ENVIRONMENTAL PROTECTION PLAN

PROPOSED HIGHLAND PROPERTY DEVELOPMENT (WEST POINT ESTATES) NEAR JACKFISH LAKE, ALBERTA IN NE & NW9-52-2-W5M

ENVIRO MAK Inc.
Environmental Management Consultants

ENVIRONMENTAL PROTECTION PLAN

PROPOSED HIGHLAND PROPERTY DEVELOPMENT (WEST POINT ESTATES) NEAR JACKFISH LAKE, ALBERTA IN NE & NW9-52-2-W5M

Submitted to:

KEN HORN

OF

HIGHLAND PROPERTY DEVELOPMENTS LTD.

JACKFISH LAKE, ALBERTA

Submitted by:

K.L. WALKER-MAKOWECKI &
R. MAKOWECKI
OF
ENVIROMAK INC.
ENVIRONMENTAL MANAGEMENT CONSULTANTS
EDMONTON, ALBERTA
WITH CONTRIBUTION BY
URBAN SYSTEMS

Revision 2: December 20, 2017

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1.0 PURPOSE

Highland Property Developments Ltd. is planning the development of a 98.5ha (241.0 ac) subdivision named West Point Estates (North) within NE & NW9-52-2-W5M. As part of the development process, Highland Property Developments Ltd. (herein referred to as the "Proponent") contracted EnviroMak Inc. and Urban Systems to prepare an Environmental Protection Plan (EPP).

The purpose of this Environmental Protection Plan (herein referred to as the "EPP") is to ensure that biophysical factors and/or Valued Ecosystem Components (VECs) located within the West Point Estates subdivision are strategically protected and to identify and describe environmental protection measures and procedures to promote the long-term environmental sustainability of the development. The EPP has been developed in consideration of the results of a Biophysical Environmental Assessment (EnviroMak 2017) and Wetland Assessment and Impact Report (WAIR, EnviroMak 2017) completed as part of the development process.

The Biophysical Environmental Assessment and WAIR included comprehensive existing information review as well as ground truthing assessments in 2006, 2015 and 2016. The assessments intended to identify potential areas of environmental significance, sensitivity and/or concern including but not limited to wetlands and waterbodies, fish and fish habitat, vegetation, wildlife and At Risk species, historical resources and environmentally significant areas (e.g. Jackfish Lake). The desktop existing information review and combined field reconnaissance determined that twelve wetlands of various classes were present within the site; however, many other potential VECs were not present in the existing information record nor observed or identified during field reconnaissance. The results of the assessments (including wetland delineation, classification and quantification) were provided to the Proponent along with a description of potential wetland avoidance, minimization and replacement options for consideration in the development design.

This EPP compliments existing federal, provincial and municipal environmental legislation, regulations and guidelines. Federally the *Fisheries Act*, the *Migratory Birds Convention Act*, the *Species at Risk Act*, the *Navigable Waters Act* and all the associated regulations may influence the actions of persons who reside within West Point Estates. Provincial legislation including but not limited to the *Water Act*, the *Public Lands Act*, the *Wildlife Act*, the *Fisheries Act* and Alberta Fisheries Regulations, the *Environmental Protection and Enhancement Act*, the *Weed Control Act*, the *Historical Resources Act*, the *Soils Conservation Act* and all the associated regulations may influence the actions of persons who reside on the West Point Estates. Additionally, the County of Parkland municipal by-laws and land use plans provide specific environmental expectations of future residents in West Point Estates.

With appropriate environmental protection measures and regulatory approval (i.e. Water Act Approval), development could proceed with minimal anticipated environmental impact.

An Environmental Protection Plan (EPP) is considered a living document to be appended and amended as needed to capture changes to the development plan, regulatory permitting, operations/construction methods, site conditions and construction schedule and other variable factors.

2.0 LOCATION AND DEVELOPMENT DESCRIPTION

The proposed development is located directly east of Jackfish Lake within the Parkland County Municipal Development Plan Bylaw No. 37-2007 (Figures 2.1, 2.2 and Excerpted Figure 5.1 Page 27 from Outline Plan as Provided by Urban Systems).

West Point Estates has been designed as a cluster (conservation) development (Figure 2.3). This design recognizes the natural features of the subdivision lands, including the shoreline of Jackfish Lake and wetland areas, through preservation as a combination of Environmental Reserve (ER) and natural Municipal Reserve (MR), compensation/replacement and avoidance under the Alberta *Water Act* and Wetland Policy, and locates residential lots on smaller parcels while protecting lands that could have been residential lots as additional shared open space for residents. In addition, this design maintains the rural character of the area by protecting existing treed and open space areas, which would not qualify for ER under the definition of Municipal Government Act (MGA) and compromise more than 10% Gross Developable Land (GDA) MR dedication requirement entitled to the County under the provisions of the MGA.

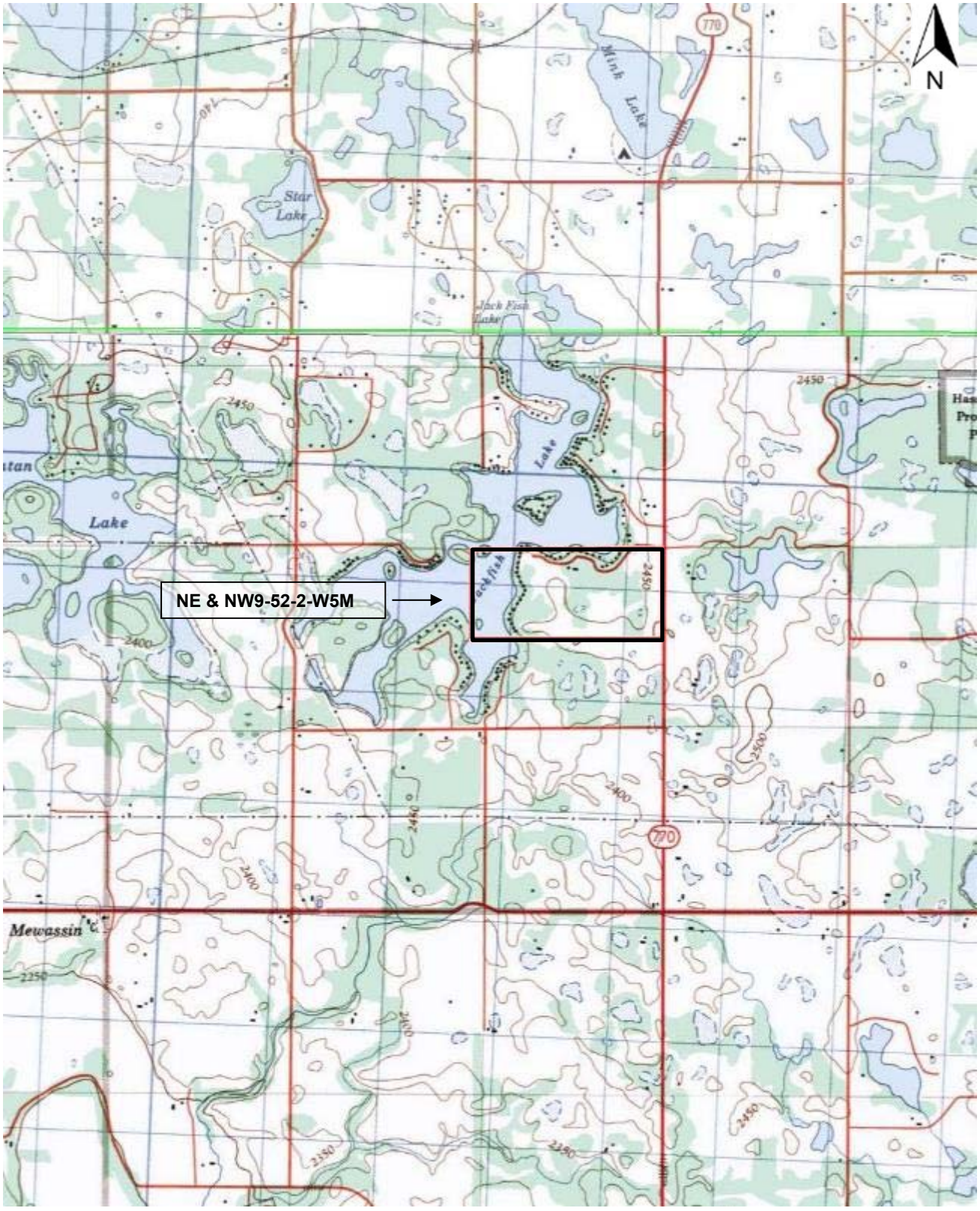


Figure 2.1. General location of proposed West Point Estates in NE & NW9-52-2-W5M (1:50,000 scale Etopo NTS Map, 83G08, 1989).

Figure 2.2. General location of proposed West Point Estates in NE & NW9-52-2-W5M; general area for proposed development outlined in yellow solid line; north half section outlined in purple solid line (Google Earth September 2015 Imagery; Google Earth 2016).

Figure 5-1 - Land Use Concept

3.0 VALUED ECOSYSTEM COMPONENT SUMMARY

The biophysical environmental and wetland assessments included extensive desktop analysis and field assessment of the proposed subdivision and adjacent lands. Specific environmental features were identified and environmental protection opportunities provided which were then reflected in the cluster subdivision design of West Point Estates, which provides a 60m setback from the lake edge of Jackfish Lake and considers existing topography.

The following is a summary of the environmental features and/or valued ecosystem components of the property (Table 3.1).

Table 3.1. General location descriptors and summary of valued ecosystem components and/or biophysical features of the proposed development lands near Jackfish Lake, Alberta at NE & NW9-52-2-W5M.

Component	Description
Legal Land Description	NE & NW9-52-2-W5M
[6]UTM	11 U 683642.36 m E 5929138.50 m N
[6]Lat/Long	53.479136° -114.232538°
[3]Municipality	Parkland County
Nearest Town/City[6]	Carvel and Stony Plain, Alberta
[3]Green/White Management Area	White
[2]Ecoregion	Low Boreal Mixedwood
[4]Environmentally Significant Areas (ESA)	No provincially or nationally significant ESAs for immediate property (NE9-52-2-W5M ESA Sum = 0.108; NW9-52-2-W5M ESA Sum = 0.133). Jackfish Lake/Star Lake Complex is recognized as a regionally significant environmentally significant area according to Parkland County Environmental Conservation Master Plan (Parkland County 2014). This area is labelled as highly environmentally sensitive, as it has high groundwater sensitivity and high surface water quality. Due to the unique shape of Jackfish Lake, it is recognized as highly susceptible to water quality degradation. This ESA regional land is identified as a buffer of 100m around the shoreline (Parkland County 2014). A map identifying the local significance area of L31 Jackfish – Johnny's Lake Wetland Complex is within the MDP (Parkland County MDP 2007 Map 5 Environmentally Significant Areas).
Surface Vegetation and Land Use Coverage	49.7% Agricultural / Rangeland 43.7% Mixedwood Forest 4.20% Environmental Reserve 2.33% Wetlands 0.09% Ephemeral Drainages
Landscape and Soils	Generally hummocky on medium relief landforms (AGRASID, 2012). SC 10 (Thick Black/Dark Gray-Gray Soil Zone). Thurber Engineering Geotechnical Investigation indicated primarily silty clay to silty clay loam with topsoil varying between 50 to 60mm and a well drained site.
Watershed	Lower area of the North Saskatchewan River watershed. Proximity to Jackfish Lake.
Permanent Watercourses within the Property	No permanent watercourses within property; three ephemeral drainages were observed during the May 2016 and November 2015. None of these drainages had distinct bed or bank features, nor contained water at the times of assessment (EnviroMak 2017).

Component	Description
Wetlands within the Property	Several wetlands and ephemeral drainages (intermittent drainages to Jackfish Lake) were delineated on the property. Under the Alberta Wetland Classification System (2015), six marsh wetlands (#1, #2, #3, #7, #9, #10), four deciduous wooded swamps (#4, #6, #8, #12), two fens (#5, #11) and one ephemeral wetland were identified and delineated within the property. These wetlands and wetland avoidance, mitigation and replacement were further detailed in a Wetland Impact Assessment Report (WAIR, EnviroMak 2017) submitted to Alberta Environment and Parks (AEP) for *Water Act* Approval and to meet expectations of the Alberta Wetland Policy.
Fish and Fish Habitat	No fish or fish habitat were identified within the property. Nearby Jackfish Lake is fish-bearing. FWMIS (2016) indicated the potential presence of Brook Trout (*Salvelinus fontinalis*), Brook Stickleback (*Culaea inconstans*), Iowa Darter (*Etheostoma exile*), Lake Whitefish (*Coregonus clupeaformis*), Northern Pike (*Esox lucius*), Spottail Shiner (*Notropis hudsonius*), Walleye (*Sander vitreus*) and Yellow Perch (*Perca flavescens*) within Jackfish Lake or near proximity to Jackfish Lake within the database search radius. Jackfish Lake is an important fish and fish habitat for residents and visitors. The major game fish species that are present in Jackfish Lake include Northern pike (*Esox lucius*), Yellow perch (*Perca flavescens*) and Walleye (*Stizostedion vitreum*). The lake fish habitat is extensive with a large lakeshore perimeter that contribute to the spawning and rearing of Northern pike and Yellow perch which are the dominant fish species in the lake (EnviroMak 2006 & 2017).
Jackfish Lake (located adjacent to property)	Jackfish Lake is a eutrophic lake that contains relatively high levels of nutrients such as phosphorus and nitrogen. The production of algae and the increasing potential for some winter oxygen depletion with increased eutrophication causes some concern for ensuring that additional nutrients do not enter the lake. Additionally, the drainage area is quite confined. Jackfish Lake Area Structure Plan applies. Various expectations for setbacks and lake protection apply. Nearby residents have expressed concerns for overall lake health, water quality, nutrient sources, septic field leaching, lake buffers, algal blooms and enforcement of expectations (Outline Plan, Urban Systems 2017).
Groundwater	Thurber Engineering Groundwater Supply Evaluation (2007) for the area noted that because the Total Dissolved Solids (TDS) have average concentrations that do not meet Canadian Drinking Water Quality (CDWQ) guidelines, the groundwater is not considered potable. Nearby residents expressed concerns for groundwater well depletion due to overuse.
Wildlife	Canadian Toad (*Bufo hemiophrys ;*May be at Risk in Alberta; Not at Risk as per COSEWIC) noted in existing information for within 2km radius of property. Signs of various wildlife activity and habitat presence was noted for various mammals, birds and amphibians; however, no rare, threatened or endangered wildlife species or unique habitats/dens/burrows/hibernacula were observed during the field surveys (EnviroMak 2017).
Species at Risk	No Species at Risk were documented in the existing information, and no such species were directly observed nor were any signs of Species at Risk noted during the field surveys in May 2016 and previously in November 2015 and October and November 2006 (EnviroMak 2017).
Vegetation	The property was predominately used for agricultural purposes (hay fields) with approximately 48.3ha (49.7%) of the land showing signs of repeated and previous agricultural activity. Interspersed through the property was a variety of vegetation, including mixedwood forest. Overall vegetation was composed of mixed grassland/haylands with wetland areas and tree stands containing primarily mixed-age stands of various species, as well as the adjacent Jackfish Lake riparian area. Some clearing within the mixedwood forest had occurred in association with some camping sites (EnviroMak 2017).

Component	Description
Rare Plants	No rare plants were noted in the existing information (ACIMS) or observed during the field surveys. The majority of the species observed during field reconnaissance were agricultural and/or native and listed within the ACIMS database with the Subnational Conservation Status Rank of S5/G5, meaning that the taxon is secure, widespread and abundant (AEP 2015).
Historical, Archaeological and Paleontological Resources	Historical Resources Overview/Statement of Justification of the property in NE & NW9-52-2-W5M was conducted by Altamira Consulting Ltd. (2016) Circle CRM Group Inc. conducted a full Historical Resources Impact Assessment for the Highland Property Development Ltd. in NE &NW9-52-2-W5M in 2016. The HRIA concluded that no historical resources of significant value were identified, and the Highland Property Development Ltd. West Point Estates was recommended for Historical Resources Act approval.
Public Lands	As per communications with Senior Waterbody/Boundary Research Analyst Sarina Sibbio (2016): *"*[Review of the subject lands] *indicate the Crown owns the naturally occurring bed and shore of Jackfish Lake in the NE 9-52-2-5 (most particularly LSD 15 of Section 9) and Legal subdivisions 11, 12 and 13 of the NW 9-52-2-5 and that the mutual boundary between the Crown and private land therein is the line of the bank as defined in Section 17 of the Surveys Act. However, within LSD 14 of Section 9, the Crown owns only the area covered by the water (the lake's shore, ie., the area between water's edge and the bank has been granted by express description). The boundary between the Crown and the privately owned land in LSD 14 of Section 9-52-2-5 is not the line of the bank but the water's edge."* As such, no wetlands are claimed by the Crown within NE & NW9-52-2-W5M; however, the Crown does lay claim to the bed and shore of Jackfish Lake.

[1] AAFC 2006 [2] Strong & Leggat 1992 [3] FWMIS (2016) [4]AEP 2014 and Fiera 2014
[5] Alberta Culture and Tourism Listing of Historic Resources (September 2015)
[6] Google Earth Pro 2016 (Coordinates taken from middle of Legal Subdivision)

4.0 REGULATORY COMPLIANCE AND PERMITTING

This EPP addresses and/or compliments existing federal, provincial and municipal environmental legislation, regulations and guidelines.

4.1 Potentially Relevant Regulatory Legislation

4.1.1 Federal

The following is a list of some key potentially applicable federal legislation.

- *Fisheries (Canada) Act*
- *Migratory Bird Convention Act*
- *Species At Risk Act*
- *Navigable Waters Act*
- *Transportation of Dangerous Goods Act*
- *Hazardous Products Act*

4.1.2 Provincial

The following is a list of some key potentially applicable provincial legislation.

- *Environmental Protection and Enhancement Act*
- *Water Act,* Ministerial Regulation and associated Codes of Practice
- *Wetland Policy*
- Environmental Quality Guidelines for Alberta Surface Waters and Release Reporting Regulation
- *Public Lands Act*
- *Fisheries Act*
- *Wildlife Act*
- *Historical Resources Act*
- *Weed Control Act and Weed Control Regulation*
- *Litter Act*
- *Soil Conservation Act*
- *Agricultural Pests Act and* Alberta Clubroot Management Plan

4.1.3 Municipal – County of Parkland

The following is a list of some potentially applicable municipal policies, guidelines and bylaws.

- Parkland County Municipal Development Plan Bylaw No. 37-2007
- Mayatan Area Structure Plan (1981)
- Jackfish Lake Area Structure Plan (November 1997)
- Parkland County Land Use Bylaw No. 20-2009 (September 24, 2015)

- Parkland County Environmental Conservation Master Plan (Parkland County 2014)

4.2 Regulatory Permits, Approvals, Authorizations and Notifications

When and where necessary, the EPP will be updated to capture expectations and conditions of approvals and/or permitting as they are received (Appendix 9.2).

5.0 POTENTIAL ENVIRONMENTAL EFFECTS AND MITIGATION

5.1 Highlighted Avoidance and Minimization Measures

- Greater than thirty percent of the natural landscape is proposed to be unaltered and/or replaced with naturalized ecological value consisting of: 6.7% of the Gross Area (GA) is Environmental Reserve (ER); 13.8% of the GA is Municipal Reserve (MR), and; 9.7% of the GA is dedicated to naturalized Stormwater Management (SWM) facilities.
- A riparian setback of 60m Environmental Reserve (ER) will be applied to protect the lake resources and riparian area which provides various ecological, hydrological, water quality and stressor mitigation functions for the aquatic ecosystem. This is a key measure in protecting the lake from further eutrophication and pollution as well as to protect key habitats for amphibious and/or water dependent species.
- Fisheries values are significant with some specific fish spawning and rearing areas present in Jackfish Lake. In accordance with the Jackfish Lake Area Structure Plan, lakeshore lots permitted access pathways to lake will be restricted to a maximum width as per the governing ASP and will be constructed so as not to cause sedimentation to the lake. Jackfish lake resident dock will be restricted to temporary, removable dock at the shoreline. The development will comply with the Department of Fisheries and Oceans Self Assessment criteria for temporary docks and "Measures to avoid causing harm to fish and fish habitat" where applicable (Appendix 9.3).
- All wetlands will be either avoided and preserved or replaced as per the Alberta Wetland Policy. It is proposed that approximately half of the natural wetlands on the property will be avoided and preserved in natural condition. These small wetlands do provide some ecological and hydrology functions. The remainder of the wetlands will be replaced via permittee-responsible onsite replacement wetlands and/or through financial in-lieu fee payment for wetland restoration or as approved under the Water Act Approval process.
- No endangered, threatened or Species at Risk appear to be present in the records review and/or field reconnaissance results for the property.
- A Resident Environmental Code of Conduct (RECC, Appendix 9.1) is being developed to transfer knowledge and commitments to environmental protection made in this EPP to eventual residents of the subdivision. This is intended to further fortify avoidance, minimization and mitigation measures. The RECC conforms with the Best Management Practices identified in the County of Parkland Environmental Conservation Master Plan to "Encourage all landowners and land users to cultivate an ethic of 'ownership' " (Parkland County 2014).

5.2 Activities with Potential Environmental Effects

The property development will cause alterations to the existing landscape. Activities that may cause environmental effects may include but not be limited to:

- Loading and hauling material
- Tree clearing
- Clearing and grubbing
- Topsoil stripping and stockpiling
- Road construction
- Vegetation stripping and wetland alteration
- General earthworks and surface grading
- Constructing permanent access roads
- Constructing surface water control systems, such as drainage ditches, stormwater ponds, stormwater outfalls to the lake, hydraulic berms and culverts
- Construction of homes and associated private septic holding tanks and drinking water cisterns
- Landscaping and revegetation
- Installing erosion control measures
- Installation of signage
- Resident activity

5.3 Potential Environmental Effects and Mitigation Measures

The specific potential effects related to these project activities are detailed in Table 5.1 with description of mitigation measures to be applied to eliminate and/or reduce potential effects on valued ecosystem components.

Table 5.1. Potential environmental effects and mitigation measures by activity for the proposed development lands near Jackfish Lake, Alberta at NE & NW9-52-2-W5M.

Responsible Party	Activity/ Development	Potential Environmental Effect	Environmental Mitigation Measures
Developer/ Developer's Contractors	Site Selection and Planning	Reduction in ecological diversity and natural habitats	• Site selection and planning incorporated avoidance and minimization measures so as to retain some ecological diversity through avoidance of approximately half of the wetlands and protection of some forested areas focusing on development of previously disturbed agricultural lands where feasible. Maintenance of a lake riparian buffer was applied to planning to protect valuable lake resource and ecological diversity of riparian area. The shoreline and wetlands are protected within the ER and replaced as wetlands within the PUL; forested areas are protected under the MR. • Avoidance of steep slopes, through their identification and provision of appropriate setbacks, as determined through Geotechnical Investigation and Slope Stability Assessments by qualified professional Geotechnical Engineers. • Numerous studies supported site selection and development planning including: Domestic Groundwater Assessment, Geotechnical Investigation, Shallow Water Table and Percolation Investigation, Biophysical Environmental Assessment, Wetland Assessment and Impact Report, Slope Stability Assessment, Phase 1 Environmental Site Assessment and Riparian Setback Matrix Model.
Developer /Developer's Contractors	Excavation	Damage or destruction of Historical, Archaeological and Paleontological Resources	• Historical Resource Impact Assessment (HRIA) completed and deemed no resources of significant value present.
Developer/ Developer's Contractors & Home Builder/ Home Builder's Contractors	Excavation	Damage or destruction of Historical, Archaeological and Paleontological Resources	• If historical, archaeological and/or paleontological resources are found, STOP work and report.

Responsible Party	Activity/ Development	Potential Environmental Effect	Environmental Mitigation Measures
Developer/ Developer's Contractors	All activities	Air pollution, climate change and public safety	• Follow municipal burning and fire safe requirements and include in the Resident Environmental Code of Conduct (RECC).
Developer/ Developer's Contractors & Home Builder/ Home Builder's Contractors	All activities	Air pollution, climate change and public safety	• Encourage limited unnecessary idling of equipment and household carbon footprint. • Follow Occupational Health and Safety Standards during construction. • Application of various temporary erosion control measures to address wind erosion during stripping, grading, stockpiling and lot development.
Developer/ Developer's Contractors	All activities	Contamination to land and water	• Phase 1 Environmental Site Assessment conducted and determined no need for further investigation for potential contamination. • Preservation of 60m riparian setback buffer to Jackfish Lake. • Replacement of agricultural lands with residential use may reduce potential use of fertilizers, herbicides and pesticides within area. • Development to use private holding tanks and private contract removal for sewage to contain and prevent risk of nutrient pollution to lake. • Preservation of some natural wetlands and development of a stormwater management plan to direct surface runoff through a treatment train that incorporates naturalization for filtration of nutrients and suspended sediments, flood functions and attenuation of surface waters. • Installation of control structures on stormwater management facilities.
Developer/ Developer's Contractors & Home Builder/Home Builder's Contractors	All activities	Contamination to land and water	• Spill prevention, equipment cleanliness and inspection and refueling setbacks off 100m from lake during construction. • Report spills to Alberta Environment and Parks hotline. • Best management practices and planning for erosion and sediment control during construction. • Best management practices for invasive species prevention during construction. • Various other measures indicated in other sections of table.

Responsible Party	Activity/ Development	Potential Environmental Effect	Environmental Mitigation Measures
Developer/ Developer's Contractors	Sewage and Water Supply	Surface water quality and groundwater effects	• Fertilizer, herbicide and pesticide use should be consistent with the Jackfish Lake Area Structure Plan, and will be prohibited by the RECC within a minimum of 30m setback of the lake and/or in areas prone to runoff into the lake. • Any contaminants released into the environment especially ground and surface waters should be reported to the Alberta Environment and Parks Hotline via telephone at 1-800-222-6514. • No new groundwater wells to be installed. • Private holding tanks and cistern/alternative drinking water mechanism included in development design rather than septic field. Discharge of sewage to lake is prohibited and fortified in RECC. • Development to comply with Alberta Private Sewage Disposal Systems Regulation and Alberta Private Sewage Systems Standard of Practice (2015).
Developer/ Developer's Contractors	All activities	Jackfish Lake aquatic ecosystem effects and water quality	• Biophysical Environmental Assessment conducted. • Riparian Setback Matrix Model applied.
Developer/ Developer's Contractors & Home Builder/Home Builder's Contractors	All activities	Jackfish Lake aquatic ecosystem effects and water quality	• Preserve 60m riparian setback buffer to Jackfish Lake extending along the Jackfish Lake border, extending upland from the edge of water as surveyed in 2008 by Pals. This 60m riparian buffer will include a 30m Environmental Reserve extending upland from Jackfish Lake shoreline, which will total approximately 2.04ha (2.10%). An additional 30m will be designated as Environmental Reserve Easement, which will extend past the Environmental reserve, contributing to approximately 2.04ha (2.10%) of the landscape. No development by adjacent private landowners shall be allowed on these lands, apart from a path that is to be allowed for access to the lake. The width of the path is to be equivalent to 20% of the average lot width and to a maximum width of 10 meters. For 15 new rezoning lots the maximum width of the trails will be 8m (higher environmental standard than Jackfish Lake Area Structure Plan requirements). Pathways should be stabilized so as not to result in sedimentation to the lake. • Fertilizer use will be consistent with the Jackfish Lake Area Structure Plan and is not recommended for use within a minimum of 30m of the lake and/or in areas prone to runoff into the lake. Fertilizer controls and/or prohibitions on fertilizer use by residents will be fortified in the RECC. • Resident dock will be restricted to temporary, removable docks permitted with appropriate permissions/approvals. • No installation of communal sanitary sewer or drinking water systems or groundwater wells. Private septic for sewage and alternative drinking water delivery mechanism (i.e. cistern) to be used.

Responsible Party	Activity/ Development	Potential Environmental Effect	Environmental Mitigation Measures
Developer/ Developer's Contractors	All activities	Jackfish Lake aquatic ecosystem effects and water quality	• Public notice signs denoting the boundaries of the environmental reserve parcels will be installed as educational signage for residents conveying importance of lake shoreline riparian buffer preservation. • RECC produced to ensure awareness of lake use requirements, boating guidelines and expectations. • Stormwater management plan to be developed to direct surface runoff through a treatment train that incorporates naturalization for filtration of nutrients and suspended sediments, flood functions and attenuation of surface waters as reviewed and approved by Alberta Environment and Parks. • Stormwater management systems will be implemented to ensure water releases into the lake meet the applicable regulatory guidelines. • The Urban Systems West Point Estates Stormwater Management Plan (2016) describes the drainage patterns of the landscape. • Subdivision designed to prevent and/or limit nutrient pathways to the lake.
Developer/ Developer's Contractors	All activities	Fish and fish habitat (Jackfish Lake)	• No alteration of Jackfish Lake (i.e. aquatic weed removal, dredging, etc.). • Lake riparian buffer to be preserved with signage. • RECC to be developed to identify measures to protect fish and fish habitat for resident reference.
Home Builder/ Home Builder's Contractors	All activities	Fish and fish habitat (Jackfish Lake)	• No alteration of Jackfish Lake (i.e. aquatic weed removal, dredging, etc.). • Resident dock to be restricted to temporary removable dock only. Docks to comply with the Department of Fisheries and Oceans Self Assessment Tool criteria which includes “all new construction, repair or rebuild of a floating, cantilever or post dock where total combined footprint does not exceed 20 m^2”. All removal activities of such docks are included in the Self Assessment criteria. All activities to comply with Department of Fisheries and Oceans “Measures to avoid causing harm to fish and fish habitat” (DFO 2016; Appendix 9.3). • Walking paths to lake to be limited in width as per ASP (and limited to a higher standard of 8m widths for 15 rezoned lots) and pathways stabilized so as not to cause sedimentation into lake.
Developer/ Developer's Contractors & Home Builder/ Home Builder's Contractors	All activities	Fish and fish habitat (Jackfish Lake)	• No water to be withdrawn from Jackfish Lake. • No construction or wastewater to be discharged to Jackfish Lake. • All water handling near Jackfish Lake must meet the Environmental Quality Guidelines for Alberta Surface Waters for Protection of Aquatic Life. • Private holding tanks and cistern/alternative drinking water mechanism included in development design rather than septic field. Discharge of sewage to lake is prohibited and fortified in RECC. Development to comply with Alberta Private Sewage Disposal Systems Regulation and Alberta Private Sewage Systems Standard of Practice (2015). • Follow DFO guidelines for avoiding serious harm to fish and “Measures to avoid causing harm to fish and fish habitat” (DFO 2016; Appendix 9.3).

Responsible Party	Activity/ Development	Potential Environmental Effect	Environmental Mitigation Measures
Developer/ Developer's Contractors	All activities	Amphibian mortalities	• Approximately 50% of wetlands to be preserved and 50% of altered wetlands to be replaced onsite. • Lake riparian buffer to be preserved with signage. • Wetland alteration of wetlands approved for alteration under Water Act Approval should avoid key wildlife periods of approximately April 1 to August 31 if possible. Alternatively a pre-construction survey by a biologist or environmental practitioner could precede wetland alteration.
Developer/ Developer's Contractors	Construction	Vegetation effects	• Naturalization of stormwater ponds with live wetland soils where possible and native vegetation such as native local willows and other local riparian vegetation.
Developer/ Developer's Contractors & Home Builder/ Home Builder's Contractors	Construction	Vegetation effects	• Use of weed free certified seed mix for revegetation during landscaping. • Application of "Fire Smart" principles in landscaping balancing tree removal with measures to reduce risk of fires for residents. • Avoid parking construction equipment on grasses when weather conditions are hot and/or dry. • Clean equipment prior to mobilizing to and demobilizing from site during construction.
Developer/ Developer's Contractors	All activities	Introduction and/or spread of invasive species and noxious weeds	• If noxious weeds are observed, they should be controlled and/or removed as part of the Weed Control Act and as per the direction of the local Alberta Agricultural field person. RECC should include this commitment. • No herbicides, pesticides or fertilizers should be applied within the riparian buffer area. RECC should include this commitment. • Native seed mix for temporary erosion and sediment control is indicated in the Biophysical Environmental Assessment. • Use of signage rather than introduced vegetation for delineation of lake riparian buffer.
Developer/ Developer's Contractors & Home Builder/ Home Builder's Contractors	All activities	Introduction and/or spread of invasive species and noxious weeds	• Construction equipment accessing the site for development should be clean and free of invasive species and noxious weeds. • Soils containing seeds of weeds should not be used in areas free of weeds during construction. • The application of pesticides and herbicides by residents should meet the requirements of County. RECC should include this commitment.

Responsible Party	Activity/ Development	Potential Environmental Effect	Environmental Mitigation Measures
Developer/ Developer's Contractors & Home Builder/ Home Builder's Contractors	Construction	Introduction and/or spread of invasive species and noxious weeds Contamination	• To ensure that the equipment is brought onto site clean and in good condition and to reduce the possibility of fuel, oil and fluid spills as well as introduction of weeds and invasive species, the following commitments will be included in the RECC and/or expected of construction contractors: • Equipment used should be free of leaks and should be inspected and maintained regularly. • Equipment should be equipped with spill kits and fire extinguishers. • Drip Pans will be used as necessary to reduce impact of minor spills on stationary equipment or during refueling. • Any contaminants released into the environment especially ground and surface waters should be reported to the Alberta Environment and Parks Hotline via telephone at 1-800-222-6514.
Developer/ Developer's Contractors	Construction	Air pollution	• Dust control and erosion control measures for wind will be applied as necessary during construction. • Watering should ensure no chlorinated water be applied onto natural areas. • Limit idling of equipment when and where possible.
Developer/ Developer's Contractors	Construction (Particularly tree clearing and vegetation stripping)	Wildlife Mortalities and/or Loss of Wildlife Habitat	• The removal of vegetation should avoid the potential nesting bird period of February 15 to August 31. Clearance to remove vegetation during this period would require the assessment by a Qualified Environmental Specialist and/or ornithologist under applicable provincial research licence/permit less than 72 hours (but no greater than 7 days) prior to disturbance/clearing activity. If at any time during the construction an active nest or what may be nesting activity is observed, construction should be halted until it can be confirmed or denied by a qualified biologist that nesting in the area is occurring. • Scheduling of construction is recommended to minimize harmful effects on nesting birds and/or other wildlife denning or nesting sites. • Use of signage for delineation of lake riparian buffer rather than fencing so as not to impede wildlife movement.
Developer/ Developer's Contractors & Home Builder/ Home Builder's Contractors	Construction (Particularly tree clearing and vegetation stripping)	Wildlife Mortalities and/or Loss of Wildlife Habitat	• Reduce footprint of temporary and permanent disturbance where possible.

Responsible Party	Activity/ Development	Potential Environmental Effect	Environmental Mitigation Measures
Developer/ Developer's Contractors & Home Builder/ Home Builder's Contractors	Construction Stockpiling	Erosion and sedimentation, soil loss and degradation, water quality to offsite areas	• Application of best management practices for stockpiling including temporary vegetative cover or esc measures (i.e. perimeter control and cover) for long term stockpiles.
Developer/ Developer's Contractors & Home Builder/ Home Builder's Contractors	Construction Site Maintenance	Tracking	• Clean up materials tracked onto public roadways.
		Waste littering	• Use construction waste bins for construction litter. • Implement proper waste disposal.
Developer/ Developer's Contractors & Home Builder/ Home Builder's Contractors	Construction Earthworks	Erosion and sedimentation and soil loss and degradation	• Application of best management practices. • Handle topsoil separately and salvage where possible. • Minimize bare soil exposure and footprint; schedule works so as to minimize and phase disturbance. • Apply phased and/or controlled stripping and appropriate stockpiling as per specifications. • Expediency to be applied during vulnerable bare soils phases to apply permanent erosion and sediment control and/or revegetation measures as soon as possible. • Erosion and Sediment Control Plan (temporary and permanent measures) to be developed and implemented in coordination with construction.
		Introduction and/or spread of noxious weeds, invasive species and contaminants	• Selective and/or phased stripping and stockpiling to prevent contamination. • Equipment to be cleaned prior to mobilization to site and prior to demobilization from site. • Minimize traffic on and off site. • Seed mixes and hydroseed and/or tackifiers, if used. shall be free of weed species. • Noxious weeds to be controlled and/or removed.

Responsible Party	Activity/ Development	Potential Environmental Effect	Environmental Mitigation Measures
Developer/ Developer's Contractors & Home Builder/ Home Builder's Contractors	Construction Earthworks	Contaminant Spills	• Emergency spill response and AEP hotline reporting. • Equipment should be equipped with spill kits and fire extinguishers. • Use of drip pans and/or secondary containment. • Refueling at least 100m away from aquatic waterbodies, wetlands, watercourses.
		Tree and Wetland Protection	• Minimize footprint where possible. • Flag areas to be preserved prior to construction. • Apply setback to wetlands to be preserved during construction under guidance of wetland specialist. • Ensure earthworks do not alter preserved wetlands.
Developer/ Developer's Contractors	Wetlands	Wetland alteration and effects to ecological functions	• Avoid alteration to approximately half of wetlands as per the Wetland Assessment and Impact Report (WAIR) and Water Act Approval process. • Update EPP and mitigation measures identified below with Water Act Approval conditions upon receipt of approval document. • Install temporary perimeter controls and/or flagging to demarcate boundary of wetlands prior to earthworks if needed. • Install ESC measures to prevent erosion and sedimentation into wetlands during construction. Onsite setback recommendations can be provided by wetland specialist prior to construction. • Wetlands within the designated ER and MR areas will be maintained at their existing grades, with no site grading required. They will be protected during and after development from alteration. Development plan will ensure preserved wetlands are not drained. • Water Act Approval to be in place prior to any wetland alteration. • Public Lands Water Boundaries response indicated no Public Lands claims to wetlands within property. • Schedule, stage and phase construction of earthworks in remaining wetlands to be altered to avoid key ecological periods of approximately April 1 to August 31 or as guided by wetland specialist. • Minimize impacts to wetlands as the development progresses by installing lot fencing to prevent future access by motorized vehicles/ATVs into wetlands.

Responsible Party	Activity/ Development	Potential Environmental Effect	Environmental Mitigation Measures
Developer/ Developer's Contractors	Wetlands	Wetland alteration and effects to ecological functions	• Roadside ditches and existing ephemeral ditches used to conduct runoff towards proposed SWM facilities will be protected and retained. • Impact on the preserved wetlands will be minimized as able by working to maintain existing drainage patterns, preventing noxious weeds from spreading and restoring any temporarily impacted wetland areas. • Additional minimization steps including timing of construction, setbacks, surface water management, minimization and staging of construction footprint. • Apply naturalization principles to stormwater management facilities with salvage and application of live wetland soils where feasible and planting of native vegetation such as native local willows and other local riparian vegetation with appropriate permitting for procurement of local supply. • Adhere to conditions and guidelines of Water Act Approval and Wetland Policy.
Developer/ Developer's Contractors	Stormwater management	Contamination, eutrophication of lake, water quality effects	• Ponds to be designed to provide a 100 year level of flood protection and particulate removal as per AEP guidelines, prior to discharging to Jackfish Lake. • Stormwater management plan to be reviewed and approved by AEP under the Environmental Protection and Enhancement Act (EPEA). • Naturalization of stormwater ponds to reduce potential eutrophication and sedimentation towards outside systems while at the same time providing additional onsite enhancement of wildlife habitat.

6.0 CONSIDERATIONS AND CONCLUSIONS

The potential for deterioration of various ecological components was recognized; however, the various design features and mitigation measures of the proposed development have minimized the environmental effects and the risks. Several avoidance, minimization and mitigation measures have been described in this Environmental Protection Plan. In summary, some key considerations and conclusions are noted below.

1. Ensuring that the quality of the environment is not harmed is a major objective of the proposed development for West Point Estates. It follows that this ecological value objective is anticipated to be highly desirable to the likely expectations of potential future residents of West Point Estates. It is in this sense that the avoidance, mitigation and environmental protection measures offered are in the best interest of future and existing residents and stakeholders of the area and for the protection of Jackfish Lake.

2. With respect to development near lake environments, cumulative environmental effects should be considered. It is with this in mind, that the avoidance, mitigation and environmental protection measures are identified within the EPP with respect to activity and development design. Wherein the environmental risks and effects of the specified development can be avoided, mitigated and/or addressed, related cumulative risk and impacts from the specific development are generally in concert being avoided, mitigated and/or addressed.

   Previous developments in other jurisdictions do provide significant useful development guidelines and regulatory advice and direction for reduction of environmental effects and risks. The effective protection of riparian areas and waters are demonstrated in communities with much higher human densities than the residential development proposed by deploying effective buffers, complete removal of sewage and waste waters, effective erosion and sedimentation control on infrastructure and development, control on the use of fertilizers/herbicides/pesticides, prevention and control of invasive species, installation of naturalized stormwater systems for the development of landscapes around lakes and the effective disposal of garbage and wastes. With suitable environmental protection measures, environmental impacts or cumulative impacts can be addressed.

   In the case of the proposed West Point Estates, social cooperation further fortifies the actual realization of the environmental protection measures through the development of a Resident Environmental Code of Conduct (RECC) outlining the cooperation and enforcement from the people themselves.

   Some of the key environmental protection measures identified in the EPP are highlighted below:

   a. Development of residential areas located at West Point Estates on Jackfish Lake has been positioned through the cluster subdivision design largely on lands which had been previously cleared for agriculture to strategically minimize new surface disturbance and risk of erosion.

b. Nutrients from sewage disposal and garbage disposal will be controlled using private holding tanks and water delivery mechanisms rather than communal infrastructure systems or septic fields. Systems will comply with Alberta Private Sewage Disposal Systems Regulation (2005) and Alberta Private Sewage Systems Standard of Practice (2015).

c. New groundwater wells will not be installed.

d. Protection of the Jackfish Lake riparian area is addressed by a 60m Environmental Reserve (ER). The ER zone is to be left in its natural state, with the exception of potential pathways from the lakeshore lots to the shore of Jackfish Lake. Restricted width (maximum 10m) pathways to the lake are permitted for each lakeshore resident and will be monitored by the RECC. Pathway development in the municipal reserve areas for residents will be limited in size and will be maintained in a natural condition other than the removal of the trees and shrubs which will be fortified in the RECC.

e. Stormwater management systems will be implemented to ensure water released into the lake meets the applicable regulatory guidelines and limits for water quality. The Urban Systems West Point Estates Stormwater Management Plan describes the drainage patterns of the landscape and relevant stormwater management information for the area. The proposed Stormwater management facilities will provide a 100 year level of flood protection as well as water quality enhancements as per the requirements of the AEP Stormwater Management Guidelines and Parkland County standards. This stormwater management plan is in the process of review by Alberta Environment and Parks. Naturalization of stormwater management facilities will be applied as feasible. Additionally, due to the subdivision design, little or no nutrients should reach the lake particularly as compared to older subdivisions and in light of the proposed installation of control structures within stormwater management facilities.

   Water quantity concerns have been under review by the Jackfish Lake Watershed Association and continued assessment is being conducted in regard to the proposal to divert water from the North Saskatchewan River to Jackfish Lake to stabilize the water levels.

f. All wetlands will be addressed under the Alberta Wetland Policy and Alberta *Water Act*. Approximately half of the natural wetland features will be preserved onsite and the remaining wetlands will be replaced (permittee-responsible onsite replacement and/or in-lieu fee replacement) as per the Wetland Policy and Alberta *Water Act* Approval process. Both ER and MR zones are to be left in their natural state, with the exception of potential walking trails, subject to restricted widths and expectation for stabilization, in the MR.

g. Some trees will need to be removed to accommodate residential development; however, although residents will be encouraged to retain some natural trees and shrubs, the people must also be "Fire Smart" to ensure that residences are safe from fire. Generally, compared to agricultural clearing which could occur at any time, the long-term residential use will likely retain more mixedwood forest than would agricultural use. The potential ecological benefit of avoiding agricultural runoff laden with silt, pesticides, herbicides and fertilizers is also expected with the development of a residential subdivision.

h. Sedimentation will be minimized through construction designed to prevent and control erosion and sedimentation. Best Management Practices to minimize potential environmental effects such as those provided in the Erosion and Sediment Control Manual (Alberta Transportation 2011), The City of Edmonton Erosion and Sedimentation Control Guide or relevant municipal guides should be adhered to along with the relevant sections of this Environmental Protection Plan. Construction contractors may provide formal Erosion and Sediment Control Plans to the proponent for review prior to construction.

i. Resident dock to be restricted to temporary removable dock only. Docks to comply with the Department of Fisheries and Oceans Self Assessment Tool criteria which includes "all new construction, repair or rebuild of a floating, cantilever or post dock where total combined footprint does not exceed 20 m^2". All removal activities of such docks are included in the Self Assessment criteria. All activities are to comply with Department of Fisheries and Oceans "Measures to avoid causing harm to fish and fish habitat including aquatic species at risk" (DFO 2016; Appendix 9.3).

j. The Environmental Protection Plan (EPP) concepts and avoidance, minimization and mitigation measures are addressed through a Resident Environmental Code of Conduct (RECC) that will be attached to this Environmental Protection Plan as Appendix 9.1. This RECC, which will be provided to each future resident of West Point Estates as part of an agreement to purchase, is intended to educate future residents with regard to actions they can take to protect the environmental features within the subdivision lands and adjacent Jackfish lake. It also provides contact information for the authorities responsible to ensure appropriate behaviors are followed. Using this information, future residents will practice self-policing to protect the environmental features within the West Point Estates subdivision. [The RECC will be drafted during the development permitting process and in conjunction with regulatory approvals.]

   Both the EPP and RECC may be expected to be living documents during the development planning, design and regulatory permitting process.

3. Managing human activity and addressing carrying capacity on waterbodies may be accomplished with the use of boating restriction regulations. Increased boat use, human use and human densities with regard to waterbodies are not directly legislated other than trespass legislation. The existing Vessel Operation Restriction Regulations provide an opportunity for the residents to reduce boat sizes and motors and speeds for safety and environmental reasons. The municipality could play an important role in introducing Vessel Operation Restriction Regulations with the use of signage. The existing regulations do list Jackfish Lake.

4. The risk of cumulative environmental effects for this development have been minimized by the numerous environmental protection and mitigation measures. Some environmental risk may occur with the limited trail development allowed through the Environmental Reserve (ER), the permitted temporary docks, stormwater management, the replacement of wetlands, construction related risks and the potential increased densities of lake boat traffic. These risks have been addressed, minimized and/or compensated for in this plan.

   The developer has integrated into the development plan a higher environmental standard than the requirements of the Jackfish Lake Area Structure Plan in further reducing the maximum allowable trail width on 15 lake front rezoning lots from 10 m to 8 m for an overall reduction of approximately 20% in trail footprint within the buffer area for these lots. This is a significant voluntary design element that has value to overall ecological integrity of the area.

5. Existing federal and provincial environmental legislation provides protection for wetlands, fish habitat, fish stocks, water quality, species at risk, migratory birds, wildlife, soils, air and the various valued ecosystem components (VECs).

7.0 LIMITATIONS AND CLOSURE

Limitations have been noted in the plan where applicable. This is a living document that is expected to be updated with the obtainment of regulatory permitting and through the development planning, design and regulatory permitting process.

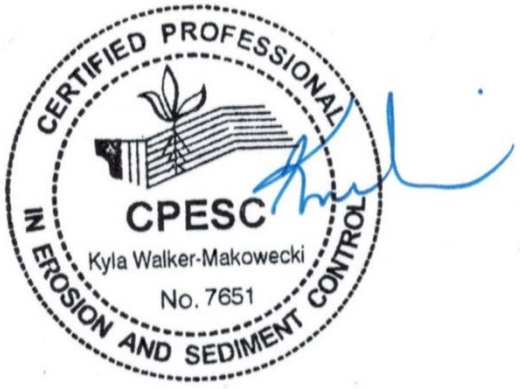
The plan is prepared based on the legislation and regulatory policy, guidelines and expectations at the time of the assessment. As regulatory expectations are dynamic, regulatory scoping and conclusions/recommendations related to regulatory permitting are limited in validity to the time in which they have been prepared.

In conducting the assessment and rendering our conclusions, EnviroMak gives the benefit of its best judgment based on its experience and in accordance with generally accepted professional standards for this type of plan in present time. This plan was submitted with the best information to date and on the information provided. This report has been prepared for the exclusive use of the proponent/client. Any use which any other third party makes of this report, or any reliance on or decisions to be made on it, are the responsibility of such third parties. EnviroMak accepts no responsibility for damages, if any, suffered by any other third party as a result of decisions made or actions based on this report.

Please contact EnviroMak Inc. by telephone at (780) 425-2461 (office) or email to info@enviromak.com with any questions or concerns.

Sincerely,

Kyla Walker-Makowecki, M.Sc., QAES, CPESC, EP
Principal, EnviroMak Inc.



Ray Makowecki, B.Sc., B.Ed., M.Sc., P.Biol., QAES
Senior Biologist, EnviroMak Inc.

Attachments: Bibliography and Appendices

8.0 BIBLIOGRAPHY

Agriculture and Agri-food Canada. 2006. Land Resource Unit, Research Branch. Alberta Soil Names File User's Handbook (Generation 3), 7-133.

Agronomic Interpretations Working Group. 1995. Land Suitability Rating System for Agricultural Crips: 1. Spring-seeded small grains. Edited by W.W. Pettapiece. Tech. Bull. 1995-6E. Centre for Land and Biological Resources Research, Agriculture and Agri-food Canada, Ottawa. 90 pages, 2 maps.

Alberta Agriculture and Rural Development, 2015. Alberta Soil Information Viewer. Accessed November 20, 2015.

Alberta Agriculture, Food and Rural Development. 2010. Weed Control Act and Regulations. Alberta Agriculture, Food and Rural Development website http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/acts6156.

Alberta Agriculture and Forestry. 2015. Current and Historical Alberta Weather Station Data Viewer. Data provided by AgroClimatic Information Service (ACIS). http://agriculture.alberta.ca/acis/alberta-weather-data-viewer.jsp. Data accessed January 18, 2016.

Alberta Culture and Tourism. 2015. Listing of Historic Resources (September 2015 Edition). http://culture.alberta.ca/documents/SSL-Public.pdf

Alberta Conservation Information Management System (ACIMS). 2015. Element (Species and Ecological Communities) Data. Online data accessed November 21, 2015. Alberta Environment and Parks, Edmonton, Alberta.

Alberta Conservation Information Management System, Parks Division, Alberta Tourism, Parks and Recreation. 2013. ACIMS Database – Element Occurrence Report. Data Accessed November 20, 2015. http://tpr.alberta.ca/parks/heritageinfocentre/datarequests/default.aspx

Alberta Environment and Parks. 2001. Administrative Guide for Approvals to Protect Surface Water Bodies under the Water Act. Queen's Printer for Alberta. Edmonton, Alberta.

Alberta Environment and Parks. 2006. Code of Practice for Watercourse Crossings; Water Act – Water (Ministerial Regulation). Consolidated to include amendments in force as of 2013/06/24. Queen's Printer for Alberta. Edmonton, Alberta. 44 pp.

Alberta Environment and Parks. 2013. Alberta Wetland Policy. http://aep.alberta.ca/water/programs-and-services/wetlands/documents/AlbertaWetlandPolicy-Sep2013.pdf.

Alberta Environment and Parks. 2014. Environmental Quality Guidelines for Alberta Surface Waters. Water Policy Branch, Policy Division. Edmonton. 48 pp.

Alberta Environment and Parks. 2015. Past Month and Seasonal Precipitation Maps. http://environment.alberta.ca/forecasting/data/precipmaps/may2015/pastprecipmaps.html.

Alberta Environment and Parks. 2014. Guide for Assessing Permanence of Wetland Basins. Land and Forestry Policy Branch, Policy Division. 20 pp.

Alberta Environment and Parks. 2015. Alberta Wetland Rapid Evaluation Tool – Estimate of Relative Wetland Value by Section. Accessed via GeoDiscover Alberta. January 20, 2016. https://geodiscover.alberta.ca/geoportal/catalog/search/resource/details.page?uuid=%7B3E09FED1-60CA-4BFB-9395-DD411036AB6C%7D

Alberta Environment and Parks. 2015. Alberta Merged Wetland Inventory Dataset. Accessed via GeoDiscover Alberta. November 20, 2015.

Alberta Environment and Parks. 2015. Element (Species and Ecological Communities) Data. Lists of Elements in Alberta – Vascular Plants. Alberta Parks Management and Land Use. http://www.albertaparks.ca/albertaparksca/management-land-use/alberta-conservation-information-management-system-acims/download-data/

Alberta Environment and Parks. 2015. Alberta Wetland Classification System. Water Policy Branch, Policy and Planning Division, Edmonton, Alberta. http://aep.alberta.ca/water/programs-and-services/wetlands/documents/ClassificationSystem-Jun01-2015.pdf

Alberta Geological Survey. 2015. Sand and gravel deposits with aggregate resource potential web maps. http://www.ags.gov.ab.ca/.

Circle CRM Group Inc. 2016. Statement of Justification for Historical Resources Act Requirements for Projects Other than Small-scale Oil and Gas. Prepared for Highland Property Development Ltd. NE & NW 9-52-2-5.

Circle CRM Ground Inc. 2016. Final Report Historical Resources Impact Assessment Highland Property Developments Ltd. West Point Estates. ASA Permit 16-020. Prepared for EnviroMak Inc.

Committee on the Status of Endangered Wildlife in Canada (COSEWIC). 2014. Canadian Wildlife Species at Risk. http://www.cosewic.gc.ca/eng/sct0/rpt/rpt_csar_e.pdf

Daum, Donald R. 2015. Soil Compaction and Conservation Tillage (Crops and Soils). Crops and Soils. Penn State Extension. http://extension.psu.edu/plants/crops/soil-management/conservation-tillage/soil-compaction-and-conservation-tillage.

Department of Fisheries and Oceans. 2017. Projects Near Water: Self Assessment: Does DFO Need to Review My Project. Website. Accessed 2017.

Department of Fisheries and Oceans. 2016. Measures to avoid causing harm to fish and fish habitat including aquatic species at risk. Website. Accessed 2017.

EnviroMak Inc. 2017. Biophysical Environmental Assessment of Proposed Highland Property Development, Jackfish Lake, Alberta in NE & NW9-52-2-W5M. Prepared March 1, 2017.

EnviroMak Inc. 2017. Wetland Assessment and Impact Report (WAIR) for the proposed Highland Property Development within NE & NW9-52-2-W5M in Parkland County, Alberta. Prepared June 26, 2017.

EnviroMak Inc. 2006. Biophysical Site Assessment of Proposed Jackfish Lake Development Subdivision (N½ 9-52-02-W5M). Prepared for Armin A. Preiksaitis & Associates Ltd.

Environment Canada. 2010. Canadian climate normals 1971 – 2000. Environment Canada website. http://www.climate.weatheroffice.ec.gc.ca/climate_normals/

Environment Canada. 1991. Birds protected in Canada under the Migratory Birds Convention Act. Canadian Wildlife Service Occasional Paper No. 1. Ottawa.

Fiera (Fiera Biological Consulting Ltd.). 2014, Environmentally Significant Areas of Alberta: 2014 Update. Report prepared for the Government of Alberta, Edmonton, Alberta. Fiera Biological Consulting Report Number 1305. Pp. 51. http://www.albertaparks.ca/media/5425575/2014-esa-final-report-april-2014.pdf

Fish and Wildlife Management Information System Internet Mapping Framework. 2015. Fish and wildlife public site. Accessed November 20, 2015. http://www.srd.gov.ab.ca/fishwildlife/guidelinesreseApacheh/fwmis.aspx

GeoDiscover Alberta Map Viewer. 2015. Accessed November 20, 2015. http://geodiscover.alberta.ca/Viewer/?Viewer=GDA

Government of Alberta. 2015. Alberta Private Sewage Disposal Systems Regulation.

Government of Alberta. 2015. Alberta Wetland Assessment and Impact Report Directive. Water Policy Branch, Alberta Environment and Parks, Edmonton, Alberta. http://aep.alberta.ca/water/programs-and-services/wetlands/documents/AssessmentImpactDirective-Jun01-2015.pdf

Government of Alberta. 2015. Alberta Wetland Identification and Delineation Directive. Water Policy Branch, Alberta Environment and Parks. Edmonton, Alberta. http://aep.alberta.ca/water/programs-and-services/wetlands/documents/IdentificationDelineationDirectiveJun2015.pdf

Government of Alberta. 2015. Alberta Wetland Mitigation Directive. Water Policy Branch, Alberta Environment and Parks. Edmonton, Alberta.

Government of Alberta. 2015. Alberta Wetland Rapid Evaluation Tool – Actual (ABWRET-A) Manual. Water Policy Branch, Alberta Environment and Parks. Edmonton, Alberta.

Government of Alberta. 2014. Environmentally Significant Areas (ESAs) in Alberta: 2014 Update. 1:1,000,000 Map produced by Parks Division, Alberta Tourism, Parks and Recreation.

Government of Alberta. 2011. Recommended Land Use Guidelines for Protection of Selected Wildlife Species and Habitat within Grassland and Parkland Natural Regions of Alberta. http://esrd.alberta.ca/fish-wildlife/wildlife-land-use-guidelines/documents/WildlifeLandUse-SpeciesHabitatGrasslandParkland-Apr28-2011.pdf

Government of Alberta. 2005. Alberta Private Sewage Systems Standard of Practice (2015).

Government of Alberta. 2005. Natural Regions and Subregions of Alberta. Alberta Environment and Parks, Alberta Community Development, and Agriculture and Agri-Food Canada, June 2005.

Government of Canada. 2015. Climate. http://climate.weather.gc.ca/index_e.html

Government of Canada. 2011. Species at Risk Act. S.C. 2002, c. 29. Assented to 2002-12-12.

Government of Canada. 1991. The Federal Policy on Wetland Conservation. Available from the Canadian Wildlife Service, Environment Canada, Ottawa.

Migratory Birds Convention Act. 1994. c. 22. Consolidated Regulations of Canada.

Migratory Birds Regulations, [C.R.C., c. 1035]. Consolidated Regulations of Canada.

National Wetlands Working Group. 1997. The Canadian Wetland Classification System, 2nd Edition. Warner, B.G. and C.D.A. Rubec (eds.), Wetlands Research Centre, University of Waterloo, Waterloo, ON, Canada. 68 p.

Native Plant Working Group. 2000. Native Plant Revegetation Guidelines for Alberta. H. Sinton-Gerling (ed.), Alberta Agriculture, Food and Rural Development and Alberta Environment and Parks, Edmonton, Alberta.

Natural Regions Committee. 2006. Natural Regions and Subregions of Alberta. Compiled by D.J. Downing and W.W. Pettapiece. Government of Alberta. Pub. No. T/852.

Parkland County. 1981. Jackfish-Mayatan Area Structure Plan. Bylaw No. 18-2006. http://www.parklandcounty.com/Assets/About+Us/Department+Information/Planning+$!26+Development+-+LRP/Jackfish+Mayatan+Area+Structure+Plan.pdf

Parkland County. 1997. Jackfish Lake Area Structure Plan. Office Consolidation July 2013. http://www.parklandcounty.com/Assets/About+Us/Department+Information/Planning+$!26+Development+-+LRP/Jackfish+Lake+Area+Structure+Plan.pdf

Parkland County 1998. Environment Reserve Bylaw 26-98. http://www.parklandcounty.com/Assets/Governance/Bylaws/Environmental+Reserve+Bylaw+26-98.pdf

Parkland County. 2014. Environmental Conservation Master Plan. Phase 1 Background Technical Report. Prepared by O2 Planning and Design Inc. http://www.parklandcounty.com/Assets/About+Us/Projects+and+Studies/Environmental+Conservation+Master+Plan/FINAL+ECMP+%28COMPLETE%29+-+JUNE+28-2014.pdf

Parkland County. 2015. Land Use Bylaw. Bylaw No. 20-2009. http://www.parklandcounty.com/Assets/Consolidated+LUB+Sept+2015.pdf

Pedocan Land Evaluation Ltd. 1993. Soil Series Information for Reclamation Planning in Alberta, Volumes 1 & 2. Report # ARTAC 93-7. Prepared for the Alberta Conservation and Reclamation Council (Reclamation Research Technical Advisory Committee).

Province of Alberta. 2010. Weed Control (Alberta) Regulation. As filed under the Weed Control (Alberta) Act. Statutes of Alberta Chapter W-5.1. Queen's Printer. Edmonton, Alberta.

Province of Alberta. 2010. Weed Control (Alberta) Act. Statutes of Alberta Chapter W-5.1. Queen's Printer. Edmonton, Alberta. Originally published 2008. Current as of October 1, 2011.

Province of Alberta. 2000. Water (Alberta) Act. http://www.aeda.gov.ab.ca/qp/indiv.html Edmonton, Alberta.

Province of Alberta. 1997. Wildlife Regulation. Chapter/Regulation: 143/1997. Edmonton, Alberta. 242p.

Province of Alberta. 1994. Environmental Protection and Enhancement of Alberta. http://www.aeda.gov.ab.ca/qp/indiv.html Edmonton, Alberta.

Province of Alberta. 1984. Wildlife Act. http://www.aeda.gov.ab.ca/qp/indiv.html Edmonton, Alberta.

Province of Alberta. Public Lands Act of Alberta. http://www.aeda.gov.ab.ca/qp/indiv.html Edmonton, Alberta.

Sibbio, Sarina. R. 2016. Senior Waterbody/Boundary Research Analyst. Provincial Wetlands & Water Boundaries Unit. Provincial Programs Branch, Operations Division. Alberta Environment and Parks. Personal communications. March 2016.

Stewart, Robert E., and Harold A. Kantrud. 1971. Classification of natural ponds and lakes in the glaciated prairie region. Resource Publication 92, Bureau of Sport Fisheries and Wildlife, U.S. Fish and Wildlife Service, Washington, D.C. 57pp.

Strong, W.L. and K.R. Leggat. 1992. Ecoregions of Alberta. Alberta Forestry, Lands and Wildlife Publication Number T/245. Edmonton, AB. 59pp. Plus map.

United States Environmental Protection Agency (EPA). 2015. Heat Islands. http://www2.epa.gov/heat-islands/learn-about-heat-islands

Wheatland County. 2012. Alberta Invasive Plant Identification Guide: Prohibited Noxious and Noxious Weeds. 81pp. http://www.wheatlandcounty.ca/weedguide

9.0 APPENDICES

9.1 West Point Estates Resident Environmental Code of Conduct (RECC)

TO BE ADDED

The Resident Environmental Code of Conduct will be developed to provide an increased awareness and expectation for all residents of the subdivision. The code will address numerous subjects including but not limited to:

1. Restrictions, prohibitions and control on the use of fertilizers, pesticides and herbicides
2. Garbage disposal
3. Wetland protection
4. Erosion and sediment control
5. Tree removal limitations and landscaping guidance
6. Temporary removal dock specifications and shoreline protection measures
7. Guidance for private pathway development
8. Fire management
9. Potential environmental enhancement developments
10. Noise control
11. Air quality
12. Boating restrictions and regulations
13. Jackfish Lake fish and fish habitat
14. Jackfish Lake angling regulations
15. Contaminant Prevention, Control and Best Management Practices
    (a) Alberta Environmental and Parks Environmental Quality Guidelines for Alberta Surface Water for the Protection of Aquatic Life, AEP Release Reporting Guidelines and AEP Reporting Hotline Contact Information
    (b) Department of Fisheries and Oceans Contact Information
16. Management of the Code
    (c) Reporting
    (d) Enforcement
    (e) Meeting of the Residents
    (f) Development of an Association

9.2 Regulatory Permitting and Approvals Documentation

TO BE ADDED AS RECEIVED.

9.3 Measures to avoid causing harm to fish and fish habitat including aquatic species at risk (Department of Fisheries and Oceans 2016)

Measures to avoid causing harm to fish and fish habitat including aquatic species at risk

If you are conducting a project near water, it is your responsibility to ensure you avoid causing serious harm to fish in compliance with the Fisheries Act and avoid contravening SARA prohibitions. The following advice will help you avoid causing harm and comply with both Acts.

PLEASE NOTE: This advice applies to all project types and replaces all “Operational Statements” previously produced by DFO for different project types in all regions. Projects near water must also comply with the pollution prevention provisions of the Fisheries Act.

Measures

▼ 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, and impacts to SARA-listed aquatic species, their residences or critical habitat 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.

▼ 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.

▼ Shoreline/bank re-vegetation and stabilization

- 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 re-vegetation 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.
- **Species at Risk** Do not remove riparian vegetation if the riparian area is identified as part of critical habitat of an aquatic listed species at risk.

▼ 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, or result in the stranding or death of fish.
- Retain a qualified environmental professional to ensure appropriate protocols are applied, and 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.

SARA-listed aquatic species

Any capture and relocation of an endangered or threatened aquatic species at risk will require approval from DFO. See the protocols for the detection and relocation of certain aquatic species at risk.

- 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.
    - In freshwater, follow these measures for design and installation of intake end of pipe fish screens to protect fish where water is extracted from fish-bearing waters:
        - Screens should be located in areas and depths of water with low concentrations of fish throughout the year.
        - Screens should be located away from natural or artificial structures that may attract fish that are migrating, spawning, or in rearing habitat.
        - The screen face should be oriented in the same direction as the flow.

- Ensure openings in the guides and seals are less than the opening criteria to make “fish tight”.
- Screens should be located a minimum of 300 mm (12 in.) above the bottom of the watercourse to prevent entrainment of sediment and aquatic organisms associated with the bottom area.
- Structural support should be provided to the screen panels to prevent sagging and collapse of the screen.
- Large cylindrical and box-type screens should have a manifold installed in them to ensure even water velocity distribution across the screen surface. The ends of the structure should be made out of solid materials and the end of the manifold capped.
- Heavier cages or trash racks can be fabricated out of bar or grating to protect the finer fish screen, especially where there is debris loading (woody material, leaves, algae mats, etc.). A 150 mm (6 in.) spacing between bars is typical.
- Provision should be made for the removal, inspection, and cleaning of screens.
- Ensure regular maintenance and repair of cleaning apparatus, seals, and screens is carried out to prevent debris-fouling and impingement of fish.
- Pumps should be shut down when fish screens are removed for inspection and cleaning.

- Avoid using explosives in or near water. Use of explosives in or near water produces shock waves that can damage a fish swim bladder and rupture internal organs. Blasting vibrations may also kill or damage fish eggs or larvae.

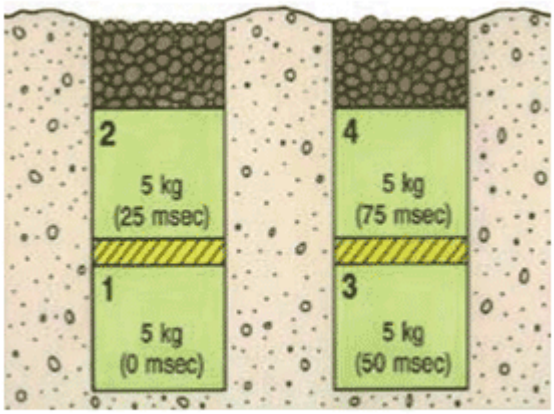
SARA-listed aquatic species

Do not use explosives where SARA-listed aquatic species, their residences or critical habitat occur, without review by DFO.

- If explosives are required as part of a project (e.g., removal of structures such as piers, pilings, footings; removal of obstructions such as beaver dams; or preparation of a river or lake bottom for installation of a structure such as a dam or water intake), the potential for impacts to fish and fish habitat should be minimized by implementing the following measures:

- Time in-water work requiring the use of explosives to prevent disruption of vulnerable fish life stages, including eggs and larvae, by adhering to appropriate fisheries timing windows.
- Isolate the work site to exclude fish from within the blast area by using, for example, bubble/air curtains (i.e., a column of bubbled water extending from the substrate to the water surface as generated by forcing large volumes of air through a perforated pipe/hose), cofferdams or aquadams.
- Remove any fish trapped within the isolated area and release unharmed beyond the blast area prior to initiating blasting
- Minimize blast charge weights used and subdivide each charge into a series of smaller charges in blast holes (i.e., decking) with a minimum 25 millisecond (1/1000 seconds) delay between charge detonations (see Figure 1).
- Back-fill blast holes (stemmed) with sand or gravel to grade or to streambed/water interface to confine the blast.
- Place blasting mats over top of holes to minimize scattering of blast debris around the area.
- Do not use ammonium nitrate based explosives in or near water due to the production of toxic by-products.
- Remove all blasting debris and other associated equipment/products from the blast area.

Figure 1: sample blasting arrangement



Per Fig. 1: 20 kg total weight of charge; 25 msecs delay between charges and blast holes; and decking of charges within holes.

▼ 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.
- **Species at Risk** Do not ford, place crossing materials or operate machinery on the bed of a waterbody where SARA-listed shellfish occur, or critical habitat or residences of freshwater SARA-listed aquatic species occur.

Date modified:

2016-11-18