

**ADDITIONAL INFORMATION FOR IMPROVED STREAM CROSSING***a) Mid-Level Low Flow Ditch and Stream Crossings with Culverts*

- Projects must obtain approval from all appropriate agencies prior to construction  
These structures are used where a crossing can be constructed above the bottom grade level on a ditch or a stream
- A mid-level crossing allows low channel flows to pass through steel corrugated culverts which have been designed to carry a minimum of the mean annual flow for the stream or ditch.
- Flows exceeding the capacity of the culvert(s) pass over the top surface of the crossing.
- Fences and gates must be used to keep cattle out of watercourse
- These crossings must include adequate slope and slope length for exit and entrance ramps, properly protected from erosion
- Care should be taken to choose and properly install the correct armour material for the crossing as well as the correct geotextile.

*b) Bed-Level Ditch and Stream Crossings*

- Projects must obtain approval from all appropriate agencies prior to construction  
These structures are used where a machinery crossing can be constructed at or below the bottom grade level on a ditch or a stream
- A bed-level crossing allows flows to pass over the surface of the structure without causing obstructions to channel flow
- These crossings must include adequate slope and slope length for exit and entrance ramps, properly protected from erosion
- Livestock must be excluded from this type of crossing unless approval has been obtained from appropriate authorities.
- Care should be taken to choose and properly install the correct armour material for the crossing as well as the correct geotextile

*c) Clear Span Bridges*

- If the project involves a Clear Span Bridge Crossing Stamped Engineered Drawings must be included.

## MITIGATION GUIDELINES

Program participants are responsible for applying appropriate mitigation.

| <b>EROSION CONTROL WORK:</b> |  |
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| <b>Project Component</b>     | <b>Description of Effect Mitigation</b>  |
| Air Quality                  | <p><i>Decreased ambient air quality due to dust and other particulate matter.</i></p> <ul style="list-style-type: none"> <li>• Avoid site preparation or construction during windy and prolonged dry periods.</li> <li>• Cover and contain fine particulate materials during transportation to and from the site</li> <li>• Instruct workers and equipment operators on dust control methods.</li> <li>• Minimize cutting of vegetation and maintain windbreaks.</li> <li>• Restore disturbed areas as soon as possible to minimize duration of soil exposure</li> <li>• Spray water to minimize dust off paved areas or exposed soils. Use dust suppressants only over material.</li> <li>• Stabilize high traffic areas with a clean gravel surface layer or other suitable covering</li> <li>• Stabilize stored and stockpiled construction materials, debris and excavated material</li> <li>• Minimize operation and idling of vehicles and gas-powered equipment</li> <li>• Use well-maintained equipment and machinery within operating specifications.</li> </ul>  |
| Fauna                        | <p><i>Disruption to wildlife migration and movement patterns, breeding, nesting or hibernation.</i></p> <ul style="list-style-type: none"> <li>• Avoid activities during sensitive periods of wildlife migration, staging, nesting, breeding, hibernation or nursing.</li> <li>• Avoid creating major obstructions at important wildlife crossing and movement points.</li> <li>• Establish vegetated buffer strips between construction zones and areas containing sensitive vegetation and wildlife.</li> </ul> <p><i>Possible disease, mortality or decline in populations of wildlife due to exposure to disease bearing organisms (e.g. mosquitoes carrying West Nile Virus).</i></p> <ul style="list-style-type: none"> <li>• Avoid creating still water or stagnant wet areas that may attract and/or propagate disease-bearing organisms that may negatively affect wildlife. (Note: If the project involves natural wetlands, once established, the wetland ecosystem will likely mitigate potential effects of disease bearing organisms.)</li> </ul> <p><i>Wildlife injury or mortality from entanglement in silt fences.</i></p> <ul style="list-style-type: none"> <li>• Avoid using heavy-duty silt fences, particularly those reinforced with wide mesh, in areas where large-bodied amphibians and reptiles (e.g. large snakes) are found.</li> <li>• Survey the area for active nests, dens, burrows, etc. and avoid</li> </ul> |

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|   | disturbing them.   |
| <i>Flora</i>                            | <p><i>Introduction of non-native species, including opportunistic species.</i></p> <ul style="list-style-type: none"> <li>• Clean heavy machinery and equipment prior to transporting to new location.</li> </ul>  |
| <i>Surface Water Quality</i>            | <ul style="list-style-type: none"> <li>• Operate heavy machinery from above the top of the stream bank or on the shore above the normal water level.</li> <li>• Ensure that refueling and handling of contaminants is conducted off-site, where possible, and away from any water body or from ditches and drains connecting to a water body.</li> <li>• Minimize use and discharge of chemicals and cleaning agents.</li> <li>• Refuel equipment off slopes and well away from water bodies.</li> <li>• Securely contain and store all oils, lubricants, fuels and chemicals. If necessary, use impermeable pads or provide berms.</li> </ul>   |
| <i>Groundwater Quality and Quantity</i> | <ul style="list-style-type: none"> <li>• Where possible, conduct activities in the dry, above the actual water level and above any expected rises in water level that may occur during a rainfall or snowmelt event.</li> </ul>  |
| <i>Humans</i>                           | <p><i>Personal injuries to public and workers during construction activities due to exposure to disease bearing organisms (e.g. mosquitoes carrying West Nile Virus).</i></p> <ul style="list-style-type: none"> <li>• Remove standing water from equipment and containers.</li> <li>• Wear protective clothing and insect repellent if working in areas where mosquitoes are breeding.</li> </ul>   |
| <i>Soil Quality</i>                     | <p><i>Disturbance to microscopic organisms in the soil.</i></p> <ul style="list-style-type: none"> <li>• Limit size of stockpiles to avoid anaerobic conditions.</li> <li>• Protect stockpiled soils from exposure to and sterilization by solar radiation (or stockpile in an uncovered shaded area).</li> </ul> <p><i>Reduced soil capability through compaction and rutting, and mixing of topsoil and layers below.</i></p> <ul style="list-style-type: none"> <li>• Avoid working during wet conditions and/or confine operation to paved or gravel surfaces.</li> <li>• Whenever possible, strip and store topsoil separately from the layers below and return to excavation in sequence.</li> </ul>                                     |
| <i>Surface Water Hydrology</i>          | <p><i>Adverse modifications to surface drainage patterns, affecting storm water runoff rates and volumes.</i></p> <ul style="list-style-type: none"> <li>• Ensure that earthworks do not exacerbate flood hazards nor create undesired obstructions to drainage into natural water bodies.</li> <li>• Maintain effective surface drainage upon completion of the project, which may include re-establishment of, or improvement to, the original site drainage.</li> <li>• Minimize changes to the ground surface and vegetation cover that would affect infiltration and runoff characteristics.</li> <li>• Whenever possible, limit construction time in flood prone areas and any low-lying shoreline areas to 72 hours or less.</li> </ul> |
| <i>Surface Water Quality</i>            | <p><i>Reduced water quality and clarity due to increased erosion and sedimentation, and transport of debris.</i></p>   |

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|                               | <ul style="list-style-type: none"> <li>• Apply wet weather restrictions to construction activity.</li> <li>• Backfill and compact excavations as soon as possible.</li> </ul> <p><i>Optimize degree of compaction to minimize erosion and allow for revegetation.</i></p> <ul style="list-style-type: none"> <li>• Comply with any local regulations, policies and guidelines that stipulate a minimum acceptable buffer width (the allowable distance from a water body). Maximum buffer widths are desirable.</li> <li>• Create interceptor swales to divert runoff from the top of slopes that are susceptible to erosion.</li> <li>• Ensure that all materials placed below the high water mark of the water body are clean and free of silt and clay sized particles. All materials must meet the applicable regulations governing the placement of fill in water bodies.</li> <li>• If possible, direct surface drainage away from working areas and areas of exposed soils. To the maximum extent possible, promote overland sheet flow to well vegetated areas.</li> <li>• Install and maintain silt curtains, sedimentation ponds, check dams, coffer dams or drainage swales, and silt fences around soil storage sites and elsewhere, as required.</li> <li>• Securely contain and store all oils, lubricants, fuels and chemicals. If necessary, use impermeable pads or provide berms.</li> <li>• Stabilize slopes as appropriate for local site conditions. Possible methods include hard and soft designs or combinations of designs using crib walls, revetments, gabions, erosion control blankets, live fascines, or brush bundles.</li> </ul>                      |
| <p>Terrain and Topography</p> | <p><i>Ground subsidence from soil thaw and poor excavation and backfilling practices; ground surface mounding or structure movement due to frost heave from inappropriate backfill material or shallow foundation depth.</i></p> <ul style="list-style-type: none"> <li>• Ensure that backfilling is undertaken using suitable materials free of ice and frozen soils, and that adequate soil compaction is conducted to avoid ground subsidence. Provide additional backfill where subsidence has occurred.</li> <li>• In areas with high groundwater levels, ensure that soils susceptible to frost heave (generally fine sands and silty soils) are not used for backfill. Increased soil exposure resulting in erosion, sedimentation, slope instability and risk of mudslides, slumping, rock falls, etc.</li> <li>• Create interceptor swales to divert runoff from the top of slopes that are susceptible to erosion.</li> <li>• Direct runoff and overland flow away from working areas and areas of exposed soils. Promote overland sheet flow to the maximum extent possible.</li> <li>• On steep slopes that do not require grading, hand clear, without grubbing.</li> <li>• If necessary, install sediment and erosion controls prior to commencing the work and maintain them until the site has been stabilized.</li> <li>• If slope stabilization is not a project objective, avoid high-risk areas with unstable slopes (e.g. steep slopes, soil liquefaction risk areas).</li> <li>• Keep site clearing to a minimum to maintain sufficient vegetated cover and windbreaks.</li> <li>• Phase work to minimize duration of exposure of disturbed areas at</li> </ul> |

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|  | <p>risk.</p> <ul style="list-style-type: none"> <li>• Stabilize slopes as appropriate for local site conditions. Possible methods include hard and soft designs or combinations of designs using crib walls, revetments, gabions, erosion control blankets, live fascines, or brush bundles.</li> </ul>   |
| Species at Risk - Terrestrial              | <p><i>Disturbance to terrestrial species at risk and/or their critical habitat.</i></p> <ul style="list-style-type: none"> <li>• If any species at risk are known or expected to be present at any time within or adjacent to the project area, consult with Environment Canada specialists or the relevant provincial authority regarding measures to avoid harmful disturbance to these species.</li> </ul> |
| Wildlife Habitat (terrestrial and aquatic) | <p><i>Physical damage and loss of habitat (terrestrial, riparian and/or wetland).</i></p> <ul style="list-style-type: none"> <li>• Avoid or minimize trampling vegetation with equipment.</li> <li>• Minimize physical damage to vegetation by avoiding push-outs and avoiding the placement of slash onto living vegetation.</li> </ul>  |

## MITIGATION GUIDELINES

Please note the mitigation stated below applies to most, **but not necessarily all** projects. Program participants are responsible for applying appropriate mitigation.

| <b>TREE PLANTING AND/OR WORKING IN/NEAR WATER:</b> |  |
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| <b>Project Component</b>                           | <b>Description of Effect Mitigation</b>  |
| Species at Risk – Aquatic                          | <p><i>Disturbance to aquatic species at risk and/or their critical habitat.</i></p> <ul style="list-style-type: none"> <li>• If any species at risk are known or expected to be present at any time within or adjacent to the project area, consult with Fisheries and Oceans Canada specialists or the relevant provincial authority regarding measures to avoid harmful disturbance to these species.</li> </ul>   |
| Aquatic Sediments                                  | <p><i>Physical alteration of water body substrates and/or increased potential for release of sediments downstream, including contaminated sediments.</i></p> <ul style="list-style-type: none"> <li>• Install and maintain sediment and erosion controls (e.g. silt curtains, check dams, coffer dams, silt fences), as required prior to construction.</li> <li>• Keep stream spoils separate from the bank spoils.</li> <li>• Remove accumulated sediments prior to removing barriers (e.g. check dams, on-line ponds, weirs).</li> </ul>  |
| Fauna  | <p><i>Disruption to fish migration, spawning and nursery periods.</i></p> <ul style="list-style-type: none"> <li>• Restrict in-water works to approved timing windows to protect fish during migratory, spawning and nursery periods, and when eggs and fry are vulnerable to floodwaters and sediment. Timing windows vary depending upon species present and water temperature. Consult with regulatory authorities to verify timing windows applicable to the project site.</li> </ul> <p><i>Disruption to wildlife migration and movement patterns, breeding, nesting or hibernation.</i></p> <ul style="list-style-type: none"> <li>• Schedule activities to avoid disturbance to water bird nesting areas until after the young have fledged.</li> </ul> <p><i>Reduced biomass and diversity of aquatic organisms due to physical activities.</i></p> <ul style="list-style-type: none"> <li>• Ensure that fish that become trapped or isolated as a result of project activities are salvaged to the main channel of the watercourse.</li> <li>• If isolating the work site, remove any remaining fish and return them to an undisturbed area (i.e. fish salvage). Approval should be obtained from the appropriate federal or provincial agencies for this work.</li> <li>• Minimize duration of in-water work, whenever possible.</li> </ul> <p><i>Wildlife injury or mortality from entanglement in silt fences.</i></p> |

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|                                | <ul style="list-style-type: none"> <li>• Avoid using heavy-duty silt fences, particularly those reinforced with wide mesh, in areas where large-bodied amphibians and reptiles (e.g. large snakes) are found.</li> </ul>   |
| <p>Surface Water Hydrology</p> | <p><i>Adverse modifications to stream or shoreline morphology, texture or topography of streambed.</i></p> <ul style="list-style-type: none"> <li>• Ensure that potential downstream effects due to erosion and mobilization of bed sediments (notably those retained behind channel obstructions and immediately downstream) are considered, and mitigated as necessary, prior to removing any obstructions.</li> <li>• Fully restore stream banks, shorelines, approaches and channels to near original soil materials and contours where this activity is consistent with the purpose of the project.</li> <li>• Whenever possible, limit construction time to 72 hours or less.</li> <li>• Where practical, conduct in-stream or wetland work under frozen conditions.</li> </ul> <p><i>Adverse modifications to water flow conveyance, volumes and levels.</i></p> <ul style="list-style-type: none"> <li>• During the removal or modification of channel obstructions, monitor areas downstream to determine whether they are being affected by changes in water flow and volumes. Base water flow in the channel must be retained at a rate that is equivalent to the flow prior to the removal or modification of the obstruction, or at a level that will support fish downstream.</li> <li>• Make provisions and contingencies for unexpected high flow or low flow conditions during activity, as applicable.</li> <li>• Remove obstructions such as beaver dams and log jams manually.</li> <li>• Suspend work prior to imminent storm events.</li> </ul> <p><i>Increased ice jamming and flooding potential at bends, bridges, crossings, fordings and other flow constrictions (including effects of flooding on the project).</i></p> <ul style="list-style-type: none"> <li>• Avoid placement of materials, including plantings, in channel and floodplain areas that may reduce its natural flow conveyance capacity, and increase the risk of upstream flooding.</li> <li>• Ensure that there are appropriate cut and fill balances for in-water activities. (Note: Meet all appropriate regulatory requirements.)</li> <li>• Minimize encroachment of permanent facilities into water bodies by installing projects above the high water mark without infilling whenever possible and consistent with project objectives.</li> <li>• Remove all barriers and obstructions related to construction and break up any ice bridges prior to spring runoff to avoid ice jams, upstream flooding and downstream erosion.</li> </ul> |
| <p>Surface Water Quality</p>   | <p><i>Reduced water quality and clarity due to increased erosion and sedimentation, and transport of debris.</i></p> <ul style="list-style-type: none"> <li>• Operate and store all materials and equipment in a manner that prevents any deleterious substance (e.g. petroleum products, silt, etc.) from entering the water.</li> <li>• Ensure sandbags used for cofferdam construction are filled with clean sand and are free of fine particulates.</li> <li>• Conduct in-stream work during dry conditions, where flow is low or</li> </ul>   |

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|  | <p>under frozen conditions.</p> <ul style="list-style-type: none"> <li>• Ensure that all materials placed below the high water mark of the water body are clean and free of silt and clay sized particles. All materials must meet the applicable regulations governing the placement of fill in water bodies.</li> <li>• Install and maintain sediment and erosion controls (e.g. silt curtains, check dams, coffer dams, silt fences), as required prior to construction.</li> <li>• Minimize duration of in-water work, whenever possible.</li> <li>• Where possible, conduct activities in a dry, above the actual water level and above any expected rises in water level that may occur during a rainfall or snowmelt event.</li> </ul>  |
| Species at Risk - Terrestrial              | <p><i>Disturbance to terrestrial species at risk and/or their critical habitat.</i></p> <ul style="list-style-type: none"> <li>• If any species at risk are known or expected to be present at any time within or adjacent to the project area, consult with Environment Canada specialists or the relevant provincial authority regarding measures to avoid harmful disturbance to these species.</li> </ul>  |
| Wildlife Habitat (terrestrial and aquatic) | <p><i>Physical changes to aquatic habitat resulting in a barrier to fish movement and a reduction in area, productive capacity and quality, or a change in function.</i></p> <ul style="list-style-type: none"> <li>• Avoid summer construction in and adjacent to natural wetlands.</li> <li>• Consult with regulatory authorities regarding any beaver dam removal.</li> <li>• Implement mitigation measures in accordance with any requirements and recommendations stipulated by authorities under the <i>Fisheries Act</i>.</li> <li>• Minimize wetland disturbance through use of swamp mats and replacement of locally removed topsoil.</li> <li>• Restore habitat where necessary.</li> <li>• Revegetate stream banks and shorelines with native species known to be well adapted to the project area.</li> <li>• Conduct removal or modification to channel obstructions at a time when effects on fish habitat can be minimized (e.g. during periods of low water).</li> <li>• Upon project completion, remove all sandbags from the water.</li> </ul> |
| <b>HERBICIDE USE:</b>                      |  |
| <b>Project Component</b>                   | <b>Description of Effect Mitigation</b>  |
| Air Quality                                | <p><i>Decreased ambient air quality due to emissions and increased concentrations of chemical pollutants.</i></p> <ul style="list-style-type: none"> <li>• Avoid spraying herbicides during windy conditions, during smog advisories or if the ambient temperature is expected to exceed 25°C on the day of application.</li> <li>• Follow any additional directions specified on the herbicide container label.</li> </ul>  |
| Species at Risk - Aquatic                  | <p><i>Disturbance to aquatic species at risk and/or their critical habitat.</i></p> <ul style="list-style-type: none"> <li>• If any species at risk are known or expected to be present at any time within or adjacent to the project area, consult with Fisheries and Oceans Canada specialists or the relevant provincial authority regarding measures to avoid harmful disturbance to these species.</li> </ul>   |
| Fauna                                      | <i>Bioaccumulation of contaminants by wildlife.</i>  |

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|                               | <ul style="list-style-type: none"> <li>• Avoid spraying herbicides within 20 metres of ungulate forage areas and, where practicable, erect barriers to prevent ungulates from grazing in sprayed zones.</li> <li>• Use herbicide products that are proven to be least toxic to wildlife.</li> </ul> <p><i>Reduced biomass and diversity of aquatic organisms due to physical activities.</i></p> <ul style="list-style-type: none"> <li>• Comply with the most stringent of any applicable regulatory requirements and also ensure that herbicides are applied at a sufficient distance from any water body to minimize the risk of contamination of aquatic biota.</li> <li>• Use herbicide products that are proven to be least toxic to aquatic organisms.</li> <li>• Use herbicides that are approved for use in Canada by the Pest Management Regulatory Agency (PMRA).</li> </ul>   |
| Humans                        | <p><i>Effects on human health due to exposure to airborne pollutants.</i></p> <ul style="list-style-type: none"> <li>• Avoid spraying herbicides during windy conditions, during smog advisories or if the ambient temperature is expected to exceed 25°C on the day of application.</li> <li>• Erect signs and post notices warning the public of herbicide spraying and identifying the compounds used.</li> <li>• Follow any additional directions specified on the herbicide container label.</li> </ul> <p><i>Effects on human health due to exposure to harmful chemicals when handling or disposing of herbicides.</i></p> <ul style="list-style-type: none"> <li>• Avoid mixing, loading, applying or disposing of herbicides in areas where they could enter water intakes or wells used for domestic purposes.</li> <li>• Contain, seal and store any unused herbicides for future use. Otherwise, return the product to the manufacturer or dispose of it through a licensed waste disposal company.</li> <li>• Install anti-back flow devices on mixing and loading equipment.</li> <li>• Keep adequate First Aid equipment on-site. Follow First Aid instructions on herbicide containers and obtain medical attention, as required.</li> <li>• Thoroughly rinse and drain herbicide containers prior to their disposal or recycling.</li> </ul> |
| Soil Quality                  | <p><i>Contamination of soil and disturbance to microscopic organisms in the soil due to herbicide applications and disposal of equipment rinsate on lands.</i></p> <ul style="list-style-type: none"> <li>• Avoid using herbicides containing metals or other substances that are persistent in the environment.</li> <li>• Whenever possible, store and reuse equipment rinsate for mixing new batches. If this is not possible, spray small amounts of equipment rinsate on land that has been previously treated with the same herbicide (provided that there are no steep slopes).</li> </ul>   |
| Species at Risk - Terrestrial | <p><i>Disturbance to terrestrial species at risk and/or their critical habitat.</i></p>   |

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|  | <ul style="list-style-type: none"> <li>• If any species at risk are known or expected to be present at any time within or adjacent to the project area, consult with Environment Canada specialists or the relevant provincial authority regarding measures to avoid harmful disturbance to these species.</li> </ul>   |
| Wildlife Habitat (terrestrial and aquatic) | <p><i>Physical damage and loss of habitat (terrestrial, riparian and/or wetland).</i></p> <ul style="list-style-type: none"> <li>• Avoid spraying herbicides during windy conditions to prevent transport of airborne chemicals into non-targeted areas.</li> <li>• Conduct controlled applications to avoid drips onto non-targeted vegetation.</li> <li>• Observe the terrestrial zone recommendations provided on the container label to protect non-targeted vegetation. Maximum buffer widths are desirable.</li> <li>• Use non-chemical controls in or adjacent to sensitive areas provided that these methods are effective in controlling the invasive exotic species and that they do not increase the potential for erosion.</li> </ul> |