be conducted without delay in response to an emergency (e.g. the project is required to address an emergency that poses a risk to public health or safety or to the environment or property), you may apply for an Emergency Authorization (http://www.dfo-mpo.gc.ca/asp/forceDownload.asp?FilePath=/pnw-ppe/reviews-revues/Emergency-Authorizations-Autorisations-Urgences-eng.pdf).

Table 1. Maintenance and Repair Activities in A – E and Unrated Drains Not Requiring DFO Review

Activity	Definition	Key Considerations
Bank Repair or Stabilization and Pipe Outlet Repair	Restoration of bank slopes to the original design in the Engineer's Report and localized activities to prevent bank failure, such as the placement of rip rap, seeding the bank, and the use of geotextile materials.	• If the work site can be isolated (e.g. using a silt curtain) from the flow, no Restricted Activity Timing Windows[1] apply. • If the work site cannot be isolated, work shall be limited to 10 m within one day in any 1 km stretch within a Restricted Activity Timing Window.
Beaver Dam Removal	The removal of beaver dams.	• Follow Beaver Dam Removal Best Management Practices (BMP).
Bridge Repair and Removal (for culverts – refer to culvert replacement below)	All removal activities and all maintenance activities including cleaning, removal and application of protective coatings, surface replacement, and removal of debris to protect piers and abutments.	Restricted Activity Timing Windows do not apply. Repairs • No increase in footprint below the High Water Mark • No new fill placed below the High Water Mark Construction of ice bridges, temporary bridges and clear-span bridges • No earth fill below the High Water Mark (temporary snow fill only) • No complete obstruction to fish passage during Restricted Activity Timing Windows
Brushing Bank Slope	The removal of vegetation along the slope of the bank. Brushing the bank slope should not disturb soil or remove the roots of any trees or shrubs.	• To preserve slope stability, the vegetative root structure should be preserved. • Restricted Activity Timing Windows do not apply.
Brushing Top of Bank	The removal of trees and other vegetation from the top of a bank. In a Class B, D, E, or Unrated drain, only one side of the drain can be brushed. If possible, leave vegetation on the south or west side as this is the shade producing vegetation. In certain situations, brushing the top of bank may require the removal of roots or the disturbance of soil.	• Restricted Activity Timing Windows do not apply.
Culvert replacement	Replacement of existing road or private access culverts (like-for-like replacement) on all drain classes without Species at Risk (SAR). On C drains only, this can also include replacements with extensions and end walls for the purposes of providing the property or road with safe access. The increase in temporary and permanent footprint impact must be no greater than 250 m^2 below the high water mark.	• Follow Culvert BMP

Activity	Definition	Key Considerations
Debris Removal	Removal of log jams, garbage, or other obstructions.	• Draw the water down slowly to reduce downstream impacts (i.e. high flows, sedimentation) to the drain. • Ensure applicable permits for relocating fish are obtained and capture any fish trapped within any isolated pools at the work site and safely relocate them to an appropriate location in the same waters. • Time work in water to respect Restricted Activity Timing Windows to protect fish.
Dyke Maintenance and Repair	Repair of breaches or bank restoration of dykes as set out in the original Engineer's Report.	• Isolate the work site from flow and prevent sediment from entering the waterbody. • Ensure applicable permits for relocating fish are obtained and capture any fish trapped within an isolated/enclosed area that is being dewatered at the work site and safely relocate them to an appropriate location in the same waters. • Time work in water to respect Restricted Activity Timing Windows to protect fish.
Leveling Spoil	Leveling the spoil excavated from open drains and deposit on the top of the bank.	• Prevent spoils and sediment from entering the waterbody. • Restricted Activity Timing Windows do not apply.
Pipe, Junction Box, or Catch Basin Maintenance and Repair	• Replacing a section of collapsed or broken pipe. • Removing roots or other blockages. • Periodic removal of sediment from the junction box bottom. • Repair or replacement of the junction box structure. • Periodic removal of sediment from the catchbasin bottom. • Repair or replacement of the catchbasin structure.	• Prevent sediment from entering the waterbody. • Restricted Activity Timing Windows do not apply.
Pump Station Maintenance and Repairs	Structural repairs or replacing a pump station in accordance with the specifications under the Engineer's Report.	• Isolate the work site from flow and prevent sediment from entering the waterbody. • Ensure applicable permits for relocating fish are obtained and capture any fish trapped within an isolated/enclosed area that is being dewatered at the work site and safely relocate them to an appropriate location in the same waters. • Restricted Activity Timing Windows do not apply.

Activity	Definition	Key Considerations
Spot Cleanout (A, B, C Drains)	Cleanout of isolated sediment build-up that is significant enough to cause erosion or flow blockage/flooding concerns in the channel. This may include a sediment trap (dug below design grade) cleanout.	• Time work in water to respect Restricted Activity Timing Windows to protect fish. • Spot cleanouts are not continuous along the drain; they will not exceed a combined total of 250 m^2 within the drain in a six month period. They can be conducted only in A, B, and C drains without DFO review.
Water Control Structure Maintenance and Repair	Structural maintenance, repair or replacement of a water control structure in accordance with the specifications under the Engineer's Report.	• Isolate the work site from flow and use standard methods to avoid harm. • Ensure applicable permits for relocating fish are obtained and capture any fish trapped within an isolated/enclosed area that is being dewatered at the work site and safely relocate them to an appropriate location in the same waters. • Time work in water to respect Restricted Activity Timing Windows to protect fish.

Restricted Activity Timing Windows

Figure 1 and Table 2 and Table 3 can be used to determine the Restricted Activity Timing Window for the drain based on its classification. Note: Restricted Activity Timing Windows identified on Ontario Ministry of Natural Resources and Forestry work permits may differ and take precedence.

Figure 1. Ontario's Northern and Southern Region boundaries for determining application of Restricted Activity Timing Windows.

Table 2. Restricted Activity Timing Windows for the protection of spawning fish and developing eggs and fry in the Northern Region. Dates represent when work should be avoided.

Drain Class	Restricted Activity Period
A	September 1 to July 15
B	April 1 to July 15
C	April 1 to July 15
D	September 1 to July 15
E	April 1 to July 15
Unrated	September 1 to July 15

Table 3. Restricted Activity Timing Windows for the protection of spawning fish and developing eggs and fry in the Southern Region. Dates represent when work should be avoided.

Drain Class	Restricted Activity Period
A	October 1 to July 15
B	March 15 to July 15
C	March 15 to July 15
D	October 1 to July 15
E	March 15 to July 15
Unrated	October 1 to July 15

Standard Measures to Avoid Causing *Serious Harm to Fish*

When undertaking any maintenance or repair activities in a municipal drain, the *Fisheries Act* still requires an individual/company to ensure they avoid causing serious harm to fish during any activities in or near water. These methods have been modified to apply to the above listed drain maintenance projects; they may not be suitable for other types of works.

1. Schedule work to avoid wet, windy, and rainy periods that may increase erosion and sedimentation.
2. Avoid performing work when flow conditions are elevated due to recent rainfall and/or snow melt event to minimize sediment and debris movement and erosion.
3. Use existing trails, roads, or cut lines wherever possible to avoid disturbance to the riparian vegetation.
4. Design and construct approaches to the municipal drain such that they are perpendicular to the watercourse to minimize loss or disturbance to riparian vegetation.
5. Whenever possible, operate machinery on land above the high water mark or on ice and in a manner that minimizes disturbance to the banks and bed of the municipal drain.
    - Ensure that machinery arrives on site in a clean condition and is maintained free of fluid leaks.
    - Limit machinery fording of the municipal drain to a one-time event (i.e. over and back), and only if no alternative crossing method is available. If repeated crossings of the municipal drain are required, construct a temporary crossing structure. Restricted Activity Timing Windows must be followed.

- Wash, refuel and service machinery and store fuel and other materials for the machinery in such a way as to prevent any deleterious substances from entering the water.
- Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.

6. Install effective sediment and erosion control measures before starting work to prevent sediment from entering the municipal drain. Inspect them regularly during the course of construction and make all necessary repairs if any damage occurs.
7. Erosion and sediment control measures should be maintained until all disturbed ground has been permanently stabilized, suspended sediment has resettled to the bed of the municipal drain and runoff water is clear.
8. When possible, undertake all in-water activities in isolation of open or flowing water to maintain the natural flow of water downstream and avoid introducing sediment into the municipal drain.
9. Ensure that the water that is being pumped/diverted from the site is filtered (sediment removed) prior to being released (e.g. pumping/diversion of water to a vegetated area).
10. Implement site isolation measures (e.g. silt boom or silt curtain) for containing suspended sediment where in-water work is required.
11. Implement measures for containing and stabilizing waste material (e.g. dredging spoils, construction waste and materials, logging waste, uprooted or cut aquatic plants, accumulated debris) above the high water mark of nearby waterbodies to prevent re-entry.
12. Stabilize banks disturbed by any activity associated with the project to prevent erosion and/or sedimentation, preferably through revegetation with native species suitable for the site.
13. If replacement rock reinforcement/armouring is required to stabilize eroding or exposed areas, then ensure that appropriately-sized, clean rock is used and that rock is installed at a similar slope to maintain a uniform bank/shoreline and natural stream/shoreline alignment.
14. Remove all construction materials from site upon project completion.

MAINTENANCE AND REPAIR OF F DRAINS

Many watercourses in Ontario have been designated as municipal drains under the *Drainage Act, 1990*. These municipal drains are classified into a number of categories to facilitate the review and approval of drain maintenance and repair activities with respect to fishes and fish habitat. This is done under a Class Authorization Process developed by Fisheries and Oceans Canada (DFO). Class F drains are intermittent watercourses (intermittent means dry for three months of the year except after storms), that do not contain federally listed Aquatic Species at Risk. This document lists the maintenance and repair activities that can be conducted in a municipal Class F drain without a review by DFO.

This list does not apply to any drains in which aquatic Species at Risk are present in the work zone or impact zone. (Note: Impact Zone = 1 km section of drain/watercourse immediately downstream of proposed works). To confirm there are no aquatic Species at Risk present, refer to the following website at: http://www.dfo-mpo.gc.ca/species-especes/fpp-ppp/index-eng.htm.
All municipal, provincial, or federal legislation that applies to the work being proposed must be respected.

Table 1 lists the drain maintenance and repair activities that do not require review by DFO and the key considerations when conducting this type of activity.

How to use Table 1:

1) Check to see if your activity is listed.
2) If listed, confirm your proposed activity meets the definition listed in the table.
3) Note the key considerations associated with your activity and confirm that you can incorporate these and the Standard Measures to Avoid Causing *Serious Harm to Fish* listed below.
4) If yes to all of the above, you can proceed with your project without formal review by DFO. No notification form is required for DFO. **If you cannot meet the meet these conditions, please complete the Notification of Drain Maintenance or Repair form and submit it to the Fisheries Protection Program at:** FisheriesProtection@dfo-mpo.gc.ca.

Note: If your project must be conducted without delay in response to an emergency (e.g. the project is required to address an emergency that poses a risk to public health or safety or to the environment or property), you may apply for an Emergency Authorization (http://www.dfo-mpo.gc.ca/asp/forceDownload.asp?FilePath=/pnw-ppe/reviews-revues/Emergency-Authorizations-Autorisations-Urgences-eng.pdf).

Table 1. Maintenance and Repair Activities Not Requiring DFO Review in F Drains

Activity	Definition	Key Considerations
Bank Repair or Stabilization and Pipe Outlet Repair	Restoration of bank slopes to the original design in the Engineer's Report and localized activities to prevent bank failure, such as the placement of rip rap, seeding the bank, and the use of geotextile materials.	• The work can be conducted if the drain is dry or frozen. It can also be conducted if the drain has flow but the work site can be isolated (e.g. using a silt curtain). • If the drain has flow and the work site cannot be isolated, work shall be limited to 10 m within one day in any 1 km stretch.
Bottom Cleanout	Removal of accumulated sediment in a drain that includes spreading of the spoil. Removal of vegetation in bottom of channel only. Work shall not go beyond design grade or cross-section.	• The work **cannot** be conducted when the drain has flow.
Beaver Dam Removal	The removal of beaver dams.	• See Beaver Dam Removal Best Management Practices.
Bridge Repair (for culverts – refer to culvert replacement below)	All removal activities and all maintenance activities including cleaning, removal and application of protective coatings, surface replacement, and removal of debris to protect piers and abutments.	• The work can be conducted when the drain is dry, frozen, or has flow. Repairs • No increase in footprint below the High Water Mark. • No new fill placed below the High Water Mark. Construction of ice bridges, temporary bridges and clear-span bridges • No earth fill below the High Water Mark (temporary snow fill only). No complete obstruction to fish passage during Restricted Activity Timing Windows.
Brushing Bank Slope	The removal of vegetation along the slope of the bank. Brushing the bank slope should not disturb soil or remove the roots of any trees or shrubs.	• To preserve slope stability, the vegetative root structure should be preserved. • The work can be conducted when the drain is dry, frozen, or has flow.
Brushing Top of Bank	The removal of trees and other vegetation from the top of a bank. If possible, leave vegetation on the south or west side as this is the shade producing vegetation. In certain situations, brushing the top of bank may require the removal of roots or the disturbance of soil.	• The work can be conducted when the drain is dry, frozen, or has flow.
Culvert replacement	Replacement of existing road or private access culverts (like-for-like replacement) on all drain types without SAR. This can also include replacements with extensions and end walls for the purposes of providing the property or road with safe access. The temporary and permanent footprint impact must be no greater than 250 m^2 below the high water mark.	• Follow Culvert BMP
Debris Removal	Removal of log jams, garbage, or other obstructions.	• The work **cannot** be conducted when the drain has flow.

Activity	Definition	Key Considerations
Dyke Maintenance and Repair	Repair of breaches or bank restoration of dykes as set out in the original Engineer's Report.	• The work **cannot** be conducted when the drain has flow.
Full Cleanout	Removal of accumulated sediment in a drain that includes spreading of the spoil. Removal of vegetation in the bottom of the channel and removal of slope vegetation, including root removal; the removal of trees and other vegetation from the top of a bank (as required). Full cleanouts shall not go beyond design grade or cross-section.	• In June, July, or August, a full cleanout can be conducted if there is no flow in the drain.
Leveling Spoil	Leveling the spoil excavated from open drains and deposit on the top of the bank.	• Prevent spoils and sediment from entering the waterbody. • The work can be completed when the drain is dry, frozen, or has flow.
Pump Station Maintenance and Repairs	Structural repairs or replacing a pump station in accordance with the specifications under the Engineer's Report.	• The work can be completed when the drain is dry or frozen. • If the drain has flow, isolate the work site from flow and prevent sediment from entering the waterbody. • Ensure applicable permits for relocating fish are obtained and capture any fish trapped within an isolated/enclosed area that is being dewatered at the work site and safely relocate them to an appropriate location in the same waters.
Spot Cleanout	Cleanout of isolated sediment build-up that is significant enough to cause erosion or flow blockage/flooding concerns in the channel. This may include a sediment trap (dug below design grade) cleanout. Spot cleanout are not continuous along the drain; they will not exceed a combined total of 250 m^2 within the drain in a six month period.	• The work **cannot** be conducted when the drain has flow.
Pipe, Junction Box, or Catch Basin Maintenance and Repair	• Replacing a section of collapsed or broken pipe. • Removing roots or other blockages. • Periodic removal of sediment from the junction box bottom. • Repair or replacement of the junction box structure. • Periodic removal of sediment from the catchbasin bottom. • Repair or replacement of the catchbasin structure.	• Prevent sediment from entering the waterbody. • The work can be conducted when the drain is dry, frozen, or has flow.
Water Control Structure Maintenance and Repair	Structural maintenance, repair or replacement of a water control structure in accordance with the specifications under the Engineer's Report.	• The work can be completed when the drain is dry or frozen. • If the work site can be isolated, the work can be conducted when the drain has flow and standard methods to avoid harm can be implemented. Ensure applicable permits

Activity	Definition	Key Considerations
		for relocating fish are obtained and capture any fish trapped within an isolated/enclosed area that is being dewatered at the work site and safely relocate them to an appropriate location in the same waters.

Note: Flow is defined as the movement of water between two points.

Standard Measures to Avoid Causing *Serious Harm to Fish*

When undertaking any maintenance or repair activities in a Class F municipal drain, the *Fisheries Act* still requires a Municipality/Contractor to ensure they avoid causing *serious harm to fish* during any activities in or near water. The following advice will help one avoid causing harm and comply with the *Act* (for additional information see http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/measures-mesures-eng.html).

1. Schedule work to avoid wet, windy, and rainy periods that may increase erosion and sedimentation.
2. Whenever possible, operate machinery on land above the high water mark or on ice and in a manner that minimizes disturbance to the banks and bed of the municipal drain.
    - Ensure that machinery arrives on site in a clean condition and is maintained free of fluid leaks.
    - Wash, refuel and service machinery and store fuel and other materials for the machinery in such a way as to prevent any deleterious substances from entering the water.
    - Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.
3. Install effective sediment and erosion control measures before starting work to inhibit sediment from entering the municipal drain. Inspect them regularly during the course of maintenance and repair, and make all necessary repairs if any damage occurs.
4. Erosion and sediment control measures should be maintained until all disturbed ground has been permanently stabilized, suspended sediment has resettled to the bed of the municipal drain and runoff water is clear.
5. Implement measures for containing and stabilizing waste material (e.g. excavated spoils, construction waste and materials, logging waste, uprooted or cut aquatic plants, accumulated debris) above the high water mark of nearby waterbodies to prevent re-entry.
6. Stabilize banks disturbed by any activity associated with the project to prevent erosion and/or sedimentation, preferably through revegetation with native species suitable for the site.
7. If replacement rock reinforcement/armouring is required to stabilize eroding or exposed areas, then ensure that appropriately-sized, clean rock is used and that rock is installed at a similar slope to maintain a uniform bank and natural stream alignment.
8. Remove all construction materials from site upon project completion.

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APPENDIX 4

BEST MANAGEMENT PRACTICES

1. *BEST MANAGEMENT PRACTICES – BEAVER DAM REMOVAL IN MUNICIPAL DRAINS*
2. *BEST MANAGEMENT PRACTICES – CULVERT REPLACEMENTS IN MUNICIPAL DRAINS*

BEST MANAGEMENT PRACTICES – BEAVER DAM REMOVAL IN MUNICIPAL DRAINS

This document describes the conditions on which one may proceed with removing a beaver dam in a municipal drain without DFO approval/notification. All municipal, provincial, or federal legislation that applies to the work being proposed must be respected. If the conditions/requirements below cannot be met, please complete the Notification of Drain Maintenance or Repair form and submit it to the Fisheries Protection Program form review at: FisheriesProtection@dfo-mpo.gc.ca.

Requirements

The following requirements must be met:

- There are no aquatic Species at Risk present in the work zone or impact zone. To confirm there are no aquatic Species at Risk present, refer to the following website at: http://www.dfo-mpo.gc.ca/species-especes/fpp-ppp/index-eng.htm.
- The municipal drain has low flow at the time of removal.
- In-water work is scheduled to respect Restricted Activity Timing Windows (Table 1 and Table 2) to protect fish, including their eggs, juveniles, spawning adults, and/or the organisms upon which they feed.
- The work can be conducted using the beaver dam removal method described below and standard measures to avoid causing *serious harm to fish* will be implemented when required.

Potential Impacts to Fish and Fish Habitat

- Disruption of downstream fish during spawning or nursery periods.
- Physical impacts from use of heavy machinery on land.
- Deposit of deleterious substances into the watercourse.
- Erosion and sediment release into watercourse.
- Re-entry of sediment that was removed/stockpiled into the watercourse.
- Sediment release and bank damage due to uncontrolled, cascading breaches of multiple dams.
- Release of sediments and other deleterious substances stored in the bottom of the beaver pond.
- Release of large volumes of water (that can be devoid of oxygen, particularly in winter) in a short period of time.
- Damage of the downstream channel from erosion due to sudden release of water.
- Release of excessive woody debris from the dam to downstream channel.
- Stranding of fish in isolated ponds following dewatering of pond.
- Impingement or entrainment of fish when dewatering pumps are used.

Considerations

The removal of a beaver dam may not prevent future beaver activity in the area. Persistent removal of a beaver dam can increase the risk of negative impacts to fish habitat. To be effective, other beaver management techniques should be used in conjunction with beaver dam removal otherwise the dam could be repaired quickly. For more information about beaver dams see the Government of Ontario's website at: https://www.ontario.ca/page/preventing-conflicts-beavers.

When implementing a beaver dam removal project in a municipal drain, the *Fisheries Act* still requires a Municipality and/or contractor to ensure they avoid causing *serious harm to fish* during any activities in or near water. The following advice will help one avoid causing harm and comply with the *Act* (see http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/measures-mesures-eng.html).

Beaver Dam Removal Methodology

- Whenever possible, remove beaver dams by using hand tools. Where removal by hand tools is not possible, then machinery may be used.
- If machinery is required, operations should be conducted in the manner described in the following manner:
    - Whenever possible, operate machinery on land above the high water mark or on ice and in a manner that minimizes disturbance to the banks and bed of the municipal drain.
    - Ensure that machinery arrives on site in a clean condition and is maintained free of fluid leaks.
    - Limit machinery fording of the municipal drain to a one-time event (i.e. over and back), and only if no alternative crossing method is available. If repeated crossings of the municipal drain are required, construct a temporary crossing structure.
    - Wash, refuel, and service machinery and store fuel and other materials for the machinery in such a way as to prevent any deleterious substances from entering the water.
    - Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.
- If blasting is required, the following website should be consulted: http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/measures-mesures-eng.html).
- Remove the dam gradually (~20 cm at a time) to allow the water to release slowly and prevent sediment at the bottom of the pond from being released downstream. As the water levels drop in the upstream pond, increase the size of the opening to drain the pond to the desired level. The width of the breach opening of the beaver dam should not exceed the width of the original stream channel to prevent bank erosion and flooding of adjacent properties.
- When a series of dams is to be removed, this should typically be done from downstream to upstream in order to avoid severe flooding and damage to fish habitat.
- Relocate any fish that become trapped in isolated pools or stranded in newly flooded areas to the main channel of the watercourse.

- Implement measures for containing and stabilizing waste material (e.g. dredging spoils, construction waste and materials, commercial logging waste, uprooted or cut aquatic plants, accumulated debris) above the high water mark of nearby waterbodies to prevent re-entry.
- Stabilize banks disturbed by any activity associated with the project to prevent erosion and/or sedimentation, preferably through revegetation with native species suitable for the site.
- If replacement rock reinforcement/armouring is required to stabilize eroding or exposed areas, then ensure that appropriately-sized, clean rock is used and that rock is installed at a similar slope to maintain a uniform bank and natural stream alignment.
- Remove all construction materials from site upon project completion.

Restricted Activity Timing Windows

Figure 1 and Table 1 and Table 2 can be used to determine the Restricted Activity period for the drain based on its classification. Note: Restricted Activity Timing Windows identified on Ontario Ministry of Natural Resources and Forestry work permits may differ and take precedence.

Figure 1. Ontario's Northern and Southern Region boundaries for determining application of Restricted Activity Timing Windows.

Table 1. Restricted Activity Timing Windows for the protection of spawning fish and developing eggs and fry in the Northern Region. Dates represent when work should be avoided.

Drain Class	Restricted Activity Period
A	September 1 to July 15
B	April 1 to July 15
C	April 1 to July 15
D	September 1 to July 15
E	April 1 to July 15
F[1]	Periods of Flow
Unrated	September 1 to July 15

[1]Flow is defined as the movement of water between two points.

Table 2. Restricted Activity Timing Windows for the protection of spawning fish and developing eggs and fry in the Southern Region. Dates represent when work should be avoided.

Drain Class	Restricted Activity Period
A	October 1 to July 15
B	March 15 to July 15
C	March 15 to July 15
D	October 1 to July 15
E	March 15 to July 15
F[1]	Periods of Flow
Unrated	October 1 to July 15

[1]Flow is defined as the movement of water between two points.

BEST MANAGEMENT PRACTICES – CULVERT REPLACEMENTS IN MUNICIPAL DRAINS

This document describes the conditions on which one may proceed with a culvert replacement in a municipal drain without DFO approval/notification. All municipal, provincial, or federal legislation that applies to the work being proposed must be respected. If the conditions/requirements below cannot be met, please complete the Notification of Drain Maintenance or Repair form and submit it to the Fisheries Protection Program form review at: FisheriesProtection@dfo-mpo.gc.ca.

Potential Impacts to Fish Habitat

- Infilling fish habitat by encroachment of the water crossing footprint or channel realignment to accommodate culvert
- Harmful substrate alteration of fish habitat (e.g. blockage of groundwater upwellings, critical Species at Risk (SAR) habitat, spawning areas)
- Removal of vegetation on top and along the banks of the municipal drain
- Removal of edge habitat (e.g. undercut bank, shallower areas with lower velocity, aquatic vegetation) creation of barriers to fish movement (e.g. perched crossings, velocity barriers, alteration of the natural stream gradient)
- Alteration of channel flow velocity and/or depth (e.g. oversized culvert resulting in insufficient depth for fish passage at low flow or undersized culvert resulting in a flow velocity barrier at high flow)
- Alteration of channel morphology and sediment transport processes caused by the physical structure of the crossing resulting in upstream and downstream sediment aggradation/erosion
- Re-entry of sediment that was removed/stockpiled into the watercourse
- Erosion downstream from sudden release of water due to the failure of site isolation
- Stranding of fish in isolated ponds following de-watering of the site
- Impingement or entrainment of fish when de-watering pumps are used
- Short term or chronic transport of deleterious substances, including sediment, into fish habitat from construction or road drainage

Requirements

The following requirements must be met:

- There are no aquatic SAR present in the work zone or impact zone. To confirm there are no aquatic SAR present, refer to the following website at: http://www.dfo-mpo.gc.ca/species-especes/fpp-ppp/index-eng.htm.
- The culvert is embedded into the streambed and must allow for the free passage of fish.
- The work involves like-for-like replacements of existing road or private access culverts on all drain types without SAR.
- On C and F drains only, this can also include replacements with extensions and end walls for the purposes of providing the property or road with safe access; however, the project does not involve temporary or permanent work that requires modifications (e.g. encroachment, dewatering, realignment, and relocation) over a total surface area of more than 250 m^2 below the high water mark.

- The project does not involve replacing a bridge or arch with one or more culverts installed in parallel or a larger-diameter culvert with more than one culvert installed in parallel.
- The project does not involve building more than one culvert installed in parallel on a single watercourse crossing site (e.g. twin culvert).
- The project does not involve temporarily narrowing the watercourse to an extent or for a duration that is likely to cause erosion, structural instability or fish passage problems.
- The municipal drain has no flow/low flow or is frozen to the bottom at the time of the replacement.
- In-water work is scheduled to respect Restricted Activity Timing Windows (Tables 1 and 2) to protect fish, including their eggs, juveniles, spawning adults, and/or the organisms upon which they feed.
- The work can be conducted using the Culvert Removal Method described below and Standard Measures to Avoid Causing *Serious Harm to Fish* will be implemented when required.

Note: If your project must be conducted without delay in response to an emergency (e.g. the project is required to address an emergency that poses a risk to public health or safety or to the environment or property), you may apply for an Emergency Authorization (http://www.dfo-mpo.gc.ca/asp/forceDownload.asp?FilePath=/pnw-ppe/reviews-revues/Emergency-Authorizations-Autorisations-Urgences-eng.pdf).

Culvert Removal Methodology

- Plan/manage the work site in a manner that prevents sediment from entering the municipal drain by installing sediment and erosion control materials where required. Ensure that a sediment and erosion control plan is developed and modified as necessary for the site.
- Where required, install effective erosion and sediment control measures before starting work to prevent sediment from entering the municipal drain.
- Implement site isolation measures when in-water work is required.
    - Install an impervious barrier upstream of the work area (Figure 1). If possible, install a secondary barrier upstream of the work area for added protection.
    - Attempt to drive out the fish from the work area and then install the impervious barrier downstream of the work area. This may reduce or eliminate the need for a fish salvage.
    - When the drain is flowing, maintain downstream flows (e.g. bypass water around the work site using pumps or flume pipes; Figure 2). Provide temporary energy dissipation measures (e.g. rip-rap) at discharge point of the hose or temporary outlet pipe when required. Routinely inspect bypass pump and hose or pipe to ensure proper operation. Inspect discharge point for erosion and reposition hose/pipe or install additional temporary energy dissipation material as needed.
    - Dewater the isolated work area. The hose for a pump may discharge along the top of the bank into existing vegetation; however, the area should be monitored for signs of erosion. Reposition the hose or install additional temporary energy dissipation material as needed.

  - A fish screen with openings no larger than 2.54 mm (0.10 inches) should be equipped on any pump used during the operation. Note: Additional information regarding fish screens can be found in the DFO Freshwater Intake End-of-Pipe Fish Screen Guideline document (http://www.dfo-mpo.gc.ca/Library/223669.pdf).
  - Collect any fish present in the isolated work area and relocate them downstream.
  - Fish salvage operations must be conducted under a license issued by the Ontario Ministry of Natural Resources and Forestry (MNRF). The MNRF should be contacted well in advance of any work to obtain the required fish collection license.
- Install the culvert so that it is embedded into the streambed; ensure the culvert remains passable (e.g. does not become perched) by fish and wildlife.
- Decommission the site isolation in a manner that minimizes the introduction of sediment. The downstream isolation barrier shall gradually be removed first, to equalize water levels inside and outside of the isolated area and to allow suspended sediments to settle.
- Stabilize and remove waste from the site.
- Where required, maintain effective erosion and sediment control measures until complete revegetation of disturbed areas is achieved.

Figure 1. Isolation of site.

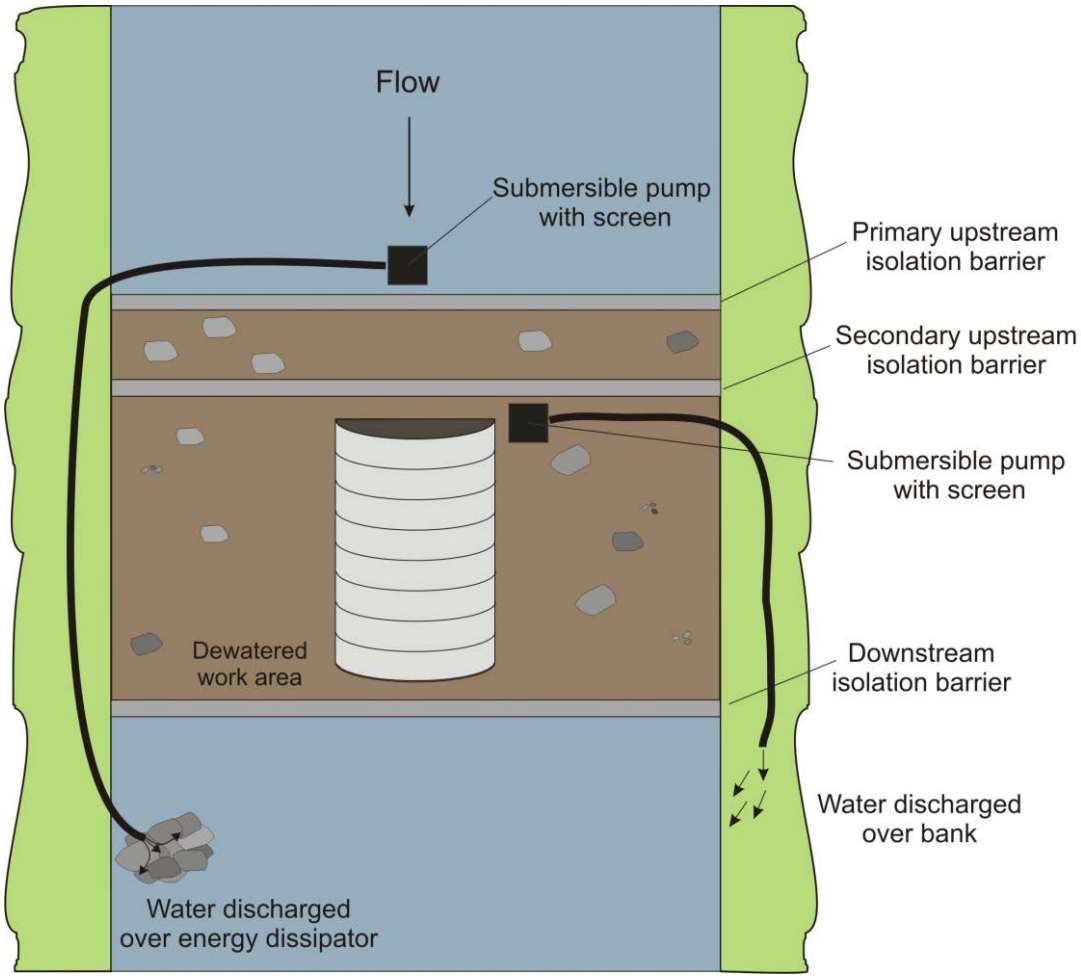

Figure 2. Isolation and bypass diversion when working in-water.

Restricted Activity Timing Windows

Figure 3 and Tables 1 and 2 can be used to determine the Restricted Activity Timing Window for the drain based on its classification. Note: Restricted Activity Timing Windows identified on Ontario Ministry of Natural Resources and Forestry work permits may differ and take precedence.

Figure 3. Ontario's Northern and Southern Region boundaries for determining application of Restricted Activity Timing Windows.

Table 1. Restricted Activity Timing Windows for the protection of spawning fish and developing eggs and fry in the Northern Region. Dates represent when work should be avoided.

Drain Class	Restricted Activity Period
A	September 1 to July 15
B	April 1 to July 15
C	April 1 to July 15
D	September 1 to July 15
E	April 1 to July 15
F[1]	Periods of Flow
Unrated	September 1 to July 15

[1]Flow is defined as the movement of water between two points.

Table 2. Restricted Activity Timing Windows for the protection of spawning fish and developing eggs and fry in the Southern Region. Dates represent when work should be avoided.

Drain Class	Restricted Activity Period
A	October 1 to July 15
B	March 15 to July 15
C	March 15 to July 15
D	October 1 to July 15
E	March 15 to July 15
F[1]	Periods of Flow
Unrated	October 1 to July 15

[1]Flow is defined as the movement of water between two points.

Standard Measures to Avoid Causing *Serious Harm to Fish*

When implementing a culvert removal project in a municipal drain, the *Fisheries Act* still requires an individual/company to ensure they avoid causing *serious harm to fish* during any activities in or near water. The following advice will help one avoid causing harm and comply with the *Act (for additional information see* http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/measures-mesures-eng.html).

1. Schedule work to avoid wet, windy, and rainy periods that may increase erosion and sedimentation.
2. Whenever possible, operate machinery on land above the high water mark or on ice and in a manner that minimizes disturbance to the banks and bed of the municipal drain.
    - Ensure that machinery arrives on site in a clean condition and is maintained free of fluid leaks.
    - Limit machinery fording of the municipal drain to a one-time event (i.e. over and back), and only if no alternative crossing method is available. If repeated crossings of the municipal drain are required, construct a temporary crossing structure.
    - Wash, refuel, and service machinery and store fuel and other materials for the machinery in such a way as to prevent any deleterious substances from entering the water.
    - Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.
3. Install effective sediment and erosion control measures before starting work to prevent sediment from entering the municipal drain. Inspect them regularly during the course of construction and make all necessary repairs if any damage occurs.
4. Erosion and sediment control measures should be maintained until all disturbed ground has been permanently stabilized, suspended sediment has resettled to the bed of the municipal drain and runoff water is clear.
5. Undertake all in-water activities in isolation of open or flowing water while maintaining the natural flow of water downstream and avoid introducing sediment into the municipal drain.
6. Ensure applicable permits for relocating fish are obtained and relocate any fish that become trapped in isolated pools or stranded in newly flooded areas to the main channel of the watercourse.
7. Ensure that the water that is being pumped/diverted from the site is filtered (sediment removed) prior to being released (e.g. pumping/diversion of water to a vegetated area).
8. Implement measures for containing and stabilizing waste material (e.g. dredging spoils, construction waste and materials, logging waste, uprooted or cut aquatic plants, accumulated debris) above the high water mark of nearby waterbodies to prevent re-entry.
9. Stabilize shoreline or banks disturbed by any activity associated with the project to prevent erosion and/or sedimentation, preferably through revegetation with native species suitable for the site.
10. If replacement rock reinforcement/armouring is required to stabilize eroding or exposed areas, then ensure that appropriately-sized, clean rock is used and that rock is installed at a similar slope to maintain a uniform bank/shoreline and natural stream/shoreline alignment.
11. Remove all construction materials from site upon project completion.

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APPENDIX 5

AVOIDANCE, MITIGATION & OFFSETTING MEASURES

AVOIDANCE, MITIGATION, AND OFFSETTING MEASURES

The following information provides descriptions of common types of drain maintenance and repair activities and measures to avoid, mitigate, or offset serious harm to fish habitat as listed on the *Notification of Drain Maintenance or Repair f*orm.

1. Drain Maintenance Activities

The work zone is the area where the drain maintenance work will occur. The impact zone is that portion of the drain extending 1 km downstream of the bottom end of the work zone.

1.1 Bank Repair and Stabilization and Pipe Outlet Repair

Maintenance and repair activities frequently include some form of bank repair or stabilization.

Eroding drain banks can be costly to farmers, municipalities, and the environment. The more sediment that enters a drain, the more that drain's flow is disrupted. The extra sediment entering the system is unlikely to be carried very far in the water, resulting in an accumulation of sediment, 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.

Bank erosion is best prevented by not disturbing the banks at all. Stable banks usually have grasses growing along the sides (slope) of the bank and grasses, shrubs, and trees on tops of the bank. 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. 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 and this improves the quality of water entering the drain.

One effective means to prevent erosion, extend the life of the drain, and improve fish habitat is to plant grasses (e.g. switchgrass, prairie cordgrass, and cylindric blazing star) along the sides (slope) of the bank and grasses, shrubs, and trees along the top of the banks and to 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 drain and, thus, minimize the need for drain maintenance or repair. In many cases, this would involve taking

productive land out of operation. The grasses, shrubs, and/or trees that are to become established in these buffer strips should be compatible (e.g. doesn't host blights/fungi which could damage crops) with the adjacent land usage. 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 the need for being plowed up, crops can be harvested annually, and the root systems remain undisturbed.

Where bank erosion has occurred and must be stabilized or repaired, the more common measures are planting or seeding of the banks and placement of riprap (over geotextile). Riprap should be used at strategic locations, not along the entire bank. There are also a number of other effective options which are discussed in Section 4.1.

Pipe outlet repair are generally not considered a significant concern when it comes to fish and fish habitat. These works typically have limited in-water work though often include placement of stone at the outlet to dissipate water energy and prevent erosion.

1.2 Brushing of Banks

Brushing involves using large mowers or chain saws to cut/shear the vegetation along the bank. The trimming 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 ensure that the mulch from the brushing that ends up in the waterway is removed so that the drain does not get clogged downstream.

Brushing can occur along the bank slope (Figure 1) or along the top of the bank (Figure 2). **If vegetation needs to be removed from a drain, it is best to remove it from one side only (preferably the south or west sides which produce shade)**. In this way, one side of the drain is better protected from erosion, less movement of equipment is needed, the cleanout is quicker, and there is less disruption. Leaving one side of the bank with vegetation also provides cover, shade, and food for fish.

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 cleanout. Rather than clearing

out all the vegetation, one can remove, for example, 20 m of vegetation on one side of the bank, skip 20 m, and then continue so on down the one side of the drain. The same can then be done on the opposite bank. Later, when one needs to maintain the drain again, 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.

Figure 1. Brushing bank slope (MNRF & OMAFRA, 2012).

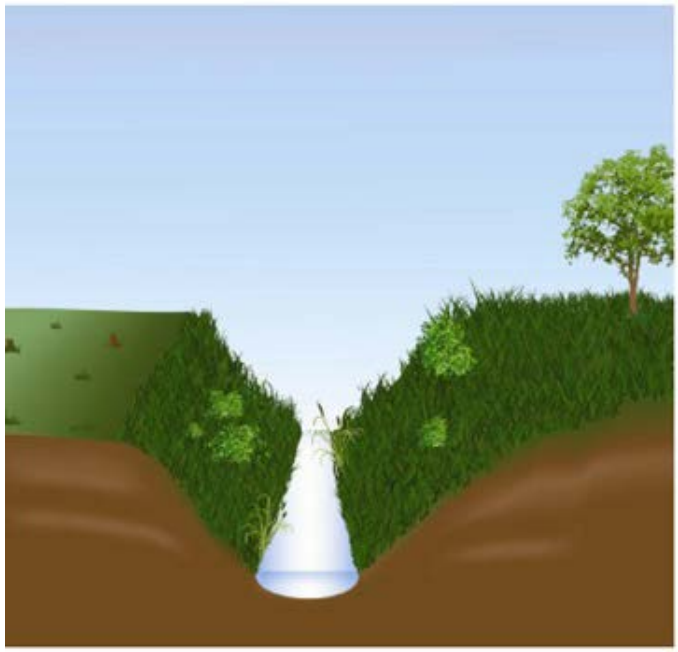

Figure 2. Brushing top of bank (MNRF & OMAFRA, 2012).

1.3 Bottom Only Cleanout

A bottom only cleanout is limited to dredging of sediments and vegetation with the bottom of the drain only, leaving the bank vegetation intact (Figure 3). This has the benefit of removing sediment and improving drainage without any need for stabilizing the banks and allowing riparian habitat along the sides and top of the bank to remain for fish. The bank vegetation prevents erosion and provides shading and food (insects) for fish.

With a bottom only cleanout, as well as with other cleanout options, a two-stage/low flow channel design may be incorporated (See Section 4.6 for additional details).

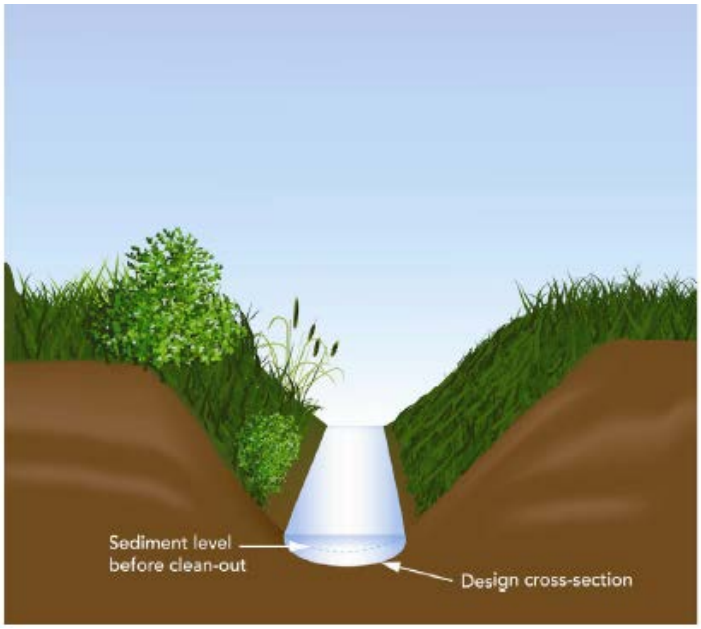

Figure 3. Bottom only cleanout (MNRF & OMAFRA, 2012).

1.4 Bottom Cleanout Plus One Bank Slope

A bottom cleanout plus one bank slope includes the dredging of sediments and vegetation in the bottom of the drain as well as removal of vegetation from one bank, leaving the other bank undisturbed (Figure 4). Where aquatic vegetation is very dense or fills in the channel quickly requiring frequent cleanout, this may be a suitable option. The cleaned slope may be brushed (preferred option, see above) or have the vegetation removed entirely, including the roots. In the latter case, the bank slope will need to be stabilized to prevent erosion. Where this design is used, the vegetation on the shade producing side of the drain (i.e. west or south bank), should be left alone. This allows increased drainage while still keeping stream temperatures cooler with the riparian shading. The undisturbed bank vegetation prevents erosion, provides shading, and provides food (insects) for fish.

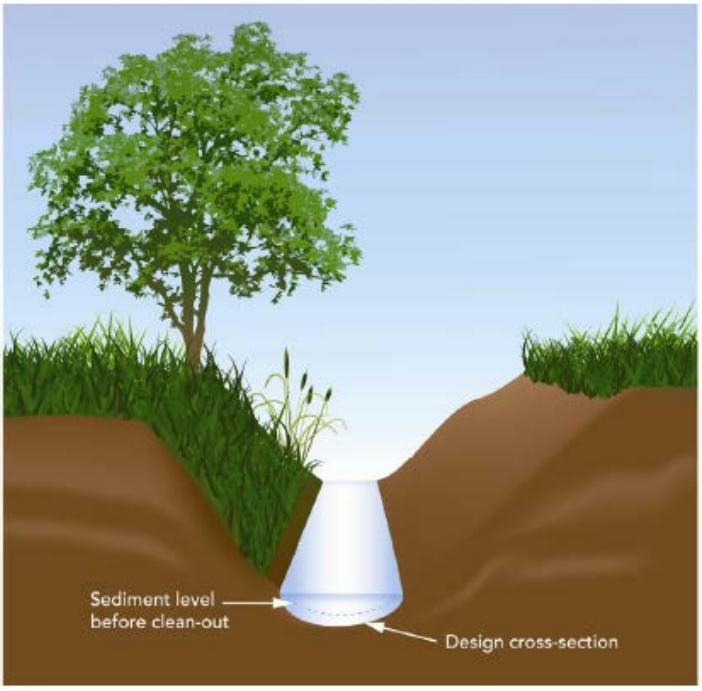

Figure 4. Bottom cleanout plus one bank slope (MNRF & OMAFRA, 2012).

1.5 Full Cleanout

A full cleanout is the removal of sediments and vegetation in the bottom of the drain as well as removal of vegetation from both bank slopes, including roots (Figure 5). This is the least preferred option as all vegetation in the channel and on the bank slopes is removed, essentially removing all habitat from the watercourse and, as a result, it takes longer for the banks to stabilize and naturalize. Thus, the bank slope will need to be stabilized to prevent erosion. Where this design is used, the vegetation on top of the bank on the shade producing side of the drain (i.e. west or south bank) should be left alone. The shade produced by the riparian vegetation on top of the bank will help to keep the stream cooler and this vegetation will provide food (i.e. insects) for fish. Note: It would be preferable to conduct a bottom cleanout of the drain and a brushing of the bank slopes.

When issuing a *Fisheries Act* Authorization, Fisheries and Oceans Canada (DFO) will assess whether impacts can be avoided. Due to the extensive habitat removal, proponents should provide justification for full cleanout. Staging the work is highly recommended for this type of cleanout (see Section 2.5 below).

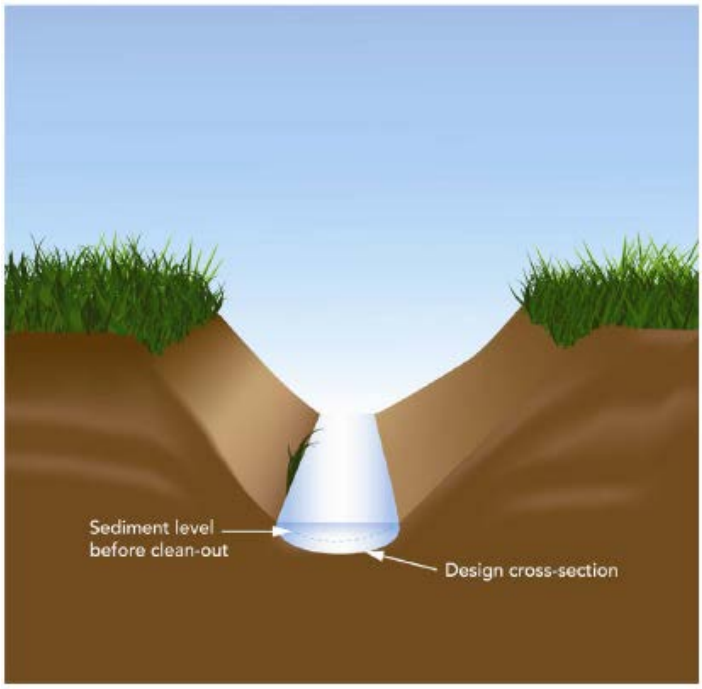

Figure 5. Full cleanout (MNRF & OMAFRA, 2012).

2. Avoidance Measures

Avoidance measures refer to steps taken to completely prevent adverse impacts to fish and fish habitat. The following measures are common and effective approaches that can be incorporated into drain maintenance plans.

> Helpful Tip:
>
> Discussions of the proposed work and the required avoidance, mitigation, and offsetting measures typically occur between the drainage superintendent (or drainage engineer) and the DFO biologist. However, a third party, the contractor, is the person who actually carries out the physical work. A successful maintenance or repair project depends on the contractor having a good understanding of the scope of the work and the necessary measures to protect fish and fish habitat. Problems can arise if the contractor does not understand *what*, *how,* and *why* the chosen measures are to be implemented. Good communication between the drainage superintendent and the contractor can make a big difference in the outcome.

2.1 Maintain Meanders

Meanders in a municipal drain can provide important fish habitat including: cover from undercut banks, rearing habitat (e.g. slower and shallower vegetated section of a drain), spawning habitat (e.g. riffles), and resting and overwintering areas (e.g. pools).

2.2 Maintain Natural Features/Coarse Substrates

Cobble and gravels often provide spawning habitat for a variety of fish species. Removal of these substrates should be avoided.

2.3 Maintain Pools and Riffles

Pools provide cover, help regulate water temperature, aid in fish passage, and are refuges for fish during low flow periods. Riffles provide protection from predators, shelter, and sources of food and some species use riffle habitat for spawning.

2.4 Spot Cleanout

Occasionally in drains, flow is not impeded along the entire length of the drain, but rather in a few specific locations. The buildup of sediment in these areas may be due to log jams, beaver dams, erosion and sloughing of banks, abundance of vegetation, or the presence of man-made debris such as tires, containers, and plastic. In addition to impeding flow, these areas can alter the stream's hydrology and also hinder fish passage. A spot cleanout of these areas may be sufficient to get water moving again, eliminating the need to clean out the entire drain, thereby reducing maintenance costs. (Note: Spot cleanouts are not continuous along the drain).

Some of the areas requiring a spot cleanout may also be providing important fish habitat. Woody debris and vegetation can provide instream cover and materials for some fish species to spawn. Pools are often associated with debris jams, as they often form immediately downstream of the jam. Pools are beneficial (e.g. summer refuge, overwintering habitat) and should only be removed when necessary.

Helpful Tip:

When submitting your Notification of Drain Maintenance or Repair form, indicate the number and approximate length of the spot cleanouts and include a map of the spot cleanout locations.

Some considerations when undertaking removing woody debris:

- Small streams and those with low gradients are more likely to benefit from the selective removal of woody debris compared to larger streams and those with higher gradients.
- If fallen trees are securely fastened to the banks of a watercourse, it is recommended that they be left in place as the root systems may be preventing erosion of the bank.
- Removal of woody debris jams can sometimes prevent bank erosion; however, removal of deeply embedded debris can reduce channel stability and also cause erosion of streambed and banks. If some large woody debris must be removed, "a clean and open" approach should be considered. By only creating an opening in the debris jam, localized flooding and erosion can be reduced and fish habitat and other benefits (e.g. flow reduction/gradient control) of the debris jam can be preserved.
- If removing all of the large woody debris is necessary, it should be done slowly and sedimentation controls should be in place downstream.
- Debris removal should only be done during low flow periods (e.g. late summer, autumn) whenever possible.
- Branches and woody debris should be either disposed of or placed well above the flood plain so that it does not re-enter the stream and cause a jam elsewhere.
- Effective erosion and sediment control measures should be installed before starting work to prevent sediment from entering the water body.
- Removing the debris jam should be down slowly otherwise large quantities of sediment may be released quickly.
- If several debris jams must be removed, start downstream and then work upstream.
- Any areas that have been disturbed by the operation should be restored.

2.5 Staged Cleanout

A staged cleanout can refer to the cleanout of a drain conducted by dividing it into sections along its length, and maintaining one section at a time, or it can refer to phasing the construction in a manner that reduces impacts to the fish and fish habitat. The temporal scale of staging may vary depending on the sensitivity of the watercourse. This is an effective, but highly underutilized, avoidance measure in drain maintenance.

Drain cleanouts can result in the removal of many kilometres of fish habitat. While fish habitat can recover in a drain over time, the resident fish population is more likely to withstand the maintenance and repair activities if refuge habitat is available nearby. In instances where long reaches of cleanout are required, works may be staged over multiple seasons. For example, a six km cleanout may be divided into 1 km reaches and phased over two years. Year one, reaches 1, 3 and 5 are cleaned out. Year two, reaches 2, 4, and 6 are

cleaned out and the fish can move into the previously cleaned areas. In many cases, the improvements made in year one, reduce the extent of cleanout needed in the subsequent year. Fish are able to use habitat above or below each of the cleanout areas on alternating years.

2.6 Two-Stage/Low-Flow Channel

Over time, a two-stage/low-flow channel may form in some wider municipal drains. During periods of low flow, the water is concentrated into the narrower deeper portion of the channel. During periods of high flow, the low-level vegetated benches on either side of the drain allow large volumes of water to be transported through the full width of the channel. This is helpful in systems that see a large variation in water flow, particularly after rain events. It reduces erosion and provides improved fish passage. When conducting a bottom cleanout, the narrower, deeper part of the channel may be cleaned out and the vegetated benches on either side of the drain should not be touched.

2.7 Work in Low or No Flow

A municipal drain is easier to clean out when there is as little flow as possible. For Class F drains, the work should be conducted when the drain is dry, frozen, or there is standing water with *no observable flow* (no movement of water between two points). For all other drain types, this means working in the drain during periods of lowest water levels, typically in the summer when spring freshet is over and warm dry weather conditions mean less surface run-off and lower flow rates. Avoiding high spring flows also means that work is not occurring when many fish species are spawning.

3. Mitigation Measures

Mitigation measures refer to steps taken to eliminate or reduce the negative environmental effects of a designated project. This section describes a number of mitigation measures that are commonly used for drain maintenance projects. In order to be effective, these measures need to be installed prior to beginning maintenance works, must be maintained and checked regularly to ensure their effectiveness (and conduct repairs as necessary), and left in place until a work site has stabilized. In most cases, materials put in place for sediment and erosion control must be carefully removed following the completion of the project (some may be left in as permanent features if they contribute to habitat diversity in the drain).

The mitigation measures that follow are not intended to be stringent requirements. Instead, they represent various strategies that have been effective in avoiding serious harm

to fish and fish habitat. Ontario Provincial Standard Drawings (OPSD) have been included when available. These are intended to be examples; the mitigation measures used should be designed to site conditions. Not all of the strategies presented are suitable in every case. Every drain is different and the mitigation measures appropriate for one site may not be appropriate for another. Selection of the appropriate strategy or set of strategies should be based on conditions at the site. Drainage superintendents, drainage engineers, and Conservation Authority staff and contractors often come up with mitigation ideas that are more suitable to the limitations or challenges of a drain maintenance site. These ideas can be indicated on the Notification of Drain Maintenance or Repair form when submitting for review. Details (e.g. number and size of features) on the selected mitigation measures should be provided on the Notification of Drain Maintenance or Repair form. Additional details and explanation should be provided along with the form in a cover email. Sketches, drawings, and site photographs are helpful for the reviewing biologist when alternative measures are proposed.

3.1 Restricted Activity Timing Windows

Typically, the Ontario Ministry of Natural Resources and Forestry (MNRF) is the lead agency for setting timing guidelines for work in and around water. Restricted Activity Timing Windows have been developed for the protection of spawning fish and developing eggs and fry. In municipal drains, MNRF only has a regulatory role when an activity will adversely affect protected Ontario Species at Risk and/or their habitat under the ESA. The timing restrictions for in water work are managed by DFO when MNRF does not have a regulatory role. DFO uses the Restricted Activity Timing Windows developed by the MNRF in letters of advice, Class Authorizations, and Authorizations. The MNRF *Regional In-water Work Timing Window Guidelines* can be found at: http://www.ontario.ca/environment-and-energy/water-work-timing-window-guidelines. Restricted Activity Timing windows listed by drain type have been provided below (Figure 6; Tables 1 and 2). Requests to work within Restricted Activity Timing Windows may be made to DFO and will be decided upon on a case by case basis. DFO will consult with MNRF staff when necessary.

Figure 6. Ontario's Northern and Southern Region boundaries for determining application of Restricted Activity Timing Windows.

Table 1. Restricted Activity Timing Windows for the protection of spawning fish and developing eggs and fry in the Northern Region. Dates represent when work should be avoided.

Drain Class	Restricted Activity Period
A	September 1 to July 15
B	April 1 to July 15
C	April 1 to July 15
D	September 1 to July 15
E	April 1 to July 15
F[1]	Periods of Flow[1]
Unrated	September 1 to July 15

[1]Flow is defined as the movement of water between two points.

Table 2. Restricted Activity Timing Windows for the protection of spawning fish and developing eggs and fry in the Southern Region. Dates represent when work should be avoided.

Drain Class	Restricted Activity Period
A	October 1 to July 15
B	March 15 to July 15
C	March 15 to July 15
D	October 1 to July 15
E	March 15 to July 15
F[1]	Periods of Flow[1]
Unrated	October 1 to July 15

[1]Flow is defined as the movement of water between two points.

3.2 Erosion Control Mats (Temporary)


Photograph by D. Heinbuck

Erosion control mats and blankets can be used to stabilize banks and disturbed areas where revegetation or seeding is not appropriate, or cannot be implemented at the right time of year to become established. Temporary erosion control mats and blankets are made from natural fibers such as jute, straw, or coir mats that will break down over time as vegetation takes hold. Mats are typically used in combination with reseeding and some mats are available that contain seed. When completing a Notification of Drain Maintenance or Repair form, indicate the extent of the area that erosion control mats are to be used (i.e. in a specific location or along the entire length of the drain).

3.3 Erosion Control Mats (Permanent)

Similar to the temporary mats discussed above, permanent erosion control mats can be used where seeding and revegetation is not appropriate or immediate stabilization is required. Permanent erosion control mats and blankets are made from synthetic fibers that will not break down.

In addition to stabilizing banks, these mats can be used instream in place of riprap for outfall protection below culverts and tile outlets.

3.4 Silt Curtain

Silt curtains may be a helpful mitigation measure for maintenance/repair work in larger drains with little or no flow. Water levels in some drains are heavily influenced by the water levels of the receiving waterbody downstream. This is often seen with drains that flow into lakes or large canal systems. In these situations, a silt curtain may be installed just upstream of the outlet to prevent sediment movement downstream. Silt curtains may also be used to isolate a drain from the receiving waterbody, preventing fish from moving up into the drain during the construction. Upon completion of work, silt curtains need to be removed with care to prevent release of any sediment that has been trapped by the curtain.

3.5 Silt Fence Barrier (Light-Duty)

This mitigation measure refers to the installation of a geotextile fabric above the waterline, parallel to water flow (Figure 7; OPSD 219.110). Placement of silt fencing across (perpendicular to) the channel is a type of flow check dam and is discussed in section 3.7.2 below. Silt fence barriers prevent sediment from entering the drain from work areas along the bank slope or the top of the banks. Silt fencing needs to be installed correctly, with the fabric extending into a trench and back filled in order to work effectively. This fencing should be staked with no more than 2.3 m between the stakes.

3.6 Silt Fence Barrier (Heavy-Duty)

Similar to light duty fencing discussed above, heavy duty silt fencing is installed parallel to water flow (Figure 8; OPSD 219.130). Heavy duty fencing is trenched, backfilled and staked further into the ground to withstand heavier sediment loads. Stakes should also be no more than 2 m apart.

3.7 Straw Bale Barrier (Light-Duty)

Straw bales may be used, similar to silt fencing, as a light duty option to prevent sediment from entering a drain when work is being completed along the banks (Figure 9; OPSD 219.100). This measure is also installed parallel to water flow. Straw bales need to be trenched 75 mm and staked well into the ground (600 mm), with the trench backfilled and compacted to prevent sediment from washing under the bales. The bales need to be butted tightly against adjoining bales to prevent sediment flowing between the bales and each bale should have two stakes to prevent shifting.

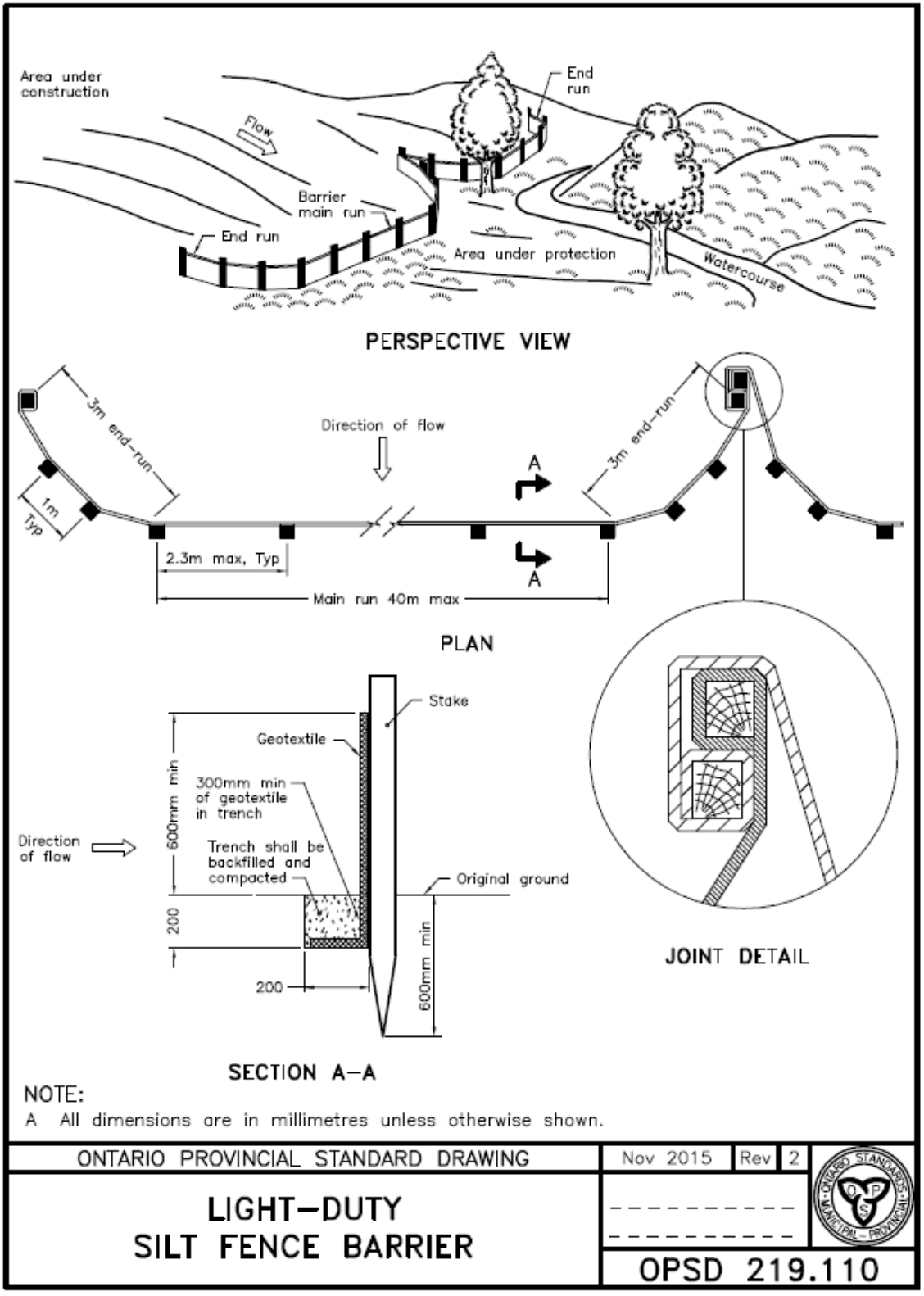

Figure 7. OPSD 219.110 Silt fence barrier (light duty).

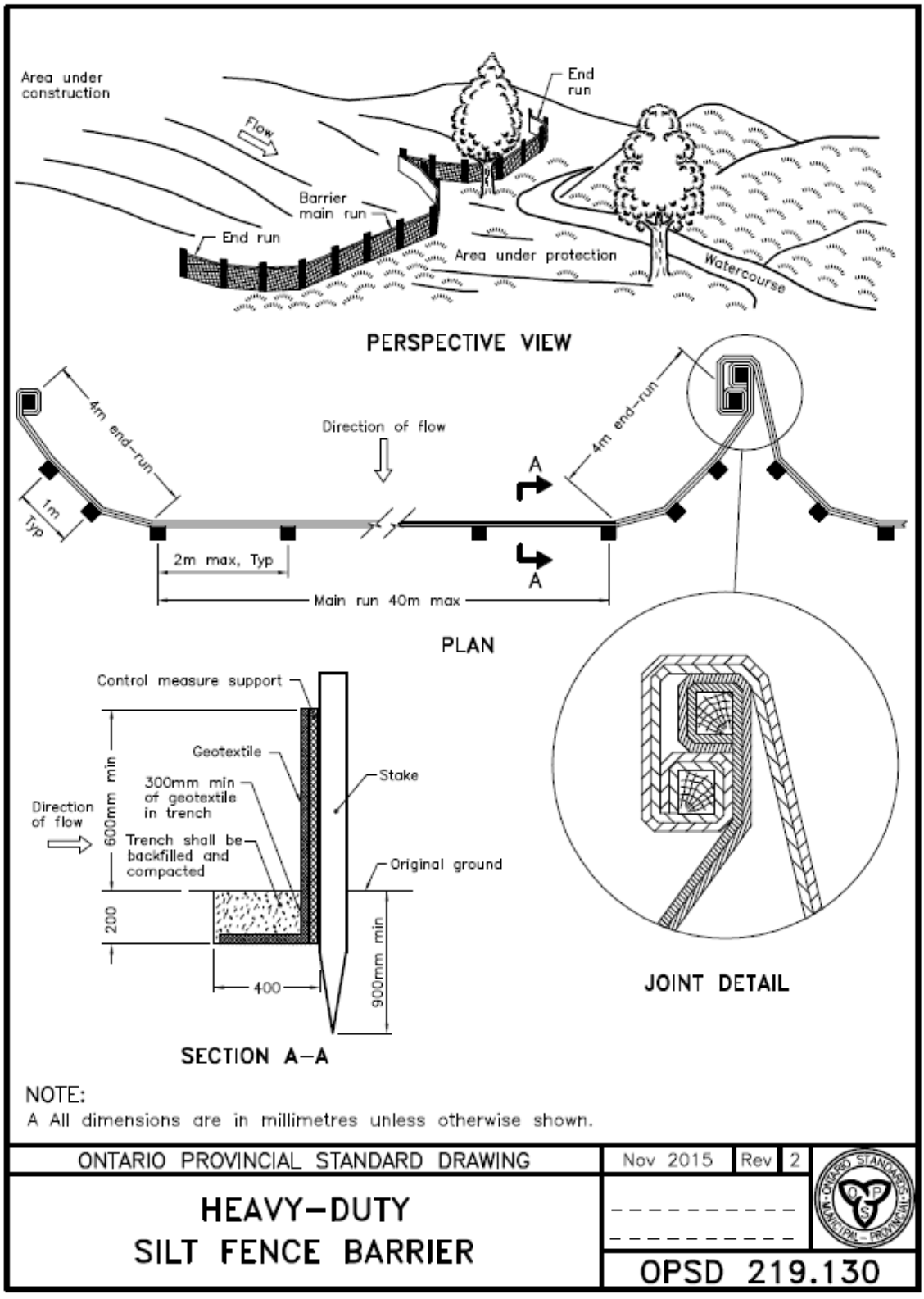

Figure 8. OPSD 219.130 Silt fence barrier (heavy duty).

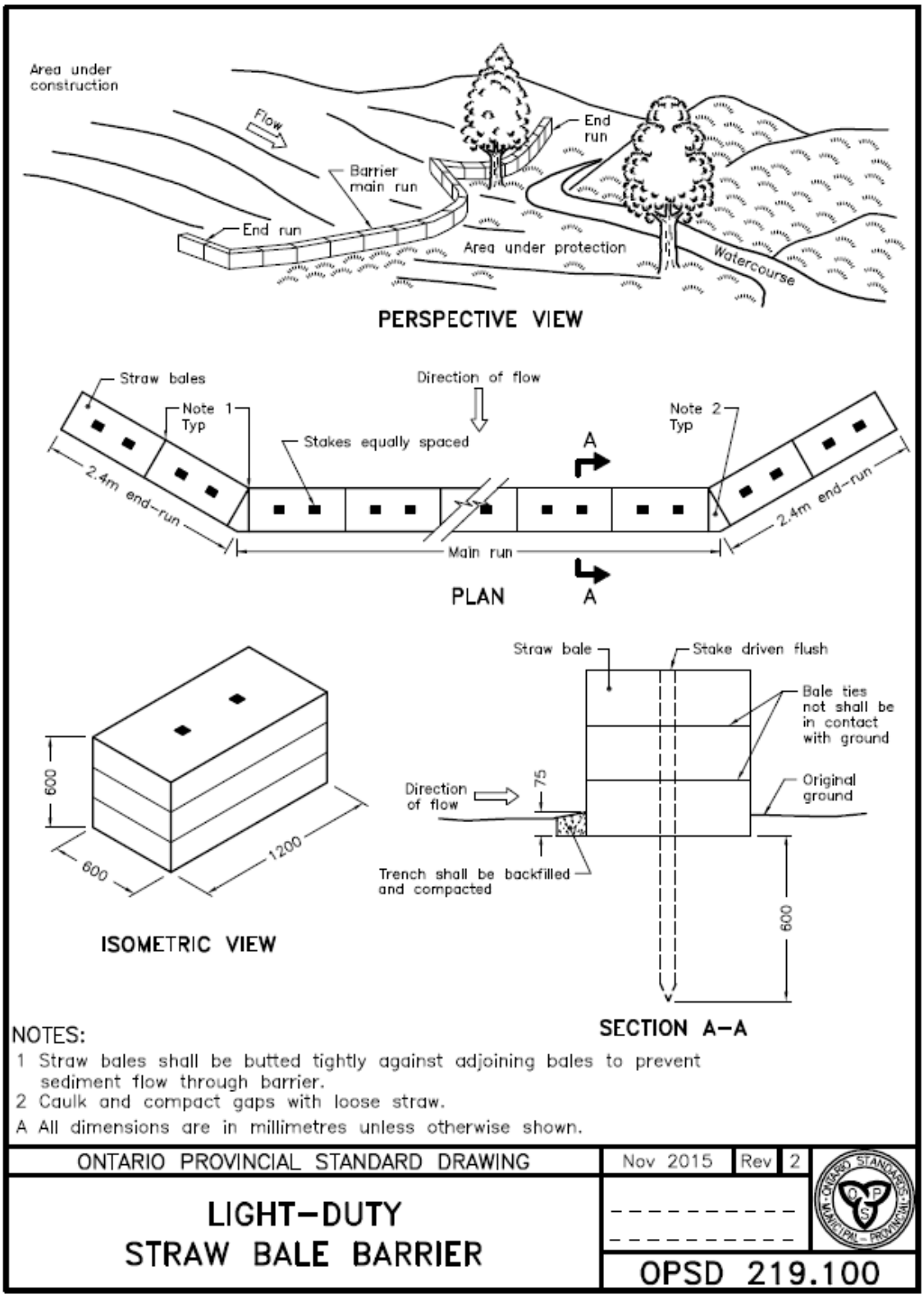

Figure 9. OPSD 219.100 Straw bale barrier (light duty).

3.8 Flow Check Dams (Temporary)

Temporary flow check dams are commonly used sediment control measures in municipal drains. Constructed downstream of the maintenance site, flow check dams are used to reduce flow velocity in a watercourse and dissipate flow energy allowing sediment to settle out of the water. Water is allowed to flow slowly through or over the check dam with the sediment remaining behind.

In-water sediment control measures can be effective for short periods on small drainage areas. However, it is important that they are only used when flow in the drain is low. Otherwise, the sediment will not settle out behind the check dam. Flow check dams are not effective sediment controls in large watercourses or during high flow events (e.g. major rain events).

Helpful Tip:

When submitting your Notification of Drain Maintenance or Repair form, provide details and approximate dimensions for the avoidance, mitigation, and offsetting measures you select on page 2 of the form.

As with all sediment and erosion control measures, prior to removing the barriers any sediment accumulated behind in-water sediment barriers must be removed carefully to avoid re-suspension.

3.8.1 Straw Bale Flow Check Dam

Straw bale flow check dams require staking straw bales, tightly fitted together across a channel (Figure 10; OPSD 219.180). The bales must be installed tight enough together to prevent sediment laden water from flowing between them. This method can be used in flat bottom and V-shaped ditches.

The most common error when installing straw bales is placing bales in the channel only. The straw bales must extend well up the bank on either side of the channel. Without bales on the slopes, flows will work around the dam releasing sediment and causing additional bank erosion.

For this mitigation measure, the flow check dam should consist of two rows of straw bales which are offset to prevent flow through the dam. The bales need to be trenched, backfilled, and evenly staked. To prevent bale ties from degrading, the ties should not be touching the ground.

These structures should not be confused with the use of straw bales along the banks as discussed in Section 3.6.

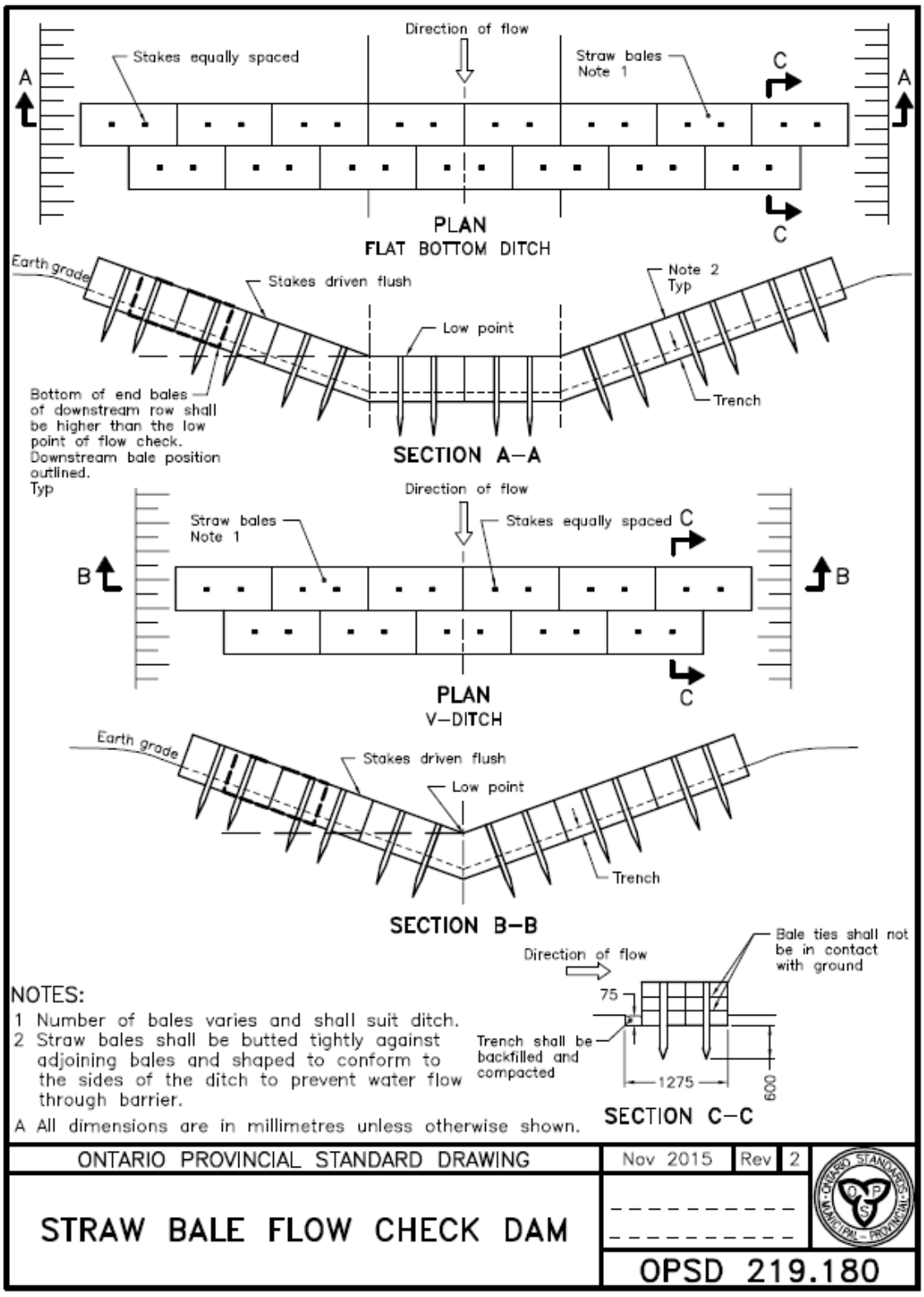

Figure 10. OPSD 219.180 Straw bale flow check dam.

3.8.2 Silt Fence Flow Check Dam

Silt fence flow check dams are frequently indicated on Notification of Drain Maintenance or Repair forms as the chosen mitigation measure, however, they only work in small drains with very low flow and are only effective when they are properly installed and maintained (Figure 11).

As with straw bales, the silt fence slows the flow allowing sediment to settle out of the water column and also filters sediment from water as it passes through the material. More than one set of curtains may be required and the number of check dams proposed for a drain maintenance or repair project should be indicated on the Notification of Drain Maintenance or Repair form.

Silt fences are commonly placed where flows are too high, or can be inadequate during a rain event. When installing the silt fence, it should be constructed so that the top of the fence will give way releasing some of the water, but continuing to hold back the sediment that has settled out. Without proper trenching and backfilling, the bottom of the silt fence will kick out and the sediment will be washed downstream.

Care also needs to be taken when removing these controls. Excess sediment should be removed from the entrapment before taking down a sediment control structure. That way, the sediment captured will not be released back into the stream. These structures should not be confused with the use of silt fencing along the banks as discussed in Section 3.4 and 3.5.

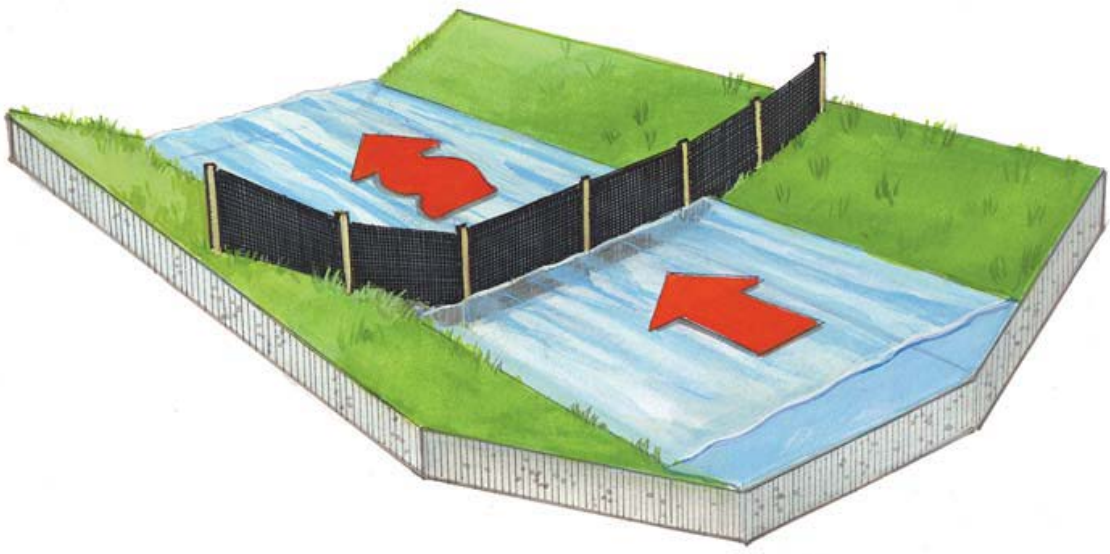

Figure 11. Temporary silt fence flow check dams.

3.8.3 Rock Flow Check Dam, V-Ditch

Rock flow check dams can be designed as temporary or permanent structures. (Note: The gradient of the municipal drain may influence the design of the rock flow check dam, V-ditch.) Rock is usually installed in combination with geotextile to create a dam which forms a pool behind it (Figure 12; OPSD 219.210). Water velocity is reduced and heavier sediments are allowed to settle. While rock flow check dams are able to withstand somewhat higher flows than the straw bale or silt fence versions, it is still not a good option for large drainage areas with high flows.

The design should include a long spillway on the downstream slope creating a riffle. This pool riffle feature can be left permanently, or modified to a lower height after maintenance works have been completed to add habitat diversity to the drain (see Section 4.3). These structures are also used in combination with sediment traps (See Section 4.4).

The rock flow check dam V-ditch version is used in narrow, deep v-shaped drains. Rock is placed in the channel to form the flow check dam. Geotextile fabric is placed over the rock, taking care to trench and backfill the geotextile fabric at the upstream end to anchor to prevent water from lifting it. A layer of rock is placed over the geotextile to secure it. The geotextile acts as an additional sediment filter. These structures can fail if water is able to undermine or skirt the structure along the banks.

The number and size of the proposed rock flow check dams should be indicated on the Notification of Drain Maintenance or Repair form.

3.8.4 Rock Flow Check Dam, Flat-Bottom Ditch

Rock flow check dams, flat bottom ditch is similar to the V-ditch design above but is meant for use in wide, flat-bottom drains (Figure 13; OPSD 219.211).

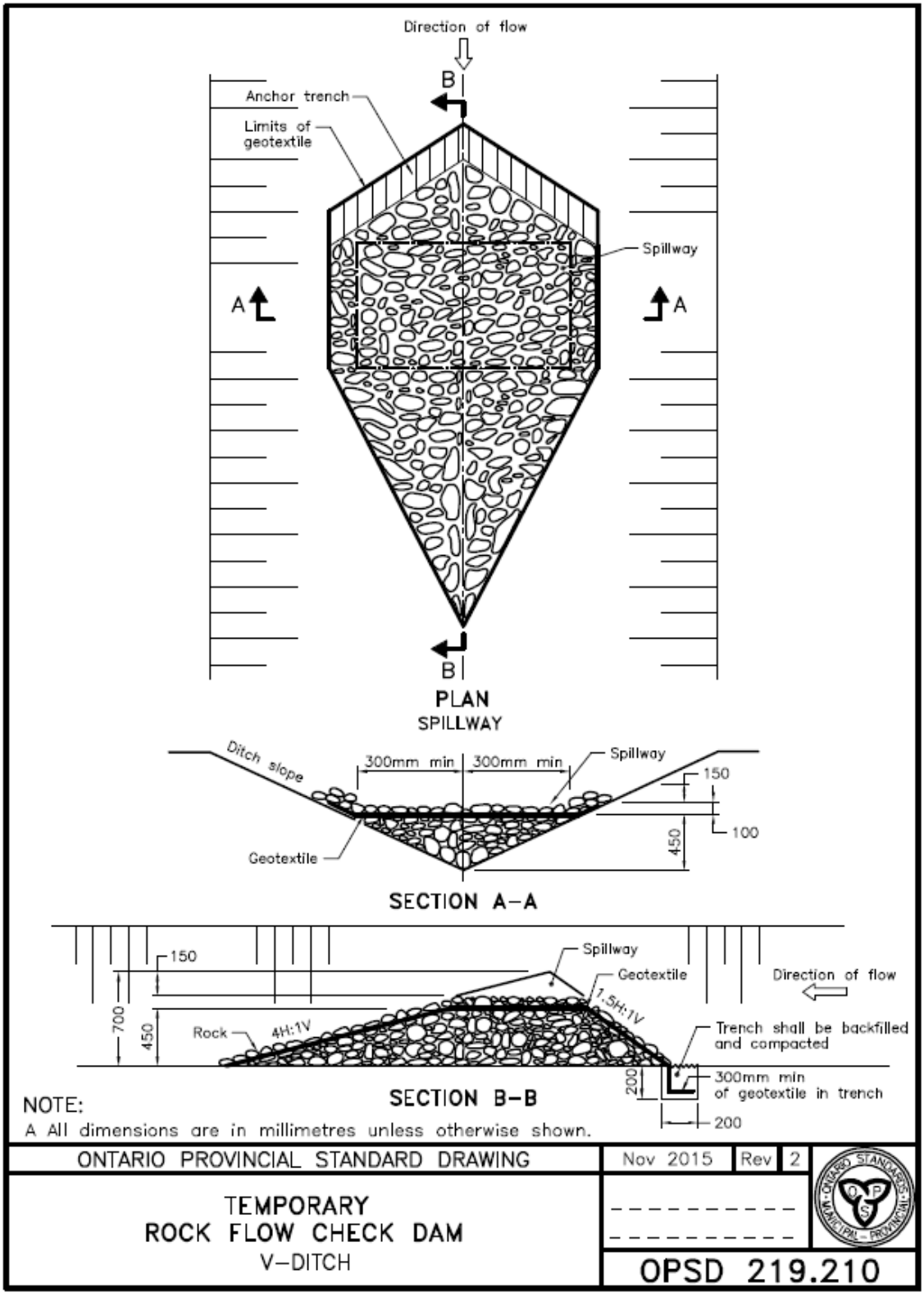

Figure 12. OPSD 219.210 Temporary rock flow check dam, V-ditch.

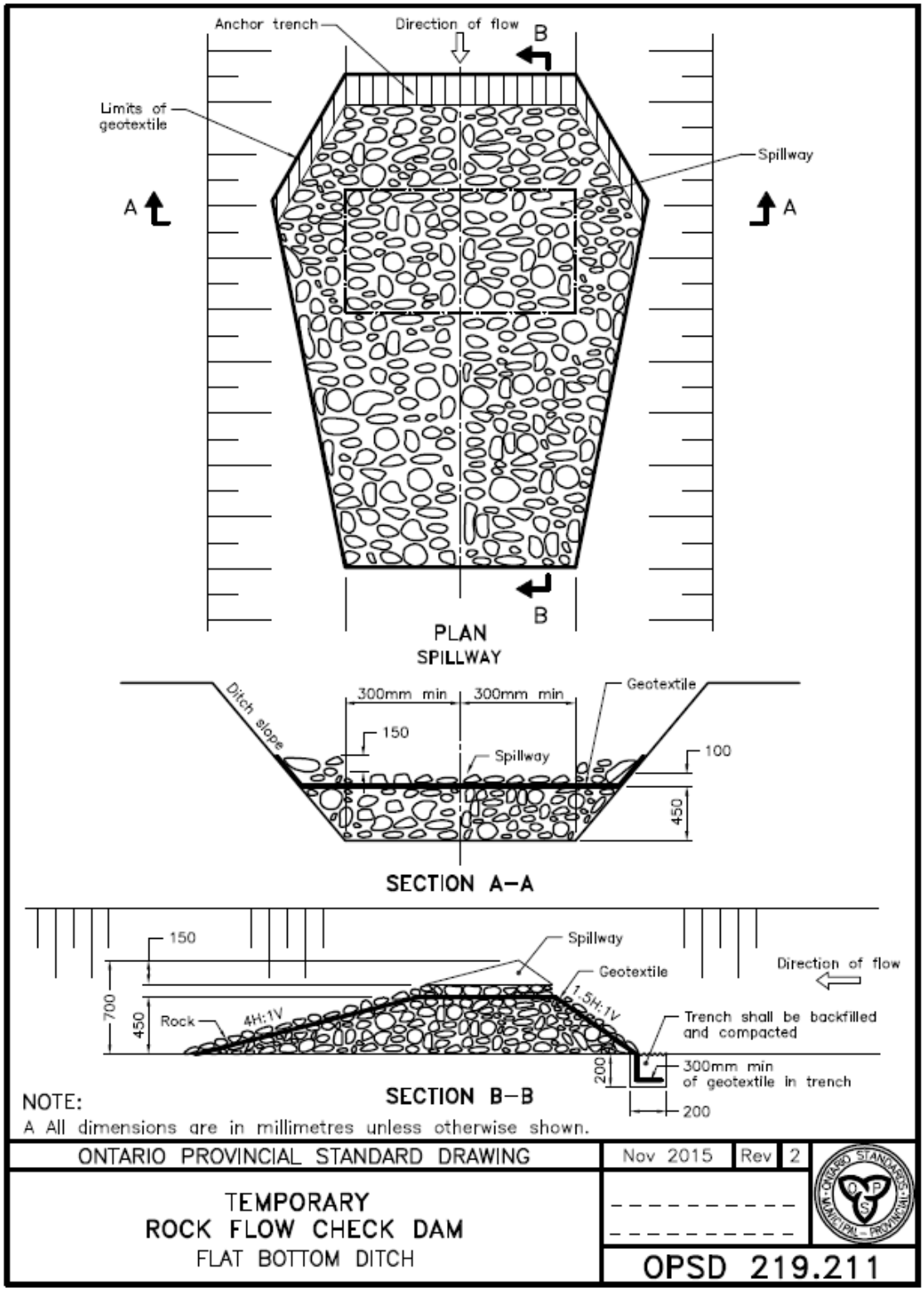

Figure 13. OPSD 219.211 Temporary rock flow check dam, flat bottom ditch.

3.9 Standard Measures to Avoid Serious Harm to Fish

When implementing a project, the *Fisheries Act* requires a proponent to ensure they avoid causing *serious harm to fish* during any activities in or near water. The following advice will help one avoid causing harm and comply with the *Act*. Note: Not all advice provided may be applicable for drain maintenance and repair activities.

3.9.1 Project Planning

Timing

- Time work in water to respect timing windows to protect fish, including their eggs, juveniles, spawning adults, and/or the organisms upon which they feed.
- Minimize duration of in-water work.
- Conduct instream work during periods of low flow, or at low tide, to further reduce the risk to fish and their habitat or to allow work in water to be isolated from flows.
- Schedule work to avoid wet, windy, and rainy periods that may increase erosion and sedimentation.

Site Selection

- Design and plan activities and works in waterbody such that loss or disturbance to aquatic habitat is minimized and sensitive spawning habitats are avoided.
- Design and construct approaches to the waterbody such that they are perpendicular to the watercourse to minimize loss or disturbance to riparian vegetation.
- Avoid building structures on meander bends, braided streams, alluvial fans, active floodplains or any other area that is inherently unstable and may result in erosion and scouring of the stream bed or the built structures.
- Undertake all instream activities in isolation of open or flowing water to maintain the natural flow of water downstream and avoid introducing sediment into the watercourse.

Contaminant and Spill Management

- Plan activities near water such that materials such as paint, primers, blasting abrasives, rust solvents, degreasers, grout, poured concrete or other chemicals do not enter the watercourse.
- Develop a response plan that is to be implemented immediately in the event of a sediment release or spill of a deleterious substance and keep an emergency spill kit on site.
- Ensure that building material used in a watercourse has been handled and treated in a manner to prevent the release or leaching of substances into the water that may be deleterious to fish.

3.9.2 Operation of Machinery

- Ensure that machinery arrives on site in a clean condition and is maintained free of fluid leaks, invasive species, and noxious weeds.

- Whenever possible, operate machinery on land above the high water mark, on ice, or from a floating barge in a manner that minimizes disturbance to the banks and bed of the waterbody.
- Limit machinery fording of the watercourse to a one-time event (i.e. over and back), and only if no alternative crossing method is available. If repeated crossings of the watercourse are required, construct a temporary crossing structure.
- Use temporary crossing structures or other practices to cross streams or waterbodies with steep and highly erodible (e.g. dominated by organic materials and silts) banks and beds. For fording equipment without a temporary crossing structure, use stream bank and bed protection methods (e.g. swamp mats, pads) if minor rutting is likely to occur during fording.
- Wash, refuel, and service machinery and store fuel and other materials for the machinery in such a way as to prevent any deleterious substances from entering the water.

3.9.3 Erosion and Sediment Control

- Develop and implement an Erosion and Sediment Control Plan for the site that minimizes risk of sedimentation of the waterbody during all phases of the project. Erosion and sediment control measures should be maintained until all disturbed ground has been permanently stabilized, suspended sediment has resettled to the bed of the waterbody or settling basin and runoff water is clear. The plan should, where applicable, include:
    - Installation of effective erosion and sediment control measures before starting work to prevent sediment from entering the water body.
    - Measures for managing water flowing onto the site, as well as water being pumped/diverted from the site such that sediment is filtered out prior to the water entering a waterbody. For example, pumping/diversion of water to a vegetated area, construction of a settling basin or other filtration system.
    - Site isolation measures (e.g. silt boom or silt curtain) for containing suspended sediment where in-water work is required (e.g. dredging, underwater cable installation).
    - Measures for containing and stabilizing waste material (e.g. dredging spoils, construction waste and materials, commercial logging waste, uprooted or cut aquatic plants, accumulated debris) above the high water mark of nearby waterbodies to prevent re-entry.
    - Regular inspection and maintenance of erosion and sediment control measures and structures during the course of construction.
    - Repairs to erosion and sediment control measures and structures if damage occurs.
    - Removal of non-biodegradable erosion and sediment control materials once site is stabilized.

3.9.4 Fish Protection

- Ensure that all in-water activities, or associated in-water structures, do not interfere with fish passage, constrict the channel width, or reduce flows.
- Retain a qualified environmental professional to ensure applicable permits for relocating fish are obtained and to capture any fish trapped within an isolated/enclosed area at the work site and safely relocate them to an appropriate location in the same waters. Fish may need to be relocated again, should flooding occur on the site.

- Screen any water intakes or outlet pipes to prevent entrainment or impingement of fish. Entrainment occurs when a fish is drawn into a water intake and cannot escape. Impingement occurs when an entrapped fish is held in contact with the intake screen and is unable to free itself.
- A fish screen with openings no larger than 2.54 mm (0.10 inches) should be equipped on any pump used during the operation. Note: Additional information regarding fish screens can be found in the DFO Freshwater Intake End-of-Pipe Fish Screen Guideline document (http://www.dfo-mpo.gc.ca/Library/223669.pdf).

3.9.5 Bank Stabilization and Revegetation

- Clearing of riparian vegetation should be kept to a minimum: use existing trails, roads or cut lines wherever possible to avoid disturbance to the riparian vegetation and prevent soil compaction. When practicable, prune or top the vegetation instead of grubbing/uprooting.
- Minimize the removal of natural woody debris, rocks, sand, or other materials from the banks, the shoreline or the bed of the waterbody below the ordinary high water mark. If material is removed from the waterbody, set it aside and return it to the original location once construction activities are completed.
- Immediately stabilize shoreline or banks disturbed by any activity associated with the project to prevent erosion and/or sedimentation, preferably through revegetation with native species suitable for the site.
- Restore bed and banks of the waterbody to their original contour and gradient; if the original gradient cannot be restored due to instability, a stable gradient that does not obstruct fish passage should be restored.
- If replacement rock reinforcement/armouring is required to stabilize eroding or exposed areas, then ensure that appropriately-sized, clean rock is used and that rock is installed at a similar slope to maintain a uniform bank/shoreline and natural stream/shoreline alignment.
- Remove all construction materials from site upon project completion.

4. Offsetting Measures (Permanent)

Offsetting harm is required when serious harm to fish and fish habitat cannot be avoided or mitigated and a project Authorization from DFO is required.

The objective of offsetting is to counterbalance unavoidable serious harm to fish and the loss of fisheries productivity resulting from a project. Offsetting measures support and enhance the sustainability and ongoing productivity of fish that are part of or support a commercial, recreational, or Aboriginal fishery.

Notification of Drain Maintenance or Repair forms should include details on the selected offsetting measures such as the length or number of features that can be successfully implemented. The number and size of the offsetting measures used should reflect the scale and extent of the disturbance.

Sections 4.1 – 4.6 describe the list of offsetting measures in the Notification of Drain Maintenance or Repair form. There are many varied ways to protect (mitigate) and enhance (offset) fish habitat. For more ideas, refer to the **Rehabilitation and Enhancement of Aquatic Habitat Guide V. 1.0 (2015) by R.J. Kavanagh & C.T. Hoggarth, Central and Arctic Region, Fisheries and Oceans Canada.**

4.1 Bank Stabilization

There are a number of ways that bank stabilization can be achieved from simple reseeding of exposed soils to more elaborate bioengineering techniques. Reseeding is discussed in Section 4.5 below. This section will focus on alternative methods.

Bioengineering or artificial (riprap or gabion baskets) methods can be used to stabilize banks that are eroding where natural revegetation is either not possible or not practical. Bioengineering techniques use plant material to stabilize banks and have greater habitat benefits than artificial methods. Bioengineering methods include:

- Placement of dogwood bundles to provide, immediate soil and bank reinforcement;
- Use of root wads (trunks butted into the bank leaving the root mass exposed) to protect banks; and
- Placement of riprap along the banks. Geotextile fabric should be placed underneath riprap to prevent erosion behind the armouring. This is not a preferred method for long reaches.

Photograph by D. Heinbuck

- Live Rock Revetments – This is a combination of live dormant cuttings with field or armour stone (riprap). The live cuttings are placed in the openings between the rock, during or after rock placement. The rock holds the cuttings in place and as the cuttings grow the roots hold the rock in place and help to stabilize the site. This method has also been referred to as a joint planting, vegetated rip-rap, and rock fill with branch layering (See Kavanagh & Hoggarth, 2015).
- Brush mattresses - The soil bioengineering version of rock rip-rap. A brush mattress is a protective mat of cuttings placed on the stream bank and staked sufficiently to hold it in place. This mat provides 100% coverage in the area that it is placed. Brush mattresses have also been referred to as live brush mats or brush matting (See Kavanagh & Hoggarth, 2015).
- Live fascines – These are best described as a rope-shaped bundle of live cuttings, lashed together with twine. Fascines grow rapidly when constructed from live materials. The resulting root systems work well to secure soils and to hold the fascine in place. They are simple and effective, require little time to build, and can be installed with little site disturbance (See Kavanagh & Hoggarth, 2015).
- Live cribwall - A three dimensional structure created from untreated timbers, fill, and live cuttings. This structure, once filled, acts as a retaining wall. The timbers provide immediate protection and stability for the structure, but their importance is gradually lessened as they decompose, and the live cuttings grow and proliferate. The resulting root mass binds the fill and the parent soils into a single coherent mass. Live cribwalls are also one of the more complex structures listed in this manual, as their construction can cause considerable site disturbance (See Kavanagh & Hoggarth, 2015).

4.2 Culvert Replacement/Removal to Improve Fish Passage

Removal or replacement of culverts is often under taken as part of the maintenance and repair of drains. Culvert removals can be done without review by DFO. Culvert replacements can also be conducted without DFO review when the requirements and conditions in the Culvert Replacement Best Management Practices can be followed (Appendix 4). The following documents should be reviewed when planning a culvert replacement in a municipal drain:

- Municipal Drain (Class A – E and Unrated) Maintenance and Repair Activities Not Requiring DFO Review (Appendix 3);
- Maintenance and Repair of F Drains (Appendix 3); and
- Culvert Replacement Best Management Practices (Appendix 4).

In some circumstances, the removal or replacement of perched culverts (not properly embedded into the bottom of the drain) or undersized culverts, which are barriers to fish passage, may be used as a measure to offset other maintenance works. When replacing a culvert, the diameter of the new culvert should be large enough to permit water to flow through at a normal velocity. Undersized culverts concentrate flows creating a “fire hose” effect where the water velocity is too fast for most fish species to swim against the flow.

A replaced culvert should also be embedded into the substrate at both the upstream end, to prevent erosion and undermining, and at the downstream end to prevent excessive

scouring and erosion, and to ensure that fish can swim through the culvert even during low flow conditions.

Perched culverts blocking fish passage.

A municipal drain culvert replacement project with culvert embedded below the channel bed.

4.3 Newbury Weir/V-Ditch Rock Flow Check Dam

Rock flow check dams were discussed in Sections 3.7.3 and 3.7.4 above. Newbury weirs are similar to rock flow check dams with a few modifications (Figure 14). Newbury weirs are intended to be permanent structures. The shape of the rock flow check dam should be low enough to allow fish passage over the structure, and shaped in a "V" to concentrate low flows. Newbury weirs can be used to enhance pools, recruit gravel, re-aerate flows, and assist fish passage. They are typically used in channelized stream reaches to help restore run-pool-riffle sequences but can also provide other benefits. For example they can:

- Aerate water;
- Control the gradient of a stream and creates fish habitat in the process; and
- Increase fish production by providing spawning substrate.

A Newbury riffle constructed in a municipal drain.

If not constructed properly, this type of structure can be a barrier to fish during low flows. Some maintenance will be required, particularly after high flow events.

Considerable experience is required when designing these structures and, therefore, this rehabilitation project should not be carried out without the support of experts (e.g. aquatic biologists, engineers, and hydrologists). For design criteria and details, refer to the Rehabilitation and Enhancement of Aquatic Habitat Guide V. 1.0 by R.J. Kavanagh & C.T. Hoggarth, Central and Arctic Region, Fisheries and Oceans Canada.

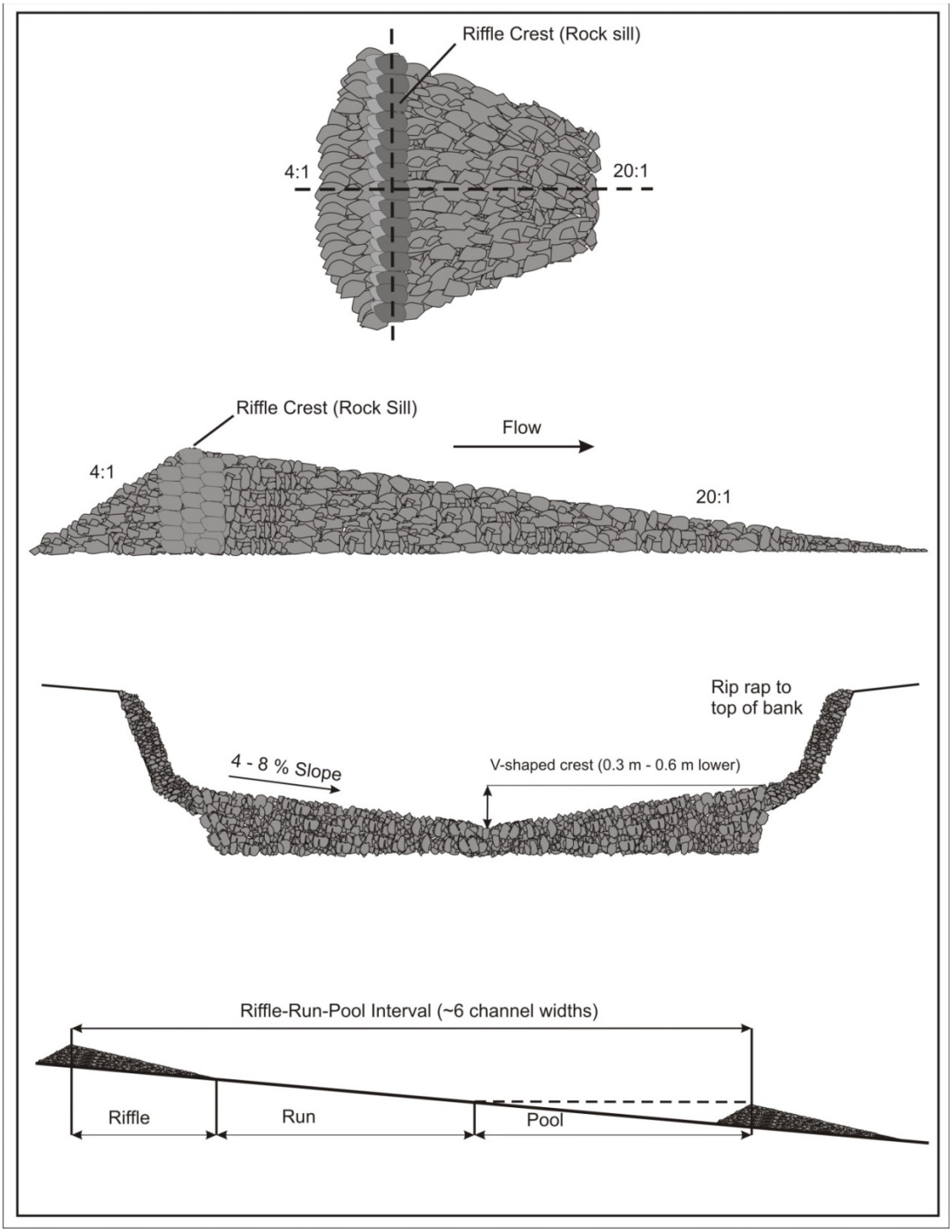

Figure 14. Drawings of a Newbury riffle (Modified from Slaney & Zaldokas, 1997; Newbury, 2013).

4.4 Refugia Pools/Sediment Traps

Sediment traps are created by strategically digging a spot that is wider and deeper in the open drain (Figure 15 & Figure 16; OPSD 219.220). Excessive widening of the channel should be avoided, however, the channel must be widened enough to stabilize the banks. If the pool is designed correctly, it acts as a settling pond, slowing down water and allowing heavier sediments to settle to the bottom of the sediment trap. If it is too small, it will not be effective at trapping sediment. It is important that the banks of the drain will remain stable, otherwise erosion will occur and the sediment trap will quickly fill with sediment. When building a sediment trap for mitigation purposes, this feature should be used in combination with a rock flow check dam downstream of the pool. Once it is no longer required, the rock flow check dam should be removed or the rock can be used to create a Newbury riffle.

Placement of sediment traps at strategic locations along the length of the drain can reduce maintenance costs by limiting the size of the cleanout required. By conducting a spot cleanout on a regular basis, a cleanout along the entire length of the drain may be avoided. Sediment traps need to be maintained to be effective, so locations should be chosen that allow for convenient access. Selection of locations for sediment traps should also take into account the shape of the channel and its hydrology so that the potential for scour of the deposited material during high flow events is minimized.

In addition to the sediment control benefits, sediment traps can be created as an offsetting measure in A, B, C, and E drains since they also serve as refugia pools for fish. During low flow conditions, when even permanent watercourses can dry up for short periods of time, these larger deeper areas are important habitat for fish, providing cover and cooler temperatures.

The number of refugia pools/sediment traps created should reflect the length of drain being maintained. As a minimum, there should be one sediment trap per 1 km. Indicate the number of traps proposed on the Notification of Drain Maintenance or Repair form and attach a map with the proposed locations.

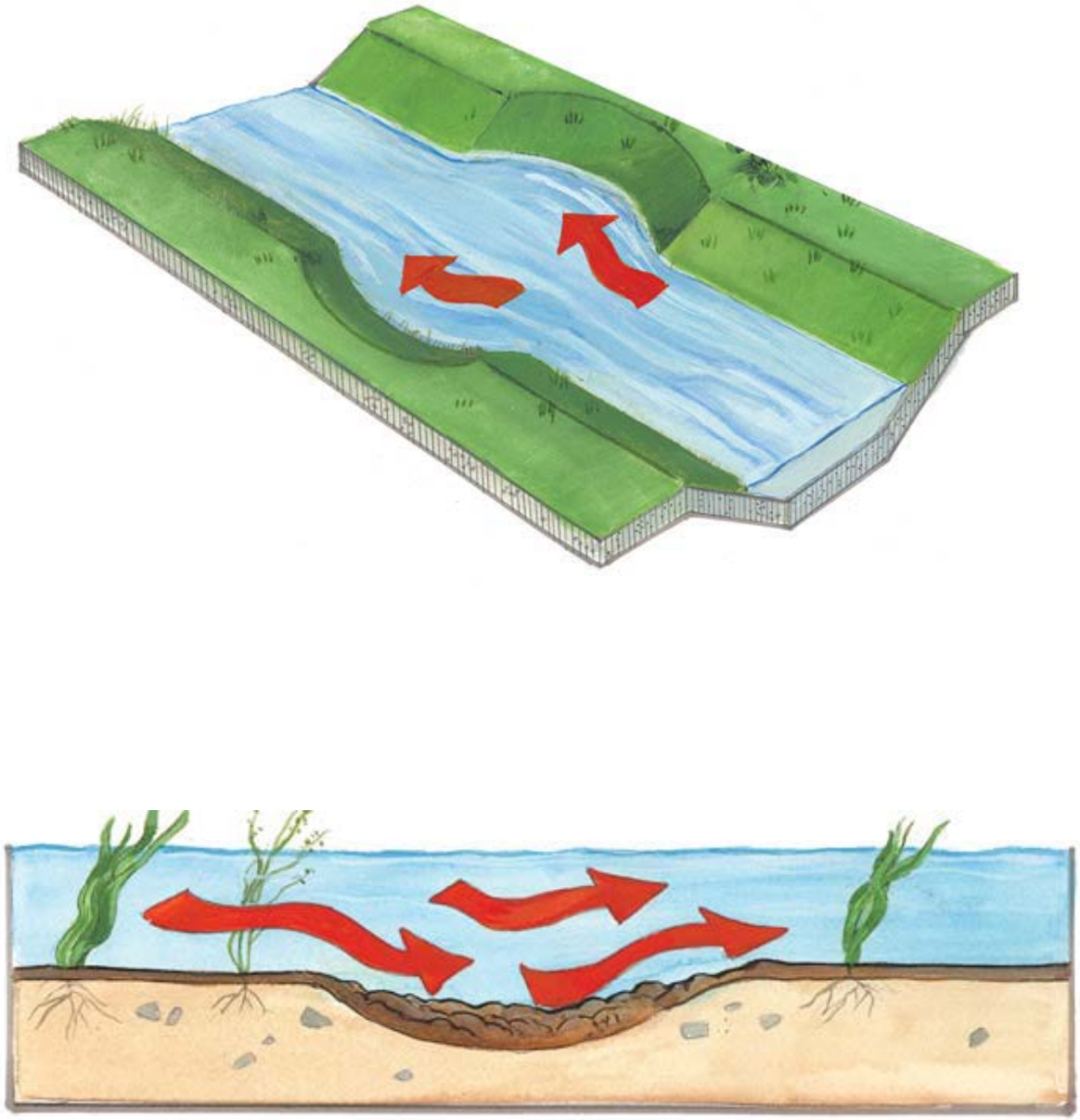

Figure 15. Basic design of a refugia pool/sediment trap in municipal drains.

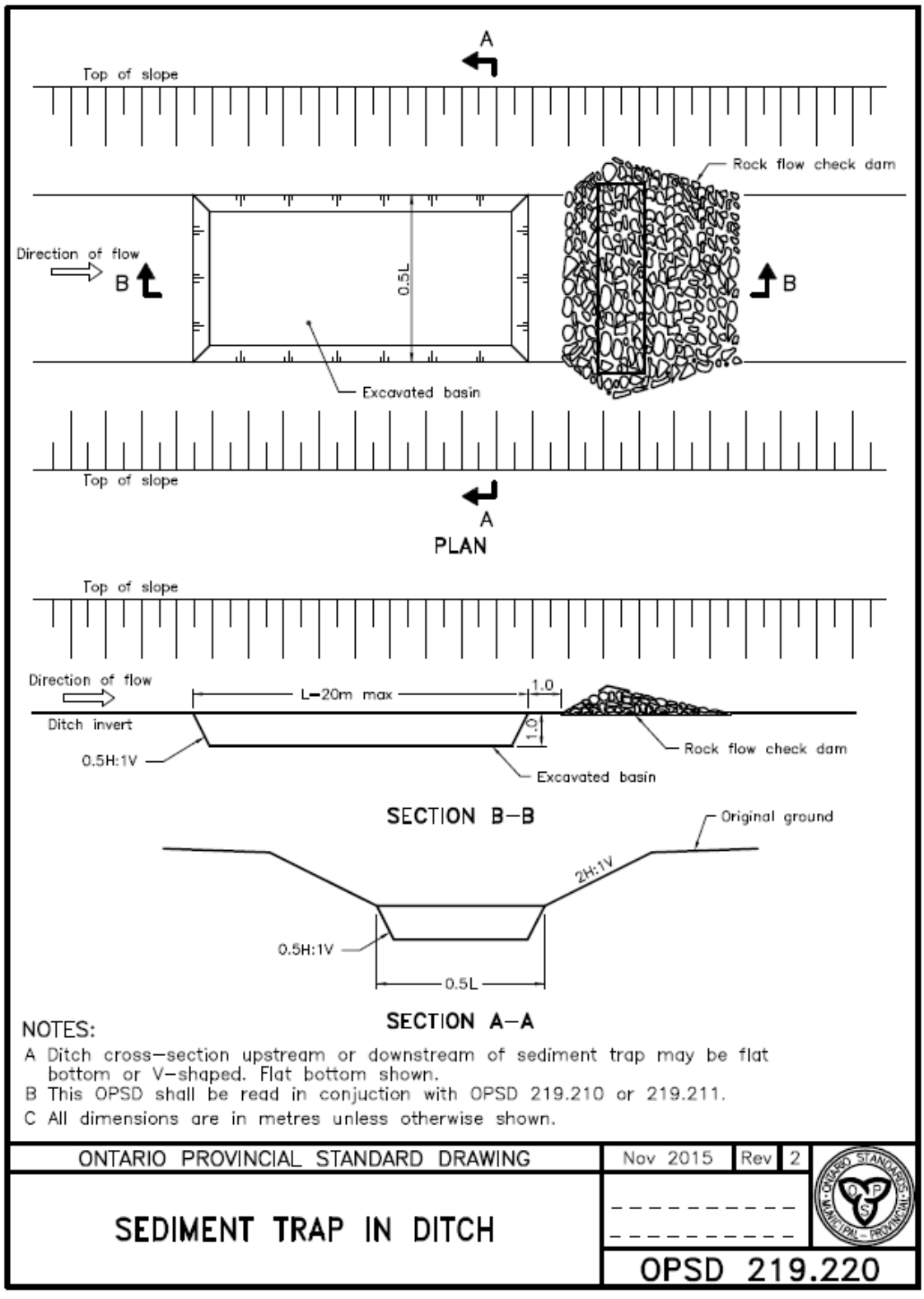

Figure 16. OPSD 219.220, Sediment trap in ditch.

4.5 Reseeding and/or Planting

As soon as the drain maintenance or repair project is completed, the spoils or excavated material created from the cleanout should be levelled and reseeded (when not in a cultivated agricultural field). This is typically undertaken as a mitigation measure to stabilize disturbed soils and prevent sediment from entering the drain.

When reseeding, the following should be considered:

- Disturbed soils should be seeded with native grass seed or a seed legume mix within 48 hours of the disturbance and ideally within 24 hours if possible. Grasses such as switchgrass, prairie cordgrass, and cylindric blazing star have very long roots and may provide more stabilization of soils compared to other grass species.
- Seeding should occur while the disturbed soil is still moist to facilitate germination.
- Sufficient time should be left in the growing season to ensure that germination can occur for revegetation to be successful.
- Where revegetation cannot be undertaken within a reasonable time after soils are disturbed or the work is conducted outside of the growing season, artificial cover such as mulch, straw, or fiber mats should be used to stabilize the banks until natural revegetation occurs.

When reseeding is being undertaken as an offsetting approach, look for opportunities to improve poorly vegetated areas, riparian areas and widen buffers strips. The benefits of reseeding to both drainage and fish habitat include:

- Filtering of sediment from overland flow;
- Removal of nitrogen and phosphorus in water (preventing excessive in-stream vegetation growth);
- Increased shading and cooling of water;
- Improved cover from overhead predators;
- Increased nutrients and food for fish; and
- Improved bank stability with a vegetation root mass.

Reseeding is often used in combination with other bank stabilization techniques.

4.6 Two-Stage/Low Flow Channel Design

This design incorporates a deepening of the centre of the channel in wider drains, or through a floodplain with low-level vegetated benches on either side (Figure 17). During periods of high flow, the channel is able to transport large volumes of water through the full width of the channel. During periods of low flow, the water is concentrated into the narrower portion of the channel allowing for higher velocity to minimize sediment deposition with the added benefits of reduced erosion and improved fish passage. This is also helpful in systems that see a large variation in water flow, particularly after rain events.

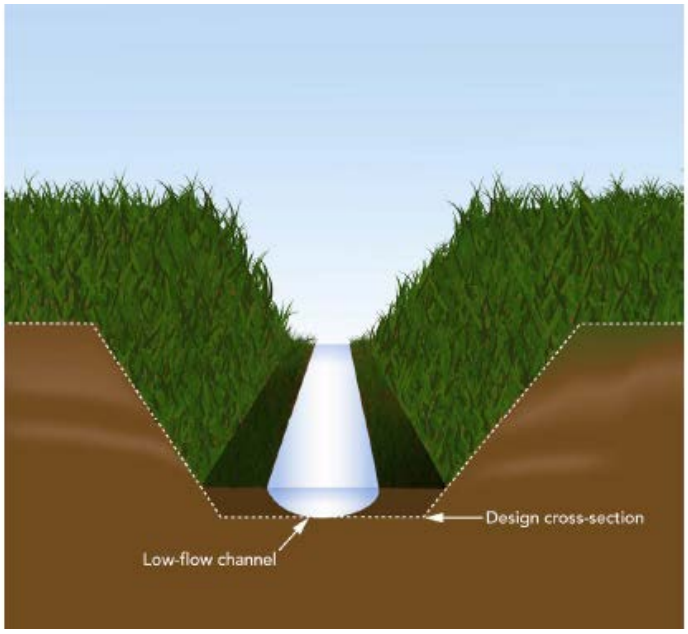

Figure 17. Two-stage/low-flow channel (MNRF & OMAFRA, 2012).

5. References

Ministry of Natural Resources (MNRF) and Ministry of Agriculture, Food and Rural Affairs (OMAFRA). 2012. *Drainage Act* and *Conservation Authorities Act* Protocol: Protocol for Municipalities and Conservation Authorities in Drain Maintenance and Repair Activities. ISBN 978-1-4606-0722-0. Retrieved April 10, 2017 from: https://www.ontario.ca/document/drainage-act-and-conservation-authorities-act-protocol.

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APPENDIX 6

MUNICIPAL DRAIN CLASS FACT SHEETS

1. *A CLASS AUTHORIZATION SYSTEM FOR MUNICIPAL DRAINS IN ONTARIO*
2. *MUNICIPAL DRAIN CLASS A*
3. *MUNICIPAL DRAIN CLASS B*
4. *MUNICIPAL DRAIN CLASS C*
5. *MUNICIPAL DRAIN CLASS D*
6. *MUNICIPAL DRAIN CLASS E*
7. *MUNICIPAL DRAIN CLASS F*
8. *UNRATED MUNICIPAL DRAINS*

A CLASS AUTHORIZATION SYSTEM FOR MUNICIPAL DRAINS IN ONTARIO

The Federal *Fisheries Act*

Serious harm to fish and fish habitat is prohibited by the *Fisheries Act* unless it is authorized by the Minister of Fisheries and Oceans. Persons having a *Fisheries Act* Authorization for their project may proceed with their work without violating the *Fisheries Act*, provided they comply with the conditions of the Authorization. Fisheries and Oceans Canada (DFO) recognizes the important contribution of agriculture to Ontario's economy. DFO also recognizes that substantial fish habitat is found in municipal drains. The Class Authorization system was developed to strike a balance between the need to protect fish habitat and the need to provide drainage to agricultural lands. The system streamlines the process of reviewing the effects of drain maintenance and repair activities on fish and fish habitat under the *Fisheries Act.*

The Benefits of a Class Authorization System

In most instances, DFO issues Authorizations for the serious harm to fish and fish habitat on a project by project basis. This means each project is examined individually (site specific review) and a site specific Authorization is issued when required. The Class Authorization system classifies municipal drains according to their sensitivity (Table 1) and provides the following benefits:

- Users can complete works on less sensitive drains under a Class Authorization, provided the work is done as outlined in the Authorization;
- This process reduces the workload of biologists to review each case individually;
- It expedites planning for Drainage Superintendents, as they know in advance what will be required for each project;
- It allows Drainage Superintendents to identify in advance which drains may require a more in depth examination;
- It reduces the amount of time required to receive an Authorization; and
- Biologists will be able to focus resources towards those watercourses that would be most impacted by in-water activities.

Not All Drains are the Same

From a drainage perspective, all municipal drains serve the same function; they remove excess water from the land. However, from a fisheries perspective, drains do differ based on the fish habitat they provide and the fish species that they contain. While some drains contain fish habitat and fish species that are relatively resilient to drain maintenance activities, other drains have fish habitat and species that are more vulnerable to these types of activities. It is these more vulnerable drains that require a site specific review. Important habitats may need to be avoided and specific mitigation measures employed to minimize impacts to fish and fish habitat in these types of drains. With drains that have more tolerant fish species, the works causing serious harm to fish can proceed under a Class Authorization.

The drains are classified based on the following characteristics:

Flow — Permanent watercourses are more sensitive than those that are intermittent (dry for at least 3 months of the year).

Fish Species Present — Some fish species are more sensitive to activities than others, including both top predator species as well as some small minnow species. Aquatic Species at Risk (SAR) are particularly sensitive and have additional protection under the federal *Species at Risk Act* (SARA).

Where a specific drain characteristic is unknown, such as fish species present or flow (permanent or intermittent), the drain remains "Unrated". Unless data on flow and fish presence can be obtained for the Unrated drain, a site specific review is required.

Who Classifies the Drains?

Typically, drains are classified by DFO. However, Conservation Authorities or municipalities may also collect the necessary data to classify a drain, or hire a qualified biologist, and submit the data to DFO. Once classified, this information can then be added to maps for use by the agricultural community. Drain classifications can be updated from year to year as new information is available. The most up to date drain mapping is available through Ontario Ministry of Agriculture, Food, and Rural Affairs (OMAFRA)'s AgMaps website: http://www.omafra.gov.on.ca/english/landuse/gis/portal.htm.

Table 1. Summary of key characteristics of drain classification types.

Class	Flow	Restricted Activity Timing Window[1]	Species	Time Since Last Cleanout[2]	Authorization
A	Permanent	Fall or Combination Spring/Fall	No sensitive fish species present	Not applicable	Class A
B	Permanent	Spring	Sensitive fish species present[5]	Less than 10 years	Class B
C	Permanent	Spring	No sensitive fish species present	Not applicable	Class C
D	Permanent	Fall or Combination Spring/Fall	Sensitive fish species present[5]	Not applicable	Site Specific
E	Permanent	Spring	Sensitive fish species present[5]	Not applicable	Class E
F	Intermittent	Periods of Flow[4]	Not applicable	Not applicable	None[3] - if work can be done when drain is dry, frozen, or there is no flow
Unrated[5]	Unknown	Unknown	Unknown	Unknown	Class Authorization or Site Specific[6]

Note:

[1]Restricted activity timing windows vary by geographic location and fish species present. Additional guidance is available at: www.dfo-mpo.gc.ca/pnw-ppe/timing-periodes/index-eng.html

[2]Time since last cleanout is no longer collected as part of the Drain Classification Project as per a decision made by the Drainage Action Working Group (DAWG) in 2010. No new Class B drains will be assigned and any existing Class B drains will not change classification unless new data becomes available to support the reclassification.

[3]If the work is to occur during a period of flow (e.g. spring), a site specific review will be required.

[4]Flow is defined as the movement of water between two points.

[5]For details, see Appendix 10 – Sensitive Species List.

[6]If there is data on flow and fish species for the drain, a Class Authorization may be issued; otherwise, a site specific review will be required.

Aquatic Species at Risk (SAR)

If aquatic SAR are present, drain maintenance and repair activities will require a site specific review regardless of drain class. To determine if SAR are found in the work zone or impact zone (1 km downstream), refer to: http://www.dfo-mpo.gc.ca/species-especes/fpp-ppp/index-eng.htm.

For further information contact:

Fisheries and Oceans Canada
Fisheries Protection Program
867 Lakeshore Road
Burlington, ON L7R 4A6
fisheriesprotectionprogram@dfo-mpo.gc.ca

Municipal Drain Class A

A

FLOW: PERMANENT
SPAWNING PERIOD: SPRING/FALL
SPECIES: NO SENSITIVE SPECIES PRESENT
AUTHORIZATION: CLASS A AUTHORIZATION

DO I NEED TO SUBMIT MY DRAIN MAINTENANCE PROJECT TO DFO FOR REVIEW?

Fisheries and Oceans Canada (DFO) has created a list of Maintenance and Repair Activities that do not require review by DFO (See Appendix 3 - *Municipal Drain (Class A – E and Unrated) Maintenance and Repair Activities Not Requiring DFO Review)*. If your drain maintenance or repair activity is on the list and you can meet the required conditions, you do not need to submit your project to DFO for review. NOTE: Your project may still need to be submitted to the Conservation Authority.

If your activity is not on the list, provide the following information to DFO for review:

- Fill out the *Notification of Drain Maintenance or Repair* form
  - Determine whether aquatic Species at Risk (SAR) may be present in the work zone or impact zone. Visit: http://www.dfo-mpo.gc.ca/species-especes/fpp-ppp/index-eng.htm.
  - Be sure to select Avoid, Mitigation, and Offsetting options that are most relevant to the proposed work and that you are prepared to implement. Select the appropriate offsetting options that can be successfully implemented. The number and size of the offsetting measures used should reflect the scale and extent of the disturbance.
- Include site photographs and a map of the drain location identifying areas proposed for maintenance or repair.
- Are there more details you can provide on the work proposed, why the works are required, or specific information about the fish habitat? The more information that can be provided up front, the faster the review can be completed. A cover email is a convenient place to provide more information when submitting your completed form.
- Sign and date the notification form. Submit the completed form, photographs, mapping, and any other relevant information by email to fisheriesprotection@dfo-mpo.gc.ca. Where applicable, it is recommended that you copy the Conservation Authority on the email.

Approval Process for Maintenance of Class A Drains: CLASS A AUTHORIZATION

A Class A Authorization can be issued to permit serious harm to fish when undertaking maintenance activities in Class A municipal drains. Serious harm could include incidental death of fish through dredging activities and/or the permanent alteration and destruction of fish habitat.

PERMITTED WORKS

The serious harm to fish and/or fish habitat resulting from drain maintenance and repair activities as outlined in the proponent's Notification of Drain Maintenance or Repair form can be authorized pursuant to Section 35(2) of the *Fisheries Act* by the Class Authorization for Class A drains.

As long as the work is undertaken according to the conditions specified in the Class Authorization, the requirements of Section 35 of the *Fisheries Act* are met. However, failure to comply with any of the conditions will be a viewed as violation and may lead to prosecution.

NOTE: If for some reason work cannot be undertaken according to conditions of the Class Authorization, a site specific review will be required.

Conditions Of Authorization

The terms and conditions that will appear in a Class Authorization for Class A drains are listed below:

Avoid & Mitigate

- No in-water work can be undertaken within a specified time period (Northern Ontario – September 1 – July 15; Southern Ontario – October 1 – July 15.
- Sediment and erosion control measures must be in place, upgraded, and maintained such that the release of sediment is prevented to protect habitat downstream (impact zone).
- The finished channel shall be as narrow and deep as possible within the specifications of the most recent Engineer's Report.
- A bottom cleanout involving bank reshaping shall include the following:
  - Banks slopes will be graded to a slope that will maintain bank stability (may vary depending on local conditions).
  - Any bends in the channel shall be stabilized, to prevent erosion as required.
- Work in water shall not be conducted at times when flows are elevated due to local rain events, storms, or seasonal floods.
- Vegetation on top of the bank shall not be removed/altered on more than one side of the drain. Where vegetation on top of the bank must be removed/altered on one side, the shade producing side of the drain shall remain unaltered unless specified in the most recent Engineer's Report.
- Where vegetation on top of the bank and/or bank slope has been removed, the proponent shall stabilize the banks to prevent erosion and/or sedimentation, preferably through revegetation with native species suitable for the site.
- All construction materials and equipment used for the purposes of site preparation and project completion shall be operated and stored in a manner that prevents any deleterious substances (dirt, grease, oil, fuel) from entering the water.

Offsetting

- Offsetting measures to be carried out according to the Notification of Drain Maintenance or Repair form approved by DFO and attached to the Authorization.
- All fish habitat offsetting measures to be completed and functioning according to the criteria as described in the proponents plan.
- If the results of monitoring indicate that offsetting measures are not completed by the date specified and/or are not functioning according to the above criteria, the proponent shall give written notice to DFO and put in place contingency measures and associated monitoring measures as contained within their approved offsetting plan to ensure the offsetting is completed and/or functioning as required by the Authorization.
- Offsetting measures shall function as intended and the Proponent shall not carry on any work, activity, or undertaking that will adversely disturb or impact the offsetting measures.

Monitoring & Reporting

- Monitoring and reporting to DFO must be undertaken within 60 days after the work has been completed to demonstrate whether measures and standards to avoid and mitigate serious harm to fish and offsetting measures were conducted according to the conditions of the Authorization.
  - Upon request, the proponent shall provide dated photographs, a site sketch, and inspection reports to demonstrate effective implementation and functioning of the mitigation measures and standards described above to limit the serious harm to what is covered by the Authorization and to demonstrate effective implementation and functioning of the offsetting measures.
  - Provide details of any contingency measures that were followed to prevent impacts greater than those covered by the Authorization in the event that mitigation measures did not function as described.

Aquatic Species at Risk (SAR)

If aquatic (fish and mussel) SAR are present, drain maintenance activities will require a site specific review regardless of drain class. To determine if SAR are found in the work zone or impact zone (1 km downstream), refer to: http://www.dfo-mpo.gc.ca/species-especes/fpp-ppp/index-eng.htm.

For more information, visit http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html or contact the Fisheries Protection Program at fisheriesprotection@dfo-mpo.gc.ca.

Municipal Drain Class B

B

FLOW: PERMANENT
SPAWNING PERIOD: SPRING/FALL
SPECIES: SENSITIVE SPECIES PRESENT
TIME SINCE LAST CLEANOUT: <10 YRS
AUTHORIZATION: CLASS B AUTHORIZATION

DO I NEED TO SUBMIT MY DRAIN MAINTENANCE PROJECT TO DFO FOR REVIEW?

Fisheries and Oceans Canada (DFO) has created a list of Maintenance and Repair Activities that do not require review by DFO (See Appendix 3 - *Municipal Drain (Class A – E and Unrated) Maintenance and Repair Activities Not Requiring DFO Review)*. If your drain maintenance or repair activity is on the list and you can meet the required conditions, you do not need to submit your project to DFO for review. NOTE: Your project may still need to be submitted to the Conservation Authority.

If your activity is not on the list, provide the following information to DFO for review:

- Fill out the *Notification of Drain Maintenance or Repair* form
  - Determine whether aquatic Species at Risk (SAR) may be present in the work zone or impact zone. Visit: http://www.dfo-mpo.gc.ca/species-especes/fpp-ppp/index-eng.htm.
  - Be sure to select Avoid, Mitigation, and Offsetting options that are most relevant to the proposed work and that you are prepared to implement. Select the appropriate offsetting options that can be successfully implemented. The number and size of the offsetting measures used should reflect the scale and extent of the disturbance.
- Include site photographs and a map of the drain location identifying areas proposed for maintenance or repair.
- Are there more details you can provide on the work proposed, why the works are required, or specific information about the fish habitat? The more information that can be provided up front, the faster the review can be completed. A cover email is a convenient place to provide more information when submitting your completed form.
- Sign and date the notification form. Submit the completed form, photographs, mapping, and any other relevant information by email to fisheriesprotection@dfo-mpo.gc.ca. Where applicable, it is recommended that you copy the Conservation Authority on the email.

Approval Process for Maintenance of Class B Drains:

CLASS B AUTHORIZATION

A Class B Authorization can be issued to permit serious harm to fish when undertaking maintenance activities in Class B municipal drains. Serious harm could include incidental death of fish through dredging activities and/or the permanent alteration and destruction of fish habitat.

These drains were originally Class E drains but since they undergo regular maintenance, the review process was streamlined. *Note: No new Class B drains will be assigned, and any existing Class B drains will not change classification unless new data becomes available to support the reclassification.*

PERMITTED WORKS

The serious harm to fish and/or fish habitat resulting from drain maintenance and repair activities as outlined in the proponent's Notification of Drain Maintenance or Repair form can be Authorized pursuant to Section 35(2) of the *Fisheries Act* by the Class Authorization for Class B drains.

As long as the work is undertaken according to the conditions specified in the Class Authorization, the requirements of Section 35 of the *Fisheries Act* are met. However, failure to comply with any of the conditions will be a viewed as violation and may lead to prosecution.

NOTE: If for some reason work cannot be undertaken according to conditions of the Class Authorization, a site specific review will be required.

CONDITIONS OF AUTHORIZATION

The terms and conditions that will appear in a Class Authorization for Class B drains are listed below:

AVOID & MITIGATE

- No in-water work can be undertaken within a specified time period (Northern Ontario - April 1 – July 15; Southern Ontario - March 15- July 15).
- Sediment and erosion control measures must be in place and shall be upgraded and maintained such that the release of sediment is avoided at the location of the maintenance or repair work.
- The finished channel shall be as narrow and deep as possible within the specifications of the most recent Engineer's Report.
- A bottom cleanout involving bank reshaping shall include the following:
  - Banks slopes will be graded to a slope that will maintain bank stability (may vary depending on local conditions)
  - Any bends in the channel shall be stabilized, to prevent erosion as required.
- Work in water shall not be conducted at times when flows are elevated due to local rain events, storms or seasonal floods.
- Vegetation on top of the bank shall not be removed/altered on more than one side of the drain. Where vegetation on top of the bank must be altered on one side, the shade producing side of the drain shall remain unaltered unless specified in the most recent Engineer's Report.
- Where vegetation on top of the bank and/or bank slope has been removed, the proponent shall stabilize the banks to prevent erosion and/or sedimentation, preferably through revegetation with native species suitable for the site.
- All construction materials and equipment used for the purposes of site preparation and project completion shall be operated and stored in a manner that prevents any deleterious substances (dirt, grease, oil, fuel) from entering the water.

OFFSETTING

- Offsetting measures to be carried out according to the Notification of Drain Maintenance or Repair form approved by DFO and attached to the Authorization.
- All fish habitat offsetting measures to be completed and functioning according to the criteria as described in the proponents plan.
- If the results of monitoring indicate that offsetting measures are not completed by the date specified and/or are not functioning according to the above criteria, the proponent shall give written notice to DFO and put in place contingency measures and associated monitoring measures as contained within their approved offsetting plan to ensure the offsetting is completed and/or functioning as required by the Authorization.
- Offsetting measures shall function as intended, and the Proponent shall not carry on any work, activity, or undertaking that will adversely disturb or impact the offsetting measures.

MONITORING & REPORTING

- Monitoring and reporting to DFO must be undertaken within 60 days after the work has been completed to demonstrate whether the measures and standards to avoid and mitigate serious harm to fish and offsetting measures were conducted according to the conditions of the Authorization.
  - Upon request, the proponent shall provide dated photographs, a site sketch, and inspection reports to demonstrate effective implementation and functioning of the mitigation measures and standards described above to limit the serious harm to what is covered by the Authorization and to demonstrate effective implementation and functioning of the offsetting measures.
  - Provide details of any contingency measures that were followed to prevent impacts greater than those covered by the Authorization in the event that mitigation measures did not function as described.

AQUATIC SPECIES AT RISK (SAR)

If aquatic (fish and mussel) SAR are present, drain maintenance activities will require a site specific review regardless of drain class. To determine if SAR are found in the work zone or impact zone (1 km downstream), refer to: http://www.dfo-mpo.gc.ca/species-especes/fpp-ppp/index-eng.htm.

For more information, visit http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html or contact the Fisheries Protection Program at fisheriesprotection@dfo-mpo.gc.ca.

C

Municipal Drain Class C

FLOW: PERMANENT
SPAWNING PERIOD: SPRING
SPECIES: NO SENSITIVE SPECIES PRESENT
AUTHORIZATION: CLASS C AUTHORIZATION

DO I NEED TO SUBMIT MY DRAIN MAINTENANCE PROJECT TO DFO FOR REVIEW?

Fisheries and Oceans Canada (DFO) has created a list of Maintenance and Repair Activities that do not require review by DFO (See Appendix 3 - *Municipal Drain (Class A – E and Unrated) Maintenance and Repair Activities Not Requiring DFO Review)*. If your drain maintenance or repair activity is on the list and you can meet the required conditions, you do not need to submit your project to DFO for review. NOTE: Your project may still need to be submitted to the Conservation Authority.

If your activity is not on the list, provide the following information to DFO for review:

- Fill out the *Notification of Drain Maintenance or Repair* form
  - Determine whether aquatic Species at Risk (SAR) may be present in the work zone or impact zone. Visit: http://www.dfo-mpo.gc.ca/species-especes/fpp-ppp/index-eng.htm.
  - Be sure to select Avoid, Mitigation, and Offsetting options that are most relevant to the proposed work and that you are prepared to implement. Select the appropriate offsetting options that can be successfully implemented. The number and size of the offsetting measures used should reflect the scale and extent of the disturbance.
- Include site photographs and a map of the drain location identifying areas proposed for maintenance or repair.
- Are there more details you can provide on the work proposed, why the works are required, or specific information about the fish habitat? The more information that can be provided up front, the faster the review can be completed. A cover email is a convenient place to provide more information when submitting your completed form.
- Sign and date the notification form. Submit the completed form, photographs, mapping, and any other relevant information by email to fisheriesprotection@dfo-mpo.gc.ca. Where applicable, it is recommended that you copy the Conservation Authority on the email.

Approval Process for Maintenance of Class C Drains:

CLASS C AUTHORIZATION

A Class C Authorization can be issued to permit serious harm to fish when undertaking maintenance activities in Class C municipal drains. Serious harm could include incidental death of fish through dredging activities and/or the permanent alteration and destruction of fish habitat.

PERMITTED WORKS

The serious harm to fish and/or fish habitat resulting from drain maintenance and repair activities as outlined in the proponent's Notification of Drain Maintenance or Repair form can be Authorized pursuant to Section 35(2) of the *Fisheries Act* by the Class Authorization for Class C drains.

As long as the work is undertaken according to the conditions specified in the Class Authorization, the requirements of Section 35 of the *Fisheries Act* are met. However, failure to comply with any of the conditions will be a viewed as violation and may lead to prosecution.

NOTE: If for some reason work cannot be undertaken according to conditions of the Class Authorization, a site specific review will be required.

CONDITIONS OF AUTHORIZATION

The terms and conditions that will appear in a Class Authorization for Class C drains are listed below:

AVOID & MITIGATE

- No in-water work can be undertaken within a specified time period (Northern Ontario – April 1 – July 15; Southern Ontario – March 15 – July 15).
- Sediment and erosion control measures must be in place and shall be upgraded and maintained such that the release of sediment is avoided at the location of the maintenance or repair work.
- The finished channel shall be as narrow and deep as possible within the specifications of the most recent Engineer's Report.
- A bottom cleanout involving bank reshaping shall include the following:
  - Banks slopes will be graded to a slope that will maintain bank stability (may vary depending on local conditions).
  - Any bends in the channel shall be stabilized, to prevent erosion as required.
- Work in water shall not be conducted at times when flows are elevated due to local rain events, storms, or seasonal floods.
- Vegetation on top of the bank shall not be removed/altered on more than one side of the drain. Where vegetation on top of the bank must be removed/altered on one side, the shade producing side of the drain shall remain unaltered unless specified in the most recent Engineer's Report.
- Where vegetation on top of the bank and/or bank slope has been removed, the proponent shall stabilize the banks to prevent erosion and/or sedimentation, preferably through revegetation with native species suitable for the site.
- All construction materials and equipment used for the purposes of site preparation and project completion shall be operated and stored in a manner that prevents any deleterious substances (dirt, grease, oil, fuel) from entering the water.

OFFSETTING

- Offsetting measures to be carried out according to the notification form approved by DFO and attached to the Authorization.
- All fish habitat offsetting measures to be completed and functioning according to the criteria as described in the proponents plan.
- If the results of monitoring indicate that offsetting measures are not completed by the date specified and/or are not functioning according to the above criteria, the proponent shall give written notice to DFO and put in place contingency measures and associated monitoring measures as contained within their approved offsetting plan to ensure the offsetting is completed and/or functioning as required by the Authorization.
- Offsetting measures shall function as intended and the Proponent shall not carry on any work, activity, or undertaking that will adversely disturb or impact the offsetting measures.

MONITORING & REPORTING

- Monitoring and reporting to DFO must be undertaken within 60 days after the work has been completed to demonstrate whether measures and standards to avoid and mitigate serious harm to fish and offsetting measures were conducted according to the conditions of the Authorization.
  - Upon request, the proponent shall provide dated photographs, a site sketch, and inspection reports to demonstrate effective implementation and functioning of the mitigation measures and standards described above to limit the serious harm to fish and fish habitat and to demonstrate effective implementation and functioning of the offsetting measures.
  - Provide details of any contingency measures that were followed to prevent impacts greater than those covered by the Authorization in the event that mitigation measures did not function as described.

AQUATIC SPECIES AT RISK (SAR)

If aquatic (fish and mussel) SAR are present, drain maintenance activities will require a site specific review regardless of drain class. To determine if SAR are found in the work zone or impact zone (1 km downstream), refer to: http://www.dfo-mpo.gc.ca/species-especes/fpp-ppp/index-eng.htm.

For more information, visit http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html or contact the Fisheries Protection Program at fisheriesprotection@dfo-mpo.gc.ca.

Municipal Drain Class D

D

FLOW: PERMANENT
SPAWNING PERIOD: FALL
SPECIES: SENSITIVE SPECIES PRESENT
AUTHORIZATION: SITE SPECIFIC

DO I NEED TO SUBMIT MY DRAIN MAINTENANCE PROJECT TO DFO FOR REVIEW?

Fisheries and Oceans Canada (DFO) has created a list of Maintenance and Repair Activities that do not require review by DFO (See Appendix 3 - *Municipal Drain (Class A – E and Unrated) Maintenance and Repair Activities Not Requiring DFO Review)*. If your drain maintenance or repair activity is on the list and you can meet the required conditions, you do not need to submit your project to DFO for review. NOTE: Your project may still need to be submitted to the Conservation Authority.

If your activity is not on the list, provide the following information to DFO for review:

- Fill out the *Notification of Drain Maintenance or Repair* form
  - Determine whether aquatic Species at Risk (SAR) may be present in the work zone or impact zone. Visit: http://www.dfo-mpo.gc.ca/species-especes/fpp-ppp/index-eng.htm.
  - Be sure to select Avoid, Mitigation, and Offsetting options that are most relevant to the proposed work and that you are prepared to implement. Select the appropriate offsetting options that can be successfully implemented. The number and size of the offsetting measures used should reflect the scale and extent of the disturbance.
- Include site photographs and a map of the drain location identifying areas proposed for maintenance or repair.
- Are there more details you can provide on the work proposed, why the works are required, or specific information about the fish habitat? The more information that can be provided up front, the faster the review can be completed. A cover email is a convenient place to provide more information when submitting your completed form.
- Sign and date the notification form. Submit the completed form, photographs, mapping, and any other relevant information by email to fisheriesprotection@dfo-mpo.gc.ca. Where applicable, it is recommended that you copy the Conservation Authority on the email.

APPROVAL PROCESS FOR MAINTENANCE OF CLASS D DRAINS:

SITE SPECIFIC REVIEW

Fish communities and supporting habitats found in Class D drains are more sensitive to disturbances associated with drain maintenance and repair activities. This does not mean these types of drains cannot be maintained; however, more rigorous mitigation measures may need to be applied to ensure that drain maintenance does not result in unacceptable adverse effects.

If the proposed maintenance project will result in serious harm to fish or fish habitat that cannot be prevented by mitigation measures, the work will ultimately require an Authorization by DFO. DFO will determine if the serious harm resulting from the project is acceptable and will work with the proponent to establish appropriate mitigation measures, and if offsetting is required, will help in the review and development of offsetting measures. In rare cases, where the loss of a particular habitat type is considered unacceptable or when adequate offsetting may not be achieved, an Authorization may be denied.

WHAT IF A SITE SPECIFIC *FISHERIES ACT* AUTHORIZATION IS REQUIRED?

If, after a project review, it is determined that your project will cause serious harm to fish that are part of or that support a commercial, recreational or Aboriginal fishery, you must apply for an Authorization (Paragraph 35(2)(*b*) *Fisheries Act* Authorization from the Minister of Fisheries and Oceans to ensure compliance with the Act.

An application for an Authorization must include all information listed in Schedule 1 of the *Fisheries Act* Applications Regulations and a letter of credit. Applications must include the following information and document:

- Contact Information;
- Description of proposed work, undertaking or activity;
- Timeline;
- Location;
- Description of fish and fish habitat (aquatic environment);
- Description of effects on fish and fish habitat;
- Measures and standards to avoid or mitigate serious harm to fish;
- Residual serious harm to fish after implementation of avoidance and mitigation measures and standards;
- Offsetting plan; and
- Letter of credit The *Fisheries Act* Applications Regulations require that all applications for Authorization must include a letter of credit to cover the cost of implementing an offsetting plan.

Not submitting all of the information and documentation prescribed by the *Fisheries Act* Applications Regulations will likely result in delay with the processing of your application. If there are gaps in the information/documentation provided, the Minister of Fisheries and Oceans will notify you accordingly and your application will not be processed until the required information and documentation are submitted.

IMPORTANT OR EXCEPTIONAL HABITAT IN CLASS D DRAINS

When conducting a site specific review of drain maintenance and repair projects, DFO biologists will consider whether high quality habitat will likely be permanently altered or destroyed, and if so, will work with the proponent to protect this habitat through avoidance, mitigation and offsetting measures. If you are uncertain whether or not important or exceptional habitat occurs within the work zone or impact zone, consult with a qualified biologist, local Conservation Authority, or Fisheries and Oceans Canada.

Important habitat

- Uncommonly found habitat may (but may not) be one of the limiting factors to the fish population.
- Habitat in its natural condition or only slightly degraded relative to the function that it supports. Examples include:
  - streams with high level of complexity (e.g. riffles, pools, higher gradient, substrate diversity, riparian buffer, permanent flow etc.);
  - spawning and nursery habitat;
  - migration routes required to get to spawning grounds or overwintering habitat; and
  - mature, natural riparian areas.

Exceptional habitat

- Rare or limiting habitat, fish populations are highly dependent on the habitat to support critical life functions
- Critical habitat (features and functions) for aquatic SAR as described in the Recovery Strategy or Action Plan for the species
- Areas contributing to fisheries productivity that are exceptionally productive, likely to be limiting and are rare or relatively uncommon. Examples include:
  - brook trout spawning habitat; and
  - cold water streams with groundwater upwellings.

AQUATIC SPECIES AT RISK (SAR)

If aquatic (fish and mussel) SAR are present, drain maintenance activities will require a site specific review regardless of drain class. To determine if SAR are found in the work zone or impact zone (1 km downstream), refer to http://www.dfo-mpo.gc.ca/species-especes/fpp-ppp/index-eng.htm.

For more information, visit http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html or contact the Fisheries Protection Program at fisheriesprotection@dfo-mpo.gc.ca.

Municipal Drain Class E

E

FLOW: PERMANENT
SPAWNING PERIOD: SPRING
SPECIES: SENSITIVE SPECIES PRESENT
AUTHORIZATION: CLASS E AUTHORIZATION

EFFECTIVE MARCH 15, 2017

DO I NEED TO SUBMIT MY DRAIN MAINTENANCE PROJECT TO DFO FOR REVIEW?

Fisheries and Oceans Canada (DFO) has created a list of Maintenance and Repair Activities that do not require review by DFO (See Appendix 3 - *Municipal Drain (Class A – E and Unrated) Maintenance and Repair Activities Not Requiring DFO Review)*. If your drain maintenance or repair activity is on the list and you can meet the required conditions, you do not need to submit your project to DFO for review. NOTE: Your project may still need to be submitted to the Conservation Authority.

If your activity is not on the list, provide the following information to DFO for review:

- Fill out the *Notification of Drain Maintenance or Repair* form
    - Determine whether aquatic Species at Risk (SAR) may be present in the work zone or impact zone. Visit: http://www.dfo-mpo.gc.ca/species-especes/fpp-ppp/index-eng.htm.
    - Be sure to select Avoid, Mitigation, and Offsetting options that are most relevant to the proposed work and that you are prepared to implement. Select the appropriate offsetting options that can be successfully implemented. The number and size of the offsetting measures used should reflect the scale and extent of the disturbance.
- Include site photographs and a map of the drain location identifying areas proposed for maintenance or repair.
- Are there more details you can provide on the work proposed, why the works are required, or specific information about the fish habitat? The more information that can be provided up front, the faster the review can be completed. A cover email is a convenient place to provide more information when submitting your completed form.
- Sign and date the notification form. Submit the completed form, photographs, mapping, and any other relevant information by email to fisheriesprotection@dfo-mpo.gc.ca. Where applicable, it is recommended that you copy the Conservation Authority on the email.

Approval Process for Maintenance of Class E Drains: CLASS E AUTHORIZATION

A Class E Authorization can be issued to permit serious harm to fish when undertaking maintenance activities in Class E municipal drains (Effective March 15, 2017). Serious harm could include incidental death of fish through dredging activities and/or the permanent alteration and destruction of fish habitat.

Photograph by D. Heinbuck

CLASS E

For activities in a Class E drain, there are two types of authorizations that will be issued. The fish species that are present in the municipal drain will determine the cleanout that is possible and, thus, the type of authorization that is issued. For some municipal drains, the entire bottom of the municipal drain may be cleaned out; however, one bank slope and the top of the bank is to remain intact and are, therefore, considered "No Work Zones". In other municipal drains, it may be necessary to protect half of the emergent and submergent vegetation in the drain as it is particularly important for certain fish species and, thus, only half of the bottom of the drain may be cleaned out. The other bottom half of the drain, as measured from the centre line, will not be dredged and aquatic vegetation will remain in place and one bank slope and the top of one bank is to remain intact (no removal of sediment or vegetation). These areas are considered "No Work Zones".

PERMITTED WORKS

The serious harm to fish and/or fish habitat resulting from drain maintenance and repair activities as outlined in the proponent's Notification of Drain Maintenance or Repair form can be Authorized pursuant to Section 35(2) of the *Fisheries Act* by the Class Authorization for Class E drains. As long as the work is undertaken according to the conditions specified in the Class Authorization, the requirements of Section 35 of the *Fisheries Act* are met. However, failure to comply with any of the conditions will be a viewed as violation and may lead to prosecution. N*OTE: If for some reason work cannot be undertaken according to conditions of the Class Authorization, a site specific review will be required.*

Conditions Of Authorization

The terms and conditions that will appear in a Class Authorization for Class E drains are listed below:

Avoid & Mitigate

- No in-water work can be undertaken within a specified time period (Northern Ontario – April 1 – July 15; Southern Ontario – March 15 – July 15).
- Sediment and erosion control measures must be in place and shall be upgraded and maintained such that the release of sediment is avoided at the location of the maintenance or repair work.
- The finished channel shall be as narrow and deep as possible within the specifications of the most recent Engineer's Report.
- A bottom cleanout involving bank reshaping may include the following:
  - The entire bottom of the municipal drain may be cleaned out.
  - One bank slope may be graded to a slope that will maintain bank stability. The other bank slope must remain intact and is considered a "No Work Zone".
  - Any bends in the channel shall be stabilized to prevent erosion as required.

  Or
  - Only half of the bottom of the municipal drain may be cleaned out.
  - One bank slope may be graded to a slope that will maintain bank stability. The other bank slope must remain intact and is considered a "No Work Zone".
  - Any bends in the channel shall be stabilized to prevent erosion as required.
- Work in water shall not be conducted at times when flows are elevated due to local rain events, storms, or seasonal floods.
- Vegetation on top of the bank shall not be removed/altered (root system must remain) on more than one side of the drain. Where vegetation on top of the bank must be removed/altered on one side, the shade producing side of the drain shall remain unaltered.
- Where vegetation on top of the bank and/or bank slope has been removed, the proponent shall stabilize the banks to prevent erosion and/or sedimentation, preferably through revegetation with native species suitable for the site.
- All construction materials and equipment used for the purposes of site preparation and project completion shall be operated and stored in a manner that prevents any deleterious substances (dirt, grease, oil, fuel) from entering the water.

Offsetting

- Offsetting measures to be carried out according to the notification form approved by DFO and attached to the Authorization.
- All fish habitat offsetting measures to be completed and functioning according to the criteria as described in the proponents plan.
- If the results of monitoring indicate that offsetting measures are not completed by the date specified and/or are not functioning according to the above criteria, the proponent shall give written notice to DFO and put in place contingency measures and associated monitoring measures as contained within their approved offsetting plan to ensure the offsetting is completed and/or functioning as required by the Authorization.
- Offsetting measures shall function as intended and the Proponent shall not carry on any work, activity or undertaking that will adversely disturb or impact the offsetting measures.

Monitoring & Reporting

- Monitoring and reporting to DFO must be undertaken within 60 days after the work has been completed to demonstrate whether measures and standards to avoid and mitigate serious harm to fish and offsetting measures were conducted according to the conditions of the Authorization.
  - Upon request, the proponent shall provide dated photographs, a site sketch and inspection reports to demonstrate effective implementation and functioning of the mitigation measures and standards described above to limit the serious harm to what is covered by the Authorization and to demonstrate effective implementation and functioning of the offsetting measures.
  - Provide details of any contingency measures that were followed, to prevent impacts greater than those covered by the Authorization in the event that mitigation measures did not function as described.

Aquatic Species at Risk (SAR)

If aquatic (fish and mussel) SAR are present, drain maintenance activities will require a site specific review regardless of drain class. To determine if SAR are found in the work zone or impact zone (1 km downstream), refer to: http://www.dfo-mpo.gc.ca/species-especes/fpp-ppp/index-eng.htm.

For more information, visit http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html or contact the Fisheries Protection Program at fisheriesprotection@dfo-mpo.gc.ca.

Municipal Drain Class F

F

FLOW: INTERMITTENT
SPAWNING PERIOD: SPRING
SPECIES: N/A
AUTHORIZATION: NONE REQUIRED IF WORK DONE IN DRY OR NO FLOW

DO I NEED TO SUBMIT MY DRAIN MAINTENANCE PROJECT TO DFO FOR REVIEW?

Most maintenance activities in Class F drains do not require review by DFO. Fisheries and Oceans Canada (DFO) has created a list of Maintenance and Repair Activities that do not require review by DFO (See Appendix 3 - *Maintenance and Repair of F Drains*). If your drain maintenance or repair activity is on the list and you can meet the required conditions, you do not need to submit your project to DFO for review. NOTE: Your project may still need to be submitted to the Conservation Authority. All municipal, provincial, or federal legislation that applies to the work being proposed must be respected.

If your activity is *not* on the list, provide the following information to DFO for review:

- Fill out the Notification of Drain Maintenance or Repair form
  - Determine whether aquatic Species at Risk (SAR) may be present in the work zone or impact zone. Visit: http://www.dfo-mpo.gc.ca/species-especes/fpp-ppp/index-eng.htm. If SAR are present, DFO review is required (see below).
  - Be sure to select Avoid and Mitigation options that are most relevant to the proposed work and that you are prepared to implement. At least one option must be selected for each. (Offsetting is not required for Class F drains).
- Include site photographs and a map of the drain location identifying areas proposed for maintenance or repair.
- Are there more details you can provide on the work proposed, why the works are required, or specific information about the fish habitat? The more information that can be provided up front, the faster the review can be completed. A cover email is a convenient place to provide more information when submitting your completed form.
- Sign and date the notification form. Submit the completed form, photographs, mapping, and any other relevant information by email to fisheriesprotection@dfo-mpo.gc.ca. Where applicable, it is recommended that you copy the Conservation Authority on the email.

Photograph by L.Wren

Approval Process for Maintenance of Class F Drains: NONE REQUIRED (WHEN WORK DONE IN DRY OR NO FLOW)

Class F drains are, by definition, intermittent systems, meaning that they are dry for at least 3 months of the year (except after rain events) and do not contain federally listed aquatic SAR. As such, maintenance activities on these drains are considered low risk to fish and fish habitat, particularly if the work can be completed in the dry, during periods of no flow (though may have some water in pools), or in the winter when completely frozen. If there is flow, a site specific review is required.

AQUATIC SPECIES AT RISK (SAR)

If aquatic (fish and mussel) SAR are present, drain maintenance activities will require a site specific review regardless of drain class. To determine if SAR are found in the work zone or impact zone (1 km downstream), refer to http://www.dfo-mpo.gc.ca/species-especes/fpp-ppp/index-eng.htm.

For more information, visit http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html or contact the Fisheries Protection Program at fisheriesprotection@dfo-mpo.gc.ca.

UNRATED

FLOW: UNKNOWN
SPAWNING PERIOD: UNKNOWN
SPECIES: UNKNOWN
AUTHORIZATION: CLASS AUTHORIZATION OR SITE SPECIFIC

Municipal Drain Class Unrated

DO I NEED TO SUBMIT MY DRAIN MAINTENANCE PROJECT TO DFO FOR REVIEW?

Fisheries and Oceans Canada (DFO) has created a list of Maintenance and Repair Activities that do not require review by DFO (See Appendix 3 - *Municipal Drain (Class A – E and Unrated) Maintenance and Repair Activities Not Requiring DFO Review*). If your drain maintenance or repair activity is on the list and you can meet the required conditions, you do not need to submit your project to DFO for review. NOTE: Your project may still need to be submitted to the Conservation Authority.

If your activity is not on the list, provide the following information to DFO for review:

- Fill out the *Notification of Drain Maintenance or Repair* form
  - Determine whether aquatic Species at Risk (SAR) may be present in the work zone or impact zone. Visit: http://www.dfo-mpo.gc.ca/species-especes/fpp-ppp/index-eng.htm.
  - Be sure to select Avoid, Mitigation, and Offsetting options that are most relevant to the proposed work, and that you are prepared to implement.
- Include site photographs and a map of the drain location identifying areas proposed for maintenance or repair.
- Are there more details you can provide on the work proposed, why the works are required, or specific information about the fish habitat? The more information that can be provided up front, the faster the review can be completed. A cover email is a convenient place to provide more information when submitting your completed form.
- Sign and date the notification form. Submit the completed form, photographs, mapping, and any other relevant information by email to fisheriesprotection@dfo-mpo.gc.ca. Where applicable, it is recommended that you copy the Conservation Authority on the email.

Approval Process for Maintenance of Unrated Drains: SITE SPECIFIC REVIEW

Unrated refers to drains which are identified as municipal drains but are missing some or all of the data required to assign a classification.

If a drain is "Unrated", there is no information on whether the municipal drain has intermittent or permanent flow and/or no information on what fish species are present in the drain. DFO will consult with other agencies (MNRF, Conservation Authorities) to try and obtain this information and a site visit may also be conducted. If there is sufficient information, the drain may be assigned a temporary or permanent classification (dependent on the quality of data) and a Class Authorization or Letter of Advice may be issued for work in Class A, C, E, or F drains. If it is determined that the Unrated drain should be considered to be a D drain or there is insufficient information to assign a classification (even temporarily), a site specific review will be required.

During the site specific review process, DFO will determine if the serious harm resulting from the project is acceptable and will work with the proponent to establish appropriate mitigation measures, and if offsetting is required, will help in the review and development of offsetting measures. After the review, a Letter of Advice or a *Fisheries Act* Authorization may be issued for the drain maintenance and repair activities. In rare cases, where the loss of a particular habitat type is considered unacceptable or when adequate offsetting may not be achieved, an Authorization may be denied.

WHAT IF A SITE SPECIFIC *FISHERIES ACT* AUTHORIZATION IS REQUIRED?

If, after a project review, it is determined that your project will cause serious harm to fish that are part of or that support a commercial, recreational or Aboriginal fishery, you must apply for an Authorization (Paragraph 35(2)(*b*) *Fisheries Act* Authorization from the Minister of Fisheries and Oceans) to ensure compliance with the Act.

An application for an Authorization must include all information listed in Schedule 1 of the *Fisheries Act* Applications Regulations and a letter of credit. Applications must include the following information and document:

- Contact Information;
- Description of proposed work, undertaking or activity;
- Timeline;
- Location;
- Description of fish and fish habitat (aquatic environment);
- Description of effects on fish and fish habitat;
- Measures and standards to avoid or mitigate serious harm to fish;
- Residual serious harm to fish after implementation of avoidance and mitigation measures and standards;
- Offsetting plan; and
- Letter of credit The *Fisheries Act* Applications Regulations require that all applications for authorization must include a letter of credit to cover the cost of implementing an offsetting plan.

Not submitting all of the information and documentation prescribed by the *Fisheries Act* Applications Regulations will likely result in delay with the processing of your application. If there are gaps in the information/documentation provided, the Minister of Fisheries and Oceans will notify you accordingly and your application will not be processed until the required information and documentation are submitted.

IMPORTANT OR EXCEPTIONAL HABITAT IN UNRATED DRAINS

When conducting a site specific review of drain maintenance projects, DFO biologists will consider whether high quality habitat will likely be permanently altered or destroyed, and if so, will work with the proponent to protect this habitat through avoidance, mitigation and offsetting measures. If you are uncertain whether or not important or exceptional habitat occurs within the work zone or impact zone, consult with a qualified biologist, local Conservation Authority, or Fisheries and Oceans Canada.

☐ **Important habitat**

- Uncommonly found habitat, may (but may not) be one of the limiting factors to the fish population.
- Habitat in its natural condition or only slightly degraded relative to the function that it supports. Examples include:
  - streams with high level of complexity (e.g. riffles, pools, higher gradient, substrate diversity, riparian buffer, permanent flow etc.);
  - spawning and nursery habitat ;
  - migration routes required to get to spawning grounds or overwintering habitat; and
  - mature, natural riparian areas.

☐ **Exceptional habitat**

- Rare or limiting habitat, fish populations are highly dependent on the habitat to support critical life functions.
- Critical habitat (features and functions) for aquatic SAR as described in the Recovery Strategy or Action Plan for the species.
- Areas contributing to fisheries productivity that are exceptionally productive, likely to be limiting and are rare or relatively uncommon. Examples include:
  - brook trout spawning habitat; and
  - cold water streams with groundwater upwellings.

AQUATIC SPECIES AT RISK (SAR)

If aquatic (fish and mussel) SAR are present, drain maintenance activities will require a site specific review regardless of drain class. To determine if SAR are found in the work zone or impact zone (1 km downstream), refer to: http://www.dfo-mpo.gc.ca/species-especes/fpp-ppp/index-eng.htm.

For more information, visit http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html or contact the Fisheries Protection Program at fisheriesprotection@dfo-mpo.gc.ca.

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APPENDIX 7

SAMPLE CLASS AUTHORIZATIONS

1. Sample Class Authorizations

The following Class Authorizations (effective March 15, 2017) have been provided as examples. These are templates of authorizations which can be expected to change over time.

File No.: Class A_ON

FISHERIES ACT 35 (2)(b)AUTHORIZATION

Authorization issued to:

Drainage Superintendent or other municipal representative in Ontario as identified as, the Contact Name and Municipality on the "*Notification of Municipal Drain Maintenance Work*" form submitted for this work (hereafter referred to as the "Proponent").

Location of Proposed Project

Class A Drainage Systems in Ontario established under the authority of a municipal by-law under the *Drainage Act* in Ontario.

File No.: Class A_ON

Description of Proposed Project

The proposed project of which the work, undertaking or activity authorized is a part involves:

Routine maintenance of an existing 'Class A Municipal Drain' to facilitate drainage activities

Description of Authorized work(s), undertaking(s) or activity(ies) likely to result in serious harm to fish

The works, undertakings, or activities associated with the proposed project described above, which are likely to result in serious harm to fish, are:

- Drain maintenance and repair activities as outlined in the proponent's Drain Maintenance and Notification Form.

- This *Fisheries Act* Class Authorization is restricted and only applicable to drains as defined as "drainage works" under the Ontario *Drainage Act* and classified as Class "A" by Fisheries and Oceans Canada through the Agricultural Drain Classification Process. (Class A Municipal Drains have permanent flow and fall and/or spring spawning Commercial, Recreational, Aboriginal fish species that are tolerant to drain maintenance).

The serious harm to fish likely to result from the proposed work, undertaking, or activity, and covered by this authorization includes:

- Incidental death of fish through dredging activities associated with drain maintenance works.

- Permanent alteration and destruction of fish habitat in Class A Municipal Drains.

- Type and sensitivity of fish habitat to be permanently altered or destroyed is defined as a 'Class A Municipal Drain' have permanent flow, and fall and/or spring spawning Commercial, Recreational, Aboriginal fish species tolerant to drain maintenance.

- Quantity of habitat impacted will vary depending on specific project location. The length of drain impacted and the duration of the work, as outlined in the form: Notification of Municipal Drain Maintenance Work Conducted under a *Fisheries Act* paragraph 35(2)(b) Class Authorization.

File No.: Class A_ON

Conditions of Authorization

The above described work, undertaking or activity that is likely to result in serious harm to fish must be carried on in accordance with the following conditions.

1. **Conditions that relate to the period during which the work, undertaking or activity that will result in serious harm to fish can be carried on:**

The work, undertaking or activity that results in serious harm to fish is authorized to be carried on during the following period:

From	To
March 15, 2017	March 14, 2019

If the Proponent cannot complete the work, undertaking or activity during this period, Fisheries and Oceans Canada (DFO) must be notified. DFO may, where it considers appropriate, provide in writing notice that the period to carry on the work, undertaking or activity has been extended.

The period during which other conditions of this authorization must be complied with are provided in their respective sections below.

2. **Conditions that relate to measures and standards to avoid and mitigate serious harm to fish:**

2.1 This *Fisheries Act* Class Authorization is restricted to be applicable only to drains as defined as "drainage works" under the Ontario *Drainage Act* and classified as Class "A" (defined above) by Fisheries and Oceans Canada.

2.2 No in-stream work or construction activity shall occur within the following dates, without the specific written permission of DFO:

2.2.1 **Northern Region:** September 1 to July 15

2.2.2 **Southern Region:** October 1 to July 15

2.3 Sediment and erosion control measures must be in place and shall be upgraded and maintained, such that release of sediment is avoided at the location of the authorized work, undertaking, or activity.

2.4 The finished channel shall be as narrow and deep as possible within the specifications of the most recent Engineer's Report (Municipal Bylaw).

2.5 A bottom clean-out involving bank reshaping shall include the following:

2.5.1 Bank slopes shall be graded to a slope that will maintain bank stability. This value may vary depending on local conditions.

2.5.2 Any bends in the channel shall be stabilized, to prevent erosion as required.

File No.: Class A_ON

2.6 Work in water shall not be conducted at times when flows are elevated due to local rain events, storms or seasonal floods.

2.7 Vegetation on top of the bank shall not be removed/altered (dug-out, root systems remains) on more than one side of the drain. Where vegetation must be altered on one side, the shade producing side of the drain shall remain unaltered unless specified in the most recent Engineer's Report (Municipal Bylaw).

2.8 Where vegetation has been removed on top of the bank and/or on the bank slope, the proponent shall stabilize the banks to prevent erosion and/or sedimentation, preferably through re-vegetation with native species suitable for the site.

2.9 For culvert removal/replacement activities:

2.9.1 The site shall be isolated using impervious barriers.

2.9.2 Where water is pumped from the watercourse for any purpose, pump intakes shall be screened in accordance with DFO's Freshwater Intake End-of-Pipe Fish Screen Guideline. Each hose outlet shall have a diffuser or be placed in a location that is not subject to erosion from the outflow.

2.9.3 A fish salvage shall be completed within all isolated areas prior to any in-water works and/or dewatering activities. All fish shall be live released downstream of the project site.

2.9.4 If the watercourse is flowing at the time of construction, downstream flows must be maintained at all times during this project.

2.9.5 Install the culvert so that it is embedded into the streambed and ensure that the culvert remains passable by fish.

2.10 Rip rap, river stone, and rock utilized in the project shall:

2.10.1 Be clean and free of fine materials and debris prior to placement and shall be of sufficient size to resist displacement during design flood events;
2.10.2 Not be obtained from area below the high water mark of any fish-frequented waterbodies; and
2.10.3 Not be placed/positioned in a manner that prevents fish passage under low flow conditions.

File No.: Class A_ON

3. **Conditions that relate to monitoring and reporting of measures and standards to avoid and mitigate serious harm to fish:**

3.1 The Proponent shall undertake monitoring and report to DFO, within 60 days after the work has been completed, whether measures and standards to avoid and mitigate serious harm to fish were conducted according to the conditions of this Authorization.

3.1.1 Upon request, the proponent shall provide dated photographs, a site sketch, and inspection reports to demonstrate effective implementation and functioning of mitigation measures and standards described above to limit the serious harm to what is covered by this authorization.

3.1.2 Provide details of any contingency measures that were followed, to prevent impacts greater than those covered by this authorization in the event that mitigation measures did not function as described.

4. **Conditions that relate to the offsetting for the serious harm to fish likely to result from the authorized work, undertaking or activity:**

4.1 Offsetting measures shall be carried out according to the Notification Form approved by DFO and attached to the authorization.

4.2 All fish habitat offsetting measures shall be completed and functioning according to the criteria as described in the proponent's plan.

4.3 If the results of monitoring, as required in condition 5, indicate that the offsetting measures are not completed by the date specified in condition 4.2, and/or are not functioning according to the above criteria, the Proponent shall give written notice to DFO and put in place contingency measures and associated monitoring measures, as contained within their approved offsetting plan, to ensure the offsetting is completed and/or functioning as required by this authorization.

4.4 Offsetting measures shall function as intended, and the Proponent shall not carry on any work, undertaking or activity that will adversely disturb or impact the offsetting measures.

5. **Conditions that relate to monitoring and reporting of offsetting measures (described above in section 4):**

5.1 The Proponent shall undertake monitoring, within 60 days after the work has been completed, to demonstrate that offsetting measures were conducted according to the conditions of this Authorization.

5.1.1 Upon request, the proponent shall provide the monitoring report to DFO with dated photographs, and a site sketch to demonstrate effective implementation and functioning of offsetting measures.

File No.: Class A_ON

Authorization Limitations and Application Conditions

The Proponent is solely responsible for plans and specifications relating to this authorization and for all design, safety and workmanship aspects of all the works associated with this authorization.

The holder of this authorization is hereby authorized under the authority of Paragraph 35(2)(b) of the *Fisheries Act*. R.S.C., 1985, c.F. 14 to carry on the work(s), undertaking(s) and/or activity(ies) that are likely to result in serious harm to fish as described herein. This authorization does not purport to release the applicant from any obligation to obtain permission from or to comply with the requirements of any other regulatory agencies.

This authorization does not permit the deposit of a deleterious substance in water frequented by fish. Subsection 36(3) of the *Fisheries Act* prohibits the deposit of any deleterious substances into waters frequented by fish unless authorized by regulations made by Governor in Council.

This authorization does not permit the killing, harming, harassment, capture or taking of individuals of any aquatic species listed under the *Species at Risk Act* (SARA) (s. 32 of the SARA), or the damage or destruction of residence of individuals of such species (s. 33 of the SARA) or the destruction of the critical habitat of any such species (s. 58 of the SARA).

At the date of issuance of this authorization, no individuals of aquatic species listed under the SARA were identified in the vicinity of the authorized works, undertakings or activities.

The failure to comply with any condition of this authorization constitutes an offence under Paragraph 40(3)(a) of the *Fisheries Act* and may result in charges being laid under the *Fisheries Act*. This authorization must be held on site and work crews must be made familiar with the conditions attached.

This authorization cannot be transferred or assigned to another party. If the work(s), undertaking(s) or activity(ies) authorized to be conducted pursuant to this authorization are expected to be sold or transferred, or other circumstances arise that are expected to result in a new Proponent taking over the work(s), undertaking(s) or activity(ies), the Proponent named in this authorization shall advise DFO in advance.

Date of Issuance: _____

Approved by: _____

Dale Nicholson
Regional Director General
Central and Arctic Region
Fisheries and Oceans Canada

File No.: Class B_ON

FISHERIES ACT 35 (2)(b)AUTHORIZATION

Authorization issued to:

Drainage Superintendent or other municipal representative in Ontario as identified as, the Contact Name and Municipality on the "Notification of Municipal Drain Maintenance Work'' form submitted for this work (hereafter referred to as the "Proponent").

Location of Proposed Project

Class B Drainage Systems in Ontario established under the authority of a municipal by-law under the *Drainage Act* in Ontario.

File No.: Class B_ON

Description of Proposed Project

The proposed project of which the work, undertaking or activity authorized is a part involves:

Routine maintenance of an existing 'Class B Municipal Drain' to facilitate drainage activities

Description of Authorized work(s), undertaking(s) or activity(ies) likely to result in serious harm to fish

The works, undertakings, or activities associated with the proposed project described above, which are likely to result in serious harm to fish, are:

- Drain maintenance and repair activities as outlined in the proponent's Drain Maintenance and Notification Form.

- This *Fisheries Act* Class Authorization is restricted to be applicable only to drains as defined as "drainage works" under the Ontario *Drainage Act* and classified as Class "B" by Fisheries and Oceans Canada through the Agricultural Drain Classification Process. (Class B Municipal Drains have permanent flow and spring spawning Commercial, Recreational, Aboriginal fish species tolerant to drain maintenance, and have undergone a full cleanout within the last ten years.)

The serious harm to fish likely to result from the proposed work, undertaking, or activity, and covered by this authorization includes:

- Incidental death of fish through dredging activities associated with drain maintenance works.

- Permanent alteration and destruction of fish habitat in Class B Municipal Drains.

- Type and sensitivity of fish habitat to be permanently altered or destroyed is defined as a 'Class B Municipal Drain' have permanent flow, spring spawning Commercial, Recreational, Aboriginal fish species tolerant to drain maintenance, and have undergone a full cleanout within the last ten years.

- Quantity of habitat impacted will vary depending on specific project location. The length of drain impacted and the duration of the work, as outlined in the form: Notification of Municipal Drain Maintenance Work Conducted under a *Fisheries Act* paragraph 35(2)(b) Class Authorization.

File No.: Class B_ON

Conditions of Authorization

The above described work, undertaking or activity that is likely to result in serious harm to fish must be carried on in accordance with the following conditions.

1. **Conditions that relate to the period during which the work, undertaking or activity that will result in serious harm to fish can be carried on:**

The work, undertaking or activity that results in serious harm to fish is authorized to be carried on during the following period:

From	To
March 15, 2017	March 14, 2019

If the Proponent cannot complete the work, undertaking or activity during this period, Fisheries and Oceans Canada (DFO) must be notified. DFO may, where it considers appropriate, provide in writing notice that the period to carry on the work, undertaking or activity has been extended.

The period during which other conditions of this authorization must be complied with are provided in their respective sections below.

2. **Conditions that relate to measures and standards to avoid and mitigate serious harm to fish:**

2.1 This *Fisheries Act* Class Authorization is restricted to be applicable only to drains as defined as "drainage works" under the Ontario *Drainage Act* and classified as Class "B" (defined above) by Fisheries and Oceans Canada.

2.2 No in-stream work or construction activity shall occur within the following dates, without the specific written permission of DFO:

2.2.1 **Northern Region:** April 1 to July 15

2.2.2 **Southern Region:** March 15 to July 15

2.3 Sediment and erosion control measures must be in place and shall be upgraded and maintained, such that release of sediment is avoided at the location of the authorized work, undertaking, or activity.

2.4 The finished channel shall be as narrow and deep as possible within the specifications of the most recent Engineer's Report (Municipal Bylaw).

2.5 A bottom clean-out involving bank reshaping shall include the following:

2.5.1 Bank slopes shall be graded to a slope that will maintain bank stability. This value may vary depending on local conditions.

2.5.2 Any bends in the channel shall be stabilized, to prevent erosion as required.

File No.: Class B_ON

2.6 Work in water shall not be conducted at times when flows are elevated due to local rain events, storms or seasonal floods.

2.7 Vegetation on top of the bank shall not be removed/altered (dug-out, root system remains) on more than one side of the drain. Where vegetation must be altered on one side, the shade producing side of the drain shall remain unaltered unless specified in the most recent Engineer's Report (Municipal Bylaw).

2.8 Where vegetation has been removed on top of the bank and/or on the bank slopes, the proponent shall stabilize the banks to prevent erosion and/or sedimentation, preferably through re-vegetation with native species suitable for the site.

2.9 For culvert removal/replacement activities:

2.9.1 The site shall be isolated using impervious barriers.

2.9.2 Where water is pumped from the watercourse for any purpose, pump intakes shall be screened in accordance with DFO's Freshwater Intake End-of-Pipe Fish Screen Guideline. Each hose outlet shall have a diffuser or be placed in a location that is not subject to erosion from the outflow.

2.9.3 A fish salvage shall be completed within all isolated areas prior to any in-water works and/or dewatering activities. All fish shall be live released downstream of the project site.

2.9.4 If the watercourse is flowing at the time of construction, downstream flows must be maintained at all times during this project.

2.9.5 Install the culvert so that it is embedded into the streambed and ensure that the culvert remains passable by fish.

2.10 Rip rap, river stone, and rock utilized in the project shall:

2.10.1 Be clean and free of fine materials and debris prior to placement and shall be of sufficient size to resist displacement during design flood events;

2.10.2 Not be obtained from area below the high water mark of any fish-frequented waterbodies; and

2.10.3 Not be placed/positioned in a manner that prevents fish passage under low flow conditions.

File No.: Class B_ON

3. **Conditions that relate to monitoring and reporting of measures and standards to avoid and mitigate serious harm to fish:**

3.1 The Proponent shall undertake monitoring and report to DFO, within 60 days after the work has been completed, whether measures and standards to avoid and mitigate serious harm to fish were conducted according to the conditions of this Authorization.

3.1.1 Upon request, the proponent shall provide dated photographs, a site sketch, and inspection reports to demonstrate effective implementation and functioning of mitigation measures and standards described above to limit the serious harm to what is covered by this authorization.

3.1.2 Provide details of any contingency measures that were followed, to prevent impacts greater than those covered by this authorization in the event that mitigation measures did not function as described.

4. **Conditions that relate to the offsetting for the serious harm to fish likely to result from the authorized work, undertaking or activity:**

4.1 Offsetting measures shall be carried out according to the Notification Form approved by DFO and attached to the authorization.

4.2 All fish habitat offsetting measures shall be completed and functioning according to the criteria as described in the proponent's plan.

4.3 If the results of monitoring, as required in condition 5, indicate that the offsetting measures are not completed by the date specified in condition 4.2, and/or are not functioning according to the above criteria, the Proponent shall give written notice to DFO and put in place contingency measures and associated monitoring measures, as contained within their approved offsetting plan, to ensure the offsetting is completed and/or functioning as required by this authorization.

4.4 Offsetting measures shall function as intended, and the Proponent shall not carry on any work, undertaking or activity that will adversely disturb or impact the offsetting measures.

5. **Conditions that relate to monitoring and reporting of offsetting measures (described above in section 4):**

5.1 The Proponent shall undertake monitoring, within 60 days after the work has been completed, to demonstrate that offsetting measures were conducted according to the conditions of this Authorization.

5.1.1 Upon request, the proponent shall provide the monitoring report to DFO with dated photographs, and a site sketch to demonstrate effective implementation and functioning of offsetting measures.

File No.: Class B_ON

Authorization Limitations and Application Conditions

The Proponent is solely responsible for plans and specifications relating to this authorization and for all design, safety and workmanship aspects of all the works associated with this authorization.

The holder of this authorization is hereby authorized under the authority of Paragraph 35(2)(b) of the *Fisheries Act*. R.S.C., 1985, c.F. 14 to carry on the work(s), undertaking(s) and/or activity(ies) that are likely to result in serious harm to fish as described herein. This authorization does not purport to release the applicant from any obligation to obtain permission from or to comply with the requirements of any other regulatory agencies.

This authorization does not permit the deposit of a deleterious substance in water frequented by fish. Subsection 36(3) of the *Fisheries Act* prohibits the deposit of any deleterious substances into waters frequented by fish unless authorized by regulations made by Governor in Council.

This authorization does not permit the killing, harming, harassment, capture or taking of individuals of any aquatic species listed under the *Species at Risk Act* (SARA) (s. 32 of the SARA), or the damage or destruction of residence of individuals of such species (s. 33 of the SARA) or the destruction of the critical habitat of any such species (s. 58 of the SARA).

At the date of issuance of this authorization, no individuals of aquatic species listed under the SARA were identified in the vicinity of the authorized works, undertakings or activities.

The failure to comply with any condition of this authorization constitutes an offence under Paragraph 40(3)(a) of the *Fisheries Act* and may result in charges being laid under the *Fisheries Act*. This authorization must be held on site and work crews must be made familiar with the conditions attached.

This authorization cannot be transferred or assigned to another party. If the work(s), undertaking(s) or activity(ies) authorized to be conducted pursuant to this authorization are expected to be sold or transferred, or other circumstances arise that are expected to result in a new Proponent taking over the work(s), undertaking(s) or activity(ies), the Proponent named in this authorization shall advise DFO in advance.

Date of Issuance: _____

Approved by: _____

Dale Nicholson
Regional Director General
Central and Arctic Region
Fisheries and Oceans Canada

File No.: Class C_ON

FISHERIES ACT 35 (2)(b)AUTHORIZATION

Authorization issued to:

Drainage Superintendent or other municipal representative in Ontario as identified as, the Contact Name and Municipality on the "Notification of Municipal Drain Maintenance Work'' form submitted for this work (hereafter referred to as the "Proponent").

Location of Proposed Project

Class C Drainage Systems in Ontario established under the authority of a municipal by-law under the *Drainage Act* in Ontario.

File No.: Class C_ON

Description of Proposed Project

The proposed project of which the work, undertaking or activity authorized is a part involves:

Routine maintenance of an existing 'Class C Municipal Drain' to facilitate drainage activities

Description of Authorized work(s), undertaking(s) or activity(ies) likely to result in serious harm to fish

The works, undertakings, or activities associated with the proposed project described above, which are likely to result in serious harm to fish, are:

- Drain maintenance and repair activities as outlined in the proponent's Drain Maintenance and Notification Form.

- This *Fisheries Act* Class Authorization is restricted to be applicable only to drains as defined as "drainage works" under the Ontario *Drainage Act* and classified as Class "C" by Fisheries and Oceans Canada through the Agricultural Drain Classification Process. (Class C Municipal Drains have permanent flow and spring spawning Commercial, Recreational, Aboriginal fish species tolerant to drain maintenance).

The serious harm to fish likely to result from the proposed work, undertaking, or activity, and covered by this authorization includes:

- Incidental death of fish through dredging activities associated with drain maintenance works.

- Permanent alteration and destruction of fish habitat in Class C Municipal Drains

- Type and sensitivity of fish habitat to be permanently altered or destroyed is defined as a 'Class C Municipal Drain' have permanent flow and spring spawning Commercial, Recreational, Aboriginal fish species tolerant to drain maintenance.

- Quantity of habitat impacted will vary depending on specific project location. The length of drain impacted and the duration of the work, as outlined in the form: Notification of Municipal Drain Maintenance Work Conducted under a *Fisheries Act* paragraph 35(2)(b) Class Authorization.

File No.: Class C_ON

Conditions of Authorization

The above described work, undertaking or activity that is likely to result in serious harm to fish must be carried on in accordance with the following conditions.

1. **Conditions that relate to the period during which the work, undertaking or activity that will result in serious harm to fish can be carried on:**

The work, undertaking or activity that results in serious harm to fish is authorized to be carried on during the following period:

From	To
March 15, 2019	March 14, 2019

If the Proponent cannot complete the work, undertaking or activity during this period, Fisheries and Oceans Canada (DFO) must be notified. DFO may, where it considers appropriate, provide in writing notice that the period to carry on the work, undertaking or activity has been extended.

The period during which other conditions of this authorization must be complied with are provided in their respective sections below.

2. **Conditions that relate to measures and standards to avoid and mitigate serious harm to fish:**

2.1 This *Fisheries Act* Class Authorization is restricted to be applicable only to drains as defined as "drainage works" under the Ontario *Drainage Act* and classified as Class "C" (defined above) by Fisheries and Oceans Canada.

2.2 No in-stream work or construction activity shall occur within the following dates, without the specific written permission of DFO:

2.2.1 **Northern Region:** April 1 to July 15

2.2.2 **Southern Region:** March 15 to July 15

2.3 Sediment and erosion control measures must be in place and shall be upgraded and maintained, such that release of sediment is avoided at the location of the authorized work, undertaking, or activity.

2.4 The finished channel shall be as narrow and deep as possible within the specifications of the most recent Engineer's Report (Municipal Bylaw).

2.5 A bottom clean-out involving bank reshaping shall include the following:

2.5.1 Bank slopes shall be graded to a slope that will maintain bank stability. This value may vary depending on local conditions.

2.5.2 Any bends in the channel shall be stabilized, to prevent erosion as required.

File No.: Class C_ON

2.6 Work in water shall not be conducted at times when flows are elevated due to local rain events, storms or seasonal floods.

2.7 Vegetation on top of the bank shall not be removed/altered (dug-out, root systems remains) on more than one side of the drain. Where vegetation must be altered on one side, the shade producing side of the drain shall remain unaltered unless specified in the most recent Engineer's Report (Municipal Bylaw).

2.8 Where vegetation has been removed on top of the bank and/or on the bank slope, the proponent shall stabilize the banks to prevent erosion and/or sedimentation, preferably through re-vegetation with native species suitable for the site.

2.9 For culvert removal/replacement activities:

2.9.1 The site shall be isolated using impervious barriers.

2.9.2 Where water is pumped from the watercourse for any purpose, pump intakes shall be screened in accordance with DFO's Freshwater Intake End-of-Pipe Fish Screen Guideline. Each hose outlet shall have a diffuser or be placed in a location that is not subject to erosion from the outflow.

2.9.3 A fish salvage shall be completed within all isolated areas prior to any in-water works and/or dewatering activities. All fish shall be live released downstream of the project site.

2.9.4 If the watercourse is flowing at the time of construction, downstream flows must be maintained at all times during this project.

2.9.5 Install the culvert so that it is embedded into the streambed and ensure that the culvert remains passable by fish.

2.10 Rip rap, river stone, and rock utilized in the project shall:

2.10.1 Be clean and free of fine materials and debris prior to placement and shall be of sufficient size to resist displacement during design flood events;

2.10.2 Not be obtained from area below the high water mark of any fish-frequented waterbodies; and

2.10.3 Not be placed/positioned in a manner that prevents fish passage under low flow conditions.

File No.: Class C_ON

3. **Conditions that relate to monitoring and reporting of measures and standards to avoid and mitigate serious harm to fish:**

3.1 The Proponent shall undertake monitoring and report to DFO, within 60 days after the work has been completed, whether measures and standards to avoid and mitigate serious harm to fish were conducted according to the conditions of this Authorization.

3.1.1 Upon request, the proponent shall provide dated photographs, a site sketch, and inspection reports to demonstrate effective implementation and functioning of mitigation measures and standards described above to limit the serious harm to what is covered by this authorization.

3.1.2 Provide details of any contingency measures that were followed, to prevent impacts greater than those covered by this authorization in the event that mitigation measures did not function as described.

4. **Conditions that relate to the offsetting for the serious harm to fish likely to result from the authorized work, undertaking or activity:**

4.1 Offsetting measures shall be carried out according to the Notification Form approved by DFO and attached to the authorization.

4.2 All fish habitat offsetting measures shall be completed and functioning according to the criteria as described in the proponent's plan.

4.3 If the results of monitoring, as required in condition 5, indicate that the offsetting measures are not completed by the date specified in condition 4.2, and/or are not functioning according to the above criteria, the Proponent shall give written notice to DFO and put in place contingency measures and associated monitoring measures, as contained within their approved offsetting plan, to ensure the offsetting is completed and/or functioning as required by this authorization.

4.4 Offsetting measures shall function as intended, and the Proponent shall not carry on any work, undertaking or activity that will adversely disturb or impact the offsetting measures.

5. **Conditions that relate to monitoring and reporting of offsetting measures (described above in section 4):**

5.1 The Proponent shall undertake monitoring, within 60 days after the work has been completed, to demonstrate that offsetting measures were conducted according to the conditions of this Authorization.

5.1.1 Upon request, the proponent shall provide the monitoring report to DFO with dated photographs, and a site sketch to demonstrate effective implementation and functioning of offsetting measures.

File No.: Class C_ON

Authorization Limitations and Application Conditions

The Proponent is solely responsible for plans and specifications relating to this authorization and for all design, safety and workmanship aspects of all the works associated with this authorization.

The holder of this authorization is hereby authorized under the authority of Paragraph 35(2)(b) of the *Fisheries Act*. R.S.C., 1985, c.F. 14 to carry on the work(s), undertaking(s) and/or activity(ies) that are likely to result in serious harm to fish as described herein. This authorization does not purport to release the applicant from any obligation to obtain permission from or to comply with the requirements of any other regulatory agencies.

This authorization does not permit the deposit of a deleterious substance in water frequented by fish. Subsection 36(3) of the *Fisheries Act* prohibits the deposit of any deleterious substances into waters frequented by fish unless authorized by regulations made by Governor in Council.

This authorization does not permit the killing, harming, harassment, capture or taking of individuals of any aquatic species listed under the *Species at Risk Act* (SARA) (s. 32 of the SARA), or the damage or destruction of residence of individuals of such species (s. 33 of the SARA) or the destruction of the critical habitat of any such species (s. 58 of the SARA).

At the date of issuance of this authorization, no individuals of aquatic species listed under the SARA were identified in the vicinity of the authorized works, undertakings or activities.

The failure to comply with any condition of this authorization constitutes an offence under Paragraph 40(3)(a) of the *Fisheries Act* and may result in charges being laid under the *Fisheries Act*. This authorization must be held on site and work crews must be made familiar with the conditions attached.

This authorization cannot be transferred or assigned to another party. If the work(s), undertaking(s) or activity(ies) authorized to be conducted pursuant to this authorization are expected to be sold or transferred, or other circumstances arise that are expected to result in a new Proponent taking over the work(s), undertaking(s) or activity(ies), the Proponent named in this authorization shall advise DFO in advance.

Date of Issuance: _____

Approved by: _____

David Nicholson
Regional Director General
Central and Arctic Region
Fisheries and Oceans Canada

File No.: Class E1_ON

FISHERIES ACT 35 (2)(b)AUTHORIZATION

Authorization issued to:

Drainage Superintendent or other municipal representative in Ontario as identified as, the Contact Name and Municipality on the "Notification of Municipal Drain Maintenance Work'' form submitted for this work (hereafter referred to as the "Proponent").

Location of Proposed Project

Class E Drainage Systems in Ontario established under the authority of a municipal by-law under the *Drainage Act* in Ontario.

File No.: Class E1_ON

Description of Proposed Project

The proposed project of which the work, undertaking or activity authorized is a part involves:

Routine maintenance of an existing 'Class E Municipal Drain' to facilitate drainage activities

Description of Authorized work(s), undertaking(s) or activity(ies) likely to result in serious harm to fish

The works, undertakings, or activities associated with the proposed project described above, which are likely to result in serious harm to fish, are:

- Drain maintenance and repair activities as outlined in the proponent's Drain Maintenance and Notification Form.

- This *Fisheries Act* Class Authorization is restricted to be applicable only to drains as defined as "drainage works" under the Ontario *Drainage Act* and classified as Class "E" by Fisheries and Oceans Canada through the Agricultural Drain Classification Process. (Class E Municipal Drains have permanent flow and Commercial, Recreational, Aboriginal fish species that are sensitive to drain maintenance).

The serious harm to fish likely to result from the proposed work, undertaking, or activity, and covered by this authorization includes:

- Incidental death of fish through dredging activities associated with drain maintenance works.

- Permanent alteration and destruction of fish habitat in Class E Municipal Drains, as a result of a full bottom cleanout and vegetation clearing from one bank only.

- Type and sensitivity of fish habitat to be permanently altered or destroyed is defined as a 'Class E Municipal Drain' have permanent flow and spring spawning Commercial, Recreational, Aboriginal fish species that are sensitive to drain maintenance.

- Quantity of habitat impacted will vary depending on specific project location. The length of drain impacted and the duration of the work, as outlined in the form: Notification of Municipal Drain Maintenance Work Conducted under a *Fisheries Act* paragraph 35(2)(b) Class Authorization.

File No.: Class E1_ON

Conditions of Authorization

The above described work, undertaking or activity that is likely to result in serious harm to fish must be carried on in accordance with the following conditions.

1. **Conditions that relate to the period during which the work, undertaking or activity that will result in serious harm to fish can be carried on:**

The work, undertaking or activity that results in serious harm to fish is authorized to be carried on during the following period:

From	To
March 15, 2017	March 14, 2019

If the Proponent cannot complete the work, undertaking or activity during this period, Fisheries and Oceans Canada (DFO) must be notified. DFO may, where it considers appropriate, provide in writing notice that the period to carry on the work, undertaking or activity has been extended.

The period during which other conditions of this authorization must be complied with are provided in their respective sections below.

2. **Conditions that relate to measures and standards to avoid and mitigate serious harm to fish:**

2.1 This *Fisheries Act* Class Authorization is restricted to be applicable only to drains as defined as "drainage works" under the Ontario *Drainage Act* and classified as Class "E" (defined above) by Fisheries and Oceans Canada.

2.2 No in-stream work or construction activity shall occur within the following dates, without the specific written permission of DFO:

2.2.1 **Northern Region**: April 1 to July 15

2.2.2 **Southern Region**: March 15 to July 15

2.3 Sediment and erosion control measures must be in place and shall be upgraded and maintained, such that release of sediment is avoided at the location of the authorized work, undertaking, or activity.

2.4 The finished channel shall be as narrow and deep as possible within the specifications of the most recent Engineer's Report (Municipal Bylaw).

2.5 A bottom clean-out involving bank reshaping shall include the following:

2.5.1 One bank slope shall be graded to a slope that will maintain bank stability. This value may vary depending on local conditions.

2.5.2 Any bends in the channel shall be stabilized, to prevent erosion as required.

File No.: Class E1_ON

2.6 Work in water shall not be conducted at times when flows are elevated due to local rain events, storms or seasonal floods.

2.7 One side of the bank slope and the top of the bank is to remain intact and is considered a No Work Zone.

2.8 Where vegetation on top of the bank must be removed/altered (root system remains) on one side, the shade producing side of the drain shall remain unaltered.

2.9 Where riparian and bank vegetation has been removed on the top of the bank and/or the bank slope, the proponent shall stabilize the banks to prevent erosion and/or sedimentation, preferably through re-vegetation with native species suitable for the site.

2.10 For culvert removal/replacement activities:

2.10.1 The site shall be isolated using impervious barriers.

2.10.2 Where water is pumped from the watercourse for any purpose, pump intakes shall be screened in accordance with DFO's Freshwater Intake End-of-Pipe Fish Screen Guideline. Each hose outlet shall have a diffuser or be placed in a location that is not subject to erosion from the outflow.

2.10.3 A fish salvage shall be completed within all isolated areas prior to any in-water works and/or dewatering activities. All fish shall be live released downstream of the project site.

2.10.4 If the watercourse is flowing at the time of construction, downstream flows must be maintained at all times during this project.

2.10.5 Install the culvert so that it is embedded into the streambed and ensure that the culvert remains passable by fish.

2.11 Rip rap, river stone, and rock utilized in the project shall:

2.11.1 Be clean and free of fine materials and debris prior to placement and shall be of sufficient size to resist displacement during design flood events;

2.11.2 Not be obtained from area below the high water mark of any fish-frequented waterbodies; and

2.11.3 Not be placed/positioned in a manner that prevents fish passage under low flow conditions.

File No.: Class E1_ON

3. **Conditions that relate to monitoring and reporting of measures and standards to avoid and mitigate serious harm to fish:**

3.1 The Proponent shall undertake monitoring and report to DFO, within 60 days after the work has been completed, whether measures and standards to avoid and mitigate serious harm to fish were conducted according to the conditions of this Authorization.

3.1.1 Upon request, the proponent shall provide dated photographs, a site sketch, and inspection reports to demonstrate effective implementation and functioning of mitigation measures and standards described above to limit the serious harm to what is covered by this authorization.

3.1.2 Provide details of any contingency measures that were followed, to prevent impacts greater than those covered by this authorization in the event that mitigation measures did not function as described.

4. **Conditions that relate to the offsetting for the serious harm to fish likely to result from the authorized work, undertaking or activity:**

4.1 Offsetting measures shall be carried out according to the Notification Form approved by DFO and attached to the authorization.

4.2 All fish habitat offsetting measures shall be completed and functioning according to the criteria as described in the proponent's plan.

4.3 If the results of monitoring, as required in condition 5, indicate that the offsetting measures are not completed by the date specified in condition 4.2, and/or are not functioning according to the above criteria, the Proponent shall give written notice to DFO and put in place contingency measures and associated monitoring measures, as contained within their approved offsetting plan, to ensure the offsetting is completed and/or functioning as required by this authorization.

4.4 Offsetting measures shall function as intended, and the Proponent shall not carry on any work, undertaking or activity that will adversely disturb or impact the offsetting measures.

5. **Conditions that relate to monitoring and reporting of offsetting measures (described above in section 4):**

5.1 The Proponent shall undertake monitoring, within 60 days after the work has been completed, to demonstrate that offsetting measures were conducted according to the conditions of this Authorization.

5.1.1 Upon request, the proponent shall provide the monitoring report to DFO with dated photographs, and a site sketch to demonstrate effective implementation and functioning of offsetting measures.

File No.: Class E1_ON

Authorization Limitations and Application Conditions

The Proponent is solely responsible for plans and specifications relating to this authorization and for all design, safety and workmanship aspects of all the works associated with this authorization.

The holder of this authorization is hereby authorized under the authority of Paragraph 35(2)(b) of the *Fisheries Act*. R.S.C., 1985, c.F. 14 to carry on the work(s), undertaking(s) and/or activity(ies) that are likely to result in serious harm to fish as described herein. This authorization does not purport to release the applicant from any obligation to obtain permission from or to comply with the requirements of any other regulatory agencies.

This authorization does not permit the deposit of a deleterious substance in water frequented by fish. Subsection 36(3) of the *Fisheries Act* prohibits the deposit of any deleterious substances into waters frequented by fish unless authorized by regulations made by Governor in Council.

This authorization does not permit the killing, harming, harassment, capture or taking of individuals of any aquatic species listed under the Species at Risk Act (SARA) (s. 32 of the SARA), or the damage or destruction of residence of individuals of such species (s. 33 of the SARA) or the destruction of the critical habitat of any such species (s. 58 of the SARA).

At the date of issuance of this authorization, no individuals of aquatic species listed under the SARA were identified in the vicinity of the authorized works, undertakings or activities.

The failure to comply with any condition of this authorization constitutes an offence under Paragraph 40(3)(a) of the *Fisheries Act* and may result in charges being laid under the *Fisheries Act*. This authorization must be held on site and work crews must be made familiar with the conditions attached.

This authorization cannot be transferred or assigned to another party. If the work(s), undertaking(s) or activity(ies) authorized to be conducted pursuant to this authorization are expected to be sold or transferred, or other circumstances arise that are expected to result in a new Proponent taking over the work(s), undertaking(s) or activity(ies), the Proponent named in this authorization shall advise DFO in advance.

Date of Issuance: _____

Approved by: _____

Dale Nicholson
Regional Director General
Central and Arctic Region
Fisheries and Oceans Canada

File No.: Class E2_ON

FISHERIES ACT 35 (2)(b)AUTHORIZATION

Authorization issued to:

Drainage Superintendent or other municipal representative in Ontario as identified as, the Contact Name and Municipality on the "Notification of Municipal Drain Maintenance Work'' form submitted for this work (hereafter referred to as the "Proponent").

Location of Proposed Project

Class E Drainage Systems in Ontario established under the authority of a municipal by-law under the *Drainage Act* in Ontario.

File No.: Class E2_ON

Description of Proposed Project

The proposed project of which the work, undertaking or activity authorized is a part involves:

Routine maintenance of an existing 'Class E Municipal Drain' to facilitate drainage activities

Description of Authorized work(s), undertaking(s) or activity(ies) likely to result in serious harm to fish

The works, undertakings, or activities associated with the proposed project described above, which are likely to result in serious harm to fish, are:

- Drain maintenance and repair activities as outlined in the proponent's Drain Maintenance and Notification Form.

- This *Fisheries Act* Class Authorization is restricted to be applicable only to drains as defined as "drainage works" under the Ontario *Drainage Act* and classified as Class "E" by Fisheries and Oceans Canada through the Agricultural Drain Classification Process. (Class E Municipal Drains have permanent flow and Commercial, Recreational, Aboriginal fish species that are sensitive to drain maintenance).

The serious harm to fish likely to result from the proposed work, undertaking, or activity, and covered by this authorization includes:

- Incidental death of fish through dredging activities associated with drain maintenance works.

- Permanent alteration and destruction of fish habitat in Class E Municipal Drains as a result of bottom cleanout of half of the drain channel (from drain centre line) and vegetation clearing and removal from one bank only.

- Type and sensitivity of fish habitat to be permanently altered or destroyed is defined as a 'Class E Municipal Drain' have permanent flow and spring spawning Commercial, Recreational, Aboriginal fish species that are sensitive to drain maintenance.

- Quantity of habitat impacted will vary depending on specific project location. The length of drain impacted and the duration of the work, as outlined in the form: Notification of Municipal Drain Maintenance Work Conducted under a *Fisheries Act* paragraph 35(2)(b) Class Authorization.

File No.: Class E2_ON

Conditions of Authorization

The above described work, undertaking or activity that is likely to result in serious harm to fish must be carried on in accordance with the following conditions.

1. **Conditions that relate to the period during which the work, undertaking or activity that will result in serious harm to fish can be carried on:**

The work, undertaking or activity that results in serious harm to fish is authorized to be carried on during the following period:

From	To
March 15, 2017	March 14, 2019

If the Proponent cannot complete the work, undertaking or activity during this period, Fisheries and Oceans Canada (DFO) must be notified. DFO may, where it considers appropriate, provide in writing notice that the period to carry on the work, undertaking or activity has been extended.

The period during which other conditions of this authorization must be complied with are provided in their respective sections below.

2. **Conditions that relate to measures and standards to avoid and mitigate serious harm to fish:**

2.1 This *Fisheries Act* Class Authorization is restricted to be applicable only to drains as defined as "drainage works" under the Ontario *Drainage Act* and classified as Class "E" (defined above) by Fisheries and Oceans Canada.

2.2 No in-stream work or construction activity shall occur within the following dates, without the specific written permission of DFO:

2.2.1 **Northern Region:** April 1 to July 15

2.2.2 **Southern Region:** March 15 to July 15

2.3 Sediment and erosion control measures must be in place and shall be upgraded and maintained, such that release of sediment is avoided at the location of the authorized work, undertaking, or activity.

2.4 The finished channel shall be as narrow and deep as possible within the specifications of the most recent Engineer's Report (Municipal Bylaw).

2.5 A bottom clean-out involving bank reshaping shall include the following:

2.5.1 One bank slope shall be graded to a slope that will maintain bank stability. This value may vary depending on local conditions.

2.5.2 Any bends in the channel shall be stabilized, to prevent erosion as required.

File No.: Class E2_ON

2.6 Work in water shall not be conducted at times when flows are elevated due to local rain events, storms or seasonal floods.

2.7 One side of the bank slope and the top of the bank is to remain intact and is considered a No Work Zone.

2.8 One half of the drain, as measured from the centre line, will not be dredged and aquatic vegetation will remain in place.

2.9 Where vegetation on top of the bank must be removed/altered (root system remains) on one side, the shade producing side of the drain shall remain unaltered.

2.10 Where riparian and bank vegetation has been removed on the top of the bank and/or the bank slope, the proponent shall stabilize the banks to prevent erosion and/or sedimentation, preferably through re-vegetation with native species suitable for the site.

2.11 For culvert removal/replacement activities:

2.11.1 The site shall be isolated using impervious barriers.

2.11.2 Where water is pumped from the watercourse for any purpose, pump intakes shall be screened in accordance with DFO's Freshwater Intake End-of-Pipe Fish Screen Guideline. Each hose outlet shall have a diffuser or be placed in a location that is not subject to erosion from the outflow.

2.11.3 A fish salvage shall be completed within all isolated areas prior to any in-water works and/or dewatering activities. All fish shall be live released downstream of the project site.

2.11.4 If the watercourse is flowing at the time of construction, downstream flows must be maintained at all times during this project.

2.11.5 Install the culvert so that it is embedded into the streambed and ensure that the culvert remains passable by fish.

2.12 Rip rap, river stone, and rock utilized in the project shall:

2.12.1 Be clean and free of fine materials and debris prior to placement and shall be of sufficient size to resist displacement during design flood events;

2.12.2 Not be obtained from area below the high water mark of any fish-frequented waterbodies; and

2.12.3 Not be placed/positioned in a manner that prevents fish passage under low flow conditions.

File No.: Class E2_ON

3. **Conditions that relate to monitoring and reporting of measures and standards to avoid and mitigate serious harm to fish:**

3.1 The Proponent shall undertake monitoring and report to DFO, within 60 days after the work has been completed, whether measures and standards to avoid and mitigate serious harm to fish were conducted according to the conditions of this Authorization.

3.1.1 Upon request, the proponent shall provide dated photographs, a site sketch, and inspection reports to demonstrate effective implementation and functioning of mitigation measures and standards described above to limit the serious harm to what is covered by this authorization.

3.1.2 Provide details of any contingency measures that were followed, to prevent impacts greater than those covered by this authorization in the event that mitigation measures did not function as described.

4. **Conditions that relate to the offsetting for the serious harm to fish likely to result from the authorized work, undertaking or activity:**

4.1 Offsetting measures shall be carried out according to the Notification Form approved by DFO and attached to the authorization.

4.2 All fish habitat offsetting measures shall be completed and functioning according to the criteria as described in the proponent's plan.

4.3 If the results of monitoring, as required in condition 5, indicate that the offsetting measures are not completed by the date specified in condition 4.2, and/or are not functioning according to the above criteria, the Proponent shall give written notice to DFO and put in place contingency measures and associated monitoring measures, as contained within their approved offsetting plan, to ensure the offsetting is completed and/or functioning as required by this authorization.

4.4 Offsetting measures shall function as intended, and the Proponent shall not carry on any work, undertaking or activity that will adversely disturb or impact the offsetting measures.

5. **Conditions that relate to monitoring and reporting of offsetting measures (described above in section 4):**

5.1 The Proponent shall undertake monitoring, within 60 days after the work has been completed, to demonstrate that offsetting measures were conducted according to the conditions of this Authorization.

File No.: Class E2_ON

5.1.1 Upon request, the proponent shall provide the monitoring report to DFO with dated photographs, and a site sketch to demonstrate effective implementation and functioning of offsetting measures.

Authorization Limitations and Application Conditions

The Proponent is solely responsible for plans and specifications relating to this authorization and for all design, safety and workmanship aspects of all the works associated with this authorization.

The holder of this authorization is hereby authorized under the authority of Paragraph 35(2)(b) of the *Fisheries Act*. R.S.C., 1985, c.F. 14 to carry on the work(s), undertaking(s) and/or activity(ies) that are likely to result in serious harm to fish as described herein. This authorization does not purport to release the applicant from any obligation to obtain permission from or to comply with the requirements of any other regulatory agencies.

This authorization does not permit the deposit of a deleterious substance in water frequented by fish. Subsection 36(3) of the *Fisheries Act* prohibits the deposit of any deleterious substances into waters frequented by fish unless authorized by regulations made by Governor in Council.

This authorization does not permit the killing, harming, harassment, capture or taking of individuals of any aquatic species listed under the Species at Risk Act (SARA) (s. 32 of the SARA), or the damage or destruction of residence of individuals of such species (s. 33 of the SARA) or the destruction of the critical habitat of any such species (s. 58 of the SARA).

At the date of issuance of this authorization, no individuals of aquatic species listed under the *Species at Risk Act* (SARA) were identified in the vicinity of the authorized works, undertakings or activities.

The failure to comply with any condition of this authorization constitutes an offence under Paragraph 40(3)(a) of the *Fisheries Act* and may result in charges being laid under the *Fisheries Act*. This authorization must be held on site and work crews must be made familiar with the conditions attached.

This authorization cannot be transferred or assigned to another party. If the work(s), undertaking(s) or activity(ies) authorized to be conducted pursuant to this authorization are expected to be sold or transferred, or other circumstances arise that are expected to result in a new Proponent taking over the work(s), undertaking(s) or activity(ies), the Proponent named in this authorization shall advise DFO in advance.

Date of Issuance: _____

Approved by: _____

Dale Nicholson
Regional Director General
Central and Arctic Region
Fisheries and Oceans Canada

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APPENDIX 8

NOTIFICATION OF DRAIN MAINTENANCE OR REPAIR FORM

USER GUIDE

How to Complete the Notification of Drain Maintenance or Repair Form

Introduction

The joint Notification of Drain Maintenance or Repair form may be used to apply for permissions from Conservation Authorities (CAs) under Section 28 of the *Conservation Authorities Act*, and Fisheries and Oceans Canada (DFO) under the *Fisheries Act* and *Species at Risk Act*. This form should be used for streamlined permissions following the *Drainage Act* and *Conservation Authorities Act* Protocol – Protocol for Municipalities and Conservation Authorities in Drain Maintenance and Repair Activities.

DFO has created a list of maintenance and repair activities that can be conducted in a municipal drain (Class A – E, Unrated, and Class F drains) without a review by DFO. To determine whether the Notification of Drain Maintenance or Repair form must be submitted to DFO for the proposed maintenance and repair activities, consult the following documents:

- Municipal Drain (Class A-E and Unrated) Maintenance and Repair Activities Not Requiring DFO Review (Appendix 3); and
- Maintenance and Repair of F Drains (Appendix 3).

As outlined in these documents, the following requirements must be met:

- The proposed activity is listed and meets the definition listed in the table;
- The key considerations associated with the activity and the Standard Measures to Avoid Causing Serious Harm to Fish can be incorporated; and
- Aquatic Species at Risk (SAR) are not present in the work zone or impact zone.

Note: Note: the impact zone extends 1 km downstream from the bottom end of the work zone. To confirm there are no aquatic SAR present, refer to the following website at: http://www.dfo-mpo.gc.ca/species-especes/fpp-ppp/index-eng.htm.

If the above requirements are met, a Notification of Drain Maintenance or Repair form does not need to be submitted to DFO. The form must still be submitted to the appropriate CA and all municipal, provincial, or federal legislation that applies to the work being proposed must be followed. If you cannot meet the requirements, then a Notification of Drain Maintenance or Repair form must be submitted to DFO.

Pictures (<500 kb per image) and detailed information about the proposed work should be submitted together with the Notification of Drain Maintenance or Repair form.

Section 1: Contact Information, Location, and Dates for Proposed Works

- Complete the contact information, location of the work, and start/finish dates. Either latitude/longitude or UTM coordinates may be used.
- Please attach a location map with the drain classification and highlight the area for the proposed work, including distinguishing between spot and continuous cleanout locations, staging, etc. (Figure 1).

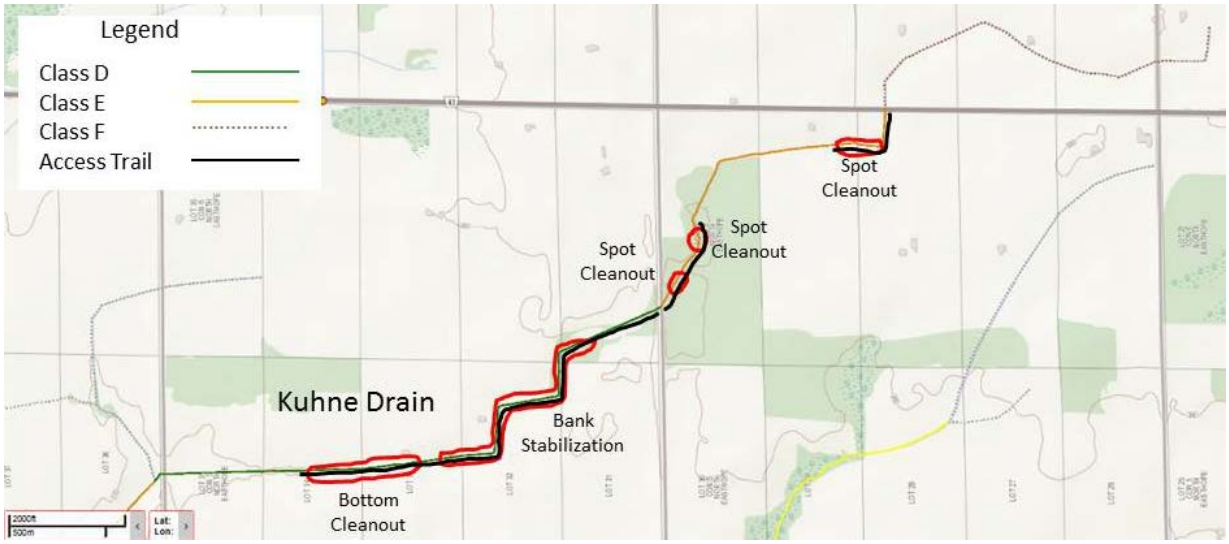

Figure 1. Kuhne Drain Example.

Section 2: Drain Classification

Indicate the drain class and length of the work zone and impact zone.

- Select the drain class for the work zone (area where the work is being completed) and record the length. Note: Some municipal drains may have more than one class. For example, one section of the drain may be a Class D and another section may be a Class E. If work was expected to occur in both sections, the length of each work zone should be recorded.
- Indicate the drain class of the impact zone or select natural watercourse where required. Note: the impact zone extends 1 km downstream from the bottom end of the work zone.
- Indicate whether federal aquatic SAR are present in the work zone or impact zone. SAR maps can be found at: http://www.dfo-mpo.gc.ca/species-especes/fpp-ppp/index-eng.htm.
- A site specific review will be required for Class D drains and for any drains in which aquatic SAR are present in the impact zone or work zone. Note: If a drain has not been classified (Unrated) and there is insufficient data on fish species and flow in the drain, DFO will complete a site specific review of the proposed works.

Indicate the drain type:

- Channel
- Tile
- Channel & Tile Combination

Note: Any open ditch or drain is considered a channel.

Select the *Drainage Act* Section:

- *Section 74 – Maintenance/Repair*

  This option should be selected when drain repair/maintenance work is proposed by a municipal drainage superintendent, without a new report, under the authority of an older engineer's report adopted by by-law. Section 74 requires a municipality to keep municipal drainage systems maintained and repaired. The Drainage Act defines "maintenance" as the preservation of a drainage system (e.g. brushing, spraying, etc.) and "repair" as the restoration of a drainage system to its original condition (e.g. sediment removal, blockage removal, replacement of a crossing).

- *Section 77 - Deepen/Widen/Extend (Not applicable under DART protocol – regular permit process for CAs applies for this type of activity)*

  This option should be selected when minor improvements to the drain are proposed by the drainage superintendent without a new engineer's report. Section 77 of the Drainage Act allows a municipality to make minor improvements to a drain by deepening, widening or extending the drain to an outlet, but the value of the work is limited to $4,500. This section is infrequently used to perform activities such as removing an obstruction downstream from the end of a drain or stabilizing a bank that goes beyond the definition of repair.

- *Section 78 – Maintenance/Repair Only*

  This option should be selected only when drain repair/maintenance work (as defined earlier) is proposed under the authority of a new report and by-law passed under Section 78 of the Drainage Act. Section 78 allows a municipality to perform projects to improve a drainage system. The Act defines "improvement" as any modification/addition to a drainage system intended to increase the effectiveness of the system. Most Section 78 projects involve modifications or additions to an existing drainage system and in those situations, the Notification of Drain Maintenance or Repair form should not be used. However, occasionally Section 78 is used to update the assessment schedules and/or profiles and other drawings, and the physical work being performed falls within the definitions of "maintenance" or "repair". The notification form can be used for those situations.

- *Other*

  Provide specific details on the proposed activities.

Specify disposal of material, if applicable (e.g. location, method):

- Note the proposed location of the disposed material, method of relocation and any access considerations, if not already specified in the Engineer's Report.

Section 3: Maintenance and Repair Activities

Select all of the Maintenance and Repair Activities that apply in the drop down list in the form. Confirm the proposed activity meets the description in the form. Under "Additional Information", provide any important details of the activity. For example:

- Number of beaver dams to remove
- Number and size of spot cleanouts
- Indicate if there are any differences between the proposed activity and the description in the form

Section 4: Other Considerations for Review Agencies (Please specify):

- Provide any other relevant information that could affect the project (e.g. access considerations, buried utilities, date of last cleanout, drain condition) to assist with the review by the agencies.
- It may be helpful to attach photos (<500 kb per image) of the work site and/or for identifying any particular issues at the site.

Section 5: Avoidance, Mitigation, and Offsetting Measures

The avoidance, mitigation, and offsetting measures identified in the notification form and in the supporting information provided by the proponent will become part of a Class Authorization or *Fisheries Act* Authorization. Mitigation measures may be substituted as necessary based on the current conditions at the work site but effective sediment and erosion controls must be in place prior to starting work and maintained throughout the drain maintenance and repair activity(ies). However, it is important that the avoidance and offsetting measures that are selected are carried out as described. Failure to comply with any condition of an Authorization constitutes an offence under paragraph 40(3)(a) of the *Fisheries Act* and may result in charges being laid under the *Fisheries Act*.

Section 5a: Avoidance Measures

Avoidance measures are measures taken to completely prevent *serious harm to fish*. Avoidance measures should be used whenever possible. **Select all of the avoidance measures that will be used during the proposed drain maintenance and repair activities.**

Maintain Meanders

Meanders in a municipal drain can provide important fish habitat including: cover from undercut banks, rearing habitat (e.g. slower and shallower vegetated section of a drain), spawning habitat (e.g. riffles), and resting and overwintering areas (e.g. pools). **Indicate**

whether it is possible to keep any meanders in the municipal drain and identify these areas on a map.

Maintain Natural Features/Coarse Substrates

Cobble and gravels often provide spawning habitat for a variety of fish species. Removal of these substrates should be avoided. **Indicate whether it is possible to maintain any sections of the municipal drain that contains good areas of cobble or gravel substrates. Identify these sections on a map.**

Maintain Pools and Riffles

Pools provide cover, help regulate water temperature, aid in fish passage, and are refuges for fish during low flow periods. Riffles provide protection from predators, shelter, and sources of food and some species use riffle habitat for spawning. **Indicate whether it is possible to keep any pools and riffles in the municipal drain and identify these areas on a map.**

Spot cleanout

Spot cleanouts are removals of isolated sediment build-up that is significant enough to cause erosion or flow blockage/flooding concerns in the channel. They are not continuous along the drain. **Indicate the number and size (m^2) of the spot cleanouts in the municipal drain.**

Staged cleanout

A staged cleanout is a drain cleanout conducted in stages by dividing it into sections along its length, with maintenance occurring one section at a time. Refuge areas may be left in between sections and are subsequently cleaned out at a later date. Depending on the length or sensitivity of habitat or species maintenance could be staged over a period of years. Staging could also be looked at geographically, whereby maintenance activities would alternate between reaches to provide intermediate refugia around the activity. **Indicate whether it is possible to conduct a staged cleanout of the municipal drain. Identify the stages on a map and explain the timing of the staged cleanout (e.g. Sections 1 & 3 (August 2017), Sections 2 & 5 (August 2018).**

Two-stage/low-flow channel

Over time, a two-stage/low-flow channel may form in some wider municipal drains (Figure 2). During periods of low flow, the water is concentrated into the narrower deeper portion of the channel. During periods of high flow, the low-level vegetated benches on either side of the drain allow large volumes of water to be transported through the full width of the channel. This is helpful in systems that see a large variation in water flow, particularly after rain events. It reduces erosion and provides improved fish passage. When conducting a bottom cleanout, the narrower, deeper part of the channel may be cleaned out and the vegetated benches on either side of the drain should not be touched. **Indicate whether it is possible to maintain a two-stage/low-flow channel. If the entire low-flow channel cannot be maintained, identify the section(s) that can be maintained on a map.**

Work in low or no flow

A municipal drain is easier to clean out when there is as little flow as possible. For Class F drains, the work should be conducted when the drain is dry, frozen, or there is standing water with *no observable flow* (no movement of water between two points). For all other drain types, this means working in the drain during periods of the lowest water levels, typically in the summer when spring freshet is over and warm dry weather conditions mean less surface run-off and lower flow rates. Avoiding high spring flows also means that work is not occurring when many fish species are spawning. **Indicate on the form whether the work can be carried out during low flows in Class A, B, C, D, and E drains and no flows in Class F drains.**

Section 5b: Mitigation Measures

When avoidance is not possible, then efforts should be made to minimize (mitigate) impacts caused by the proposed municipal drain maintenance or repair activity. Appropriate sediment and erosion control measures are a requirement under Section 28 of the *Conservation Authorities* Act and the *Fisheries Act*. Note: In addition to the sediment and erosion control measures listed below, the Standard Measures to Avoid Serious Harm to Fish must also be followed.

The mitigation measures in the form represent various strategies that have been effective in avoiding serious harm to fish and fish habitat. Ontario Provincial Standard Drawings (OPSD) have been included when available. These are intended to be examples; the mitigation measures used should be designed to site conditions. Not all of the strategies presented are suitable in every case. Every municipal drain is different; the mitigation measures appropriate for one site may not be appropriate for another. Selection of the appropriate strategy or set of strategies should be based on conditions at the site. Note: Class D drains and municipal drains with aquatic SAR may require specific mitigation measures. For these drains, a biologist will work with the proponent during the site specific review process.

Indicate all of the measures that will be used to minimize sediment and erosion. Details (e.g. type of product, number, and approximate dimensions) on the selected mitigation measures should be provided on the Notification of Drain Maintenance or Repair form. Additional details and explanation should be provided along with the form in a cover email. Sketches, drawings, and site photographs are helpful for the reviewing biologist when alternative measures are proposed.

Erosion Control Mats (Temporary)

Erosion control mats and blankets can be used to stabilize banks and disturbed areas where revegetation or seeding is not appropriate, or cannot be implemented at the right time of year to become established. Temporary erosion control mats and blankets are made from natural fibers such as jute, straw, or coir mats that will break down over time as vegetation takes hold. Mats are typically used in combination with reseeding and some mats are available that contain seed. **Indicate the type of mats and the extent of the area that temporary erosion control mats are to be used (i.e. in a specific location or along the entire length of the drain).**

Erosion Control Mats (Permanent)

Similar to the temporary mats discussed above, permanent erosion control mats can be used where seeding and revegetation is not appropriate or immediate stabilization is required. Permanent erosion control mats and blankets are made from synthetic fibers that will not break down. In addition to stabilizing banks, these mats can be used instream in place of riprap for outfall protection below culverts and tile outlets. **Indicate the type of mats and the extent of the area that permanent erosion control mats are to be used (i.e. in a specific location or along the entire length of the drain).**

Silt Curtain

Silt curtains may be a helpful mitigation measure for maintenance/repair work in larger drains with little or no flow. Water levels in some drains are heavily influenced by the water levels of the receiving waterbody downstream. This is often seen with drains that flow into lakes or large canal systems. In these situations, a silt curtain may be installed just upstream of the outlet to prevent sediment movement downstream. Silt curtains may also be used to isolate a drain from the receiving waterbody, preventing fish from moving up into the drain during the construction. Upon completion of work, silt curtains need to be removed with care to prevent release of any sediment that has been trapped by the curtain. **Indicate where the silt curtain(s) will be used.**

Silt Fence Barrier (light-duty)

This mitigation measure refers to the installation of a geotextile fabric above the waterline, parallel to water flow (Figure 3; OPSD 219.110). Placement of silt fencing across (perpendicular to) the channel is a type of flow check dam and is discussed below. Silt fence barriers prevent sediment from entering the drain from work areas along the bank slope or the top of the banks. Silt fencing needs to be installed correctly, with the fabric extending into a trench and back filled in order to work effectively. This fencing should be staked with no more than 2.3 m between the stakes. **Indicate where the silt fence barrier will be used.**

Silt Fence Barrier (heavy-duty)

Similar to light duty fencing discussed above, heavy duty silt fencing is installed parallel to water flow (Figure 4; OPSD 219.130). Heavy duty fencing is trenched, backfilled and staked further into the ground to withstand heavier sediment loads. Stakes should also be no more than 2 m apart. **Indicate where the silt fence barrier will be used.**

Straw Bale Barrier (light duty)

Straw bales may be used, similar to silt fencing, as a light duty option to prevent sediment from entering a drain when work is being completed along the banks (Figure 5; OPSD 219.100). This measure is also installed parallel to water flow. Straw bales need to be trenched 75 mm and staked well into the ground (600 mm), with the trench backfilled and compacted to prevent sediment from washing under the bales. The bales need to be butted tightly against adjoining bales to prevent sediment flowing between the bales and each bale should have two stakes to prevent shifting. **Indicate where the straw bale barrier will be used.**

Flow Check Dams (Temporary)

Temporary flow check dams are commonly used sediment control measures in municipal drains. Constructed downstream of the maintenance site, flow check dams are used to reduce flow velocity in a watercourse and dissipate flow energy allowing sediment to settle out of the water. Water is allowed to flow slowly through or over the check dam with the sediment remaining behind.

In-water sediment control measures can be effective for short periods on small drainage areas. However, it is important that they are only used when flow in the drain is low. Otherwise, the sediment will not settle out behind the check dam. Flow check dams are not effective sediment controls in large watercourses or during high flow events (e.g. major rain events). As with all sediment and erosion control measures, prior to removing the barriers any sediment accumulated behind in-water sediment barriers must be removed carefully to avoid re-suspension.

Straw Bale Flow Check Dam

Straw bale flow check dams require staking straw bales, tightly fitted together across a channel (Figure 6; OPSD 219.180). The bales must be installed tight enough together to prevent sediment laden water from flowing between them. This method can be used in flat bottom and V-shaped ditches. The most common error when installing straw bales is placing bales in the channel only. The straw bales must extend well up the bank on either side of the channel. Without bales on the slopes, flows will work around the dam releasing sediment and causing additional bank erosion.

For this mitigation measure, the flow check dam should consist of two rows of straw bales which are offset to prevent flow through the dam. The bales need to be trenched, backfilled, and evenly staked. Bale ties must not be touching the ground to ensure that they are oriented properly and to prevent the ties from degrading allowing the bale to break apart. **Indicate where the straw bale flow check dam will be used.**

Silt Fence Flow Check Dam

Silt fence flow check dams are frequently indicated on the Notification of Drain Maintenance or Repair forms as the chosen mitigation measure, however, they only work in small drains with very low flow and are only effective when they are properly installed and maintained (Figure 7 & Figure 8; OPSD 219.190). As with straw bales, the silt fence slows the flow allowing sediment to settle out of the water column and also filters sediment from water as it passes through the material. More than one set of curtains may be required and the number of check dams proposed for a drain maintenance project should be indicated on the notification form.

Silt fences are commonly placed where flows are too high, or can be inadequate during a rain event. When installing the silt fence, it should be constructed so that the top of the fence will give way releasing some of the water, but continuing to hold back the sediment that has settled out. Without proper trenching and backfilling the bottom of the silt fence will kick out and the sediment will be washed downstream.

Care also needs to be taken when removing these controls. Excess sediment should be removed from the entrapment before taking down a sediment control structure; this will prevent the sediment from being released back into the stream. These structures should not be confused with the use of silt fencing along the banks. **Indicate the number of silt fence flow check dams and where the silt fence flow check dam(s) will be used.**

Rock Flow Check Dam, V-Ditch

Rock flow check dams can be designed as temporary or permanent structures. (Note: The gradient of the municipal drain may influence the design of the rock flow check dam, V-ditch.) Rock is usually installed in combination with geotextile to create a dam which forms a pool behind it (Figure 9; OPSD 219.210). These structures are also used in combination with sediment traps (Figure 10 & Figure 11; OPSD 219.220). Water velocity is reduced and heavier sediments are allowed to settle. While rock flow check dams are able to withstand somewhat higher flows than the straw bale or silt fence versions, it is still not a good option for large drainage areas with high flows.

The design should include a long spillway on the downstream slope creating a riffle. This pool-riffle feature can be left permanently, or modified to a lower height after maintenance works have been completed to add habitat diversity to the drain.

The rock flow check dam, V-ditch version is used in narrow, deep v-shaped drains. Rock is placed in the channel to form the flow check dam. Geotextile fabric is placed over the rock, taking care to trench and backfill the geotextile fabric at the upstream end to anchor and prevent water from lifting it. A layer of rock is placed over the geotextile to secure it. The geotextile acts as an additional sediment filter. These structures can fail if water is able to undermine or skirt the structure along the banks. **The number and size of the proposed rock flow check dams should be indicated on the Notification of Drain Maintenance or Repair form.**

Rock Flow Check Dam, Flat-Bottom Ditch

Rock flow check dams, flat bottom ditch is similar to the V-ditch design above but is meant for use in wide, flat-bottom drains (Figure 12; OPSD 219.211). **The number and size of the proposed rock flow check dams should be indicated on the Notification of Drain Maintenance or Repair form.**

Other Temporary Measures

Drainage superintendents, drainage engineers, and Conservation Authority staff and contractors often come up with mitigation ideas that are more suitable to the limitations or challenges of a drain maintenance site. These other mitigation measures can be indicated on the Notification of Drain Maintenance or Repair form when submitting for review.

Section 5c: Offsetting Measures (Permanent) – Applicable for DFO Submissions

After applying avoidance and mitigation measures, any residual impacts would normally require authorization and should then be addressed by offsetting.

- This section must be completed if you are working in a Class A, B, C, D, or E Drain.
- This section does not need to be completed for Class F Drains.
- Select the appropriate offsetting options that can be successfully implemented.
- The number and size of the offsetting measures used should reflect the scale and extent of the disturbance. For example, one pool created per 2 km of drain cleanout would **not** be appropriate or sufficient.
- The notification form will be considered to be incomplete by DFO if offsetting measures are not identified and quantified.
- Class D and SAR Drains require a site specific review by DFO; a biologist can work with you to determine appropriate and offsetting.

When selecting the type and location of the offsetting measures, it is important that these measures do not have a negative impact on the municipal drain. In many cases, the offsetting measures used can provide additional benefits to the drain. For example, in a section of a drain with a large gradient change, a Newbury Weir/Rock Flow Check Dam, V-Ditch or Rock Flow Check Dam, Flat-bottom Ditch can be used to slow down the movement of water and minimize the erosion in this section as well as provide important fish habitat.

Bank Stabilization

There are a number of ways that banks stabilization can be achieved from simple reseeding of exposed soils to more elaborate bioengineering techniques. Reseeding is discussed below. This section will focus on alternative methods.

Bioengineering or artificial (riprap or gabion baskets) methods can be used to stabilize banks that are eroding where natural revegetation is either not possible or not practical. Bioengineering techniques use plant material to stabilize banks and have greater habitat benefits than artificial methods.

Bioengineering methods include:

- Brush mattresses - A brush mattress is a protective mat of cuttings placed on the stream bank and staked sufficiently to hold it in place (See Kavanagh & Hoggarth, 2015). This mat provides 100% coverage in the area that it is placed.
- Live fascines – These are best described as a rope-shaped bundle of live cuttings, lashed together with twine. Fascines grow rapidly when constructed from live materials. The resulting root systems work well to secure soils and to hold the fascine in place. They are simple and effective, require little time to build, and can be installed with little site disturbance (See Kavanagh & Hoggarth, 2015).
- Root wads - Use of root wads (trunks butted into the bank leaving the root mass exposed) to protect banks (See Kavanagh & Hoggarth, 2015).
- Live cribwall - A three dimensional structure created from untreated timbers, fill, and live cuttings. This structure, once filled, acts as a retaining wall. The timbers provide immediate protection and stability for the structure, but their importance is

gradually lessened as they decompose, and the live cuttings grow and proliferate. The resulting root mass binds the fill and the parent soils into a single coherent mass. Live cribwalls are also one of the more complex structures listed, as their construction can cause considerable site disturbance (See Kavanagh & Hoggarth, 2015).

- Live Rock Revetments – This is a combination of live dormant cuttings with field or armour stone (riprap). The live cuttings are placed in the openings between the rock, during or after rock placement. The rock holds the cuttings in place and as the cuttings grow the roots hold the rock in place and help to stabilize the site. This method has also been referred to as a joint planting, vegetated rip-rap, and rock fill with branch layering (See Kavanagh & Hoggarth, 2015).
- Riprap (Bank Armouring) - Placement of riprap along the banks. Geotextile fabric should be placed underneath riprap to prevent erosion behind the armouring. This is not a preferred method for long reaches.

Indicate which bank stabilization methods are to be used and provide all necessary details (e.g. number, size, location).

Creation of a Low Flow Channel

This design incorporates a deepening of the centre of the channel in wider drains, or through a floodplain with low-level vegetated benches on either side (Figure 2). During periods of high flow, the channel is able to transport large volumes of water through the full width of the channel. During periods of low flow, the water is concentrated into the narrower portion of the channel allowing for higher velocity to minimize sediment deposition with the added benefits of reduced erosion and improved fish passage. This is also helpful in systems that see a large variation in water flow, particularly after rain events. **Provide all of the details on the construction of the low flow channel (e.g. length, depth, width of centre channel, width of benches).**

Culvert Removal/Replacement

Removal or replacement of culverts is often under taken as part of the maintenance and repair of drains. Culvert replacements can be conducted without DFO review when the new culvert is the same size as the old culvert and is in the same location; this is referred to as a "like for like" replacement. Culvert replacements can also be done without DFO review when the requirements and conditions in the Culvert Replacement Best Management Practices (Appendix 4) can be met. The following documents should be reviewed when planning a culvert replacement in a municipal drain:

Municipal Drain (Class A – E and Unrated) Maintenance and Repair Activities Not Requiring DFO Review (Appendix 3);
Maintenance and Repair of F Drains (Appendix 3); and
Culvert Replacement Best Management Practices (Appendix 4).

In some circumstances, the removal or replacement of perched culverts (not properly embedded into the bottom of the drain) or undersized culverts, which are barriers to fish passage, may be used as a measure to offset other maintenance works. When replacing a culvert, the diameter of the new culvert should be large enough to permit water to flow

through at a normal velocity. Undersized culverts concentrate flows creating a "fire hose" effect where the water velocity is too fast for most fish species to swim against the flow.

A replaced culvert should also be embedded into the substrate at both the upstream end, to prevent erosion and undermining, and at the downstream end to prevent excessive scouring and erosion, and to ensure that fish can swim through the culvert even during low flow conditions. **Provide all of the details on the culvert replacement (e.g. size of area dewatered, diameter and length of the culvert, % of embedment).**

Newbury Weir/Rock Flow Check Dam, V-Ditch

Newbury weirs are similar to rock flow check dams with a few modifications (Figure 13). Newbury weirs are intended to be permanent structures. The shape of the rock flow check dam should be low enough to allow fish passage over the structure and shaped in a "V" to concentrate low flows. Newbury weirs can be used to enhance pools, recruit gravel, re-aerate flows, and assist fish passage. They are typically used in channelized stream reaches to help restore run-pool-riffle sequences but can also provide other benefits. For example they can:

- Aerate water;
- Control the gradient of a stream and creates fish habitat in the process; and
- Increase fish production by providing spawning substrate.

If not constructed properly, this type of structure can be a barrier to fish during low flows. Some maintenance will be required, particularly after high flow events. Considerable experience is required when designing these structures and, therefore, this rehabilitation project should not be carried out without the support of experts (e.g. aquatic biologists, engineers, and hydrologists). For design criteria and details, refer to the Rehabilitation and Enhancement of Aquatic Habitat Guide V. 1.0 by R.J. Kavanagh & C.T. Hoggarth Central and Arctic Region Fisheries and Oceans Canada.

Provide all of the important construction details (e.g. number of structures, size, design details) for the Newbury Weir/Rock Flow Check Dam, V-Ditch that is to be constructed.

Refugia Pools/Sediment Traps

Refugia Pools are created by strategically digging a spot that is wider and deeper in the open drain (Figure 10 & Figure 11; OPSD 219.220). Excessive widening of the channel should be avoided, however, the channel must be widened enough to stabilize the banks. Refugia pools can be created as an offsetting measure in A, C, and E drains. During low flow conditions, when even permanent watercourses can dry up for short periods of time, these larger deeper areas are important habitat for fish, providing cover and cooler temperatures.

The number of refugia pools created should reflect the length of drain being maintained. As a minimum, there should be one refugia pool per 1 km. **Indicate the number of pools and design details (e.g. dimensions) proposed on the Notification of Drain Maintenance or Repair form and attach a map with the proposed locations.**

Reseeding and/or Planting

As soon as the drain maintenance is completed, the spoils or excavated material created from the cleanout should be levelled and reseeded (when not in a cultivated agricultural field). This is typically undertaken as a mitigation measure to stabilize disturbed soils and prevent sediment from entering the drain.

When reseeding, the following should be considered:

- Disturbed soils should be seeded with native grass seed or a seed legume mix within 48 hours of the disturbance and ideally within 24 hours if possible. Grasses such as switchgrass, prairie cordgrass, and cylindric blazing star have very long roots and may provide more stabilization of soils compared to other grass species.
- Seeding should occur while the disturbed soil is still moist to facilitate germination.
- Sufficient time should be left in the growing season to ensure that germination can occur for revegetation to be successful.
- Where revegetation cannot be undertaken within a reasonable time after soils are disturbed or the work is conducted outside of the growing season, artificial cover such as mulch, straw, or fiber mats should be used to stabilize the banks until natural revegetation occurs.

When reseeding and/or planting is being undertaken as an offsetting approach, look for opportunities to improve poorly vegetated areas, riparian areas, or widen buffers strips. The benefits of reseeding and/or planting to both drainage and fish habitat include:

- Filtering of sediment from overland flow;
- Removal of nitrogen and phosphorus in water (preventing excessive in-stream vegetation growth);
- Increased shading and cooling of water;
- Improved cover from overhead predators;
- Increased nutrients and food for fish; and
- Improved bank stability with a vegetation root mass.

Seeding is often used in combination with other bank stabilization techniques. **Indicate the size of the area that is to be re-seeded or replanted and provide any additional details (e.g. seed mix to be used).**

Note: It is important that the grasses, shrubs, and/or trees that are to become established are compatible (e.g. doesn't host blights/fungi which could damage crops) with the adjacent land usage.

Riffle Habitat

Riffles are shallow areas with fast, turbulent water running over gravel, cobble, and/or small boulders. Riffles aerate water, provide important habitat for aquatic insects, and provide cover and spawning substrate for a variety of fish species. The placement of gravel, cobble, or riprap may protect a section of a municipal drain experiencing down cutting (e.g. tile outlet). **The number and size of the proposed riffle habitat(s) should be provided and the location of the riffle(s) should be indicated on a map.**

Rock Flow Check Dam, Flat-Bottom Ditch

Rock flow check dams can be designed as temporary or permanent structures. Rock is placed in the channel to form the flow check dam. Geotextile fabric is placed over the rock, taking care to trench and backfill the geotextile fabric at the upstream end to anchor to prevent water from lifting it. A layer of rock is placed over the geotextile to secure it. These structures can fail if water is able to undermine or skirt the structure along the banks. These structures are also used in combination with refugia pools. The rock flow check dams, flat bottom ditch (Figure 12; OPSD 219.211) is meant for use in wide, flat-bottom drains. It is important that fish are able to pass the check dam structure.

The number and size of the proposed rock flow check dams should be provided and the location of the dam(s) should be indicated on a map.

Mitigation and Offsetting Measures Drawings

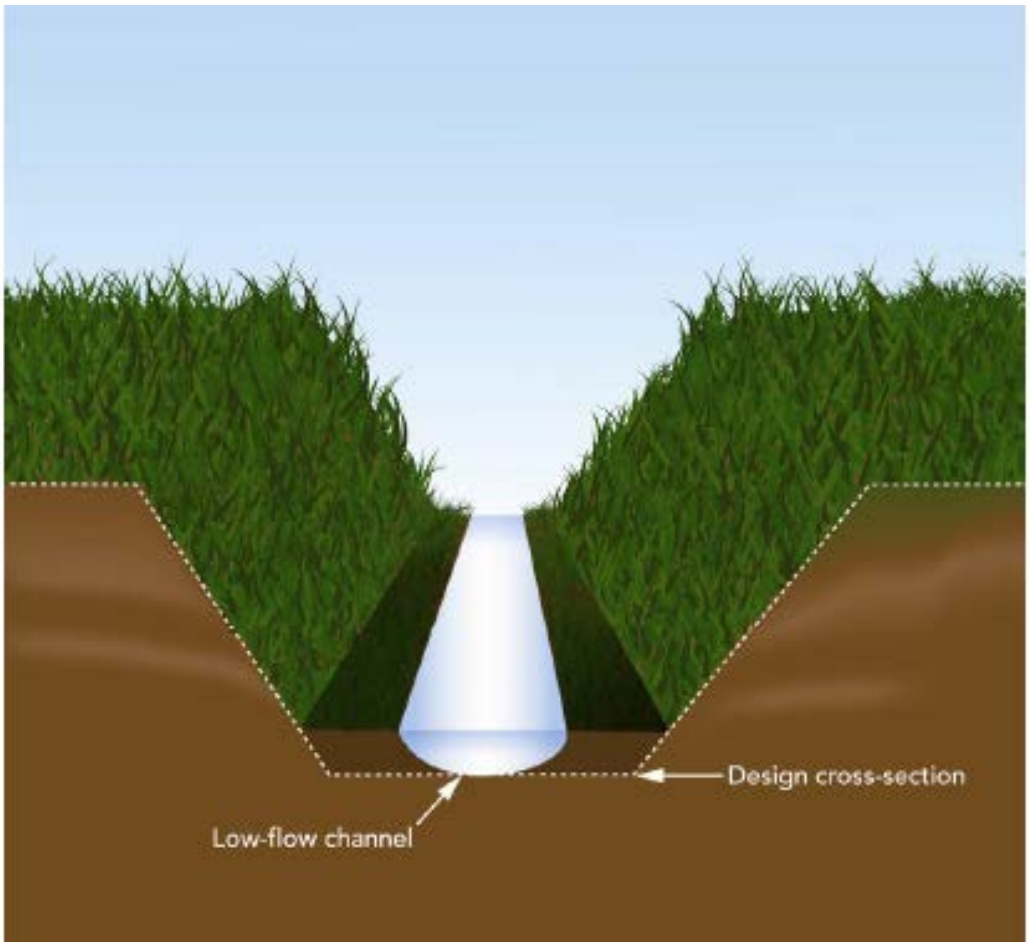

Figure 2. Two-stage/low-flow channel (MNRF & OMAFRA, 2012).
(Return to 8-6; 8-12)

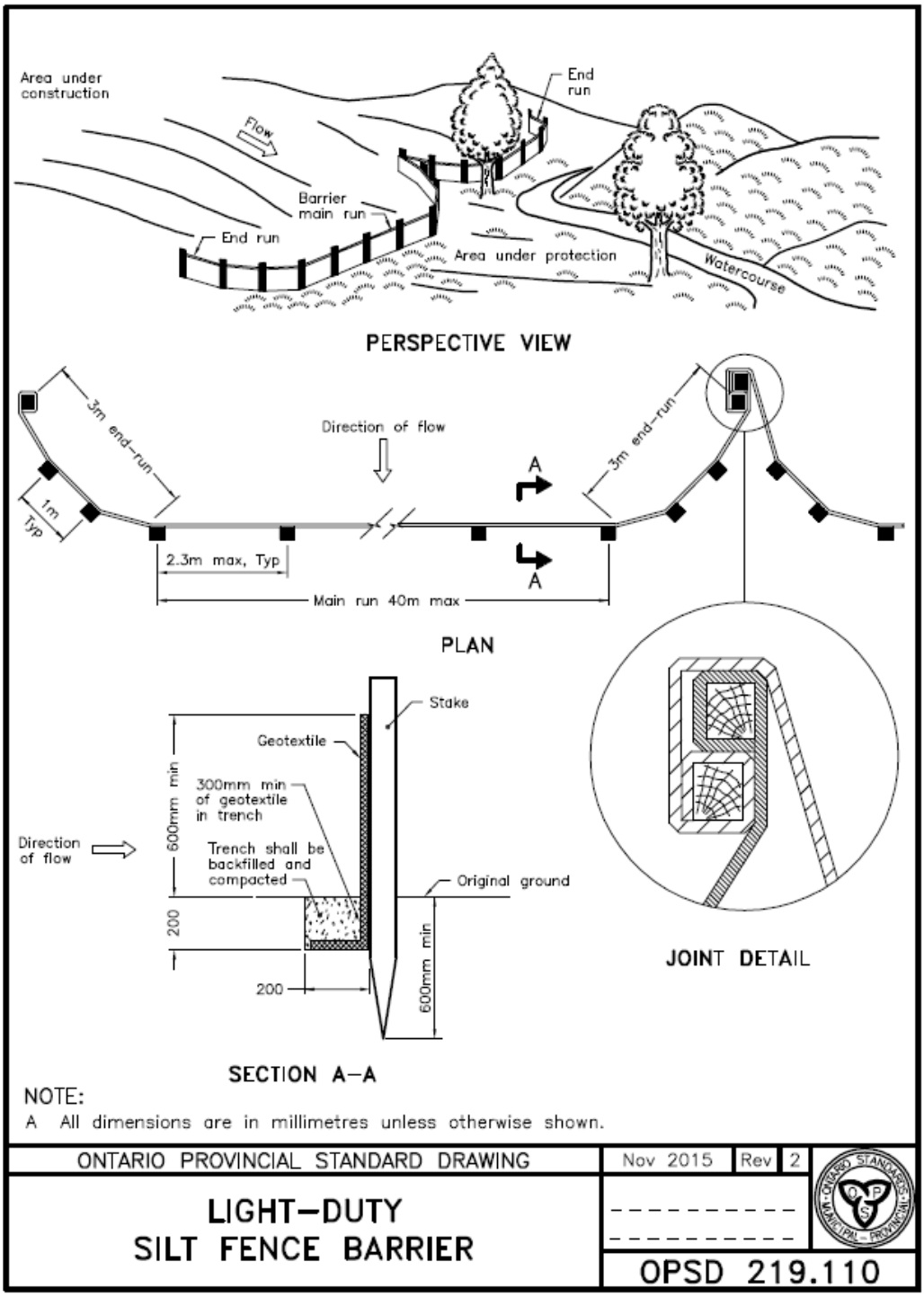

Figure 3. OPSD 219.110 Silt fence barrier (light duty).

Return to 8-8

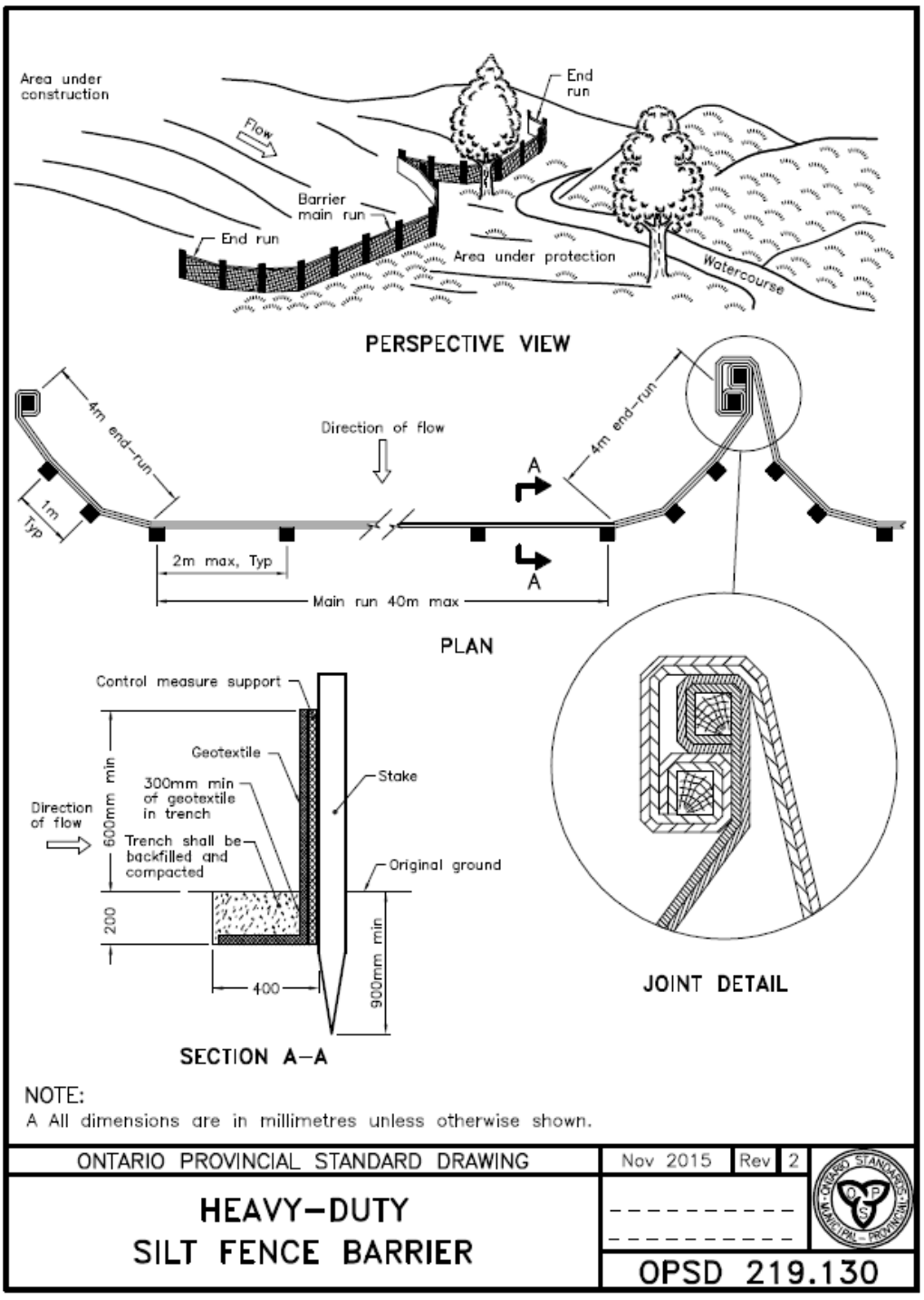

Figure 4. OPSD 219.130 Silt fence barrier (heavy duty).

Return to 8-8

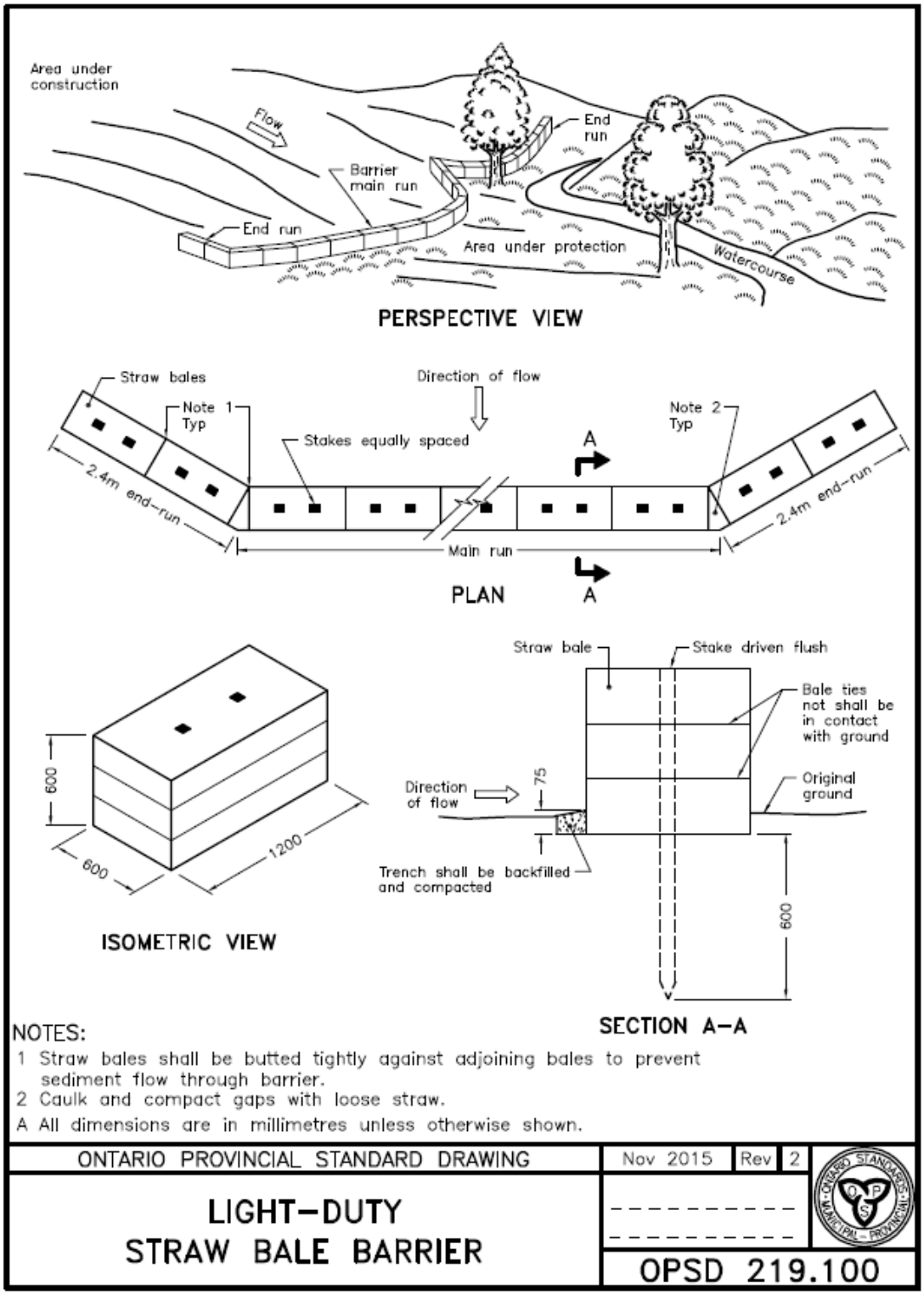

Figure 5. OPSD 219.100 Straw bale barrier (light duty).

[Return to 8-8]

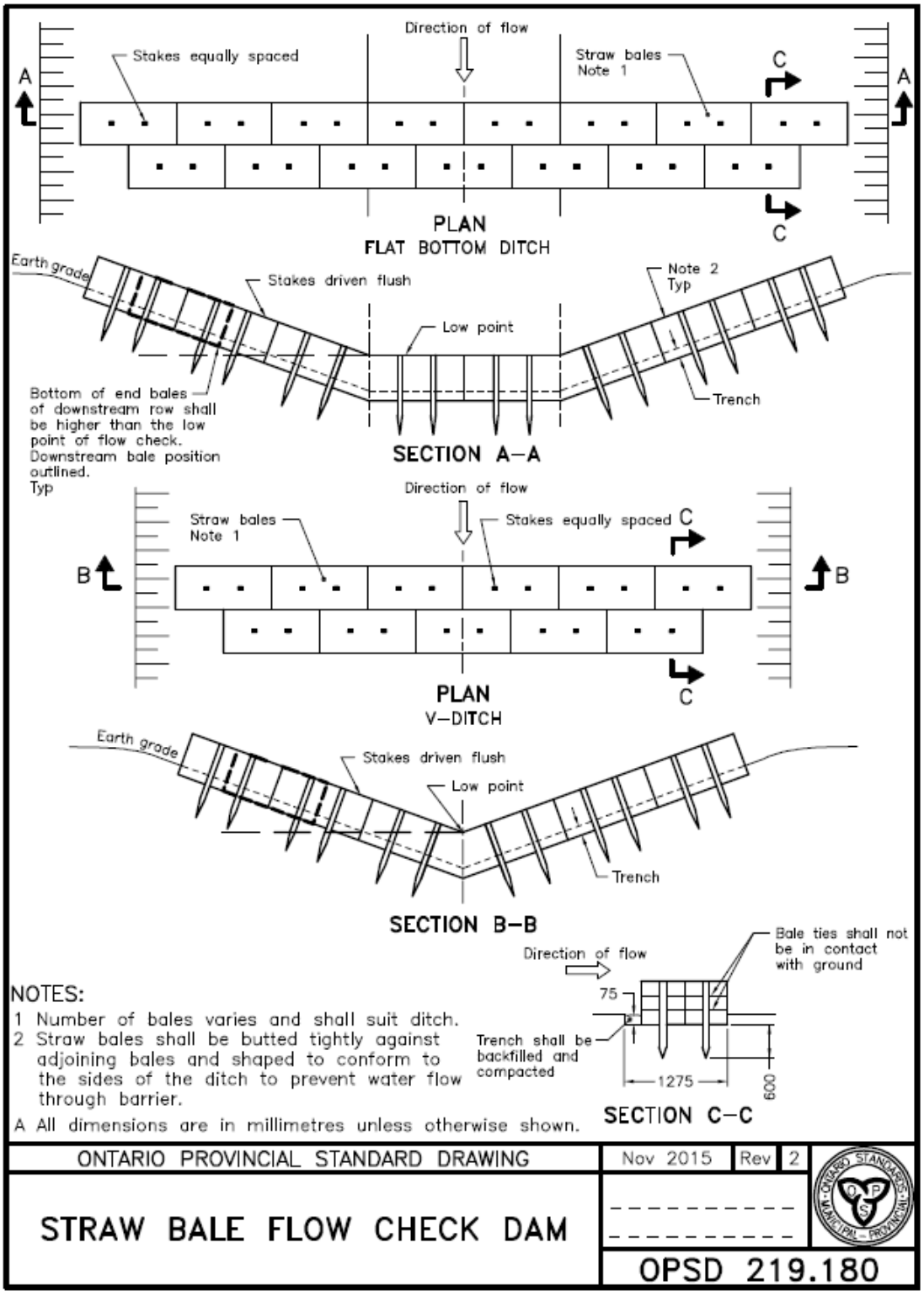

Figure 6. OPSD 219.180 Straw bale flow check dam.

[Return to 8-9]

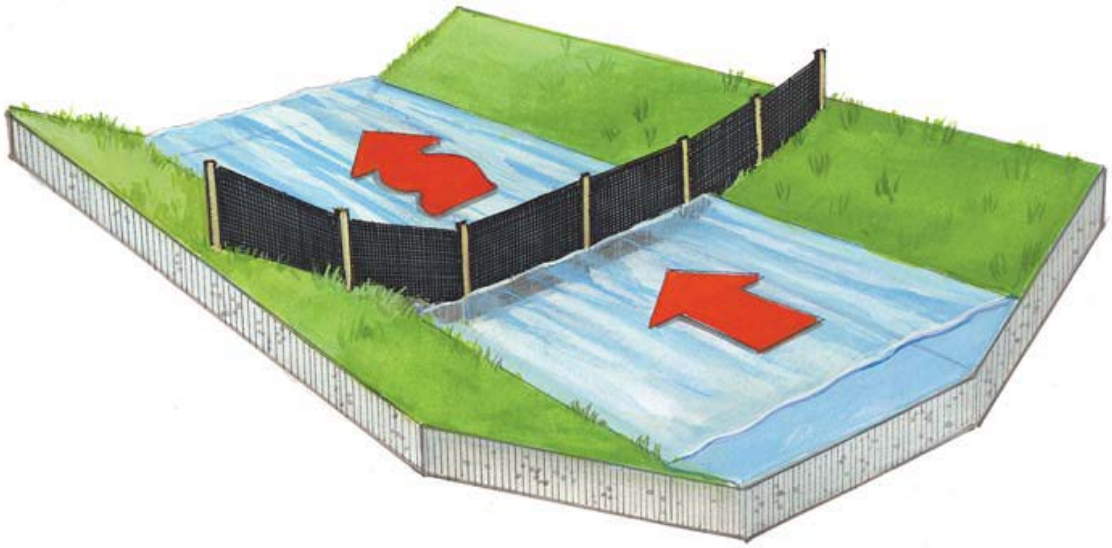

Figure 7. Temporary silt fence flow check dam.
Return to 8-9

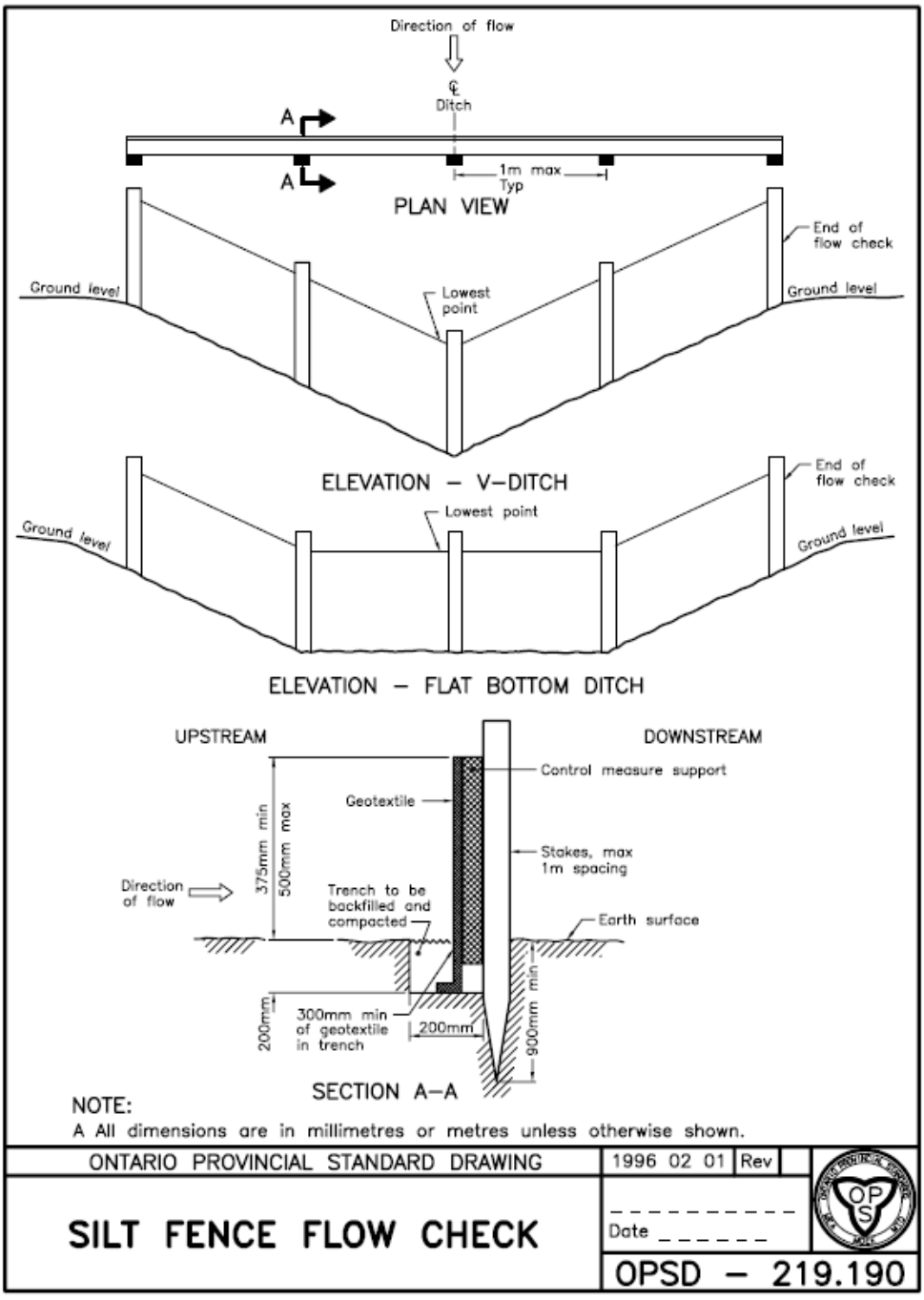

Figure 8. OPSD 219.190 Silt fence flow check dam.

Return to 8-9

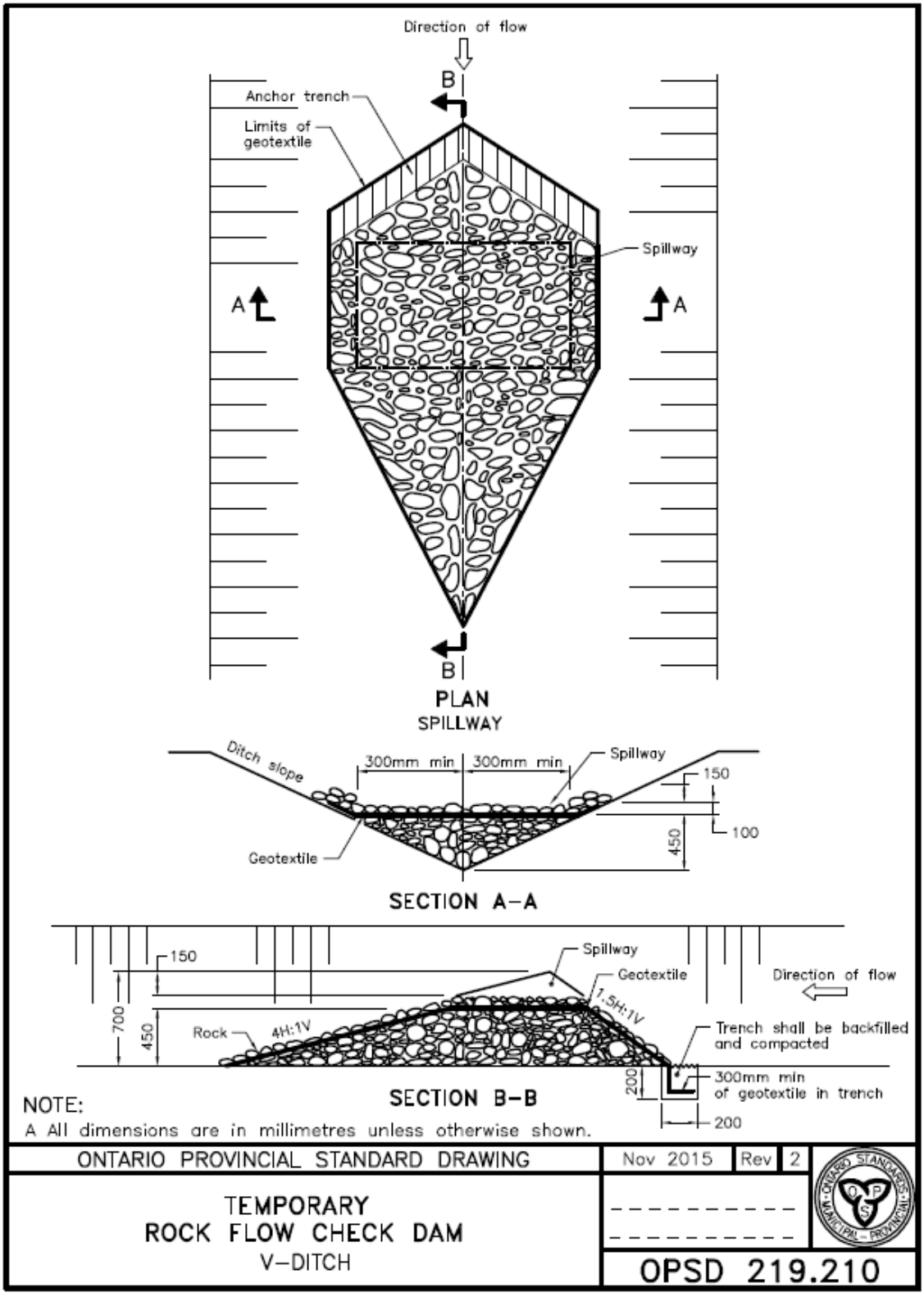

Figure 9. OPSD 219.210 Temporary rock flow check dam, V-ditch.

[Return to 8-10]

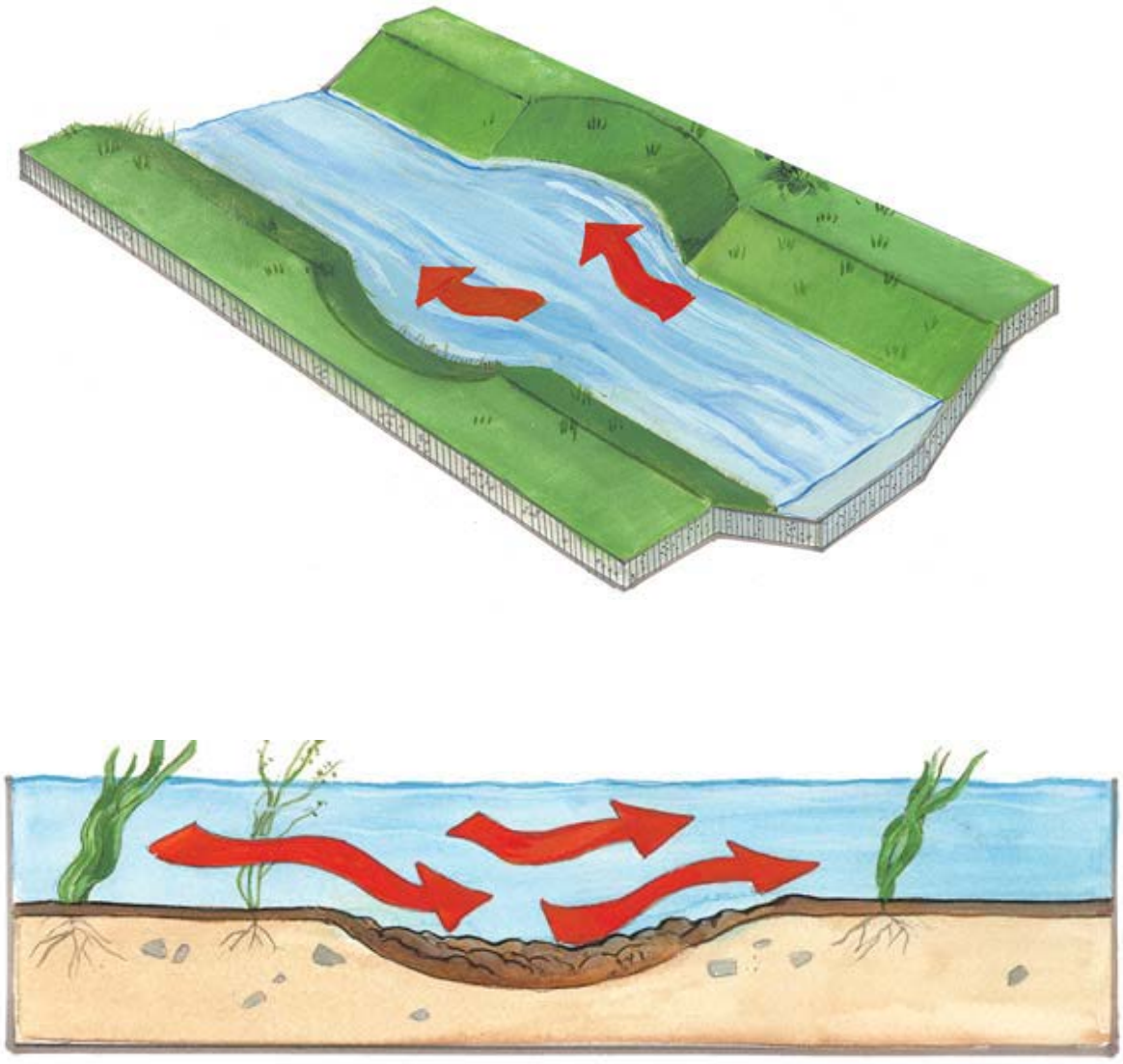

Figure 10. Basic design of a refugia pool/sediment trap in municipal drains.
Return to 8-10; 8-13

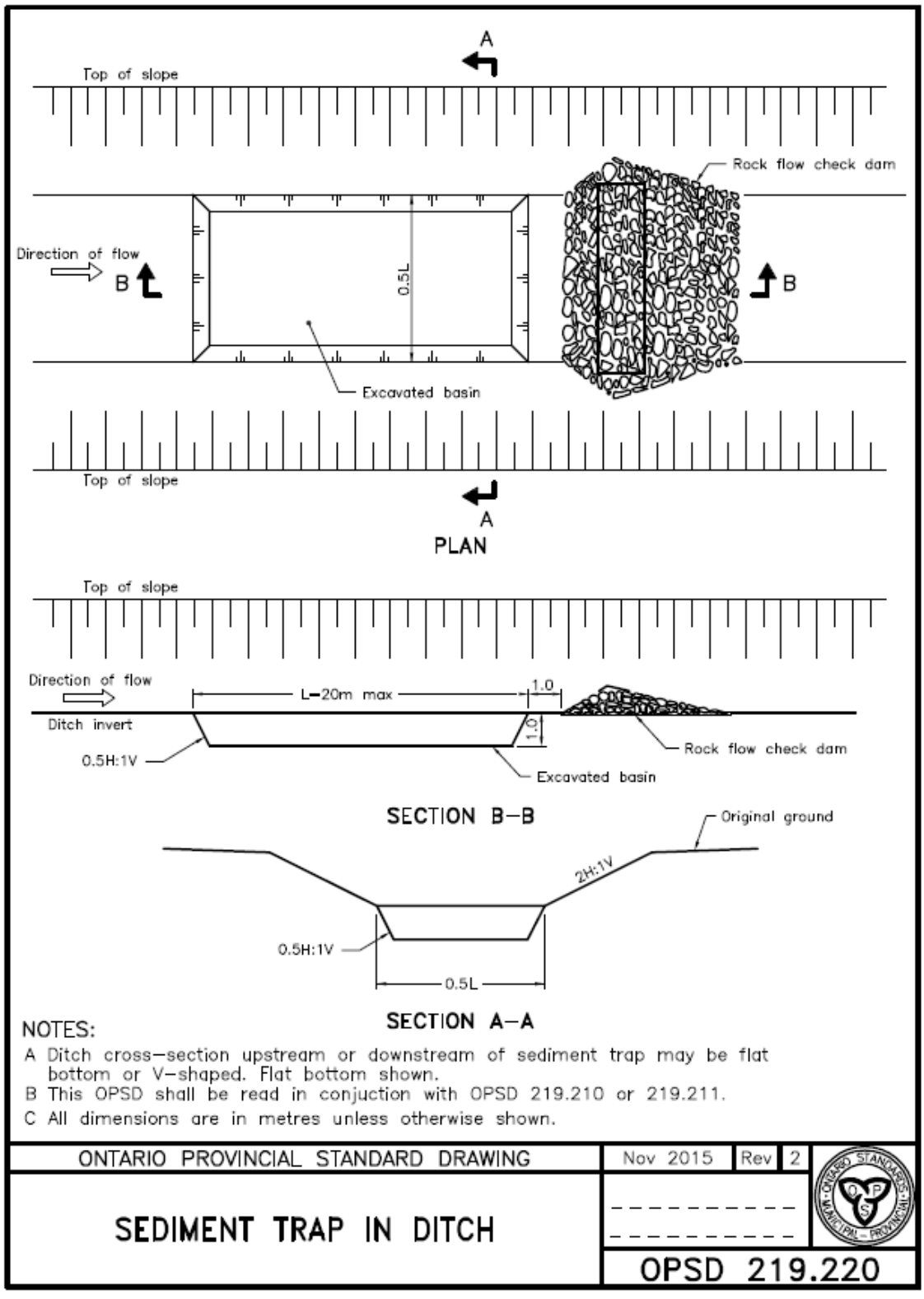

Figure 11. OPSD 219.220, Sediment trap in ditch.

[Return to 8-10; 8-13]

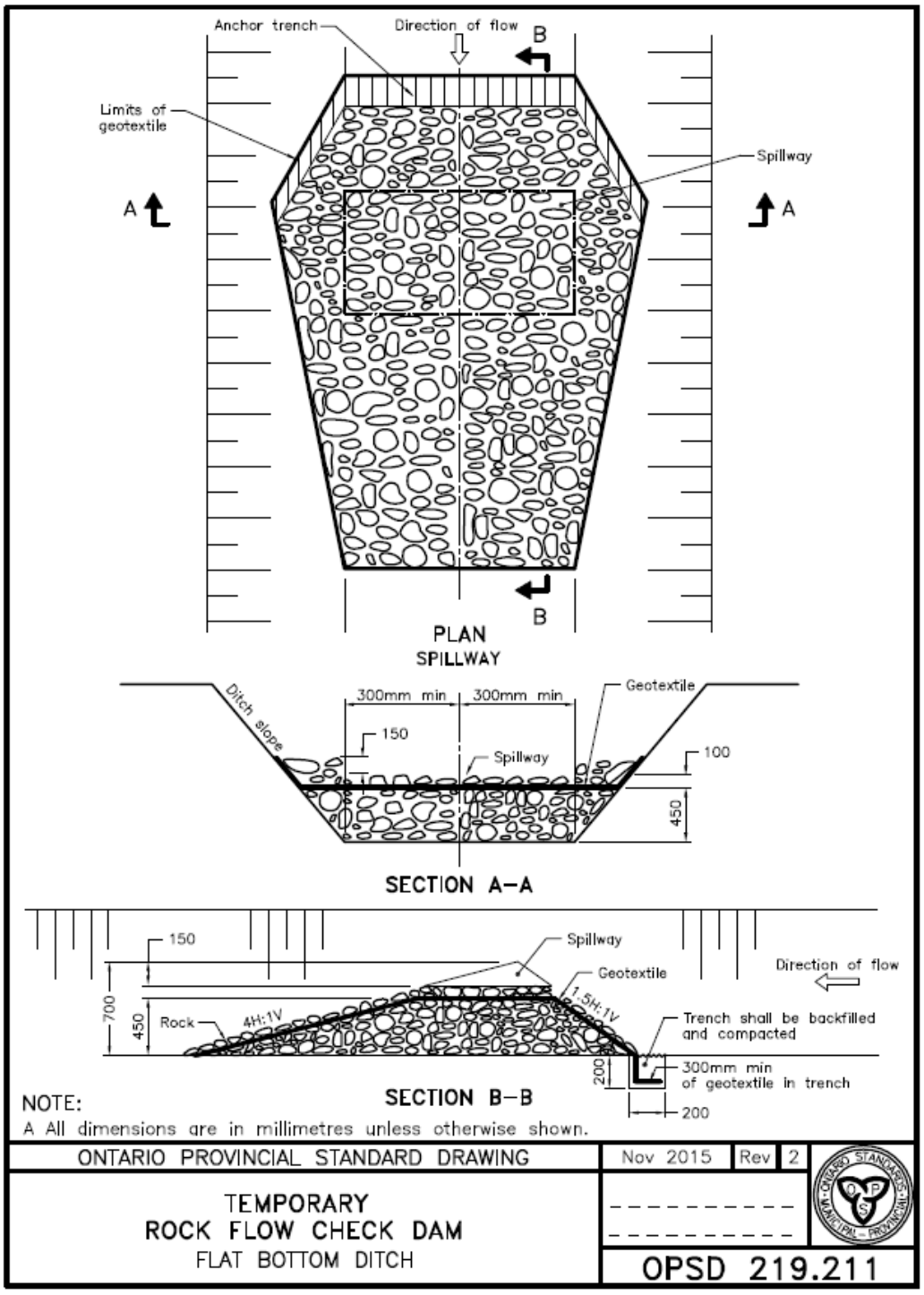

Figure 12. OPSD 219.211 Temporary rock flow check dam, flat bottom ditch.
Return to 8-10; 8-15

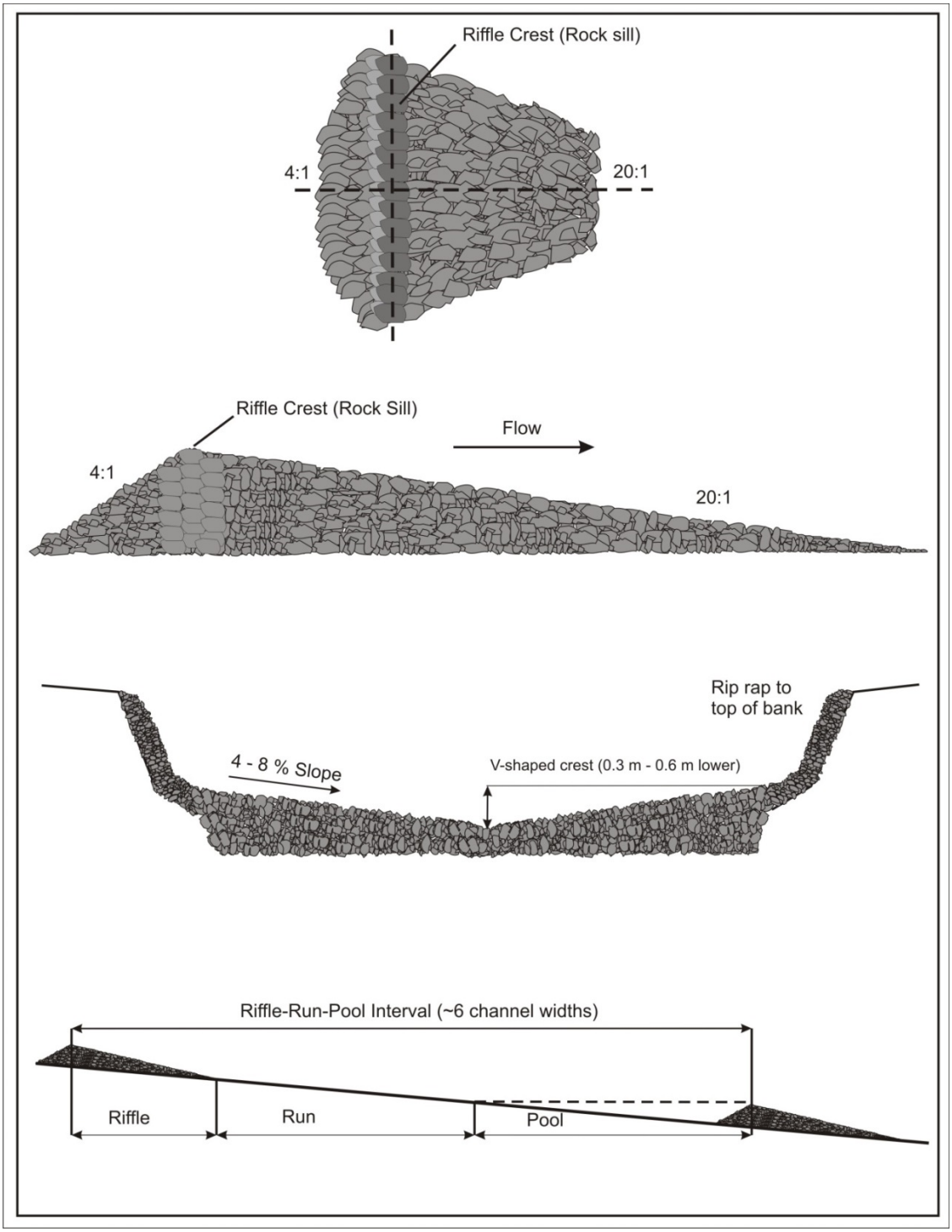

Figure 13. Drawings of a Newbury riffle (Modified from Slaney & Zaldokas, 1997; Newbury, 2013). Return to 8-13

Standard Measures to Avoid Serious Harm to Fish
(Return to 8-2; 8-7)

Standard Measures to Avoid Serious Harm to Fish

When implementing a project, the *Fisheries Act* requires a proponent to ensure they avoid causing *serious harm to fish* during any activities in or near water. The following advice will help one avoid causing harm and comply with the *Act*. Note: Not all advice provided may be applicable for drain maintenance and repair activities.

Project Planning

Timing

- Time work in water to respect timing windows to protect fish, including their eggs, juveniles, spawning adults, and/or the organisms upon which they feed.
- Minimize duration of in-water work.
- Conduct instream work during periods of low flow, or at low tide, to further reduce the risk to fish and their habitat or to allow work in water to be isolated from flows.
- Schedule work to avoid wet, windy, and rainy periods that may increase erosion and sedimentation.

Site Selection

- Design and plan activities and works in waterbody such that loss or disturbance to aquatic habitat is minimized and sensitive spawning habitats are avoided.
- Design and construct approaches to the waterbody such that they are perpendicular to the watercourse to minimize loss or disturbance to riparian vegetation.
- Avoid building structures on meander bends, braided streams, alluvial fans, active floodplains or any other area that is inherently unstable and may result in erosion and scouring of the stream bed or the built structures.
- Undertake all instream activities in isolation of open or flowing water to maintain the natural flow of water downstream and avoid introducing sediment into the watercourse.

Contaminant and Spill Management

- Plan activities near water such that materials such as paint, primers, blasting abrasives, rust solvents, degreasers, grout, poured concrete or other chemicals do not enter the watercourse.
- Develop a response plan that is to be implemented immediately in the event of a sediment release or spill of a deleterious substance and keep an emergency spill kit on site.
- Ensure that building material used in a watercourse has been handled and treated in a manner to prevent the release or leaching of substances into the water that may be deleterious to fish.

Operation of Machinery

- Ensure that machinery arrives on site in a clean condition and is maintained free of fluid leaks, invasive species, and noxious weeds.
- Whenever possible, operate machinery on land above the high water mark, on ice, or from a floating barge in a manner that minimizes disturbance to the banks and bed of the waterbody.
- Limit machinery fording of the watercourse to a one-time event (i.e. over and back), and only if no alternative crossing method is available. If repeated crossings of the watercourse are required, construct a temporary crossing structure.
- Use temporary crossing structures or other practices to cross streams or waterbodies with steep and highly erodible (e.g. dominated by organic materials and silts) banks and beds. For fording equipment without a temporary crossing structure, use stream bank and bed protection methods (e.g. swamp mats, pads) if minor rutting is likely to occur during fording.
- Wash, refuel, and service machinery and store fuel and other materials for the machinery in such a way as to prevent any deleterious substances from entering the water.

Erosion and Sediment Control

- Develop and implement an Erosion and Sediment Control Plan for the site that minimizes risk of sedimentation of the waterbody during all phases of the project. Erosion and sediment control measures should be maintained until all disturbed ground has been permanently stabilized, suspended sediment has resettled to the bed of the waterbody or settling basin and runoff water is clear. The plan should, where applicable, include:
    - Installation of effective erosion and sediment control measures before starting work to prevent sediment from entering the water body.
    - Measures for managing water flowing onto the site, as well as water being pumped/diverted from the site such that sediment is filtered out prior to the water entering a waterbody. For example, pumping/diversion of water to a vegetated area, construction of a settling basin or other filtration system.
    - Site isolation measures (e.g. silt boom or silt curtain) for containing suspended sediment where in-water work is required (e.g. dredging, underwater cable installation).
    - Measures for containing and stabilizing waste material (e.g. dredging spoils, construction waste and materials, commercial logging waste, uprooted or cut aquatic plants, accumulated debris) above the high water mark of nearby waterbodies to prevent re-entry.
    - Regular inspection and maintenance of erosion and sediment control measures and structures during the course of construction.
    - Repairs to erosion and sediment control measures and structures if damage occurs.
    - Removal of non-biodegradable erosion and sediment control materials once site is stabilized.

Fish Protection

- Ensure that all in-water activities, or associated in-water structures, do not interfere with fish passage, constrict the channel width, or reduce flows.
- Retain a qualified environmental professional to ensure applicable permits for relocating fish are obtained and to capture any fish trapped within an isolated/enclosed area at the work site and safely relocate them to an appropriate location in the same waters. Fish may need to be relocated again, should flooding occur on the site.
- Screen any water intakes or outlet pipes to prevent entrainment or impingement of fish. Entrainment occurs when a fish is drawn into a water intake and cannot escape. Impingement occurs when an entrapped fish is held in contact with the intake screen and is unable to free itself.
- A fish screen with openings no larger than 2.54 mm (0.10 inches) should be equipped on any pump used during the operation. Note: Additional information regarding fish screens can be found in the DFO Freshwater Intake End-of-Pipe Fish Screen Guideline document (http://www.dfo-mpo.gc.ca/Library/223669.pdf).

Bank Stabilization and Revegetation

- Clearing of riparian vegetation should be kept to a minimum: use existing trails, roads or cut lines wherever possible to avoid disturbance to the riparian vegetation and prevent soil compaction. When practicable, prune or top the vegetation instead of grubbing/uprooting.
- Minimize the removal of natural woody debris, rocks, sand, or other materials from the banks, the shoreline or the bed of the waterbody below the ordinary high water mark. If material is removed from the waterbody, set it aside and return it to the original location once construction activities are completed.
- Immediately stabilize shoreline or banks disturbed by any activity associated with the project to prevent erosion and/or sedimentation, preferably through revegetation with native species suitable for the site.
- Restore bed and banks of the waterbody to their original contour and gradient; if the original gradient cannot be restored due to instability, a stable gradient that does not obstruct fish passage should be restored.
- If replacement rock reinforcement/armouring is required to stabilize eroding or exposed areas, then ensure that appropriately-sized, clean rock is used and that rock is installed at a similar slope to maintain a uniform bank/shoreline and natural stream/shoreline alignment.
- Remove all construction materials from site upon project completion.

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APPENDIX 9

SITE SPECIFIC REVIEWS

SITE SPECIFIC REVIEWS

1. WHAT IS A SITE SPECIFIC REVIEW?

This refers to the normal DFO review process for work in and around water. Unlike Class Authorizations where assumptions are made based on the type of drain, a site specific review requires that each site, and each activity be assessed individually to determine the potential impacts to fish and fish habitat.

2. WHEN IS A SITE SPECIFIC REVIEW REQUIRED?

A site specific review is required for:

- Drains that have aquatic Species at Risk (SAR) and/or their Critical Habitat, as defined in a recovery strategy;
- D Class drains;
- Unrated drains which cannot be classified due to lack of data;
- Non-maintenance activities such as realignment or drain enclosures; and
- New drains.

3. WHAT INFORMATION SHOULD I SUBMIT IF MY DRAIN PROJECT IS GOING TO REQUIRE A SITE SPECIFIC REVIEW?

DFO has identified drain maintenance and repair activities that do not require review. Refer to the documents *Municipal Drain (Class A – E and Unrated) Maintenance and Repair Activities Not Requiring DFO Review* and *Maintenance and Repair of F Drains.* If your drain maintenance or repair activity is on one of these lists, you do not need to submit your project to DFO for review. NOTE: Your project may still need to be submitted to the Conservation Authority.

If your activity is not on the list, provide the following information to DFO for review:

☐ Fill out the *Notification of Drain Maintenance or Repair Form*

- ☐ Determine whether SAR may be present in the work zone or impact zone. Visit http://www.conservation-ontario.on.ca/what-we-do/watershed-stewardship/aquatic-species-at-risk.
- ☐ The name of the drain should be provided. If the drain also is known as a (former) natural watercourse, this name should also be provided (i.e. some creeks have been altered in the past to become a municipal drain and are known by two names).
- ☐ As a minimum, the location should include the county, township, lot, and concession number. In addition, where at all possible, a latitude and longitude (degrees; minutes; decimal minutes) or Universal Transverse Mercator (UTM) grid coordinates should be provided along with the township, lot and concession numbers.
- ☐ Be sure to select Avoid, Mitigation, and Offsetting options that are most relevant to the proposed work and that you are prepared to implement. Select the appropriate

offsetting options that can be successfully implemented. The number and size of the offsetting measures used should reflect the scale and extent of the disturbance.

☐ A picture is worth a thousand words. Include ***site photographs*** and a ***map of the drain location*** identifying areas proposed for maintenance or repair***.*** Photographs of the drain provide a considerable amount of information that will assist the reviewing biologist assessing the type of habitat provided by the drain and its sensitivity to disturbance by drain maintenance activities. Photographs should consist of upstream and downstream views as well as a photograph of the typical substrate (drain bottom) in the area (water clarity and depth permitting). Additional photographs should be taken of any noteworthy features that may exist within work zone. These may include features that affect the performance of the drain or illustrate the reason for the maintenance activity such as culverts, barriers to fish movement, unstable banks, riffle areas, areas with clean gravel, and large debris piles (e.g. log jams or remnant beaver dams). If possible, note the location of these features on the drain location map.

When submitting photographs include the drain name (if applicable), date of photograph, and location and direction of photograph in relation to direction of flow and easily recognizable features (e.g. looking upstream at right downstream bank 500 m downstream of culvert).

☐ Are there more details you can provide on the work proposed, why the works are required, or specific information about the fish habitat present? List the activity to be undertaken and provide a brief description of what it will involve. The linear distance of the proposed maintenance activity and the equipment that will be used should also be identified. The measures that will be taken to mitigate potential adverse effects should also be provided in the project description. The more information that can be provided up front, the faster the review can be completed. A cover email is a convenient place to provide more information when submitting your completed form.

☐ Sign and date the notification form. Submit the completed form, photographs, mapping, and any other relevant information by email to fisheriesprotection@dfo-mpo.gc.ca. Where applicable, it is recommended that you copy the Conservation Authority on the email.

4. WHAT IF A SITE SPECIFIC *FISHERIES ACT* AUTHORIZATION IS REQUIRED?

If, after a project review, it is determined that your project will cause serious harm to fish that are part of or that support a commercial, recreational, or Aboriginal fishery, you must apply for an Authorization (Paragraph 35(2)(*b*) *Fisheries Act* Authorization from the Minister of Fisheries and Oceans) to ensure compliance with the Act.

An application for an Authorization must include all information listed in Schedule 1 of the *Fisheries Act* Applications Regulations and a letter of credit. Applications must include the following information and document:

- Description of fish and fish habitat (aquatic environment);
- Description of effects on fish and fish habitat;
- Measures and standards to avoid or mitigate serious harm to fish;
- Residual serious harm to fish after implementation of avoidance and mitigation measures and standards;

- **Offsetting plan** (see http://www.dfo-mpo.gc.ca/pnw-ppe/offsetting-guide-compensation/index-eng.html); and
- **Letter of credit.** The *Fisheries Act* Applications Regulations require that all applications for authorization must include a letter of credit to cover the cost of implementing an offsetting plan. Additional details on the letter of credit can be found at: www.dfo-mpo.gc.ca/pnw-ppe/reviews-revues/application-eng.html.

Not submitting all of the information and documentation prescribed by the *Fisheries Act* Applications Regulations will likely result in delay with the processing of your application. If there are gaps in the information/documentation provided, the Minister of Fisheries and Oceans will notify you accordingly and your application will not be processed until the required information and documentation are submitted.

5. DO I NEED A SARA PERMIT?

SARA Authorizations may be necessary when the individuals, the residences, or the critical habitat of extirpated, endangered, or threatened fishes or mussels listed under SARA may be negatively affected by a proposed project activity. A SARA Authorization will be required prior to initiation of any project construction activities when:

- Project activities may cause incidental harm to a SAR, in particular the contravention of any one of the three SARA prohibitions (sections 32, 33, and 58);
- Field surveys are proposed to detect fish or mussel SAR, including any monitoring programs for SAR; and
- Mitigation strategies include either SAR mussel relocations or fish salvage operations.

If a proposed drain maintenance project is likely to impact aquatic SAR and/or critical habitat, the proponent should complete DFO's notification form, check off the SAR option in Section 2 of the form, and submit the form to FisheriesProtection@dfo-mpo.gc.ca. DFO will assess the project under the *Fisheries Act* and SARA. If a SARA-compliant *Fisheries Act* Authorization is required, refer to the process in DFO Section 2.1.3 above. If a SARA permit only is required, DFO will send the proponent the application form and once it has been completed and received by DFO, DFO has 90 days to issue or refuse a SAR permit under the "Permits Authorizing an Activity Affecting Listed Wildlife Species Regulations" http://laws-lois.justice.gc.ca/eng/regulations/SOR-2013-140/FullText.html

All of the following SARA permitting pre-conditions must be met or the work will not be authorized:

- All reasonable alternatives to the activity that would reduce the impact on the species have been considered and the best solution has been adopted;
- All feasible measures will be taken to minimize the impact of the activity on the species or its critical habitat or the residences of its individuals; and
- The activity will not jeopardize the survival or recovery of the species.

For more information, visit http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html or contact the Fisheries Protection Program at fisheriesprotection@dfo-mpo.gc.ca.

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Appendix 10

CLASSIFYING A MUNICIPAL DRAIN

CLASSIFYING A MUNICIPAL DRAIN

1. Requesting an Update to a Drain Class

Unrated drains can be classified according to Fisheries and Oceans Canada's (DF0) "Classifying Ontario Municipal Drains Protocol". The data described in the protocol is typically collected by DFO, Conservation Authorities, or a qualified biologist. The fish species present and the flow data for the drain is used by DFO to classify a drain. Occasionally, there may be an error in the classification of a drain. If there is a mistake, DFO can be notified by sending an email to FisheriesProtection@dfo-mpo.gc.ca. The email should include the drain's current class and any information which can support the belief that drain should be reclassified. A completed Notification of Drain Maintenance or Repair form should be attached to the email if work is to be conducted in this drain. DFO will review this information and if there is sufficient data to change the drains classification, it will be revised on the drainage maps during the next mapping update which occurs once annually.

2. Classifying Ontario Municipal Drains Protocol

2.1 Introduction

Many rural watercourses in Ontario have been designated as municipal drains under the *Drainage Act, 1990* and under previous versions of the *Drainage Act*. These municipal drains are classified into a number of categories to facilitate the review and approval of drain maintenance activities with respect to fish and fish habitat. This is done under a Class Authorization Process developed by DFO.

A municipal drain segment's class is determined by its flow characteristics and the fish species that occur in it (Table 1).

Table 1. Summary of key characteristics of each drain classification.

Class	Flow	Spawning Period	Species	Authorization
A	Permanent	Fall or Spring/Fall	No sensitive species present	Class A
C	Permanent	Spring	No sensitive species present	Class C
D	Permanent	Fall or Spring/Fall	[2]Sensitive species present	Site specific
E	Permanent	Spring	[2]Sensitive species present	Class E
F	Intermittent	Spring	Not Applicable	None[1] - if work can be done when drain is dry, frozen, or there is no flow
Unrated	Unknown	Unknown	Unknown	Class Authorization or Site Specific[3]

[1]If work was to occur during a period of flow (e.g. spring), a site specific review will be required.
[2]For details, see the Sensitive Fish Species List.
[3]If there is data on flow and fish species for the drain, a Class Authorization may be issued; otherwise, a site specific review will be required.

The following types of data are required to support the drain classification process:

- drain location/extent;
- flow characteristics (permanent or intermittent); and
- fish species present.

In some cases, information may already be available to determine the classification of a municipal drain. Prior to conducting field surveys, it is important to determine if fish and flow data exist for the municipal drain in question.

2.2 Drain Segmentation

Any given municipal drain will be comprised of one or more segments, each of which may be classified independently. For ease of access and delineation, road crossings should be the basis for potential segmentation. Changes in surficial geology may occur along a municipal drain segment and may be used to alter the drain segmentation. Coldwater seeps, moraines, or isolated pools upstream from the road crossing may be used to create a break in the drain segmentation. In addition, impassable barriers within the municipal drain should be used to create a break in the drain. Some of this information may be gathered prior to entering the field by using software such as Google Earth. A brief visual inspection in the field may also be sufficient to determine whether two or more road crossings may be combined into a single drain segment.

2.3 Flow

To classify a municipal drain segment, it must be determined whether the drain is a "permanent" or "intermittent" system. Permanent systems flow year round, or are consistently wet. If a municipal drain continues to flow (in an average year), or is consistently wet, during the dry summer months, it should be considered permanent. Intermittent systems flow continuously for only a portion of the year, or are consistently dry, during the summer months. If a municipal drains flows during brief periods (usually during the spring and/or fall) or for brief periods following storm events during the summer months, it should be considered intermittent. Note: During a drought, a permanent system may not flow in July and August while during a very wet year, flow may be observed in an intermittent system in these months. These drier or wetter conditions can affect other flow characteristics (e.g. vegetation). Consideration, therefore, must be given to the amount of precipitation received immediately prior to observation, or during the sampling year. Local weather statistics (e.g. from Environment Canada) should be reviewed if there are any concerns regarding abnormalities during observation periods.

The permanency of the municipal drain can be determined by using water-level loggers or by using the flow determination method described below.

2.3.1 Water-Level Loggers

As intermittency is most likely to occur as summer progresses, water-level loggers should be placed at the bottom end of a drain segment during the months of June, July, August, and September. At the end of the sampling, the data should be submitted to DFO for review.

2.3.2 Flow Determination Methodology

To determine if a municipal drain has permanent or intermittent flow, field personnel must evaluate stream flow, the presence of vegetation, and the presence of aquatic invertebrates. When making these determinations, the following requirements must be met:

- A municipal drain should be evaluated at least 48 hours after the last rainfall.
- Ideally, the determination on flow characteristics for the municipal drain should be made during low flow periods which are July, August, and September. Note: Flow sampling may be conducted during the months of May or June but there may be less weight put on certain flow characteristic results.
- The area examined must be a minimum of 60 m in length.
- The site should be located far enough upstream or downstream (minimum of 25 m) of a road crossing to avoid the hydrological influence of the crossing where the channel morphology becomes uniform.
- The site should not be located in or immediately downstream of lakes, beaver ponds, bogs, fens, marshes, and seeps. Note: Some drains are located within marshes so this may not always be possible to avoid.

The information provided below is used when collecting the flow data and completing the flow sampling determination form.

Drain Name and Identification #

Provide the name and the identification number of the municipal drain. The identification number for the drain can be found using the Agricultural Information Atlas (available at the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) AgMaps website: http://www.omafra.gov.on.ca/english/landuse/gis/portal.htm.

Sampling Date

Provide the date for when the flow characteristic information that was collected.

Drain Segment

If there are multiple segments for the drain, number the segment (e.g. Segment 1). Road crossings can also be specified.

Date of Last Cleanout

Determine the month (if possible) and year of the last cleanout for the drain from the drain superintendent.

Date of Last Rainfall Event

Determine the date of the last rainfall event for the nearest community to the municipal drain that is being sampled. This data may be available from Environment Canada (http://climate.weather.gc.ca/historical_data/search_historic_data_e.html) or the Weather Network (https://www.theweathernetwork.com/weather/historical-weather/list/caon/a).

Total Rainfall in Previous 7 days (mm)

Determine the total amount of rainfall that has occurred in the previous 7 days (mm) t rainfall event for the nearest community to the municipal drain that is being sampled. This data may be available from Environment Canada (http://climate.weather.gc.ca/historical_data/search_historic_data_e.html) or the Weather Network (https://www.theweathernetwork.com/weather/historical-weather/list/caon/a).

Start and End of Drain Segment

Provide GPS coordinates for the start and end of the drain segment in decimal degree format.

Personnel

List all of the personnel involved in the collection of the data.

Current Weather Conditions

Provide the current weather conditions.

Site Length (m)

Indicate the length of the site sampled. The site length should be a minimum of 60 m.

Flow Sampling Starting and Ending Point

Provide GPS coordinates of the flow sampling starting and ending point in decimal degree format.

Flow Characteristics

It would be inappropriate to make any conclusions on flow by making observations at one single location in the municipal drain. The following flow characteristics should, therefore, be evaluated by observing the average conditions in the entire length of the flow sampling site (minimum 60 m). When making the evaluation for each of the flow characteristics, the strength of each of the statements should be assigned a ranking: strong, moderate, weak, and very weak.

A municipal drain that had rankings of mainly strong or moderate for each of the flow characteristics would likely be classified as intermittent while those with weak or very weak rankings would likely be classified as permanent. DFO will make this final determination.

Flowing water is not present more than 48 hours after a rainfall event during the months of July, August, or September.

This flow characteristic should be evaluated during the months of July, August, or September. The condition along the entire flow sampling site should be visually assessed, with the average condition of the flow at the site being reported. Photographs should be taken upstream and downstream and provided to DFO.

The longer the period from the last rainfall the stronger the presence of flow supports the "permanent" determination for the municipal drain. The date of the last rainfall event for the nearest community to the municipal drain that is being sampled can be determined by using data from Environment Canada (http://climate.weather.gc.ca/historical_data/search_historic_data_e.html) or the Weather Network (https://www.theweathernetwork.com/weather/historical-weather/list/caon/a).

Note: If flow sampling did occur in June, the absence of flowing water in June may be used (along with other flow characteristics) to classify a municipal drain as an intermittent system. However, the reverse is not permitted (i.e. the presence of flowing water in June could not be used to classify a municipal drain as a permanent system).

Ranking	Description
Strong	There is little to no visible water in the thalweg (deepest part of the drain) of the municipal drain.
Moderate	Water is standing in pools and the hyporheic zone is saturated, but there is not visible flow through the riffles or other shallow zones of the thalweg.
Weak	Water is present in the thalweg of the municipal drain.
Very Weak	Water is present and flowing in the thalweg of the municipal drain as well as in shallower sections of the drain.

No difference between the type of vegetation observed on top of the bank and/or bank slope and the vegetation at the bottom of the drain is observed.

The condition along the entire flow sampling site should be visually assessed and the average condition reported. The vegetation found on mid-channel sand bars and islands should not be included in these observations. Representative photographs should be taken of the site conditions and provided to DFO.

Ranking	Description
Strong	There is no observable difference between the vegetation on top of the bank and/or bank slope and the vegetation along the bottom of the drain (including within the thalweg).
Moderate	Small differences between the vegetation on top of the bank and/or bank slope and the vegetation along the bottom of the drain (including within the thalweg) are observed.
Weak	There is a distinct difference between the vegetation on top of the bank and/or bank slope and the vegetation within the thalweg of drain or no vegetation is observed growing within the thalweg of the drain.

Live fibrous roots are present in and adjacent to the thalweg of the drain.

Fibrous roots are non-woody, thin (<2.5 mm), branching roots of approximately the same length. Grasses are an example of plants that have fibrous roots. The continuous presence of water inhibits oxygen exchange in the roots of water-intolerant plants. Thus, fibrous roots should be limited in and around the thalweg (deepest part of the municipal drain).

The flow sampling site should be examined for the presence of **living** fibrous roots (decaying roots should not be considered) in or near the thalweg of the municipal drain. The condition along the entire flow sampling site should be visually assessed and the average condition reported. Fibrous roots found on mid-channel sand bars and islands should not be included in these observations.

Note: During a drought, fast growing plants with fibrous roots may grow across the bottom of drain which might not be present during normal flow conditions.

Ranking	Description
Strong	A strong network of live fibrous roots is present in and adjacent to the thalweg of the municipal drain.
Moderate	A broken network of live fibrous roots is present in and adjacent to the thalweg of the municipal drain.
Weak	Weak – Very few fibrous roots are present anywhere in and adjacent to the thalweg of municipal drain or those present are dead and decaying.
Very Weak	No fibrous roots are present.

Terrestrial plants are rooted in and adjacent to the thalweg of the drain.

Flow will often prevent terrestrial plants from becoming established in municipal drains by removing seeds or preventing aeration to roots. The presence of perennial grasses and other upland plants within the thalweg of a drain provides good evidence that the drain is dry for much of the growing season. Note: The seedlings of terrestrial plants may colonize dry areas of the drain bottom during summer drought conditions.

The flow sampling site should be examined for the presence of terrestrial plants growing in or adjacent to the thalweg of the municipal drain. The condition along the entire flow sampling site should be visually assessed and the average condition reported. Terrestrial plants growing on any part of the bank of the municipal drain should not be considered. Terrestrial plants found on mid-channel sand bars and islands should also not be included in these observations. Representative photographs should be taken and provided to DFO.

Ranking	Description
Strong	Terrestrial plants are observed in and adjacent to the thalweg of the drain and cover over 75% of this area.
Moderate	Terrestrial plants are observed in and adjacent to the thalweg of the drain and cover approximately 25-75% of this area.
Weak	Terrestrial plants are observed in and adjacent to the thalweg of the drain and cover less than 25% of this area.
Very Weak	No terrestrial plants are observed.

Aquatic plants are absent in the drain.

The flow sampling site should be examined for the presence of aquatic plants (emergent plants, floating plants, and submergent plants) growing in or adjacent to the thalweg of the municipal drain. The condition along the entire flow sampling site should be visually assessed and the average condition reported. Representative photographs should be taken and provided to DFO.

Emergent plants are rooted plants with stiff or firm stems (e.g. Horned Bladderwort, cattails, Giant Burreed, bulrushes, Northern Arrowhead, Common Arrowhead, Pickerel Weed, Needle Spikerush). They are usually found in the transition area between land and water

Floating plants are not attached to the bottom but most will have roots that are suspended in the water (e.g. watermeal, duckweed, Floating Burreed, Broad-leaved Pondweed, Water Smartweed, Water Lettuce, Little Floating Heart, Fragrant Water Lily, Common Yellow Pond Lily, European Frogbit, Water Hyancinth, Water Shield).

Submergent plants are rooted plants that have most of their vegetation below the water surface although some species may have portions above the surface of the water (e.g. Common Bladderwort, Sago Pondweed, Grassy Arrowhead, Water Bulrush, Flat-stemmed Pondweed, Vasey's Pondweed, Fern-leaf Pondweed, Clasping-leaved Pondweed, Northern Snailseed Pondweed, Slender Pondweed, Bluntleaf Pondweed, Variable Pondweed, Ribbon-leaf Pondweed, Curly-leaf Pondweed, Large-leaved Pondweed, Stonewort, Slender Water Nymph, Eurasian Water Milfoil, Common Water Milfoil, Water Lobelia, freshwater sponges, Pipewort, Common Canadian Waterweed, quillwort, muskgrass, Coontail, Beck's Marsh Marigold). Unlike emergent plants, the stems of most of these plants are flaccid or soft and require the support of the water to remain upright.

Ranking	Description
Strong	Little to no floating or submergent aquatic plants are observed in or adjacent to the thalweg of the drain. If aquatic plants are present, they are emergent plants such as cattails and bulrushes.
Moderate	A few floating or submergent aquatic plants are observed in or adjacent to the thalweg of the drain but for the most part they are uncommon within the flow sampling site. Emergent plants are found in and around the thalweg of the drain.
Weak	A variety of floating and submergent aquatic plants are observed in or adjacent to the thalweg of the drain in a few locations. Emergent plants such as cattails and bulrushes are found more adjacent to the thalweg than within it.
Very Weak	A variety of floating and submergent aquatic plants are observed in or adjacent to the thalweg of the drain and are commonly found throughout the flow sampling site. Emergent plants such as cattails and bulrushes are not found within the thalweg but are observed adjacent to it or along the banks.

Algae is absent in the drain.

Algae requires an aquatic environment to survive. The flow sampling site should be examined for the presence of benthic algae (i.e. green filaments or mats or golden brown "crusts") on leaves, plants, woody debris, and rocks in or adjacent to the thalweg of the municipal drain. Submerged leaves, plants, woody debris, and rocks should be felt for the presence of a slimy coating known as periphyton (combination of diatoms, other algae, bacteria, and fungus).

Ranking	Description
Strong	No algae is observed throughout the flow sampling site.
Moderate	Very little algae is observed throughout the flow sampling site.
Weak	Some algae is observed throughout the flow sampling site.
Very Weak	Abundant algae is observed throughout the flow sampling site.

There are no mayflies, stoneflies, or caddisflies observed. (If observed, indicate which ones are present.)

The presence of certain aquatic invertebrates (caddisfly larvae, mayfly nymphs, stonefly nymphs) can be a good indicator of a permanent watercourse. Habitat that supports these benthic invertebrates should be examined. The survey should begin at the downstream end of the municipal drain and proceed upstream. Note: The sampling for benthic invertebrates must be conducted prior to any electrofishing of the site. Areas searched could include riffles, pools, undercut banks, large woody debris, and leaf packs.

A D-Net can be used to collect benthic invertebrates under undercut banks or leaf packs while the underside of large woody debris can be visually examined for their presence. If substrate consists of sand/or gravel and contains little cobble (>100 mm), a D-net and the kick and sweep method can be used to sample for aquatic invertebrates. Areas that may contain benthic invertebrates should still be targeted (e.g. riffles, pools). If the substrate of the municipal drain contains cobble, cobble (> 100 mm) can be selected from riffles (if present in the drain) and the underside examined for invertebrates. A minimum of 10 pieces of cobbles across the entire riffle should be visually examined.

In all cases, the presence of caddisfly nymphs, mayfly nymphs, and stonefly nymphs should be noted. Empty caddisfly casings and exuviae should not be considered. Other benthic invertebrates may also be reported on.

As flow decreases in a watercourse, aquatic invertebrates will seek refuge in pools, moist substrate, and under rocks and woody debris. If there is no flowing water in the municipal drain, the drain should be searched for the presence of isolated pools of water. If these pools are present, they may be sampled as described above. If no water is found, refuge areas (e.g. underneath rocks and woody debris embedded in the substrate, in leaf packs, moist areas) for benthic invertebrates should be examined. The presence of caddisfly nymphs, mayfly nymphs, and stonefly nymphs should be recorded. Empty caddisfly casings and exuviae should not be considered. Other benthic invertebrates may also be reported on.

Ranking	Description
Strong	No benthic invertebrates are present.
Moderate	Few benthic invertebrates are present. No caddisflies, mayflies, or stoneflies are observed.
Weak	Benthic invertebrates are easily observed including either caddisflies, mayflies, and/or stoneflies.

2.4 Fish Species

To classify a municipal drain, one must determine which of the following groups are present in the drain: spring spawners, fall spawners, or sensitive species. A field investigation may not always be necessary to obtain information about the fish species present in the municipal drain. MNRF, DFO, and/or the local Conservation Authority should be contacted to determine if they have the required data. The Royal Ontario Museum and Canadian Museum of Nature should also be contacted to determine if they have any collection records for the municipal drains in question.

An OMNRF scientific collector permit is required for all fish sampling and a provincial *Endangered Species Act, 2007* (ESA) permit is required if an ESA-listed species is targeted. Additionally, a federal *Species at Risk Act* (SARA) permit is required if a SARA-listed species is present. The DFO Species at Risk (SAR) Maps should be used to identify any municipal drains contain SAR (http://www.dfo-mpo.gc.ca/species-especes/fpp-ppp/index-eng.htm) prior to any sampling.

Fish Sampling and Drain Segments

The first fish sampling site should be located in the municipal drain upstream of the road crossing farthest downstream. The second fish sampling site should be located in the municipal drain above the road crossing farthest upstream. If sensitive species are found at both sites, then sensitive species should be considered to be present through the municipal drain. If sensitive species are found at only one site, or at neither site, then fish sampling should be conducted at the road crossing halfway up the municipal drain and iteratively upstream and downstream until the extent of sensitive species occurrence across the drain segments is determined (Figure 1). Sampling should only occur between road crossings if permission is granted.

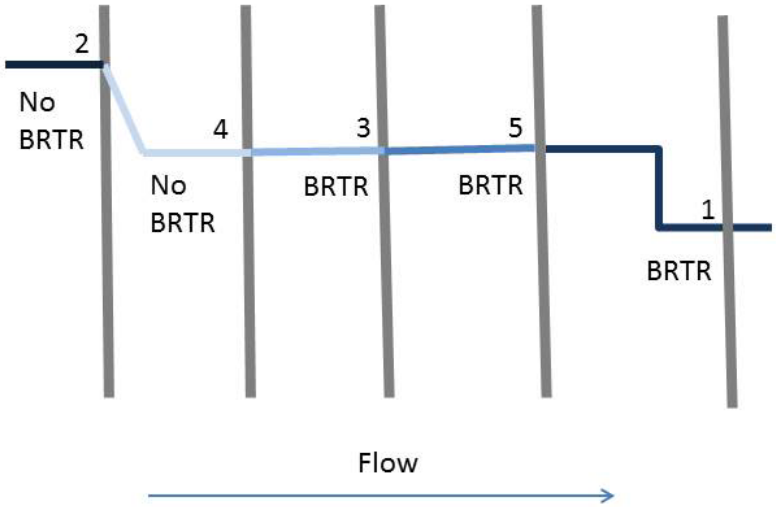

Figure 1. Example of sampling order of drain segments. BRTR = Brown Trout.

When it is not possible to use conventional site identification methods (e.g. Ontario Stream Assessment protocol; Stanfield 2010), a site can be defined as 10 times wetted width (m) or 40 m, whichever is greater. The gear to be used for the fish sampling will be dependent on the conditions found within the municipal drain. Electrofishing and seining are the most preferred sampling techniques; however, electrofishing becomes ineffective in habitats with high turbidity (fish not visible) or low conductivity (<100 µS) or high conductivity (> 600 µS) and seining may not be effective in habitats where debris, boulders, or other obstacles are present. If it is not possible to sample fish using these methods, fyke nets, or trap nets can also be used.

As many sensitive species have low detection probabilities, a minimum of three sampling events at each site is required for all gear types, as detection is unlikely to occur after a single sampling event. Fishing should continue until no new fish species have been caught in three consecutive passes or a sensitive species has been captured (See 2.9 - Fish Sampling Examples). **Note: A minimum of three sampling events should occur at each site regardless of the species captured.**

If electrofishing, each pass of the site should be sampled in an upstream direction, ensuring adequate coverage of different habitats moving from bank to bank if possible, at a rate of 2-5 sec/m^2.

If seining, each pass of the site should be sampled in a downstream direction using a seine net with a mesh size of 3 mm (1/8”). A single pass of the site may consist of multiple seine hauls.

If fyke or trap netting, a single pass of the site consists of three concurrent 24 h net sets with a mesh size of 6 mm. If a sensitive species is caught in the first 24-h net sets, then no further sampling is required. Otherwise, sampling should continue until no new species have been caught in three consecutive net sets or a sensitive species is caught, whichever comes first.

Fishes should be identified and field sheets completed after each pass. Photographic documentation or vouchers should be kept for every species collected (See 2.10 - Fish Identification and Vouchering Vouchers).

2.5 Checklist

The following information should be collected during flow determination sampling:

- Drain name, Identification #, and Drain Segment (e.g. identify the roads separating the segment)
- Date of Sampling
- Date of Last Cleanout
- Date of Last Rainfall Event and Total Rainfall in previous 7 days
- GPS coordinates (5 or 10 m accuracy is sufficient; decimal degrees – 5 or 6 decimals) for the start and end of the drain segment
- Personnel involved
- Current Weather Conditions
- Flow Sample Site Length
- GPS coordinates for the start and end of the flow sampling
- Determine presence of flow (provide photographs)
- Identify difference between vegetation on top of bank and bottom of the drain
- Determine if live fibrous roots are present
- Determine if terrestrial plants are present (provide photographs)
- Determine if aquatic plants are present (provide photographs)
- Determine if algae is present
- Determine if mayflies, stoneflies, or caddisflies are present
- Provide the GPS coordinates (decimal degrees) where a change in flow characteristics are observed

The following information should be collected during fish sampling:

- Drain name, Identification #, and Drain Segment (e.g. identify the roads separating the segment)
- Date of Sampling
- GPS coordinates (5 or 10 m accuracy is sufficient; decimal degrees – 5 or 6 decimals) for the start and end of the drain segment
- Personnel involved
- General water quality characteristics
- Sample Site length
- GPS coordinates (decimal degrees) for the start and end of the fish sampling
- Gear type used and details
- Number and type of fish species captured during each sampling event
- Photographic documentation or vouchers should be kept for every species collected

Please remember every drain segment should be sampled a minimum of three times regardless of the species captured.

2.6 Municipal Drain Classification

Once it has been determined whether the municipal drain has permanent or intermittent flow and the fish species present have been identified, DFO will review the data and then classify the drain according to the categories outlined in Table 1. Drain classification mapping will be updated once annually. The most up to date drain mapping is available through Ontario Ministry of Agriculture, Food, and Rural Affairs (OMAFRA)'s AgMaps website: http://www.omafra.gov.on.ca/english/landuse/gis/portal.htm.

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2.8 Sensitive Fish Species List

The presence of sensitive fish species is one of the factors used to determine a drain's classification. The following fish species are considered sensitive.

COMMON NAME	SCIENTIFIC NAME
American Brook Lamprey	*Lethenteron appendix*
American Eel	*Anguilla rostrata*
Blackstripe Topminnow	*Fundulus notatus*
Bridle Shiner	*Notropis bifrenatus*
Brindled Madtom	*Noturus miurus*
Brook Silverside	*Labidesthes sicculus*
Brook Trout	*Salvelinus fontinalis*
Brown Trout	*Salmo trutta*
Chestnut Lamprey	*Ichthyomyzon cataneus*
Chinook Salmon	*Oncorhynchus tshawytscha*
Chum Salmon	*Oncorhynchus keta*
Coho Salmon	*Oncorhynchus kisutch*
Cutlip Minnow	*Exoglossum maxillingua*
Golden Redhorse	*Moxostoma erythrurum*
Grass Pickerel	*Esox americanus vermiculatus*
Greater Redhorse	*Moxostoma valenciennesi*
Longear Sunfish	*Lepomis megalotis*
Longnose Dace	*Rhinichthys cataractae*
Longnose Sucker	*Catostomus catostomus*
Mottled Sculpin	*Cottus bairdii*
Muskellunge	*Esox masquinongy*
Northern Brook Lamprey	*Ichthyomyzon fossor*
Northern Pike	*Esox lucius*
Pink Salmon	*Oncorhynchus gorbuscha*
Pugnose Minnow	*Opsopoeodus emiliae*
Rainbow Trout	*Oncorhynchus mykiss*
Redside Dace	*Clinostomus elongatus*
River Redhorse	*Moxostoma carinatum*
Sauger	*Sander canadensis*
Shorthead Redhorse	*Moxostoma macrolepidotum*
Silver Chub	*Macrhybopsis storeriana*
Silver Lamprey	*Ichthyomyzon unicuspis*
Silver Redhorse	*Moxostoma anisurum*
Silver Shiner	*Notropis photogenis*
Slimy Sculpin	*Cottus cognatus*
Spotted Sucker	*Minytrema melanops*
Warmouth	*Lepomis gulosus*

2.9 Fish Sampling Examples

Example 1

Sampling Event #	Fish Species	# Captured
1	Yellow Perch	15
1	Fathead minnow	50
2	Yellow Perch	5
2	Fathead minnow	27
3	Fathead minnow	5

Fish sampling was stopped as no new species were captured after three sampling events.

Example 2

Sampling Event #	Fish Species	# Captured
1	Yellow perch	25
1	Fathead minnow	500
2	Yellow perch	15
2	Fathead minnow	75
3	Fathead minnow	25
3	Largemouth Bass	1
4	Fathead minnow	10
5	Fathead minnow	3

Fish sampling continued until no new fish species had been captured in three consecutive sampling events.

Example 3

Sampling Event #	Fish Species	# Captured
1	Trout-perch	124
2	Trout-perch	32
3	Trout-perch	5
3	Brook Trout	2

A new species is captured during the third sampling event; however, sampling stops as Brook Trout are a sensitive species.

Example 4

Sampling Event #	Fish Species	# Captured
1	Brook Trout	15
2	Brook Trout	2
3	Trout-perch	5

A new species is captured during the third sampling event; however, sampling stops as a sensitive species, Brook Trout, has already been captured during the 1st and 2nd sampling events.

2.10 Fish Identification and Vouchering

Accurate identification and recording of fish species captured is essential. At least one field crew member should be trained in fish identification (e.g. Royal Ontario Museum Fish Identification course). Preliminary identifications should be conducted and recorded in the field, and vouchers (which may include photographs) of every species caught at a site should be kept for confirmation of identifications (unless otherwise stated on permits or authorizations). Vouchers are typically whole individuals preserved for further examination in the lab but, for some species, digital vouchers may be taken.

PRESERVED VOUCHERS

The following guidance is for preserving species that cannot be vouchered digitally (modified from Portt et al. 2008). All small juvenile fishes and all lampreys should be preserved in 95 to 100% ethanol to allow for in-laboratory identification verification, and subsequent genetic analysis, if required. All other fishes can be preserved in 10% formaldehyde (10% concentration of 37% formaldehyde solution available commercially). A syringe should be used to inject preservative into the body cavity and bulky tissue areas of large fishes. To reduce the amount of pain, fishes should be sacrificed in an anesthetic solution (e.g., sodium bicarbonate, tricaine methanesulfonate, clove oil) prior to preservation. All vouchers from a single site can be placed in a single container; it is essential that an indelible label (e.g., pencil, India ink) with the site data (field number, waterbody, latitude, longitude, date, collectors) be added to the container.

DIGITAL VOUCHERS

The following guidance is for taking digital vouchers (modified from Portt et al. 2008). Photography requires more time, equipment, a certain amount of fish handling expertise and photographic ability. A camera capable of macro-photography must be available in the field and, in some cases, the fish must be anaesthetized to keep it still. Sensitivity to handling varies from species to species and some individuals may die during vouchering due to increased handling time required to obtain photographs, or after it is released. Specialized aquaria ("fish viewers") may be used in the field to facilitate photography. The key identification characters differ from species to species; and therefore, the photographic views required also differ. The photographer must know these key identification characters so that they can be photographed, and the photographs must be of sufficient quality to allow someone else to positively identify the fish.

Generally, it is easier to photograph large-bodied fish species. Table 2 provides guidance on whether a digital voucher is acceptable for a species and, if so, what features need to be photographed. Regardless of the type of photograph you are taking, it is imperative that the camera be zoomed in to ensure that the distinguishing characteristic fills the entire frame of the viewer.

Table 2. Guidance on vouchering method to be used for confirmation of species identification for all Ontario fishes (modified from Portt et al. 2008). Note that digital vouchers are typically not suitable for small juvenile fishes and that vouchers for such individuals should be preserved.

Scientific Name	Common Name	Preserved Specimen Essential	Photography Recommended
Acipenser fulvescens	Lake Sturgeon		1 - Full side view.
Alosa pseudoharengus	Alewife		1 - Full side view. 2 - Close up side view of head.
Alosa sapidissima	American Shad		1 - Full side view. 2 - Close up side view of head.
Ambloplites rupestris	Rock Bass		1 - Full side view.
Ameiurus melas	Black Bullhead		1 - Full side view. 2 - Ventral view of head clearly showing barbels from base.
Ameiurus natalis	Yellow Bullhead		1 - Full side view. 2 - Ventral view of head clearly showing barbels from base.
Ameiurus nebulosus	Brown Bullhead		1 - Full side view. 2 - Ventral view of head clearly showing barbels from base.
Amia calva	Bowfin		1 - Full side view. 2 - Gular plate.
Ammocrypta pellucida	Eastern Sand Darter		1 - Full side view showing fins and side markings.
Anguilla rostrata	American Eel		1 - Full side view.
Apeltes quadracus	Fourspine Stickleback		1 - Full side view, dorsal spines erect.
Aplodinotus grunniens	Freshwater Drum		1 - Full side view.
Campostoma anomalum	Central Stoneroller		1 - Full side view. 2 - Close up side view of head.
Carassius auratus	Goldfish		1 - Full side view, dorsal fin erect. 2 - Ventral view of head clearly showing absence of barbels.
Carpiodes cyprinus	Quillback		1 - Full side view, dorsal fin erect.
Catostomus catostomus	Longnose Sucker		1 - Full side view. 2 - Ventral view of head with finger holding mouth closed.
Catostomus commersonii	White Sucker		1 - Full side view. 2 - Ventral view of head with finger holding mouth closed.
Chrosomus eos	Northern Redbelly Dace		1 - Full side view. 2 - Close up side view of head. 3 - Ventral view of closed mouth to show mouth size.
Chrosomus neogaeus	Finescale Dace		1 - Full side view. 2 - Close up side view of head. 3 - Ventral view of closed mouth to show mouth size.
Clinostomus elongatus	Redside Dace		1 - Full side view showing fins and side colouration and markings.

Scientific Name	Common Name	Preserved Specimen Essential	Photography Recommended
			2 - Close-up side view of head.
Coregonus artedi	Cisco	Yes	
Coregonus clupeaformis	Lake Whitefish		1 - Full side view. 2 - Close up side view of head.
Coregonus hoyi	Bloater	Yes	
Coregonus johannae	Deepwater Cisco	Yes	
Coregonus kiyi	Kiyi	Yes	
Coregonus nigripinnis	Blackfin Cisco	Yes	
Coregonus reighardi	Shortnose Cisco	Yes	
Coregonus zenithicus	Shortjaw Cisco	Yes	
Cottus bairdii	Mottled Sculpin	Yes	
Cottus cognatus	Slimy Sculpin	Yes	
Cottus ricei	Spoonhead Sculpin	Yes	
Couesius plumbeus	Lake Chub		1 - Full side view, pectoral fins spread out. 2 - Close up side view of head (showing terminal barbel).
Ctenopharyngodon idella	Grass Carp	Yes	
Culaea inconstans	Brook Stickleback		1 - Full side view.
Cyprinella spiloptera	Spotfin Shiner		1 - Full side view, dorsal fin erect.
Cyprinus carpio	Common Carp		1 - Full side view. 2 - Ventral view of head clearly showing presence of barbels.
Dorosoma cepedianum	Gizzard Shad		1 - Full side view. 2 – Dorsal fin with extended last dorsal ray visible.
Erimystax x-punctata	Gravel Chub	Yes	
Erimyzon sucetta	Lake Chubsucker		1 - Side view that shows each scale for a lateral scale count as well as fins and side pigmentation. 2 - Close-up side view of head. 3 - Ventral view of closed mouth showing lips.
Esox americanus vermiculatus	Grass Pickerel		1 - Full side view. 2 - Close-up side view of head showing suborbital bar and cheek scalation. 3 - Ventral view of bottom jaw showing sub-mandibular pores.
Esox lucius	Northern Pike		1 - Full side view. 2 - Close-up side view of head showing suborbital bar and cheek scalation. 3 - Ventral view of bottom jaw showing sub-mandibular pores.
Esox masquinongy	Muskellunge		1 - Full side view. 2 - Close-up side view of head showing suborbital bar and cheek

Scientific Name	Common Name	Preserved Specimen Essential	Photography Recommended
			scalation. 3 - Ventral view of bottom jaw showing sub-mandibular pores.
Etheostoma blennioides	Greenside Darter		1 - Full side view. 2 - Spiny dorsal fin erect.
Etheostoma caeruleum	Rainbow Darter		1 - Full side view. 2 - Spiny dorsal fin erect.
Etheostoma exile	Iowa Darter		1 - Full side view. 2 - Spiny dorsal fin erect.
Etheostoma flabellare	Fantail Darter		1 - Full side view. 2 - Spiny dorsal fin erect.
Etheostoma microperca	Least Darter		1 - Full side view. 2 - Spiny dorsal fin erect.
Etheostoma nigrum	Johnny Darter	Yes, from Lake Ontario/St. Lawrence drainage	1 - Full side view. 2 - Spiny dorsal fin erect.
Etheostoma olmstedi	Tessellated Darter	Yes, from Lake Ontario/St. Lawrence drainage	1 - Full side view. 2 - Spiny dorsal fin erect.
Exoglossum maxillingua	Cutlip Minnow		1 - Full side view. 2 - Ventral view of head clearly showing trilobe lower lip.
Fundulus diaphanus	Banded Killifish		1 - Full side view.
Fundulus notatus	Blackstripe Topminnow		1 - Full side view.
Gasterosteus aculeatus	Threespine Stickleback		1 - Full side view, dorsal spines erect.
Gymnocephalus cernua	Ruffe	Yes	
Hiodon alosoides	Goldeye	Yes	
Hiodon tergisus	Mooneye	Yes	
Hybognathus hankinsoni	Brassy Minnow		1 - Full side view, dorsal fin erect. 2 - Close up side view of head.
Hybognathus regius	Eastern Silvery Minnow		1 - Full side view, dorsal fin erect. 2 - Close up side view of head.
Hypentelium nigricans	Northern Hog Sucker		1 - Full side view. 2 - Ventral view of head with finger holding mouth closed.
Ichthyomyzon cataneus	Chestnut Lamprey	Yes	
Ichthyomyzon fossor	Northern Brook Lamprey	Yes	
Ichthyomyzon unicuspis	Silver Lamprey	Yes	
Ictalurus punctatus	Channel Catfish		1 - Full side view. 2 - Caudal fin spread.
Ictiobus bubalus	Smallmouth Buffalo		1 - Full side view showing fins and lateral line scales. 2 - Close-up of dorsal fin and side view of head.

Scientific Name	Common Name	Preserved Specimen Essential	Photography Recommended
			3 - Close-up of mouth showing absence of barbels. 4 - Side and ventral view of closed mouth showing lips.
Ictiobus cyprinellus	Bigmouth Buffalo		1 - Full side view showing fins and lateral line scales. 2 - Close-up of dorsal fin and side view of head. 3 - Close-up of mouth showing absence of barbels. 4 - Side and ventral view of closed mouth showing lips.
Ictiobus niger	Black Buffalo		1 - Full side view showing fins and lateral line scales. 2 - Close-up of dorsal fin and side view of head. 3 - Close-up of mouth showing absence of barbels. 4 - Side and ventral view of closed mouth showing lips.
Labidesthes sicculus	Brook Silverside		1 - Full side view.
Lepisosteus oculatus	Spotted Gar		1 - Full side view showing fins, lateral scales, and side markings. 2 - Full dorsal view showing body profiles and markings. 3 - Full ventral view showing body profiles and markings. 4 - Close-up dorsal view of head. 5 - Dorsal view between head and origin of dorsal fin to count mid-dorsal scales. Dry photographed area with cloth to show scales.
Lepisosteus osseus	Longnose Gar		1 - Full side view showing fins, lateral scales, and side markings. 2 - Full dorsal view showing body profiles and markings. 3 - Full ventral view showing body profiles and markings. 4 - Close-up dorsal view of head. 5 - Dorsal view between head and origin of dorsal fin to count mid-dorsal scales. Dry photographed area with cloth to show scales.
Lepomis cyanellus	Green Sunfish		1 - Full side view, dorsal fins erect.
Lepomis gibbosus	Pumpkinseed		1 - Full side view, dorsal fins erect.
Lepomis gulosus	Warmouth		1 - Full side view that shows body profile as well as fins and side pigmentation. 2 - Close-up side view of head. 3 - Close-up view of dorsal fins. 4 - Close-up view of anal fin.
Lepomis humilis	Orangespotted Sunfish		1 - Full side view, dorsal fins erect.
Lepomis macrochirus	Bluegill		1 - Full side view, dorsal fins erect.
Lepomis peltastes	Northern Sunfish		1 - Full side view, dorsal fins erect.
Lethenteron appendix	American Brook Lamprey	Yes	
Lota lota	Burbot		1 - Full side view.
Luxilus chrysocephalus	Striped Shiner		1 - Full side view. 2 - Close up dorsal view of head to dorsal fin origin.

Scientific Name	Common Name	Preserved Specimen Essential	Photography Recommended
Luxilus cornutus	Common Shiner		1 - Full side view. 2 - Close up dorsal view of head to dorsal fin origin.
Lythrurus umbratilis	Redfin Shiner		1 - Full side view, dorsal fins erect.
Macrhybopsis storeriana	Silver Chub	Yes	
Margariscus nachtriebi	Northern Pearl Dace		1 - Full side view. 2 - Close up side view of head.
Micropterus dolomieu	Smallmouth Bass		1 - Full side view (mouth closed), dorsal fins erect.
Micropterus salmoides	Largemouth Bass		1 - Full side view (mouth closed), dorsal fins erect.
Minytrema melanops	Spotted Sucker		1 - Full side view that shows each scale for a lateral line scale count as well as fins and side pigmentation. 2 - Close-up side view of head. 3 - Side and ventral view of closed mouth showing lips.
Morone americana	White Perch		1 - Full side view. 2 - Close up of anal fin clearly showing anal spines.
Morone chrysops	White Bass		1 - Full side view. 2 - Close up of anal fin clearly showing anal spines.
Moxostoma anisurum	Silver Redhorse		1 - Both sides of the caudal peduncle. 2 - Dorsal and caudal fins spread out to see shape and colour. 3 - Side view that shows each scale for a lateral line scale count. 4 - Ventral view of closed mouth showing lips to see the traverse lines on the plicae.
Moxostoma carinatum	River Redhorse		1 - Both sides of the caudal peduncle. 2 - Dorsal and caudal fins spread out to see shape and colour. 3 - Side view that shows each scale for a lateral line scale count. 4 - Ventral view of closed mouth showing lips to see the traverse lines on the plicae.
Moxostoma duquesnei	Black Redhorse		1 - Both sides of the caudal peduncle. 2 - Dorsal and caudal fins spread out to see shape and colour. 3 - Side view that shows each scale for a lateral line scale count. 4 - Ventral view of closed mouth showing lips to see the traverse lines on the plicae.
Moxostoma erythrurum	Golden Redhorse		1 - Both sides of the caudal peduncle. 2 - Dorsal and caudal fins spread out to see shape and colour. 3 - Side view that shows each scale for a lateral line scale count. 4 - Ventral view of closed mouth showing lips to see the traverse lines on the plicae.
Moxostoma macrolepidotum	Shorthead Redhorse		1 - Both sides of the caudal peduncle. 2 - Dorsal and caudal fins spread out to see shape and colour. 3 - Side view that shows each scale for a lateral line scale count.

Scientific Name	Common Name	Preserved Specimen Essential	Photography Recommended
			4 - Ventral view of closed mouth showing lips to see the traverse lines on the plicae.
Moxostoma valenciennesi	Greater Redhorse		1 - Both sides of the caudal peduncle. 2 - Dorsal and caudal fins spread out to see shape and colour. 3 - Side view that shows each scale for a lateral line scale count. 4 - Ventral view of closed mouth showing lips to see the traverse lines on the plicae.
Myoxocephalus thompsonii	Deepwater Sculpin	Yes	
Neogobius melanostomus	Round Goby		1 - Full side view, dorsal fins erect.
Nocomis biguttatus	Hornyhead Chub		1 - Full side view. 2 - Close up side view of head.
Nocomis micropogon	River Chub		1 - Full side view. 2 - Close up side view of head.
Notemigonus crysoleucas	Golden Shiner		1 - Full side view, all fins extended. 2 - Close up of keel to show scales.
Notropis anogenus	Pugnose Shiner	Yes	
Notropis atherinoides	Emerald Shiner		1 - Full side view, dorsal and pelvic fins extended.
Notropis bifrenatus	Bridle Shiner	Yes	
Notropis buchanani	Ghost Shiner	Yes	
Notropis heterodon	Blackchin Shiner	Yes	
Notropis heterolepis	Blacknose Shiner	Yes	
Notropis hudsonius	Spottail Shiner		1 - Full side view.
Notropis photogenis	Silver Shiner	Yes	
Notropis rubellus	Rosyface Shiner		1 - Full side view, dorsal and pelvic fins extended.
Notropis stramineus	Sand Shiner	Yes	
Notropis volucellus	Mimic Shiner	Yes	
Noturus flavus	Stonecat		1 - Full side view, all fins extended. 2 - Full ventral view.
Noturus gyrinus	Tadpole Madtom		1 - Full side view, all fins extended. 2 - Full ventral view.
Noturus insignis	Margined Madtom	Yes	
Noturus miurus	Brindled Madtom	Yes	
Noturus stigmosus	Northern Madtom	Yes	
Oncorhynchus gorbuscha	Pink Salmon		1 - Full side view. 2 - Anal fin extended (especially on juveniles). 3 - Spots on caudal fin. 4 - Close up of head with mouth open.

Scientific Name	Common Name	Preserved Specimen Essential	Photography Recommended
Oncorhynchus kisutch	Coho Salmon		1 - Full side view. 2 - Anal fin extended (especially on juveniles). 3 - Spots on caudal fin. 4 - Close up of head with mouth open.
Oncorhynchus mykiss	Rainbow Trout		1 - Full side view. 2 - Anal fin extended (especially on juveniles). 3 - Spots on caudal fin. 4 - Close up of head with mouth open.
Oncorhynchus tshawytscha	Chinook Salmon		1 - Full side view. 2 - Anal fin extended (especially on juveniles). 3 - Spots on caudal fin. 4 - Close up of head with mouth open.
Opsopoeodus emiliae	Pugnose Minnow	Yes	
Osmerus mordax	Rainbow Smelt		1 - Full side view, adipose fin visible.
Perca flavescens	Yellow Perch		1 - Full side view.
Percina caprodes	Logperch		1 - Full side view showing fins. 2 - Close-up side view of head 3 - Close-up of mouth 4 - Downward frontal view of mouth showing protractile premaxillaries.
Percina copelandi	Channel Darter		1 - Full side view showing fins. 2 - Close-up side view of head 3 - Close-up of mouth 4 - Downward frontal view of mouth showing protractile premaxillaries.
Percina maculata	Blackside Darter		1 - Full side view.
Percina shumardi	River Darter	Yes	
Percopsis omiscomaycus	Trout-perch		1 - Full side view, adipose fin visible.
Petromyzon marinus	Sea Lamprey	Yes	
Pimephales notatus	Bluntnose Minnow		1 - Full side view, dorsal fin erect. 2 - Dorsal view anterior to dorsal fin showing crowded scales. 3 - Close up side view of head.
Pimephales promelas	Fathead Minnow		1 - Full side view, dorsal fin erect. 2 - Dorsal view anterior to dorsal fin showing crowded scales. 3 - Close up side view of head.
Polyodon spathula	Paddlefish		1 - Full side view showing profile and fins. 2 - Dorsal view showing snout and body shape.
Pomoxis annularis	White Crappie		1 - Full side view, dorsal and anal fins erect.

Scientific Name	Common Name	Preserved Specimen Essential	Photography Recommended
Pomoxis nigromaculatus	Black Crappie		1 - Full side view, dorsal and anal fins erect.
Prosopium coulteri	Pygmy Whitefish	Yes	
Prosopium cylindraceum	Round Whitefish	Yes	
Proterorhinus semilunaris	Tubenose Goby		1 - Full side view. 2 - Close-up of tubular nostrils.
Pungitius pungitius	Ninespine Stickleback		1 - Full side view, dorsal fins erect.
Pylodictis olivaris	Flathead Catfish		1 - Full side view. 2 - Dorsal view of head.
Rhinichthys atratulus	Blacknose Dace		1 - Full side view. 2 - Close-up side view of head. 3 - Ventral view of mouth. 4 - Downward frontal view of mouth showing frenum.
Rhinichthys cataractae	Longnose Dace		1 - Full side view. 2 - Close-up side view of head. 3 - Ventral view of mouth. 4 - Downward frontal view of mouth showing frenum.
Salmo salar	Atlantic Salmon		1 - Full side view.
Salmo trutta	Brown Trout		1 - Full side view.
Salvelinus fontinalis	Brook Trout		1 - Full side view.
Salvelinus fontinalis timagamiensis	Aurora Trout		1 - Full side view.
Salvelinus namaycush	Lake Trout		1 - Full side view.
Sander canadensis	Sauger		1 - Full side view. 2 - Dorsal fin extended. 3 - Lower lobe of caudal fin visible.
Sander vitreus	Walleye		1 - Full side view. 2 - Dorsal fin extended. 3 - Lower lobe of caudal fin visible.
Scardinius erythrophthalmus	Rudd		1 - Full side view, all fins extended. 2 - Close up of keel to show scales.
Semotilus atromaculatus	Creek Chub		1 - Full side view, dorsal fin erect.
Semotilus corporalis	Fallfish		1 - Full side view, dorsal fin erect.
Umbra limi	Central Mudminnow		1 - Full side view.

2.11 Data Sheets

Flow Determination Sampling Data Sheet				
Site Location Details				
Drain Name and Identification #			Sampling Date	
Drain Segment			Date of Last Cleanout	
Date of Last Rainfall Event		Total Rainfall in previous 7 days (mm)		
	Start of Drain Segment		**End of Drain Segment**	
Latitude (dd.ddddd°)		Latitude (dd.ddddd°)		
Longitude (dd.ddddd°)		Longitude (dd.ddddd°)		
Personnel:				
Current Weather Conditions			Site Length (m)	
	Flow Sampling Starting Point		**Flow Sampling Ending Point**	
Latitude (dd.ddddd°)		Latitude (dd.ddddd°)		
Longitude (dd.ddddd°)		Longitude (dd.ddddd°)		
Flow Characteristics				
Flowing water is not present more than 48 hours after a rainfall event during the months of July, August, or September.				
No difference between the type of vegetation observed on top of the bank and/or bank slope and the vegetation at the bottom of the drain is observed.				
Live fibrous roots are present in and around the thalweg of the drain.				
Terrestrial plants are rooted in and adjacent to the thalweg of the drain.				
Aquatic plants are absent in the drain.				
Algae is absent in the drain.				
There are no mayflies, stoneflies, or caddisflies observed. If observed, indicate which ones are present.				
Do you believe that the flow characteristics for this section of the municipal drain are consistent along the entire length of the drain segment? If not, provide the GPS coordinates where a change is expected.				

Fish Sampling Data Sheet					
Drain Name and Identification #			Date		
Drain Segment					
Start of Drain Segment			**End of Drain Segment**		
Latitude (dd.ddddd^{o})			Latitude (dd.ddddd^{o})		
Longitude (dd.ddddd^{o})			Longitude (dd.ddddd^{o})		
Personnel:					
Site Characterisitcs					
Air Temp. (^{o}C)		Water Temp. (^{o}C)		Conductivity (µS/cm)	
D.O. (ppm)		pH		Secchi Disc (m)	
Site Length (m)					
Fish Sampling Starting Point			**Fish Sampling Ending Point**		
Latitude (dd.ddddd^{o})			Latitude (dd.ddddd^{o})		
Longitude (dd.ddddd^{o})			Longitude (dd.ddddd^{o})		
Sampling Start Time (24h)			Sampling End Time (24 h)		
Gear Type Used					
Electrofishing					
Volts			Effort (hours/min/sec)		
Amps			Number of sampling events		
Seining					
Net Length (m)			Number of Hauls		
Mesh size (mm)			Number of sampling events		
Fyke/Trap Net					
Net Length (m)			Set time (hours)		
Mesh size (mm)			Number of sampling events		
Additional Information:					

Fish Data			
Sampling Event #	**Fish Species**	**# Captured**	**Voucher taken**

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APPENDIX 11

THE SCIENCE OF DRAINS

THE SCIENCE OF DRAINS

DFO policy and decision-making is based on the research and advice of DFO Science. Municipal drains make up a significant portion of the fish habitat in Ontario and the need for scientific research on fish and fish habitat in drains is recognized. The results of recent research are presented in the following documents.

Reference Documents

DFO. 2017. Impacts of agricultural drain maintenance in Beaver Creek on Grass Pickerel (*Esox americanus vermiculatus*), a fish species at risk. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2017/nnn.

Glass, W.R., Rook, N.A., Ratajczyk, E., and Mandrak, N.E. 2017. Effect of drain maintenance and reconstruction on the abundance and habitat of Grass Pickerel (*Esox americanus vermiculatus*) in Beaver Creek, Ontario. DFO Can. Sci. Advis. Sec. Res. Doc. 2017/nnn vi + 32 p.

Fisheries and Oceans Canada. 2014. Reference Guide for Fish and Mussel Species at Risk Distribution Maps: A Referral Review Tool for Projects Affecting Aquatic Species at Risk.

Mandrak, N.E., and Bouvier, L.D. 2014. Standardized data collection methods in support of a classification protocol for the designation of watercourses as municipal drains. DFO Can. Sci. Advis. Sec. Res. Doc. 2013/077. V + 26 p

Montgomery, F.A., Mandrak, N.E. and Reid, S.M. 2016. A Modelling-based Assessment of the Impacts of Drain Maintenance on Fish Species-at-Risk Habitat in Little Bear Creek, Ontario . DFO Can. Sci. Advis. Sec. Res. Doc. 2016/092 V + 20 p.

Reid, S.M., LeBaron, A. and Barnucz, J. 2016. Seasonal variation in the composition of fishes caught during trawl-based surveys of Little Bear Creek, Ontario. DFO Can. Sci. Advis. Sec. Res. Doc. 2016/070. iv + 15 p.

Stammler, Katie L., 2005. Agricultural Drains As Fish Habitat In Southwestern Ontario. M.Sc. Thesis, University of Guelph.

Stammler, K.L., McLaughlin, R.L., and Mandrak, N.E. 2008. Streams modified for drainage provide fish habitat in agricultural areas. Canadian Journal of Fisheries and Aquatic Sciences 65: 509-522.

Stammler, Katie L., "Extent, Characteristics and Downstream Effects of Stream Enclosure in Southwestern Ontario" (2011). Electronic Thesis and Dissertation Repository. Paper 16

Ward-Campbell, Belinda M. S. 2015. Resilience And The Management Of Fish Habitat In Agricultural Landscapes: Maintenance Of Agricultural Drains Alters Habitat But Not Fish Assemblages. Ph.D. Thesis. University Of Guelph.

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APPENDIX 12

QUICK REFERENCE RESOURCES

QUICK REFERENCE RESOURCES

DFO Self-Assessment & Measures to Avoid & Mitigate Harm

The Fisheries and Oceans Canada website for Projects Near Water can be found at the link:

http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html

Information found on this site includes the DFO self-assessment tool to determine if your project requires review as well as measures to avoid or mitigate harm to fish and fish habitat. In addition to the self-assessment tool, please refer to Appendix 3 for a list of municipal drain maintenance and repair projects that do not need to be submitted to DFO for review.

Drain Mapping

Drain Classification Maps are available on the Ontario Ministry of Agriculture, Food, and Rural Affairs (OMAFRA) AgMaps Geographic Information Portal. Follow this link:
http://www.omafra.gov.on.ca/english/landuse/gis/portal.htm

This site will be updated annually with the most current data and drain classifications. Old mapping should not be used as drain classes could be changed or updated as more information is collected and added to the database.

Species at Risk Mapping

Species At Risk Maps are available at the following website:
http://www.dfo-mpo.gc.ca/species-especes/fpp-ppp/index-eng.htm

Agency Contact Lists

Fisheries and Oceans Canada

Fisheries Protection Program
Fisheries and Oceans Canada
867 Lakeshore Road
Burlington, Ontario L7S 1A1

Telephone: 1-855-852-8320
Email: FisheriesProtection@dfo-mpo.gc.ca

Cynthia J Mitton-Wilkie

Partnerships and Standards
Fisheries and Oceans Canada
867 Lakeshore Road
Burlington, Ontario L7S 1A1

Telephone: 905-336-4821
Email: cynthia.mitton-wilkie@dfo-mpo.gc.ca

Website: www.dfo-mpo.gc.ca/pnw-ppe/fpp-ppp/index-eng.html

Ministry of Agriculture, Food and Rural Affairs
http://www.omafra.gov.on.ca/english/offices/ouroffices.html

Conservation Authorities

Conservation Authority	Address	Phone	Email	Website
Ausable Bayfield	71108 Morrison Line, RR 3 Exeter, ON N0M 1S5	519-235-2610 1-888-286-2610 519-235-1963 (fax)	info@abca.on.ca	www.abca.on.ca
Cataraqui Region	Box 160, 1641 Perth Road Glenburnie, ON K0H 1S0	613-546-4228 1-877-956-2722 613-547-6474 (fax)	crca@crca.ca	www.cataraquiregion.on.ca
Catfish Creek	RR 5, 8079 SpringwaterRd, Aylmer, ON N5H 2R4	519-773-9037 519-765-1489 (fax)	admin@catfishcreek.ca	www.catfishcreek.ca
Central Lake Ontario Conservation	100 Whiting Ave Oshawa, ON L1H 3T3	905-579-0411 905-579-0994 (fax)	mail@cloca.com	www.cloca.com
Conservation Halton	2596 Britannia Rd West, RR 2 Burlington, ON L7P 0G3	905-336-1158 905-336-7014 (fax)	admin@hrca.on.ca	www.conservationhalton.on.ca
Credit Valley Conservation	1255 Old Derry Road Mississauga, ON L5N 6R4	905-670-1615 1-800-668-5557 905-670-2210 (fax)	cvc@creditvalleyca.ca	www.creditvalleyca.ca
Crowe Valley Conservation	70 Hughes Lane, Box 416 Marmora, ON K0K 2M0	613-472-3137 613-472-5516 (fax)	info@crowevalley.com	www.crowevalley.com
Essex Region	360 Fairview Avenue West, Suite 311 Essex, ON N8M 1Y6	519-776-5209 519-776-8688 (fax)	admin@erca.org	www.crowevalley.com
Ganaraska Region	2216 County Road 28 Port Hope, ON L1A 3V8	905-885-8173 905-885-9824 (fax)	info@grca.on.ca	www.grca.on.ca
Grand River	400 Clyde Road, Box 729 Cambridge, ON N1R 5W6	519-621-761 1-866-900-4722 519-621-4844 (fax)	grca@grandriver.ca	www.grandriver.ca
Grey Sauble	RR 4 237897 Inglis Falls Rd. Owen Sound, ON N4K 5N6	519-376-3076 519-371-0437 (fax)	admin@greysauble.on.ca	www.greysauble.on.ca
Hamilton	838 Mineral Springs Rd, Box 81067 Ancaster,ON L9G 4X1	905-525-2181 905-648-4622 (fax)	nature@conservationhamilton.ca	www.conservationhamilton.ca

Kawartha Conservation	277 Kenrei Park Road, RR 1 Lindsay, ON K9V 4R1	705-328-2271 705-328-2286 (fax)	geninfo@kawarthaconservation.com	www.kawarthaconservation.com
Kettle Creek	44015 Ferguson Line, R. R. 8 St. Thomas, ON N5P 3T3	519-631-1270 519-631-5026 (fax)	elizabeth@kettlecreekconservation.on.ca	www.kettlecreekconservation.on.ca
Lake Simcoe Region	Box 282, 120 Bayview Parkway Newmarket, ON L3Y 4X1	905-895-1281 905-853-5881 (fax)	info@lsrca.on.ca	www.lsrca.on.ca
Lakehead Region	Box 10427, 130 Conservation Rd Thunder Bay, ON P7B 6T8	807-344-5857 807-345-9156 (fax)	info@lakeheadca.com	www.lakeheadca.com
Long Point Region	4 Elm Street Tillsonburg, ON N4G 0C4	519-842-4242 1-888-231-5408 519-8427123 (fax)	conservation@lprca.on.ca	www.lprca.on.ca
Lower Thames Valley	100 Thames Street Chatham, ON N7L 2Y8	519-354-7310 519-352-3435 (fax)	admin@ltvca.ca	www.lowerthames-conservation.on.ca
Lower Trent Conservation	714 Murray Street, R.R.#1 Trenton, ON K8V 5P4	613-394-4829 613-394-5226 (fax)	information@ltc.on.ca	www.ltc.on.ca
Maitland Valley	Box 127, 1093 Marietta Street Wroxeter, ON N0G 2X0	519-335-3557 519-335-3516 (fax)	maitland@mvca.on.ca	www.mvca.on.ca
Mattagami Region	100 Lakeshore Road Timmins, ON P4N 8R5	705-360-2660 705-360-2692 (fax)	mrca@timmins.ca	mrca.timmins.ca
Mississippi Valley Conservation	10970 Highway 7 Carleton Place, ON K7C 3P1	613-253-0006 613-253-0122 (fax)	info@mvc.on.ca	www.mvc.on.ca
Niagara Peninsula	250 Thorold Road West, 3rd Floor Welland, ON L3C 3W2	905-788-3135 905-788-1121 (fax)	info@npca.ca	www.npca.ca
Nickel District (Conservation Sudbury)	199 Larch Street, Suite 401, 4th Floor Sudbury, ON P3E 5P9	705-674-5249 705-674-7939 (fax)	ndca@city.greatersudbury.on.ca	www.nickeldistrict.ca
North Bay-Mattawa	15 Janey Avenue North Bay, ON P1C 1N1	705-474-5420 705-474-9793 (fax)	nbmca@nbmca.on.ca	www.nbmca.on.ca

Nottawasaga Valley	8195 Line 8 ESSA Twp. Utopia, ON L0M 1T0	705-424-1479 705-424-2115 (fax)	admin@nvca.on.ca	www.nvca.on.ca
Otonabee Conservation	250 Milroy Drive, Peterborough, ON K9H 7M9	705-745-5791 705-745-7488 (fax)	otonabeeca@otonabee.com	www.otonabee.com
Quinte Conservation	R.R. #2 2061 Old, Hwy.2 Belleville, ON K8N 4Z2	613-968-3434 613-968-8240 (fax)	quinteca@quinteconservation.ca	quinteconservation.ca
Raisin Region	P.O. Box 429, 18045 County Road 2 Cornwall, ON K6H 5T2	613-938-3611 613-938-3221 (fax)	info@rrca.on.ca	www.rrca.on.ca
Rideau Valley	PO Box 599, 3889 Rideau Valley Drive Manotick, ON K4M 1A5	613-692-3571 613-692-0831 (fax)	postmaster@rideauvalley.on.ca	www.rideauvalley.on.ca
Saugeen Conservation	1078 Bruce Rd. 12, Box 150 Formosa, ON N0G 1W0	519-367-3040 519-367-3041 (fax)	publicinfo@svca.on.ca	www.svca.on.ca
Sault Ste Marie Region	1100 Fifth Line East Sault Ste Marie, ON P6A 6J8	705-946-8530 705-946-8533 (fax)	nature@ssmrca.ca	www.ssmrca.ca
South Nation Conservation	38 Victoria Street, P.O. Box 29 Finch, ON K0C 1K0	613-984-2948 613-984-2872 (fax)	info@nation.on.ca	www.nation.on.ca
St. Clair Region	205 Mill Pond Crescent Strathroy, ON N7G 3P9	519-245-3710 519-245-3348 (fax)	stclair@scrca.on.ca	www.scrca.on.ca
Toronto and Region	101 Exchange AvenueVaughan, ON L4K 5R6	416-661-6600 416-661-6898 (fax)	info@trca.on.ca	www.trca.on.ca
Upper Thames River	1424 Clarke Road London, ON N5V 5B9	519-451-2800 519-451-1188 (fax)	infoline@thamesriver.on.ca	www.thamesriver.on.ca
Conservation Ontario	Box 11, 120 Bayview Parkway Newmarket, ON L3Y 4W3	905-895-0716 905-895-0751 (fax)	info@conservationontario.ca	www.conservationontario.ca

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APPENDIX 13

ACRONYMS AND GLOSSARY

ACRONYMS

BMPs	Best Management Practices
CA	Conservation Authority
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
DART	*Drainage Act* & (Section 28) Regulations Team
DFO	Fisheries and Oceans Canada
ESA	Ontario *Endangered Species Act* (2007)
LRIA	*Lakes and Rivers Improvement Act* (LRIA)
MNRF	Ontario Ministry of Natural Resources and Forestry
OMAFRA	Ontario Ministry of Agriculture, Food and Rural Affairs
OPSD	Ontario Provincial Standard Drawings
PLA	*Public Lands Act*
SAR	Species at Risk
SARA	*Species at Risk Act*
SARO	Species at Risk in Ontario
SRC	Standard Compliance Requirements
UTM	Universal Transverse Mercator

GLOSSARY

TERM	DEFINITION
Aboriginal (fishery)	Means that fish is harvested by an Aboriginal organization or any of its members for the purpose of using the fish as food, for social or ceremonial purposes or for purposes set out in a land claims agreement entered into with the Aboriginal organization (*Fisheries Act* subsection 2(1)).
Aquatic Vegetation	Means a plant that grows partly or wholly in water whether rooted in the streambed, floating without anchorage or rooted along a waterbody bank.
Avoidance	Means measures to completely prevent adverse impacts to fish and fish habitat.
Brushing	Brushing involves using large mowers to cut the vegetation along the bank. The trimming 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 that the mulch from the brushing that ends up in the waterway is removed so that the drain does not get clogged downstream.

Commercial (Fishery)	Means that the fish is harvested under the authority of a licence for the purpose of sale, trade, or barter (*Fisheries Act* subsection 2(1).
Critical Habitat (under SARA)	Means as defined by the *Species at Risk Act* means the habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species' critical habitat in the recovery strategy or in an action plan for the species.
Culvert	Means a conduit, usually covered by fill, whose primary function is to convey surface water through an embankment.
Debris	Means branches, stumps, logs, boulders, ice build-up, garbage or any other organic or inorganic materials that prevent the passage of water and/or fish.
Deleterious Substance	Means: a) any substance that, if added to any water, would degrade or alter or form part of a process of degradation or alteration of the quality of that water so that it is rendered or is likely to be rendered deleterious to fish or fish habitat or to the use by man of fish that frequent that water, or (b) any water that contains a substance in such quantity or concentration, or that has been so treated, processed or changed, by heat or other means, from a natural state that it would, if added to any other water, degrade or alter or form part of a process of degradation or alteration of the quality of that water so that it is rendered or is likely to be rendered deleterious to fish or fish habitat or to the use by man of fish that frequent that water.
Destruction of Fish Habitat	Means an elimination of habitat of a spatial scale, duration, and intensity that fish can no longer rely upon such habitats for use as spawning grounds, or as nursery, rearing or food supply areas, or as a migration corridor, or any other area in order to carry out one or more of their life processes.
Erosion	Means the process by which the natural (earth) or unnatural (embankment, slope protection, structure, etc.) land surface is naturally worn away by the actions of water, wind, ice or other geologic agents.
Exceptional Habitat	Means: • Rare or limiting habitat, fish populations are highly dependent on the habitat to support critical life functions • Critical habitat (features and functions) for aquatic Species at Risk (SAR) as described in the recovery strategy or action plan for the species • Areas contributing to fisheries productivity that are exceptionally productive, likely to be limiting and are rare or relatively uncommon. Examples: • Brook trout spawning habitat • Cold water streams with groundwater upwellings

Fish	Includes: • parts of fish; • shellfish, crustaceans, marine animals and any parts of shellfish, crustaceans or marine animals; and • the eggs, sperm, spawn, larvae, spat, and juvenile stages of fish, shellfish, crustaceans and marine animals.
Fish Habitat	Means spawning grounds and any other areas, including nursery, rearing, food supply, and migration areas, on which fish depend directly or indirectly in order to carry out their life processes.
Fishery	Includes the area, locality, place or station in or on which a pound, seine, net, weir or other fishing appliance is used, set, placed or located, and the area, tract or stretch of water in or from which fish may be taken by the said pound, seine, net, weir or other fishing appliance, and also the pound, seine, net, weir, or other fishing appliance used in connection therewith (*Fisheries Act* subsection 2(1)).
Important habitat	Means: • Uncommonly found habitat, may (but may not) be one of the limiting factors to the fish population. • Habitat in its natural condition or only slightly degraded relative to the function that it supports. Examples: • Streams with high level of complexity (e.g. riffles, pools, higher gradient, substrate diversity, riparian buffer, permanent flow, etc.) • Spawning and nursery habitat • Cold water streams in Southern Ontario
Mitigation	Means a measure to reduce the spatial scale, duration, or intensity of *serious harm to fish* that cannot be completely avoided.
Offsetting	Means measures that are undertaken to counterbalance unavoidable serious harm to fish resulting from a project, with the goal of maintaining or improving the productivity of the commercial, recreational or Aboriginal fishery.
Permanent Alteration to Fish Habitat	Means an alteration of fish habitat of a spatial scale, duration, and intensity that limits or diminishes the ability of fish to use such habitats as spawning grounds, or as nursery, rearing, or food supply areas, or as a migration corridor, or any other area in order to carry out one or more of their life processes.
Recreational (Fishery)	Means that fish is harvested under the authority of a licence for personal use of the fish or for sport (*Fisheries Act* subsection 2(1)).
Serious Harm to Fish	Means: • the death of fish; • a permanent alteration to fish habitat of a spatial scale, duration or intensity that limits or diminishes the ability of fish to use such habitats as spawning grounds, or as nursery, rearing, or food supply areas, or as a migration corridor, or any

	other area in order to carry out one or more of their life processes; • the destruction of fish habitat of a spatial scale, duration, or intensity that fish can no longer rely upon such habitats for use as spawning grounds, or as nursery, rearing, or food supply areas, or as a migration corridor, or any other area in order to carry out one or more of their life processes.