

Regional Municipality of York

Appendix 5E

Best Management Practices for Construction

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Best Management Practices for Construction

The table below identifies examples of Best Management Practices (BMPs) that may be employed during construction of the Preferred Undertaking. The actual BMPs to be employed will be determined by the contractor(s) prior to construction.

Construction Activity	Examples of Best Management Practices
<p>1. Vegetation Clearing and Grubbing</p>	<ul style="list-style-type: none"> • Adhere to terms of licenses, permits and approvals (e.g., Permit to Burn (if required), <i>Migratory Birds Convention Act</i> and Regulations) and relevant guidelines and Ontario Provincial Standards Specifications (OPSS) – OPSS 201 (Clearing and Grubbing), OPSS 503 (Site Preparation), OPSS 565 (Tree Protection), OPSS 182 (Environmental Protection for Construction in Waterbodies and on Waterbody Banks), and Erosion & Sediment Control Guidelines for Urban Construction (December, 2006). • Limit zone of construction impacts (e.g., vegetation removal, soil compaction) to the extent possible. • Hand clear (without grubbing) on steep slopes which do not require grading. • Minimize removal of riparian vegetation, particularly woody vegetation, for the project works. The woody vegetation that will likely require removal should be replaced with appropriate native species. This will be implemented through a comprehensive landscape design contract. • Protect vegetated areas bordering working areas with temporary tree protection and sediment fencing as determined in a grading plan. Equipment, storage of materials, and other construction activities will not be permitted in these working areas. • Restrict tree removal to the working areas. Vegetation removals associated with clearing, site access and staging will occur outside the key breeding bird period identified by Environment Canada for migratory birds (typically April 21 – July 31 for this area) to ensure compliance with the <i>Migratory Birds Convention Act</i> (MBCA), 1994 and Migratory Bird Regulations (MBR). • Conduct a nest survey by a qualified avian biologist prior to commencement of works to identify and locate active nests of species covered by the MBCA, if works must be conducted during the breeding bird season. This will include the development of a mitigation plan to address any potential impacts on migratory birds and their active nests. • Restrict tree grubbing to the required working areas. Where possible, tree stumps will be cut flush to the ground and grubbing avoided minimizing soil disturbance, particularly in erosion prone areas. • Fell trees away from any watercourse where it is safe to do so and in a manner so as to avoid damaging other standing vegetation. • Check the cleared area edges after clearing has taken place and repair or remove any trees damaged. An arborist is to inspect damage to trees. • Dispose of cut and grubbed material through chipping. Where possible, cut material may be piled and re-used for wildlife habitat. • Avoid transportation of non-native and invasive species into sensitive vegetation communities due to seed disturbance/dispersal along cleared areas and construction equipment. Indicate the extent of the target invasive species on the contract drawings and in the field by a biologist. Treat the site, prior to construction, with an herbicide application to reduce the size of the population (3 applications, 3 weeks apart). • Thoroughly clean all equipment working in the identified invasive species locations prior to moving away from the site. • Keep soils at its current locations unless it is placed in an area that will be actively managed (e.g., mowed park) or buried below an impervious surface (e.g., road). • Develop a salvage plan for the necessary removal of regionally rare species as part of subsequent design phases, with agency input, prior to construction for implementation, including retaining a biologist, where regionally rare plants are the target species, to first locate and flag the relevant material. • Use soil restoration (possibly reducing soil compaction and increasing organic matter) to facilitate the success of vegetation plantings. • Include wildlife enhancement considerations in site rehabilitation and restoration planning. • Store all vegetative debris in designated areas, ensuring that vegetative debris are covered and ensure that transporting vehicles debris off site in trucks have covers or caps to contain the debris.

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<p>2. Earthworks (e.g., soil stripping, stockpiling and storage, grading, excavation, trenching, filling and compacting)</p>	<ul style="list-style-type: none"> • Minimize vehicle traffic on exposed soils, avoid compacting or other hardening of natural ground surface, and avoid the movement of heavy machinery on areas with sensitive slopes. • Stabilize high traffic areas with clean gravel surface layer or other suitable cover material. • Ensure that construction vehicles use wheel washing facilities prior to leaving the site. • Avoid major earthworks during extremely dry and windy periods, as earthworks activities can contribute to poor air quality and dust generation. • Ensure backfilling is undertaken using suitable materials that meet the applicable land use standards and fines; free of ice and frozen soils and that adequate soil compaction is conducted to avoid ground subsidence. Provide additional backfill where subsidence has occurred. • Undertake representative sampling and laboratory testing of the quality of the fill periodically to ensure that the fill complies with these standards. A testing protocol, consistent with Ontario Regulation 153/04 will be required. • Ensure that soils susceptible to frost heave (generally fine sands to silty soils) are not used for backfill in areas with high groundwater levels. • If earthworks are not aimed at increasing the stability of slopes, avoid high risk areas with unstable slopes (e.g., steep slopes, soil liquifaction risk areas) and keep site clearing to a minimum to maintain vegetative cover and wind breaks. • Properly contain any temporarily stockpiled material, construction or related materials (e.g., within silt fencing) in areas separated a minimum of 30 m from any waterbody. • Protect stockpiled soils from exposure to and sterilization by solar radiation (an uncovered shaded area would also achieve this). • Stabilize any waste materials removed from the construction area to prevent them from entering nearby watercourses. This could include covering stockpiles with biodegradable mats or tarps as well as hanging netting or tarps underneath the crossing structure. • Avoid the storage of putrescible material as it may be considered a waste management activity. Such material is also likely to be structurally unsuitable for reuse, as it is unlikely that such organic rich material is to be stockpiled on site. Reduce excavation depths and cuts near wells and sensitive areas, where safe and feasible. • Where possible limit construction time in flood prone areas and any low-lying shoreline areas to minimize flood risk. • Backfill and compact excavations as soon as possible. Optimize degree of compaction to minimize erosion and allow for revegetation. • Properly site and contain all debris and potential contaminants (e.g., concrete and structural materials, paint and solvents) generated from construction of the structure to prevent debris from entering the watercourse, and properly disposed of all debris off-site. • Restore municipal drains, test and repair as required and repair all damages to property due to project activities. • Implement a Health and Safety Plan (HASP) for workers excavating any contaminated soil on site. • Establish a truck ticketing system to ensure that waste soil being disposed off-property will be accounted for at the receiving site.
<p>3. Dewatering and Flow Management</p>	<ul style="list-style-type: none"> • Groundwater discharges will comply with the Ontario Water Resources Act if required. • Develop temporary flow management plans to isolate the construction zones for in-water works and to maintain clean flow downstream. These plans will be developed based relevant standards and in accordance with permit-to-take-water (PTTW) conditions and any other supporting measures as may be identified by the project hydrogeologists. • Where appropriate, properly site and design withdrawal points from the channel to prevent intake of silt or bed materials. Similarly, site and design discharge points to prevent erosion and any sediment release. • Ensure that the discharged water is directed to an appropriately sized energy dissipating outlet device to prevent bed or bank erosion at the point of discharge into the natural waterbody. • Ensure that only material meeting the applicable generic site condition standards free of fine particulate matter will be placed in the water for temporary construction measures (e.g., coffer dams will be constructed of 'pea gravel' bags, geotextile fabric or other clean material) or permanent works (e.g., substrate material). • Ensure that during all temporary dewatering required for works, appropriate energy dissipation and settling/filtration measures will be used for discharge of dewatering water to minimize potential for erosion or sediment release in the watercourses / lake / drainage features. The dewatering plan will include properly sized, designed and sited temporary filtration facilities. Site and design discharge

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	<p>points for release of dewatering discharge to prevent erosion and sucking of sediment from the bottom of the pond, thereby ensuring that only clean flow is released to the watercourses. If sheet piling is used to contain dewatering areas, it will be removed following construction to prevent obstruction of groundwater movement to the streams.</p> <ul style="list-style-type: none"> ● Obtain water quality samples prior to discharge to ensure the quality is suitable for discharge. If the groundwater is not suitable for discharge, consider alternate locations of disposal or carry out adequate treatment. ● Ensure that groundwater passes through a sediment filtration system prior to being discharged to a watercourse. ● Stage groundwater discharge at the time of dewatering to avoid a single large pulse of coolwater, and to reduce the initial impact of the thermal response and pose a smaller risk to fish a sudden change in stream temperature. ● Determine erosion thresholds prior to discharging to any watercourse. ● Develop a Baseflow Loss Response Plan where a watercourse is located within a zone of influence (ZOI). ● Develop a site specific Environmental Management Plan (EMP) for locations requiring long term dewatering. ● Implement any opportunities identified during construction to divert any exposed groundwater discharge directly to the stream channels, with input from the fish biologist, environmental inspector and/or hydrogeologist, and consultation with agency staff if appropriate. ● Screen all hoses drawing water from streams supporting fish use during temporary flow management procedures to prevent potential entrainment of fish. ● Remove and relocate any fish stranded within the temporary in-water work zones using appropriate techniques by qualified fisheries specialist. ● Remove accumulated sediments prior to removing barriers (e.g., coffer dams). ● If dredging or releasing sediments, confirm whether sediment is contaminated. If sediment contaminated, implement more stringent measures to prevent release downstream.
<p>4. General In-water Works</p>	<ul style="list-style-type: none"> ● Adhere to terms of licenses, permits and approvals (i.e., <i>Canadian Environmental Protection Act; Ontario Water Resources Act, Federal Fisheries Act, etc.</i>) relevant guidelines and procedures (e.g., Ontario Ministry of Environment Guidelines and Procedures for Water Management, Protection and Management of Aquatic Sediment Quality in Ontario, Fill Quality Management, Surface Water Quality Guidelines and Department of Fisheries and Oceans Operational Statements). ● Conduct all in-water and near-water activities within the applicable in-water construction timing windows, as identified by with the MNR, to protect the resident fishery life functions. ● Where possible, limit in-water construction time to minimize flood risk. ● Undertake construction activities within the low flow period in the late summer months. ● In the case of rain events (20mm in 24 hours) and significant snow melts, temporarily stop construction until soils stabilize as to not exacerbate erosion and the potential for sediment releases into nearby watercourses. A Flood Response Plan should also be developed to deal with on-site flooding as to mitigate any possible effects to the aquatic environment. ● If construction requires that an instream work area be isolated from the primary channel, retain an adequate portion of channel with sufficient width and depth to allow for fish passage. In the event that an area must be blocked from bank to bank, construct a temporary by-pass channel to allow fish passage around the construction area. ● Operate heavy machinery from above the top of the streambank or on shore above the normal water level (where possible). ● Ensure that all equipment that comes in contact with water is free of fluid, leaks and externally cleaned / degreased. ● Conduct in stream work during dry conditions, low flow or under frozen conditions. ● Suspend work prior to imminent storm events in order to minimize soil transport. ● Make provisions/contingencies for occurrence of high flow or low flow conditions during activity, as applicable. ● Ensure that all machinery used on-site is in good repair and free of excess oil and grease. Any fuelling or maintenance of such equipment should occur on the upland well away from the foreshore. ● If steel piles are to be used, they must be capped to prevent the entry of wildlife.

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<p>5. Erosion, Sediment, and Dust Control</p>	<ul style="list-style-type: none"> ● Adhere to terms of licenses, permits and approvals (i.e., <i>Canadian Environmental Protection Act; Ontario Water Resources Act, Federal Fisheries Act, etc.</i>) and guidelines (i.e., TRCA Erosion and Sediment Control Guidelines to Urban Construction) and Ontario Provincial Standards Specifications (OPSS) – OPSS 577 (Erosion and Sediment Control Measures), OPSS 503 (Site Preparation), OPSS 206 (Grading), OPSS 506 (Dust Control). ● Install silt fences, blankets, and berms around construction areas, including the laydown area, and across sloping terrain/areas to prevent surface runoff from carrying sediment offsite and into any sewer. ● Install sub-drains/catch basins in areas of excavations/trenches or areas sensitive to erosion in order to trap runoff. ● Trap sediment using silt traps once sub-drains/catch basins have been installed. ● Design and size ditches appropriately to remove sediment before the water is discharged from the site; and, ● Implement vehicle and equipment cleaning procedures and practices to minimize or eliminate the discharge of pollutants from vehicle and equipment cleaning operations to storm drain systems or watercourses. ● Install and maintain silt fences/curtains, sedimentation ponds, check dams, coffer dams or drainage swales, around soil storage sites and elsewhere as required. ● Install and regularly inspect and maintain perimeter silt fences/curtains between the work areas and all reaches of those watercourses where works are required, including ditch and drainage works that drain to watercourses that support fish habitat. They will be left in place and maintained until all surfaces contributing drainage to these watercourses are fully stabilized. ● Appropriately surface all completed ditches (e.g., with sod, stone, riprap or manufactured fibre matting). ● Construct ditch checks consisting of straw bales or rock check dams across swales, draws or ditches and/or around inlets to reduce the velocity of stormwater runoff and to intercept silt. ● Direct runoff and overland flow away from working areas and areas of exposed soils or contaminated groundwater. Promote overland 'sheet flow' to the maximum extent possible. ● Stabilize all exposed and newly constructed surfaces using appropriate means in accordance with the characteristics of the soil material. These surfaces will be fully stabilized and re-vegetated as quickly as possible following completion of the works. Possible stabilization methods can include: 'hard' and 'soft' designs or combinations of designs using rip-rap, armor stone, crib walls, revetments, gabions, erosion control blanket, live fascines, brush bundles. ● Develop a comprehensive erosion and sediment control (ESC) plan to minimize sediment and erosion impacts to stream through the incorporation of specific elements as per the <i>Erosion and Sediment Control Guideline for Urban Construction, December 2006</i> (ESC Guideline), prepared by the Greater Golden Horseshoe Area Conservation Authorities (GGHACA). ● Prepare ESC condition reports as part of the monitoring and maintenance plan. Where ESC measures are found to be in an unacceptable condition they are to be repaired or replaced immediately. ● Install erosion and sediment control measures prior to construction and maintain them within their effective limits throughout the construction and until the restoration of disturbed vegetation, rock revetments or similar are successfully completed. ● Design, install, maintain, and remove erosion and sediment control structures according to TRCA Erosion and Sediment Control Guidelines for Urban Construction, Ontario Guidelines on Erosion and Sediment Control for Urban Construction Sites and OPSS Guidelines. ● Temporarily stabilize exposed soil areas as soon as possible (or covered with tarps, erosion control blankets, etc.) to control sediment transport and erosion. In addition, retain natural vegetation cover wherever possible (and root grubbing minimized where possible) to provide natural erosion control. Enclose earth stockpiles with appropriate sediment and erosion control fencing. ● Filter runoff from material stockpiles or site de-watering through an appropriate device (temporary settling facility, filter bag, etc.) before release. ● Regularly inspect sediment control structures, and check them after storms and repaired as required. Clean out structures when accumulated sediment reaches half the design height. ● Restore soil surfaces immediately following final grading, with surface restoration to include features that minimize erosion (e.g. placing sod). ● Re-stabilize and re-vegetate exposed surfaces as soon as possible, using native vegetation seed mixes and plantings or other appropriate cover, in consultation with agencies.

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	<ul style="list-style-type: none"> ● Capture and adequately filter drainage from any unstabilized surface prior to discharge to natural areas, including receiving drainage features. ● Protect catch basins, manholes and other storm sewer features (e.g. ditch inlets) from sediment-laden inflows through installation of sealing covers or geotextile filter media at their inlets. ● Contingency procedures, materials and notification procedures will be readily available for use in the event of a silt release, and for general application in regular maintenance and repair. ● Use dust suppression methods (water or other as appropriate) in dust sensitive areas as required to control off-site migration of particulates. The use of calcium chloride as a dust suppression method should be minimized. A dust suppressant license will be required from MOE for use of registered dust suppressants other than water. <p>Dust Control Measures:</p> <ul style="list-style-type: none"> ● Discourage and where practical limit on-site vehicle and equipment idling. Water spray or similar techniques will be used to control dust generation from construction and demolition activities, storage piles and exposed soils/surfaces. ● Minimize tracking of earth or soil from the site on trucks through the use of mud mats (e.g. granular pads located at site entrance). Where a mud mat is not effective in controlling the tracking of earth or soil onto adjacent roads, the physical removal of earth from vehicles is to be implemented. ● Vehicles hauling soil, aggregates or fine or dusty material are to be covered to minimize the generation of dust. ● Construction activities are to be scheduled or planned to limit areas of soil exposed at any given time. ● Exposed soil areas and adjacent roads are to be monitored for dust generation potential, with attention paid to areas used for pedestrian walkways and vehicle traffic. ● On-site (including roadways) flushing, sweeping and cleaning are to be performed on a regular basis, with consideration for the containment and management of any wash water. ● Exposed fill/stock piles that may be a source of fugitive dust are to be covered with tarpaulins, soil binders or other appropriate means, where practical. ● Soil surfaces are to be restored and re-vegetated as soon as possible. ● Construction activities such as cutting and grinding are to be scheduled and planned to limit the release of dust and noise to adjacent properties. ● Transportation and delivery of construction materials are to be scheduled to minimize the amount of bulk construction materials stored on-site at a given time, and, ● Speed limits within the site are to be 20 km/h to control dust generation.
<p>6. Operation of Heavy Equipment and Vehicles (e.g., backhoes, bulldozers, bobcats, trucks, trailers, weed harvesters, etc.)</p>	<ul style="list-style-type: none"> ● Use new or well-maintained heavy equipment and machinery with mandatory fully functional emission control systems/ muffler/ exhaust system baffles, engine covers, etc. to minimize combustion emissions and noise (as per Noise Pollution Control Publications 115 (MOE, 1978a) and 118 (MOE, 1978b) of the Ontario Model Municipal Noise Control By-Law, which stipulate specific sound emission standards for various pieces of construction equipment, and sets sound emission standards for motorized conveyances of various types, respectively, and NPC-207 (MOE, 1983), which deals with impulse vibration in residential buildings). ● Depending on the sensitivity of the surrounding area and the types of contaminants that may be anticipated during the works, regular monitoring may consist of hourly or daily site inspections or perimeter sampling. ● Inspect control features, and repair and/or replacement on a regular basis, as required. ● A daily inspection of all machines is to be conducted by the construction contractor before start-up to ensure that no potential exists for contamination of soils and watercourses. Operators are responsible for ensuring that no potential exists for oil, grease or other deleterious substances to enter into the environment. ● Install a tarpaulin on haulage trucks as appropriate. ● Use heavy equipment and machinery within operating specifications. ● Minimize operation and idling of vehicles, and avoid operating and idling vehicles and gas-powered equipment during smog advisories. ● Minimize traffic along access roads and maintain safe driving speeds. ● Ensure that the Contractor develops a Spills Prevention and Response Plan and keeps it on site at all times. ● Ensure refuelling and construction staging areas where contaminants are handled are located off-site where possible, or well away from a waterbody and from critical wildlife habitat.

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	<ul style="list-style-type: none"> ● Refuel equipment and machinery on impermeable pads or buried liners designed to allow full containment of spills. ● Store all oils, lubricants, fuels and chemicals in secure areas on impermeable pads, provide berms if necessary. ● Capture, contain and clean up spills and leaks immediately. Immediately notify local authorities of all reportable spills. ● Maintain an adequate supply of cleanup materials at the work site. ● Clean heavy machinery and equipment prior to transport to new construction areas. ● Install noise barriers around work areas in close proximity to sensitive receptors (e.g., homes, schools, community facilities). ● Conform to local noise by-laws/ordinances (City of Vaughan By-Law No. 96-2006). ● Notify residents of planned events that may cause disturbance, and schedule these activities to avoid sensitive time periods.